A study of mobile learning for Guangzhou's University students

Wong, Chun Hung Hugo

EdD

THE HONG KONG INSTITUTE OF EDUCATION

2015

A study of mobile learning for Guangzhou's University students

By

WONG, Chun Hung Hugo

A Thesis Submitted to The Hong Kong Institute of Education
in Partial Fulfillment of the Requirement for
the Doctor Degree of Education

Jan, 2015

UMI Number: 3704442

UMI

Dissertation Publishing

ProQuest®

STATEMENT OF ORIGINALITY

I, WONG, Chun Hung Hugo, hereby declare that I am the sole author of the thesis and the material presented in this thesis in my original work except those indicated in the acknowledgement. I further declare that I have followed the Institute's policies and regulations on Academic Honesty, Copy Right and Plagiarism in writing the thesis and no material in this thesis has been published or submitted for a degree in this or other universities.

_____

WONG, Chun Hung Hugo

January 2015

THESIS EXAMINATION PANEL APPROVAL

Members of the Thesis Examination Panel approved the thesis of WONG, Chun Hung Hugo defended on 25 June 2014.

Principal Supervisor
Dr. NG, Mee Wah Eugenia
Associate Professor
Department of Mathematics and
Information Technology
The Hong Kong Institute of Education

External Examiner
Prof. LEE, Kar Tin
Professor
School of Curriculum
Queensland University of Technology,
Australia

Internal Examiner
Prof. LIM, Cher Ping
Professor
Department of Curriculum and
Instruction
The Hong Kong Institute of Education

Approved on behalf on the Thesis Examination Panel:

_____

Chair, Thesis Examination Panel
Prof. YEUNG, Yau Yuen
Professor
Department of Science and Environmental Studies
The Hong Kong Institute of Education

ABSTRACT

A study of mobile learning for Guangzhou's University students

By Wong, Chun Hung Hugo

The Hong Kong Institute of Education

This study is to explore the practices and attitudes of mobile learning for university students studying at Guangzhou based on a theoretical model of the Framework for the Rational Analysis of Mobile Education (FRAME) model, in particular, to explore what and how knowledge will be acquired of using mobile device for formal and informal learning.

A mixed-method research strategy, both qualitative and quantitative methods for data collection and analysis, were adopted as it permits triangulation. In the collection of quantitative data, a set of tailor-made questionnaires were distributed to 495 university students who were studying in Guangzhou in the March of 2013. Besides, in the collection of qualitative data, 14 participants were invited to participate pre-focus group interviews, diaries and post-individual interview from April to June of 2013. The results find that improve learning effectiveness and efficiency and mobility

are the major factors for Guangzhou's university students used mobile device for formal and informal learning. They always use mobile device for reading and searching. Besides, the ratio of using mobile device for informal learning is higher than formal learning, especially reading and discussion. However, students are higher ratios of using mobile device for formal learning to searching, sharing, discussion and learning.

Moreover, this study provides many Guangzhou's university students using mobile device for formal and informal learning strategies. Then, this study shows that Guangzhou's university students positive attitude for mobile learning, and they believed mobile learning can facilitate their learning performance. However, this study cannot find any evidence to support higher quality mobile device may affect positive learning performance and attitude.

Based on the findings of this study, it is proposed to add the curriculum aspect into the FRAME model which is called the Framework for the Rational Analysis of mobile Education 2015 (FRAME 2015). Curriculum aspect should be evaluated in future research studies to find out how mobile informal learning experiences or activities can assist students for formal learning.

Acknowledgements

I would like to acknowledge the assistance and cooperation of a number of people who have made the completion of this thesis possible.

Firstly, I would like to express my deepest gratitude to my supervisor, Dr. Ng Mee Wah, Eugenia for her patient guidance, enthusiastic encouragement and useful critiques of this study. Her willingness to give her time so generously has been very much appreciated.

Secondly, I would like to offer my special thanks to my committee for their continued support and encouragement: Prof Yeung, Yau Yuen, my committee chair; Prof. Lim Cher Ping and Prof Lee Kar Tin. I offer my sincere appreciation for the learning opportunities provided by my committee.

Thirdly, I am particularly grateful for the assistance given by Professor Huang Zuo. He was of great help in soliciting support from Guangzhou to conduct research study.

Finally, my special thanks to my caring, loving, and supportive wife, Yuki. Her great support was the major successful factor to complete this study.

List of Abbreviations

2G	The Second-Generation wireless telephone technology
3G	The Third-Generation wireless telephone technology
ANOVA	Analysis of variance
CCL	Canadian Council on Learning
CHC	Confucian heritage culture
CNKI	China Knowledge Resources Integrated Database
CNN	Cable News Network
CPU	Central processing unit
DL	The interaction of Device Usability Aspect and Learner Aspect becomes Context Learning
DLS	The interaction of Device Usability Aspect, Learner Aspect and Social Aspect become to Mobile Learning
DS	The interaction of Device Usability Aspect and Social Aspect become Social Technology
e-Book	Electronic Book
E-learning	electronic learning
e-Reading	Electronic Reading
GDP	Gross domestic product
HEI	Chinese Higher Education Institutions'
IBM	The International Business Machines Corporation
IDC	International Data Corporation
iOS	Apple Mobile Operating System
IT	Information Technology
LS	The interaction of Learner Aspect and Social Aspect become Interaction Learning
M-learning	Mobile learning
Mobile App	Mobile Application

NSSE	The National Survey of Student Engagement
OS	Operating System
PDA	Personal Digital Assistants
RIM	Research in Motion
RMB	Renminbi
SMS	Short Message Service
SPSS	Statistical package for social sciences
The FRAME model	The Framework for the Rational Analysis of Mobile Education model
Web 2.0	The 'second generation' web-based technologies and services

Tables of Content

List of Tables

List of Figures

Chapter 1: Introduction

1.1 Background of the study

Today, mobile technology is well developed. Most schools, hostels, commercial areas, and shopping malls have set up wifi technology for people to use mobile device. In the 21st century, an increasing number of educators are considering mobile learning (m-learning) with the prospect of extending the realm of computer-mediated education to learning situations outside of the traditional educational setting (Chen, Kao, & Sheu, 2003; Uzunboylu, Cavus, & Ercag, 2009). M-learning is more cost-prohibitive and flexible than other technologies such as desktop computers and broadband connections that are necessary for e-learning. Therefore, investigation how to use a mobile device for formal learning (Sharples, Taylor, & Vavoula, 2005a; Traxler, 2007) and informal learning (Börner, Glahn, & Specht, 2009a; Börner, Glahn, & Specht, 2009b; Glahn & Börner, 2010) has become a popular research topic, because m-learning has the greater potential for expanding learning opportunities to larger segments of the community than traditional board and chalk learning or other types of electronic learning (e-learning). Yousuf (2007) argues that mobile learning brings many benefits such as:

- can be used for independent and collaborative learning experiences
- helps learners to overcome the digital diversity
- helps to make learning informal
- helps learners to be more focused for longer periods of time
- provides course content to off-campus students

- provides feedback to off-campus students

- provides student support services to off-campus students

- increases student-to-student interactivity

- increases student-to-tutor and institution interactivity (pp. 117-118)

For formal learning, the goal is the transfer of knowledge from teacher to student. M-Learning empowers students to participate actively in the learning process to make learning a process of construction rather than mere knowledge transferred (Bandalaria, 2007). Besides, m-learning is more flexible than e-learning (Kukulska-Hulme & Traxler, 2007; Peters & Framework, 2005). Its flexibility and convenience is particularly appealing to informal learning.

Marsick and Watkins (1990) express that informal learning includes incidental learning which might occur in school, but not typically classroom based or well-structured, and learners could fully control their learning. Actually, m-learning is away from the educational setting of the classroom and library (Laouris & Eteokleous, 2005). M-learning places the student at the center of the learning process which promotes collaboration and also provides an understanding of the authentic context of experience and encourages independent learning performance, so that students become lifelong learners (Naismith, Sharples, Vavoula, & Lonsdale, 2004). Anderson (2008) said "this new generation of learners is smart but impatient, creative, expecting results immediately, customizing the things they choose, and very focused on themselves" (p.203). Herrington and Herrington (2007) note that mobile technologies are particularly suitable for active learning, for example, "as tools for

2

complex and sustained tasks and problem solving" (p.5).

The China Internet Network Information Center (2014) indicated that China had 632 million internet users and 527 million mobile internet users at the end of June 2014. Besides, the utilization ratio of mobile devices exceeds the number for the personal computer. China ranked first with respect to the number of netizens and mobile netizens in the world, and more and more netizens are using a mobile rather than a personal computer. Therefore, many of China's scholars investigate how to use mobile devices for teaching and learning. (唐章蔚, 王连英, 代玲玲, & 赵宁, 2014; 孙赢, 张欣, & 王勤宏, 2013; 张珑, 王建华, 张军, & 邸佳奇, 2010; 李桂英, 马力, 宁玉文, & 李贵明, 2012; 杨文阳, 2013; 海伦 & 彭一为, 2013; 王嘉琦, 徐朝军, 钟柏昌, & 李艺, 2013; 范晨晓, 2012; 陈义勤, 2013).

1.2 Statement of the Problems

Learning is a process, not a product. Besides, learning involves change in knowledge, beliefs, behaviors, or attitudes. However, learning is not something done to students, but rather something students do themselves (Ambrose, Bridges, DiPietro, Lovett, & Norman, 2010). Therefore, this study aims to investigate Guangzhou university students' use of mobile devices for formal and informal learning.

There are four reasons to investigate Guangzhou's university students in this study.

First, according to Internet Consume Survey Center (Gong, 2012; Wang, 2012), Guangdong has the highest user penetration rate for mobile devices such as

3

smartphones or tablets to access the internet in China. Comparing with other cities in China, the percentage of using mobile phones and tablets in Guangdong in 2012 were 12.1% and 11.9% respectively.

Second, university students have the highest participation rate when it comes to online activities. The China Juvenile Online behavior survey report in 2011 (China Internet Network Information Center, 2012) discovered that a great number of higher education students visited websites such as Weibo and Baidu.com for social interactions.

Third, Guangzhou is the third largest city in China, table 1.1 lists the basic information of Guangzhou in 2011 (Guangzhou Bureau of Statistics, 2014).

Table 1.1: The basic information of Guangzhou in 2011

Item	Data
Land Area	7434.4 sq.km
Population	12,709,600
Average GDP Growth rate in the past ten years	13.49%
No. of Regular Institutions of Higher Education[1]	77
No. of Students enrollment in Higher Education	843,934
No. of Graduates in Regular Institutions of Higher Education	203,742

Last, economic growth in Guangzhou is higher than other cities. The GDP growth rate of Chinese cities has been around 8% on average in the past ten years. Therefore, economic growth in Guangzhou is obviously higher than many other Chinese cities.

---

[1] Institutions of Higher Education offer diploma, higher-diploma, undergraduate, postgraduate programs.

The citizens of Guangzhou are also richer than other Chinese cities. Therefore, this study is mainly focused on investigating mobile learning of Guangzhou university students.

1.3 Purpose of the Study

This study has three major purposes in order to achieve the statement of the problems. First is student's organizing knowledge influences how they learn and how to apply what they know (Ambrose et al., 2010). Therefore, this study would like to find out the strategies of using mobile device for learning of Guangzhou university students.

Second, students' motivation determines, directs, and sustains what they do to learn (Ambrose et al., 2010). So, this study investigates reasons for Guangzhou university students to use mobile devices for learning.

Last, goal-directed practice coupled with targeted feedback enhances the quality of students' learning (Ambrose et al., 2010). Hence, this study investigates the practices and attitudes of Guangzhou university students' using mobile devices for learning.

1.4 Research Questions

Based on the Chapter 1, section 1.3 purpose of the study - this study generated six research questions:

1. What were the Guangzhou university students' learning strategies of using mobile devices for formal and informal learning?

2. What were Guangzhou university students' reasons for using mobile devices?

3. What were the Guangzhou university students' learning practices of using mobile device?

4. What were the Guangzhou university students' learning attitudes of using mobile device for formal and informal learning?

5. What was the ratio of students using mobile device for formal and informal learning?

6. Did the type of mobile devices affect mobile learning?

1.5 Initial Conceptual Framework

There are a number of models for conducting mobile learning research. For example, the framework to analyze technology-mediated mobile learning (Sharples, Taylor, & Vavoula, 2005b) focuses on technology rather than the learner whilst the Motiwalla (2007) designed framework provided the requirements to improve m-learning applications that can be used as a complement for classroom or distance learning. The Framework for the Rational Analysis of Mobile Education model took the technical features of mobile devices as well as social and personal aspects of learning into consideration (M. Koole & Ally, 2006; M. L. Koole, 2006). The FRAME model describes mobile learning as a process resulting from the convergence of mobile technologies, human learning characteristics, and social interaction. Moreover, the FRAME model does not only outline the relationship between mobile learning, personal learning capacities, and social interaction, but it also addressed contemporary pedagogical issues of information overload, knowledge navigation, and collaborative learning. The FRAME model was taken into consideration about the technical features of mobile device as well as social and personal aspects of learning (M. Koole

6

& Ally, 2006; M. L. Koole, 2006). Since learning including formal and informal learning, therefore, the FRAME model was suitable to the aim of this study.

Recently, many researchers (Alvarez, Alarcon, & Nussbaum, 2011; Kenny et al., 2009; M. L. Koole, 2009; Park, 2011; Stockwell, 2010; Yarmey, 2011; Yongquan, 2012; 唐章蔚 et al., 2014) were inspired by the FRAME model to develop m-learning. This study employs an empirical and mixed method. This study is based on a theoretical model of the FRAME model (M. Koole & Ally, 2006; M. L. Koole, 2006). In Chapter 2, section 2.2 - section one: Initial framework of mobile learning, the FRAME model explained in more detail.

1.6 Significance of Study

This study has three significances at the teacher level, the education service provider level and the learner level. Additionally, this study modifies the FRAME model for formal and informal learning.

At the teacher level, the findings provide the strategies of using mobile devices in formal and informal learning of Guangzhou university students. So, teachers may design mobile learning and teaching activities for students based on the findings of this study.

At the education service provider level, the findings provide the students' learning practices and attitudes using mobile devices to learn in Guangzhou. According to the findings, mobile learning apps providers should provide a designated learning app

7

which meets students learning features.

At the learner level, the findings provide good examples of using mobile devices for formal and informal learning. Therefore, learner can imitate this study finding for using mobile devices to learn.

1.7 Definition of Terms

In order to avoid confusion, this study provides definitions for formal learning, informal learning, Guangzhou university student, mobile device and social media.

Formal learning

Marsick and Watkins (1990) define formal learning as the type that typically adopted in school. It is classroom based and well-structured.

Guangzhou university student

Students were studying in Guangzhou universities in the research period.

Informal learning

Marsick and Watkins (1990) express that informal learning includes incidental learning which might occur in school, but not typically classroom based or well-structured. Learners can fully control their learning, capable of learning any time, and anywhere for any purpose. Chapter 2 section 2.3.2 explains the concept of informal learning.

Mobile Device

The mobile devices referred to in this study are notebooks, smartphones, tablets and phablets. Chapter 2 section 2.3.1 discusses mobile devices.

Social Media

Social media are the technologies with social interaction. Social media includes blogs, wikis and multimedia (audio, photo, video, text) sharing in the virtual worlds (Bryer & Zavattaro, 2011). Chapter 2 section 2.2.3 explains the concept of social media.

1.8 Limitations

There are four limitations noted for this study.

First, this study may not be generalizable due to the limited sample size. Guangzhou has over 800,000 university students. This study collected 495 set questionnaires and invited fourteen Guangzhou's university students to do a pre-focus group interview, create a diary record and do a post-interview. Chapter 3 section 3.5.4 explains the reliability of quantitative data in order to reduce the implication of this limitation.

Second, a time and resources limitation existed. The target group of this study was Guangzhou university students, so the researcher needed to frequently visit Guangzhou. This proved an inconvenience since he was working in Hong Kong. Consequently, this study only invited fourteen Guangzhou university students to participate in order to collect qualitative data in this study. The results might not be

9

expected generalized from all Guangzhou Higher Education Students.

Third, the responses gathered from diary records were based on self-reporting. Given the scale of this study, software that can monitor Guangzhou's university students' use of mobile devices for online learning practices was not provided. Therefore, all diary records were based on students being honest when self-reporting. Chapter 3 section 3.6.5 explains how to enhance the level of trustworthiness when collecting qualitative data in this study in order to reduce the implication of this limitation.

Last, the findings are confined to the context of the study. The trend of mobile learning is growing rapidly. So, the learning practices and attitudes of Guangzhou university students are changing rapidly. The data was collected from March 2013 to June 2013. This study only reflects Guangzhou university students' mobile learning practices and attitudes in the research periods.

1.9 Organization of the study

This study is presented in five chapters. Chapter 1 (Introduction) includes the background of the study, statement of the problems, purpose of the study, significance of the study, definition of terms, initial conceptual framework, Research Questions, and limitations.

Chapter 2 (Literature Review) provides an extensive review of literature related to the initial framework of mobile learning. Besides are the device aspects, learner aspects, the social aspects and their interaction in the FRAME model.

10

Chapter 3 (Research Design and method) outlines the rationale of research design and method, and explains the reason to adopt a mixed-method research. Besides, it describes the procedure of data collection and the design of the research instrument, and explains the procedure of the pilot study, sampling, reliability and validity. Furthermore, it describes the actions for ethical consideration and explains the plan of analysis.

Chapter 4 (Discussion and analysis of findings) summarizes the qualitative and quantitative findings. Qualitative and quantitative data will be compared and contrasted. Under the FRAME model, the analysis of findings by three aspects will be discussed. The findings investigated the mobile learning practices, attitudes, strategies, reasons for Guangzhou university students to use mobile devices for formal and informal learning.

Chapter 5 (Conclusions, Discussion, and Recommendations) answered six Research Questions. Compare the findings and methodology between this study and other research paper of using FRAME model to investigate mobile learning. Based on the findings, a new mobile learning model will be developed and the directions of possible future research will be discussed.

1.10 Summary

This chapter explains the reason for selecting mobile learning as the research topic because mobile learning is the trend of learning and teaching. Many teachers,

11

students, and scholars are searching for an effective and efficient mobile teaching and learning approach for formal and informal learning. Therefore, to be investigated in this study is Guangzhou university students' use of mobile devices for formal and informal learning. This study is guided by the FRAME model because this model describes mobile learning as a process resulting from the convergence of mobile technologies, human learning characteristics, and social interaction.

Based on the research scope, this study formulated six Research Questions. They were mainly the learning practices, attitude, strategy, reason for formal and informal mobile learning, and find the formal and informal learning ratios of mobile learning. This study provides implications to different education shareholders. For learners, this study provides good mobile learning practices. For teachers, this study gives strategies to design teaching and learning activities that involve the use of mobile devices. For education service providers, this study provides the students' practices and attitudes for designed educational apps.

12

2.1 Introduction

This chapter has two sections. The first reviews literature of the initial framework of mobile learning. The second section reviews literature of social, device, learner aspects and the interaction in FRAME model as to examine how it related to this study.

2.2 Section one: Initial framework of Mobile learning

Sharples, Taylor and Vavoula (2005) provide an initial framework for theorizing mobile learning as complement theories of infant, classroom, workplace and informal learning. The aim of the framework is to assist in designing a new environment and technology to support mobile learning. The framework includes three elements: control, context and communication. The control of learning is mainly about one person, generally the teacher, who transfers knowledge to learners. The control of learning passed the information or knowledge between learners and technology, or learner and teachers. Context embraces the multiple communities of actors who interact with a shared objective. Communication is the method of passing message or information between the teacher and learner. The framework describes the steps towards an integrated theory of mobile learning for analyzing and designing new technologies.

Motiwalla (2007) provides the framework developing m-learning applications that can be used as a complement to classroom or distance learning. This framework

consists of two levels. The first is mobile connectivity. That focused to the applications and technology used by commercial establishment. The second is e-learning. That focused to the use of the Internet in education. The e-learning methods and approaches are useful for designing applications that incorporate the constructive learning and conversation theories into a mobile learning environment. Short Message Service (SMS) and Instant Messenger were mainly applied in this framework.

The two frameworks mentioned above mainly focus on the communication in mobile learning. However, the Framework for the Rational Analysis of Mobile Education (FRAME) (M. Koole & Ally, 2006; M. L. Koole, 2009) describes mobile learning fully covering mobile technology, human learning capacities, and social interaction. The FRAME model is useful in guiding us to understand the impact of mobile devices in learning material as well as formal and informal learning strategies for mobile learning. This model referred to concepts similar in psychological theories such as Activity Theory (Kaptelinin & Nardi, 2006) – especially pertaining to Vygotsky's (1978) work on mediation and the zone of proximal development.

In the FRAME model, mobile learning experiences were viewed as existing within the context of information. Within the context of information, the FRAME model was represented by a Venn diagram in which showed three aspects of interests. The Venn diagram shows the conceptualization of the FRAME model (Figure 2.1). The FRAME model includes three aspects:

- Device Usability Aspect (D)
- Learner Aspect (L)

- Social Aspect (S)
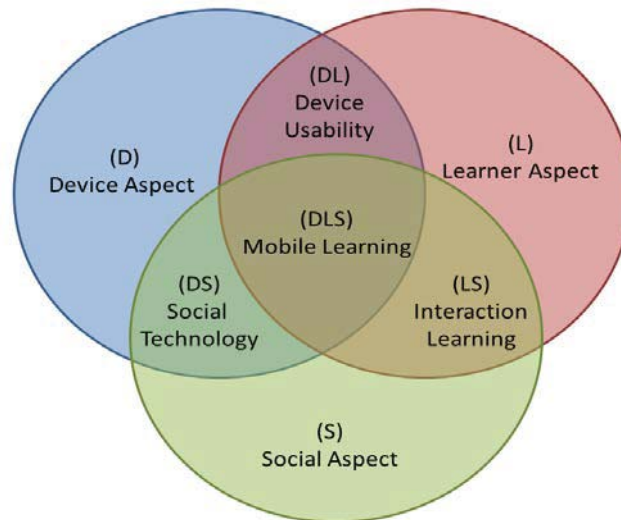
Figure 2.1: The FRAME Model

The overlapped areas contain two or more aspects attributed. Therefore, the intersection of Device Usability Aspect and Learner Aspect became Devise Usability (DL). This section relates the featured mobile devices to cognitive tasks in relating to the manipulation and information storage. The intersection of Device Aspect and Social Aspect became Social Technology (DS). This section bridges the needs and activities of learners to the hardware and software characteristics of their mobile devices. The intersection of Learner Aspect and Social Aspect became Interaction Learning (LS). This section takes into account that the needs of distance learners as individuals who are situated within unique cultures and environment. The intersection of Device Aspect, Learner Aspect and Social Aspect became the Mobile Learning (DLS). This study is guided by how these three aspects of the FRAME model affects the practices of mobile learning.

15

From the assumption of device usability aspect, the mobile device is the learning platform. Quinn (2000b) defined m-learning as the "intersection of mobile computing and e-learning: accessible resources wherever you are, strong search capabilities, rich interaction, powerful support for effective learning, and performance-based assessment." (p. 8). The aim of m-learning is to provide a learning environment in which learners can learn without any limitation of time, place, or device, thereby realizing a more creative and learner-centered educational process (Joo & Kim, 2009).

From the assumption of learner aspect, learning can be facilitated with formal and informal learning experiences. Many surveys and organizations focus on formal and non-formal education and learning, although informal learning was more general (Livingstone, 2001; Tight, 2002). Schugurensky (2000) indicates that adults sometimes internalized values, beliefs, attitudes and behaviors through the process of unintentional learning, and they were not aware that they were learning something.

From the assumption of the social aspect, social media is effective in collaborative learning. Learning is not an individual acquisition activity, but it is a social discourse (Hanson & Sinclair, 2008; Jonassen, Howland, Moore, & Marra, 2003; Lave & Wenger, 1991). Online social networks are increasingly being used not only by college students, but also by instructors for many reasons (Mazer, Murphy, & Simonds, 2007; Mazer, Murphy, & Simonds, 2009). Social media uses technologies to promote social interaction, make collaboration possible and enable deliberation across stakeholders. These technologies include blogs, wikis, media (audio, photo,

16

video, text) sharing tools, networking platforms (including Facebook), and virtual worlds (Bryer & Zavattaro, 2011). As social media is becoming increasingly ubiquitous to millennium learners, many educators see the potential benefits of using these tools for academic purposes (Hughes, 2009).

2.3 Section Two: Three aspects and interaction in FRAME model

Mobile device technology is developing rapidly. However, the FRAME model from the Koole study can be applied to this study. This study uses the FRAME model to depict the situation of Guangzhou university students using their smartphone, tablet or notebook to access social media for formal and informal learning. Figure 2.2 shown below is the conceptualization of this study.
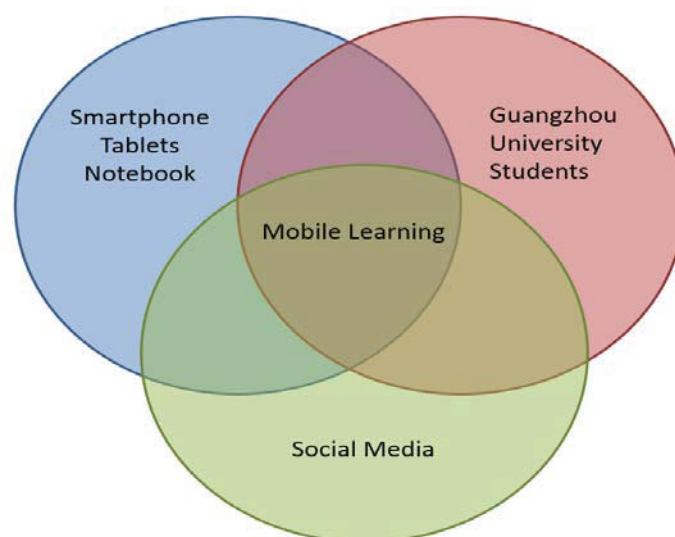
Figure 2.2: The conceptualization of this study

This study examines the extent of using mobile devices to facilitate formal and informal learning for university students studying at Guangzhou. Therefore, this

17

study applies the FRAME model to examine the mobile learning practices of Guangzhou university students. Mobile device mainly including smartphone, tablets and notebooks were considered to be the device aspect. Guangzhou university students were deemed as learner aspect. Online social networking was belonging to Social Aspect. This section reviewed literature to examine significant information for mobile learning.

2.3.1 Device Aspect: Mobile device

Recently, the market for smartphones and tablets has grown very rapidly. Ericsson (2010) forecasted that around 80% of people accessed the Internet through a mobile device. IDC predicted mobile tablets will overtake desktop usage after 2015 (FRAMINGHAM, September 12, 2011). In 2011, China became the country with the highest number of netizens and mobile netizens in the world (China Internet Network Information Center, 2012a). In 2012, mobile netizens outnumbered PC netizens (China Internet Network Information Center, 2012b).

Basically, people use two types of mobile devices, namely the smartphone and tablet. The first Smartphone was called IBM Simon and was launched in 1992 (Schneidawind, 1992). The IBM Simon had limited personal schedule functions such as an address book, calculator, and calendar. Nowadays, the Smartphone not only enables users to receive and make calls, as well as, send and receive text messages, but it also enables users to send emails, contact others through instant message, take snapshots, play games, browse the internet, arrange their personal schedule, listen to music, watch online movies and locate their position. It is similar

to a personal digital assistant that records your personal schedule. The concept-mapping applications (Apps) were a part of the software, but the sizes were much less than the software. Apps need to be run by a mobile operating system. Popular mobile operating systems are iOS which was developed by Apple, and Android which was developed by Google. Therefore, Apps were the most suitable tool to operate. Owing to its strengths, the Smartphone is popular (L. Johnson, Smith, Willis, Levine, & Haywood, 2005). In fact, the satisfaction level from using a Smartphone is higher among teenagers than the elderly (Balakrishnan & Yeow, 2007).

There are two main types of tablets. In 2010, Apple released iPad in order to increase their mobile device market shares. iPad, a tablet around 10 inches in size, removes the need for a physical keyboard. The tablet is easy to operate and provide functions for reading text, looking at photos and watching videos. In 2011, Samsung introduced the phablet Galaxy Note which was around 5.5 inches. The strength of Galaxy Note is that it combines the advantages of the smartphone and tablet. Galaxy Note is not only the most suitable for reading, but it is also able to receive incoming calls and send outgoing calls. In September 2013, Samsung launched Samsung Galaxy Note 3 and announced 10 million units were sold within 2 months (Epstein, 2013).

Mobile technology was the prospect of education (J. J. Huang, Yang, Huang, & Hsiao, 2010; Liu, Yu, & Ran, 2008). Advanced technologies, such as high bandwidth wireless communication networking infrastructure, wireless technologies, and advanced handheld devices, had broadened online-learning modes from using desktop in learning to m-learning (Sharples, 2000). The features of mobile learning were the

flexibility for students to engage in the educational process and material in anywhere and at any time (Dew, 2010). Mobile learning was very effective and efficient for classroom interaction (Motiwalla, 2007).

2.3.2 Learner Aspect: Guangzhou University students

Traditionally, Chinese believed education is the best investment for the future (Zhao, 2009). Therefore, Chinese families primarily focused on education quality and academic performance. Therefore, the Chinese Government invested considerable resources in order to improve the quality of higher education institutions.

Tianjin University, established in 1895, was the first modern Chinese University. The Chinese higher education system was modeled on the Soviet one after 1949. The number of China's higher education institutes increased from 229 in 1957 to 1,289 in 1960 (Kang, 2004). Consequently, the number of university students would be increased.

Before 1977, the Chinese Government had absolute power over the college entrance; it implemented the system by ways of centralized management, deciding the enrollment quota of students from the provinces and issuing college enrollment and test rules. However, college enrollment and examination decision-making power had been transferred to local government in 1978 (H. Wang, 2011). Chinese higher education institutions changed significantly when the economic reform and open-door policy was adopted in 1978. China's social-science researchers imported a large number of terms, concepts, theories and methods from Western countries. But,

20

maintained the mind of China's social reality and expected to connect with the modern world, researchers adopted a critical, realistic research paradigm to examine China's developmental path (Yan & Lin, 2010).

In 1995, the Chinese Government launched the project 211. This project provided tremendous support to the top 100 universities to improve their quality of teaching, research, and infrastructure in order to become leaders in the field. The total amount invested was RMB 6.4 billion Yuan which was allocated to 107 universities and 602 priority programs from 1995 to 2000 (Li, 2010). In 1998, the Chinese Government launched the project 985. The project aimed to select and invest in 40 elite universities so that they would become world class universities. The total amount invested was RMB 1.8 billion per university and major actions are listed as below (Li, 2010):

a) reforming and improving university administrative and operational mechanisms;
b) recruiting leading scholars inside and outside China to establish strong research teams;
c) establishing the Science and Technology Innovation Platform and the Social Science Research Base in those selected universities; and
d) improving university infrastructure and supporting international collaborations.

In 21st century, China became the world's largest higher education provider. The gross enrollment rate increased from 9.8% in 1998 to 24.2% in 2009 with 29.79

million students enrolled in higher education institutions (X. Wang & Liu, 2011). The reasons for increasing the HEI enrollment rate are listed below:

1. Reducing the pressure of the labor market. In 1999, the financial crisis in Asia was very serious which resulted in the rising of unemployment rate. Therefore, the Chinese Government wish to reduce the unemployment rate and expect the secondary school graduates not to enter the labor market straightaway (X. Wang & Liu, 2011).

2. Fulfilling the public expectation for study higher education in Chinese society (Wan, 2006).

3. Developing quality higher education institutions to enhance the competitiveness in Asia (Li, 2010).

4. Personnel training for future development (X. Wang & Liu, 2011)

The "Chinese learner" or otherwise known as the Confucian heritage culture (CHC) learner, is seen as a rote, passive learner lacking critical thinking skills (Kumaravadivelu, 2003; Ninnes, Aitchison, & Kalos, 1999; Ryan & Louie, 2005). CHC learners are from East Asia nations such as China (including Hong Kong), Taiwan, Singapore, Japan and Korea (Carroll & Ryan, 2005). Janette Ryan (2010) outlined differences in academic values between "Western" and "Confucian" in table 2.1. However, chapter 6 section 6.3.2 discusses the characteristics that might be changed of Chinese learner.

Table 2.1: Differences in the academic values between "Western" and "Confucian"

22

Western	Confucian
● "Deep" learners	● "Surface" or rote learners
● Independent learners	● Dependence on the teacher
● Critical thinking	● "Follow the master"
● Student-centered learning	● Respect for the teacher
● Adversarial stance	● Harmony
● Argumentative learners	● Passive learners
● Achievement of the individual	● Achievement of the group
● Constructing new knowledge	● Respect for historical texts

Many Chinese students who lived in other cities went to Guangzhou for their tertiary education, because Guangzhou had four major universities, namely Sun Yat-Sen University, Jinan University, South China University of Technology and South China Normal University, under the project 211. Therefore, this study had concluded the above literature review with the Guangzhou University students learning background and characteristic. Many Chinese scholars (朱哲 & 甄静波, 2010; 柴阳丽, 2012; 马运朋, 2010) emphasized informal learning with ICT effect to Chinese university students. Literature review was shown below with formal and informal learning.

2.3.3 Social Aspect: Social Media

Social Media, especially online social networking, is the most popular trend in the world. Every person, no matter their age range, gender, education background or nationality, they were also highly participating into online social media. Social media is a type of technology that encourages social interaction and includes blogs, wikis and multimedia (audio, photo, video, text) sharing in the virtual worlds (Bryer & Zavattaro, 2011). In recent times, 'Web 2.0' technologies have become more

**The Hong Kong
Institute of Education Library**
For private study or research only.
Not for publication or further reproduction.

advanced and popular, therefore, social media was not operating web-based only, but also it could be operated as mobile-based.

The term 'Web 2.0' was launched in 2004 by Dale Dougherty in the United States. O'Reilly (2005) explained Web 2.0 was the 'second generation' web-based technologies and services. 'Web 2.0' was mainly to collaborate and to share among users. Andreas Kaplan and Michael Haenlein (2010) define social media as a group of web-based applications which allow the creation and exchange of user-generated content.

There are four major functions and they are social networking, social bookmarking systems, blog and podcasts of social media. Social networking enables users to find others with similar interests and backgrounds, then contact them and become 'Friends'. Through common 'Friends' link, users can build a large social network to share their interests and beliefs. Social networking sites have become part of daily life with students (Bugeja, 2006; Jones, 2002). Green and Hannon (2007) indicated that there were many benefits for teenagers engaged in online social networking, such as developing the skills of creativity, ideas generation, presentation, leadership, team building, confidence, communication, innovation, initiative, critical awareness in information gathering, ability to evaluate, question and prioritize information. Besides, it was also mentioned that there were many successful reasons for online social networking (Mazer et al., 2007; 2009).

Blog is the online platform for users to express their articles on the web. In 1997,

24

Jorn Barger developed the term "blog "in order to allow users to post opinions, information, their personal diary or links for other readers to read online (Doctorow, 2002). The function of the blog was that the article could be published on the web, and privacy setting could also been adjusted to control the accessibility of the readers. Moreover, the blog can be embedded with multimedia such as audio, videos or pictures, which can beautify the blog and make it more attractive to the public. The popular reason of the blog was it let peer debate, share in the online platform (Skipper, 2006).

Social bookmarking system is the online function to manage, store, and share users' online bookmarks. Social bookmarking systems share a number of common features with the online social platform (Miller, 2005). Social bookmarking system uses 'tag' to record the online address. 'Tag' does not record the URL only. 'Tag' could record different types of online information such as people's online activities, choice of website or keyword. Moreover, social bookmarking system had the ability to allow users to subscribe web feeds to 'tag' particular users on picture, article or video.

Podcasts are video or audio recordings for online sharing. Users can subscribe their interested feed for downloading relative digital media files automatically. The downloaded podcasts could be listened to or watched on the user's computer or transferred to a portable media player for playback later. Podcasting was the most general and important usage in education recently (Brittain, Glowacki, Van Ittersum, & Johnson, 2006; Ractham & Zhang, 2006). From primary to higher education, podcasts were frequently used (Harris & Park, 2008). Apple developed the apps of

25

iTunes U to allow user downloading our colleagues learning material for self-learning. The apps of iTunes U were most welcomed in the world.

Facebook is one of the most successful and popular online social media services in the world. The website allows users to create and customize a personal website to record their daily activities and express their beliefs. Users can share their favorite videos or photos and keep close contact with their friends. They can search for users with the same interests and become friends that way, or rekindle old friendships by using the search function. As of June 2012, there were over 900 million users, ranking it first among all the online social networking services and websites in the world.

2.3.4 The intersection with device aspect and learner aspect

Although mobile devices for learning are limited by screen size, speed of CPU, battery capacity, input interface and network bandwidth (G. Chen, Chang, & Wang, 2008), educators believe that the prospect of mobile technology integrated to informal learning (Y. Chen et al., 2003; Uzunboylu et al., 2009). Clough et al. (2008) indicate that mobile devices are used in informal learning.

The Internet and digital technologies had strong potential in higher education and unprepared students (Corbeil & Valdes-Corbeil, 2007; Guri-Rosenblit, 2005). Herrington and Herrington (2007b) predicted mobile learning would be the trend in Higher Education. O'Driscoll (2003) explains that beginners such as primary or secondary students need formal learning more. Otherwise, the proportion of informal learning might be increased. The proportion of formal and informal learning

26

depended on the experience level of the workforce.

2.3.5 The intersection with social aspect and device aspect

Most mobile devices have online social media and educational technology (Taylor, 2010). Examples include translation apps, Wikimedia apps and YouTube apps. The National Survey of Student Engagement (NSSE) found positive correlations between using educational technology and student motivation and engagement, especially in collaborative learning (P. D. Chen, Lambert, & Guidry, 2010; Laird & Kuh, 2005).

Mobile devices have become the learning tools of collaborative and cooperative mobile learning (Y. Huang, Huang, & Hsieh, 2008; 2009; Järvelä, Näykki, Laru, & Luokkanen, 2007; Lundin & Magnusson, 2003). Compared with traditional learning, mobile learning enhances mobility, coordination, communication, organization of materials, negotiation and interactivity (Zurita & Nussbaum, 2007). Moreover, using a tablet in the classroom improves interactions with peers and instructors (Shuler, Hutchins, & LaShell, 2010). Mobile learning does not only have a positive impact on formal learning, but it is also beneficial for distance learning. Mobile learning provides the potential for collaborative interaction with different people (Y. Huang et al., 2009).

In the first half of 2013, the percentage of Chinese Mobile netizens increased by 70% (China Internet Network Information Center, 2013). China Mobile netizens are spending a great deal of time on social media. The famous examples of online social media are Sina.com, QQ and Weibo in China. Most mobile netizens have also

installed social media apps into their mobile devices in order to keep contact and receive information on time.

2.3.6 The intersection with learner aspect and social aspect

Learning is not an individual acquisition activity but a social discourse (Jonassen et al., 2003; Lave & Wenger, 1991).   Vygotsky (1978) suggested a constructivist approach to learn how to involve in the social relations and interactions in order to enable learners to construct new knowledge from their experiences.   Social constructivist theory is based on learners' prior knowledge and experience to construct knowledge (Derry, 1999).   Researchers have found that new technologies can support social construction of learning, assessment, motivation, differentiation and personalization, and engagement in learning for students (de Winter, Winterbottom, & Wilson, 2010; Enriquez, 2010).

Although some educators do not prefer using social networking in the classroom, or even discourage students to join the social networking websites (Ferdig, 2007; Green & Hannon, 2007), Vockley (2007) found that around 50% of students used social networking to discuss schoolwork.   Educators have observed the potential benefits of using social media in the purpose of education (Hughes, 2009; Ng & Wong, 2013). Barlow (2008) argues that social media can allow learning to be more interesting without time and place limitation.   In the virtual world, the Internet is the vehicle for information dissemination, retrieval, and collaboration (Horvath & Teles, 1999). Social media might be the key to innovative thinking and problem solving for learners (Surowiecki, 2004).

In China, the growth rate of online social networking for the first half of 2013 was 4.7%. The usage rate of online media was around 77.2% and 68% for blog (China Internet Network Information Center, 2013). It seemed that online social media service and website were so popular in China. Many of China's most popular social media services, such as RenRen.com, PPS, Weibo and Sina are similar to popular ones abroad. For instance, RenRen.com is similar to Facebook, PPS is similar to YouTube, and Weibo is similar to Twitter. The biggest difference is that China's social media is operated by Chinese entrepreneurs.

2.3.7 Mobile formal and informal learning

Marsick and Watkins (1990) define formal learning as that which students typically learn in school. It is classroom based, and well-structured. Informal learning is vastly different from formal learning. It includes incidental learning which might occur in school, but not typically classroom based or well-structured, and learners can fully control their own learning. Informal learning might not be related to the formal curriculum, and it might be related to life experiences (Merriam et al., 2012). The flexibility of informal learning is great and allows students to gain knowledge without instructors (Livingstone, 2001).

Informal learning can take place anytime and anywhere. Learners might receive knowledge from the media, magazine, internet etc. Smith and Smith (2008) listed below the informal learning activities, such as:

29

Reading books or magazine; watching videos; Attending conferences; Sharing in groups or organizations; Watching television; Using Software to gain the knowledge; learning things from the internet that is related to personal interests or helps develop personal skills.

The conceptual framework for informal learning is grounded in experiential learning theory, pioneered by Dewey (2007) and later expanded by the work of Kolb (1984) and others. Dewey (2007) believed that experience enabled learners to think reflectively during their learning processes. Schugurensky (2000) argues that informal learning takes three forms: self-directed learning, incidental learning and socialization. Self-directed learning refers to intentional and conscious learning without instruction, while incidental learning is unintentional but conscious learning that takes place in the course of doing work. Socialization is both unintentional and unconscious learning. It occurs in daily life and relates to the internalization of values, attitudes, behaviors or skills.

Matuski and Hill (1998) indicate that informal knowledge is learned from experience. Informal learning occurs through work activities (Eraut, 2004; Straka, 2004), and includes "self-directed learning, networking, coaching, mentoring and trial-and error" (Watkins & Marsick, 1992). Although it has been found that self-directed learning is promulgated through informal learning opportunities, is effective and takes place more readily than formal learning, it has also been recognized that informal learning opportunities are not adequately provided in most organizations (P. J. Smith, Sadler-

Smith, Robertson, & Wakefield, 2007).

Marsick and Volpe (1999) indicate that informal learning includes both action and reflection which involves "looking back on what we have done, measuring it against what we want to achieve, and assessing the consequence" (p.7). Listed below are informal learning strategies.

- Observation of others (Hara, 2002)

- Working in teams (Macneil, 2001)

- Reflection (Hara, 2002)

- Action learning (Miller, 2003)

- Mentoring (Coyle & Ellinger, 2001)

- Seeking information from co-workers (Lohman, Wang, & Woolf, 1996)

- Use of past learning and experience (Coyle & Ellinger, 2001)

- Intuition (Coyle & Ellinger, 2001)

- Reading (Fenwick & Hutton, 2000)

- Research (Sawchuk, 2001)

- Informal trial and error (Raffo, Lovatt, Banks, & O'Connor, 2000).

Informal learning is very popular in Canada, which is supported by one study that found over 95% of Canadians were involved in different types of informal learning activities (Livingstone, 2001). Although popular in Western society, Foley (1999) argued that informal learning was still hard to be recognized and evaluated because it often happens incidentally, and people are not aware of its influence.

Quinn (2000a) defined that effective learning and performance-based assessment are strongly supported by e-learning. He also believed m-learning is the type of using mobile computer for learning. In 2000, the major mobile learning device was Palm, a Personal Digital Assistant (PDA) hugely popular among students. However, it was faded out and replaced by Smartphone and Tablets in 2013. Kadirire (2009) agrees m-learning is a type of e-learning, with the advantage being no time and place limitation. Therefore, students learn anytime and anywhere with their mobile device such as a mobile phone or netbook. Netbooks are small, lightweight and with affordable price to students. El-Hussein & Cronje (2010) define mobile learning as "any type of learning that takes place in learning environments and spaces that take account of the mobility of technology, mobility of learners, and mobility of learning" (p.20). Nowadays, learners are interested to use m-learning resources such as Apps through the smartphone or any other mobile device to access information anytime and anywhere (Gimenez López, Magal Royo, Laborda, & Garde Calvo, 2009). M-learning provides a creative learning environment and learner-centered approach to learn (Joo & Kim, 2009).

Mobile technology has developed rapidly. Mobile technology does not only affect the way that people communicate such as voice communication in instant message, but also affects people's daily life. Actually, the number of smartphone addicts has increased. Smartphone addicts are too focused on their smartphones. Smartphone became a part of their life. However, the development of mobile technology had changed the landscape of education (J. J. Huang et al., 2010; Liu et al., 2008).

Integrated technology was engaged in student's multiple learning styles (Naimie, Siraj, Abuzaid, & Shagholi, 2010). Zywno and Waalen (2002) confirmed multimedia in learning and taught packages enhanced academic performance in students' across learning styles. A study on the perceptions of students and teachers on the affordances of new technology found that integrating technology in teaching had positive impacts of useful pedagogical outcomes (de Winter et al., 2010). Traxler (2007) believe that mobile learning is going to facilitate a wide variety of teaching methods in future. M-learning did not only integrate with teaching and learning, but also support non-academic area in school (Traxler & Kukulska-Julme, 2005). For example, pastoral care, motivation and guidance, course administration etc.

2.4 Summary

In this study, this chapter describes the Framework for the Rational Analysis of Mobile Education (FRAME) (M. Koole & Ally, 2006; M. L. Koole, 2009). The FRAME model includes three aspects which are device aspect, learning aspect and social aspect. This study is applying the FRAME model to depict the situation of Guangzhou university students use smartphone, tablets or notebooks for formal and informal learning through online social network.

For device aspect, smartphone is a popular mobile device because the sales volume is higher than tablets and notebooks. The advantages of using mobile devices to learn are let students learn in higher flexibility (Dew, 2010); effective and efficient (Motiwalla, 2007).

33

For learner aspect, Chinese believe education is the best investment for future (Zhao, 2009). In 21st century, China became the world's largest higher education institutions provider. The gross enrollment rate increased from 9.8% in 1998 to 24.2% in 2009. There were 29.79 million students enrolled in higher education institutions (X. Wang & Liu, 2011). Therefore, Chinese students would like to find out the most effective learning approach in order to improve their learning performance.

For social aspect, social media became the most popular virtual platform for people sharing information. Social media included blogs, wikis and multimedia (audio, photo, video, text) sharing in the virtual worlds (Bryer & Zavattaro, 2011). Green and Hannon (2007) indicated that there were many benefits for teenagers in participating online social networking, such as developing the skills of creativity, ideas generation, presentation, leadership, team building, confidence, communication, innovation, initiative, critical awareness in information gathering and ability to evaluate, question and prioritize information.

Formal and informal mobile learning integrated three aspects. Through the literature review, it confirmed mobile devices had positive impacts to both formal and informal learning. Nowadays, China's social media is so popular, university students are highly engaged in mobile devices (China Internet Network Information Center, 2012a; China Internet Network Information Center, 2012b; Gong, 2012). Chapter 3 of this study deeply explains the research design and method.

Chapter 3: Research Design and Method

3.1 Introduction

The purpose of this chapter is to outline the rationale of the research design and process and explains the reasons to adopt mixed-method research. Also, in this chapter, it describes the method and design of research instruments; and explains the procedure of the pilot study, sampling, reliability and validity. Lastly, it explains the actions for ethical consideration, planning of the analysis and answering research questions.

Creswell (2013) identified education research had 3 methodologies:

1. Quantitative research methodology
2. Qualitative research methodology
3. Mixed methodology

These three research methodologies will be introduced below and the reasons for choosing mixed methodology will be explained in this study.

3.2 Quantitative Research

The purpose of the quantitative research is to collect, gather and assemble primary data specifically for the study (Berg, 2004), collect and analyze numerical data to establish the overall tendency of interviewees (Creswell, 2007). After collecting the quantitative and numerical data, use a range of statistical techniques to analyze and express the final result in statistical terminologies (Mertler & Charles, 2005).

35

Typically, quantitative research uses experimental methods and/or quantitative measures to test hypothetical generalizations (Hoepfl, 1997) and examines relationships between variables (Norman Kent Denzin & Yvonna Sessions Lincoln, 2005). Questionnaire is a general research instrument tool for collecting primary quantitative data. The questionnaire survey approach is a general instrument to collect primary quantitative data and the result of the questionnaire straightforward provides numerical data for analysis (Cohen, Manion, & Morrison, 2011). Also, the questionnaire is used to quantify qualitative information and describes a population which was too large or dispersed to observe directly (E. Babbie, 2012a).

Different from observation, data of the questionnaire was collected by interviewee's response (Tuckman, 1994). Most of the questionnaires were in multiple choice formats, interviewees were just only required to tick their preferences. Respondents could conveniently select their choices and answered in any order (Gall, Borg, & Gall, 1996). The advantages of using closed-end questionnaire were efficient and effective to obtain data for analysis (Teddlie, 2009). Interviewees answered the questions without follow any order (Gall et al., 1996). Besides, it allowed a relative degree of preference, priority and intensity to be charted (Cohen et al., 2011).

Quantitative research was cost effective because it could obtain, analyze and report data very quickly (Neuman & Kreuger, 2003). It conducted a large scale of data and standardized the response for analyzing data conveniently (Punch, 2005). Moreover, it assumed a value-free method for arriving at generalizations (Creswell, 2013).

36

Quantitative research collected data from different types of respondents such as their characteristics, experiences and opinions (Gall et al., 1996). In order to answer Research Questions, compare different groups' results through a range of statistical analysis (Oppenheim, 2000).

Quantitative Research found out the impact of different variables on an outcome using quantitative research (Creswell, 2007). The particular values of using quantitative approach in research were testing hypotheses, comparing responses and producing generalizations (Creswell, 2013). If the methods of collecting and analyzing data were correct, it assumed that the findings of the population being studied were accurate (Black, 1999). Neuman and Kreguer (2003) indicated quantitative research was the best way to find out basis for critical decisions. Bogdan and Biklen (1998) indicated that for easy understanding in the quantitative research, charts and graphs were frequently used to present analyzed result.

3.3 Qualitative Research

The aim of qualitative research is to examine the hypothesis deeply (S. Johnson, 1995). Blaxter, Huges and Tight (2010) indicated that the objective of qualitative research was to achieve an in-depth research rather than a breadth one. Marshall and Rossman (2010) stated that qualitative research had four purposes:

- Exploration
- Explanation
- Description
- Prediction

Through the qualitative research, it can explore and deeply explain the phenomenon of the study. The study uses words to describe the phenomenon and predicts the possibility if there are any changes. Therefore, it expects that the findings should be more in details and deeply explained the phenomenon after in-depth investigation (Norman Kent Denzin & Yvonna Sessions Lincoln, 2005). The qualitative research should be described in greater details by a few selected individuals (Creswell, 2013). It also explained that the qualitative research could develop a conceptual framework for the study which was thorough, concise and elegant. There were several methods to obtain qualitative data such as participants' observation, field notes, structured and unstructured interviews, observation, documents and material analysis (Marshall & Rossman, 2010). The benefit of qualitative research was more appropriate when the researcher want to deeply understand different points of view of the interviewees (Creswell, 2013).

3.4 Mixed-method research

The power of quantitative research establishes the overall tendency in the study. It is cost effective and efficient for conducting a large scale of data and standardized analysis. On the other hand, the strength of qualitative research is to investigate the study deeply. The process of choosing interviewees or data collection reflected the values and preferences of researchers (Berg, 2004) because qualitative research investigated the views of person and collected information about a few people (Creswell, 2007). Collecting and gathering the qualitative data required supplement, validation, interpretation, clarification and illumination from the same subjects (Miles

38

& Huberman, 1994). Therefore, it is suggested to use the triangulation method to strengthen qualitative research (R. B. Johnson, 1997) because triangulation capture valid, reliable multiple and diverse realities (Creswell & Miller, 2000). In order to draw the full picture of the study, researchers often mixed or combined quantitative and qualitative research techniques, methods, approaches and concepts into the study (R. B. Johnson & Onwuegbuzie, 2004).

A mixed-method research design is a procedure for collecting, analyzing, "mixing" both quantitative and qualitative research; and was a single study to understand the research problem (Creswell & Clark, 2007). The purpose of using mixed methods is to provide a complete picture for the implementation process. The collection of quantitative and qualitative data was separately in two phases, so the data from one source can improve, elaborate, or complement the data from the other source (Greene, Caracelli, & Graham, 1989; Rossman & Wilson, 1985).

Triangulation design was the most common and well-known approach in mixed methods research (Creswell, Plano Clark, Gutmann, & Hanson, 2003). To understand the research problem this design can obtain different but complementary data or information on the same topic (Morse, 1991). The intention of using this design was to bring together different strengths and non-overlapping weaknesses of quantitative methods (large sample size, trends and generalization) with those qualitative methods (small sample, details and in depth) (Patton, 1990). Triangulation was using different types of collecting data approaches to collect data (Maxwell, 2012). It allowed to have stronger support for the study (Creswell, 2013), provided better accessibility for

39

the validity and generalizations of explanations developed and the reliability checking (Creswell, 2013). Therefore, triangulation improved the confidence of the study result (Creswell & Miller, 2000).

This study will draw a full picture to investigate the practices, attitudes and strategies of using mobile devices for formal and informal learning to the Guangzhou university students. So, a mixed-method research strategy will be adopted and incorporated for both qualitative and quantitative methods for data collection and analysis.

Figure 3.1: Triangulation Design - Convergence Model
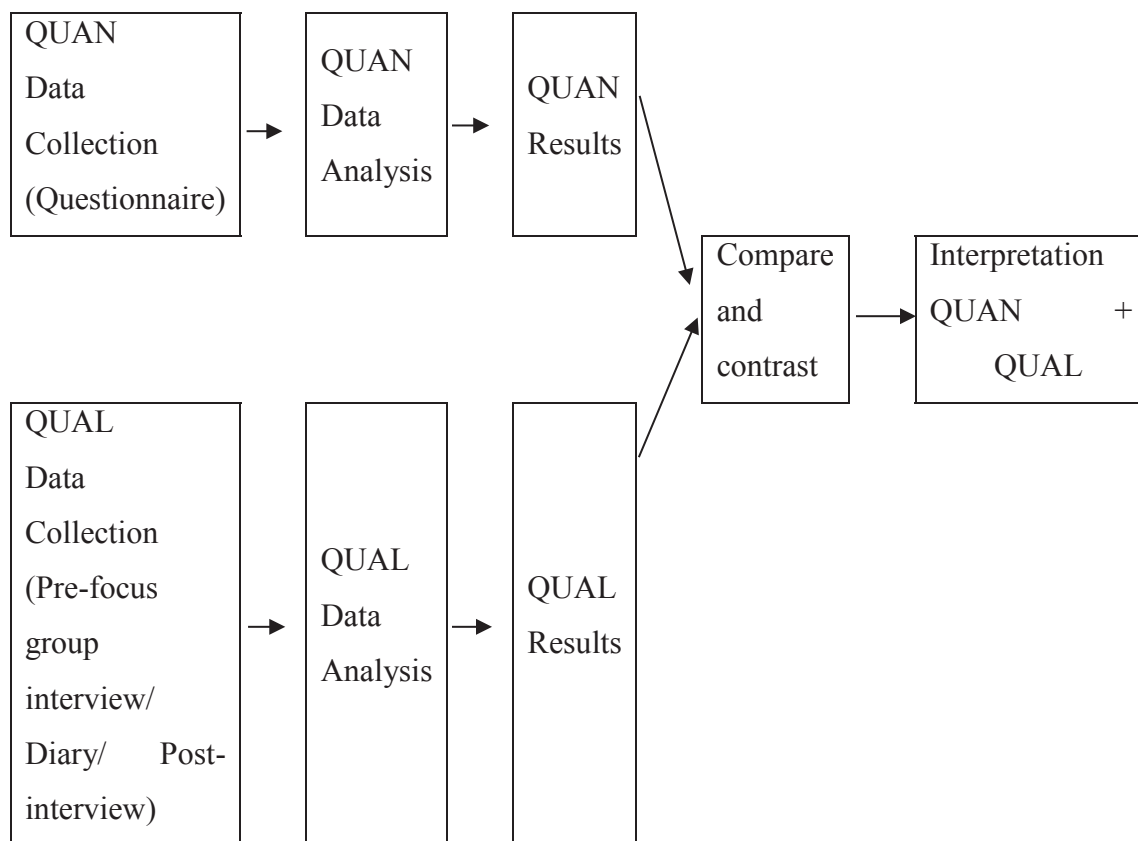
The convergence model represented the traditional model of a mixed method

40

triangulation design (Creswell, 2013). In this model, the researcher collected and analyzed quantitative and qualitative data separately on the same aspects of Koole's FRAME model, then converged the different results by comparing and contrasting during the interpretation. This study used the convergence model of the triangulation design to collect and analyze quantitative and qualitative data. Figure 3.1 "Triangulation Design of Convergence Model", researchers used this model when they wanted to compare results or to validate, confirm, or corroborate quantitative results with qualitative findings. The purpose of this model was to provide valid and well-substantiated conclusion about a single phenomenon (Creswell, 2007).

3.5 Research instrument for collecting quantitative data

This study uses self-administered questionnaires to collect quantitative data. Details of the rationale of questionnaire design, pilot study, population, sample and responded rate, and reliability will be explained below.

3.5.1 Rationale of questionnaire design

The rationale of questionnaire was designed based on the FRAME model. Questions 1 to 17 were mainly to investigate the technical preference of using mobile devices by participants. The data from question 1 to 13 assists to answer Research Question 6: Did the type of mobile devices affect mobile learning? In addition, the Chinese and English version of the questionnaires were in Appendix A and B respectively.

Question 18 classified into six categories to investigate the practices of interviewees using mobile devices in learning activities and had social interaction on each

41

category. Based on Sanko's (2012) description on the major social media, this study found that there are six types of mobile learning activities to be investigated.

- Electronic Reading/Watching

- Digital Recording

- Searching

- Learning

- Sharing Learning Resources

- Online Discussion

In each type of mobile learning activity, it included 3 to 4 related sub-activities to the major mobile learning activities. The data of question 18 assists in answering Research Question 3: What were the Guangzhou university students' learning practices of using mobile devices?

There were two benefits for the group classification. First, interviewees could directly and clearly do the answer. For example, when interviewees answered the frequency of electronic reading or watching, they had a possibility of not being alerted that many formats should be included in electronic reading or watching. Therefore, through the given classification, it let interviewees understand that there are many types of electronic reading or watching.

Second, collecting data accurately and deeply were crucial. For example, when interviewees using different communication methods answered on an online discussion, it identified what type of communication method was the most frequent

and which was rarely used. Question 18 used a five-point Likert scale to respond the frequency of using mobile devices in learning activities if interviewees tried to use mobile devices to learn. In the midpoint, the advantages of Likert scale tended to undermine extreme positions (Albaum, 1997). On the other hand, electronic reading or watching included browsing websites, articles/books, videos and news. Digital recording included photos, videos and audio. Searching included browsing search engines, knowledge websites and library websites. Learning included online assessments, translation and apps. Sharing learning resources included emails, iCloud and instant files transfer. Online discussion included instant messaging, video conferences and formed groups.

Questions 19 to 36 were mainly to examine the interviewees' attitude of using mobile devices to promote learning and a five point Likert scale was adopted to analyze their attitudes of using mobile learning for each factor. The tables below listed the findings of attitudes (Table 3.1), key factors (Table 3.2) and sense (

Table 3.3) for each question. The data from questions 19 to 36 assist in answering the Research Question 4: What were the Guangzhou university students' learning attitudes of using mobile devices for formal and informal learning?

Table 3.1: Questionnaire questions - Attitude of using mobile devices

Question	Attitude of using mobile devices
19. I agree mobile device can facilitate reading	Reading

43

Question	
20. I agree mobile device can facilitate communication	Communication
21. I agree mobile device can share my learning process	Sharing learning process
22. I agree mobile device can share my learning outcome	Sharing learning outcome
23. I agree mobile device can facilitate record data	Recording data
24. I agree mobile device can facilitate searching information	Searching
25. I agree mobile device can enhance learning ability	Enhancing learning ability
26. I agree mobile device can enhance learning interest	Enhancing learning interest
27. I agree mobile device can enhance learning efficiency	Enhancing learning efficiency
28. I agree mobile device can facilitate learning from the formal curriculum	Formal Learning
29. I agree mobile device can be effectively used to learn outside the formal curriculum	Informal Learning

Table 3.2: Questionnaire questions - Key factors of using mobile devices

Question	Key factors of using mobile devices
30. I agree the capacity of mobile device affects learning	Capacity
31. I agree the screen size of mobile device affects learning	Screen Size
32. I agree the bandwidth of mobile device affects learning	Bandwidth
33. I agree Apps affects learning	Apps

Table 3.3: Questionnaires questions - Sense of using mobile devices

Question	Sense of using mobile devices
34. I have no any difficulty when using mobile device to learn	Difficult
35. I am good at having interaction with mobile device	Interactive
36. I like using mobile devices to learn	Like

3.5.2 The Pilot Study

A good questionnaire should be designed as simple as possible and interviewees could clearly understand the entire question in the questionnaire. There had two purposes for pilot study. First is to correctly identify the research direction which means students always used mobile for learning. Second is to evaluate whether the questionnaire design was appropriate. On 15 Jan, 2013, two classes of students, at around 45 students who studied the Diploma of Vocational Education (Business) at Youth College (Kwai Fong) had been invited to engage in the study. Normally, a pilot study should be in small scale and it revealed deficiencies before doing a large scale research study (Altman et al., 2006).

For the first purpose, this pilot study confirmed the positive research direction for formal and informal mobile learning. This pilot study proved that students mostly

owned their mobile devices whereas 90% of students had smartphones and 45% had tablets. Students agreed that mobile device was really efficient for learning. Mobile device is quite useful as it provides a communication channel for students to communicate with their classmates. Moreover, mobile device is available for reading and storing information. It is the most important tool for students' daily life and they can use mobile device for formal and informal learning. For formal learning, some students mentioned that they had to do projects and presentations as to demonstrate what they had learnt such as making movie or searching information. They said that they preferred using mobile devices in doing the projects since the school did not provide sufficient desktop computers for students. Furthermore, the efficiency of using mobile devices to search information was higher than using desktop computers. Therefore, students agreed mobile device was the most helpful tool for learning. For informal learning, some students said that they preferred learning what they are interested in such as music, drawing, playing basketball and even use their mobile devices for leisure purposes. Some students said they always read their digital bible on bus or MTR.

For second purpose, ambiguous questions could have been removed. For example, interviewees responded that they did not understand the meaning of informal learning. Therefore, the question 29 was changed to "I agree mobile device can be effectively used to learn outside the formal curriculum". Through the pilot study, it made the questionnaire clearer and let the questionnaire more reliable.

3.5.3 Population, Sample and responded rate

The purpose of sampling is to select a portion of the population to observe so as to determine the entire population characteristics (E. Babbie, 2012b). There are many advantages of using sampling such as cost effectiveness, effectiveness and efficiency, time and money consuming economically. If the selection was proper, the data analyzing technique to be applied to calculate the whole population would be valid (Norman Kent Denzin & Yvonna Sessions Lincoln, 2005).

A survey research sample size calculator (National Statistical Service, 2014) was used to determine the study's sample size. In order to meet or exceed a confidence level of 95% or above, the sample size was set with a "Margin of Error/Confidence Interval" at plus or minus the standard with 5%. For the total population of 510,487 students with higher education in Guangzhou, the calculated recommending sample size was 384 participants. The purpose of the survey approach was obtaining quantitative data in order to have a general understanding of Guangzhou university students' practices and attitudes of using mobile devices for formal and informal learning. There were a total of 495 valid questionnaires received so that the results represented the whole population. According to the Guangzhou Statistical Yearbook 2012, the number of students enrolled in regular higher education institutions by the mean of field of Study in 2011 was 510,487 (The Department of Guangzhou Statistical, 2012). A confidence level of 95% meant that if the study was conducted by 100 times, the results would be within the margin of 95 out of 100 times. Table 3.4 below listed the information of the sample size.

Table 3.4: The result of determine sample size

Determine Sample Size	
Confidence Level:	95%
Population Size	510,487
Proportion	0.5
Confidence Interval	0.05
Upper	0.55
Lower	0.45
Standard Error	0.02551
Relative Standard Error	5.10
Sample Size	384

Demaio (1980) indicated researcher should not expect the full response from the studies because interviewees were voluntary. However, higher response rate would definitely make the findings with greater credibility among key stakeholders (Rogelberg & Stanton, 2007). Babbie (1990) proposed the minimum level of response rate was 50%. Fowler (2009) proposed 60% response rate as the minimum level whereas De Vaus (2002) proposed 80% response rate as the minimum level. In this study, 495 sets of questionnaires were distributed in May of 2013 in the Guangzhou Education Mega Centre and received 490 valid sets of questionnaires. The response rate was 98.99%. One of the reasons having the high response rate was the interviewers invited the interviewees to answer the questionnaires on a face-to-face basis in the Guangzhou Education Mega Centre. Interviewers stated the purpose of the interview and explained the professional terms to the interviewees. Thus, most of the interviewees welcomed to answer the questionnaires. Through the guides by the interviewers, the accurate rate of the questionnaires was raised. However, the

questionnaires were distributed to a batch of students at the same time. The accuracy of this 100% data was not confirmed.

3.5.4 Reliability

Cronhach's Coefficient Alpha is used to assess the internal consistency and reliability. Cronbach's alpha is a coefficient reliability measure. It measures how good a set of items or variables is as a one-dimensional latent construction would be used to evaluate instrument reliably. This method measures the internal consistency of the test instrument through an analysis of the test items. The items are statistically analyzed by using Cronbach's Alpha, a general measure of internal consistency, to assess the reliability. The statistics provided an indication of the average correlation among all items that made up the instrument. Alpha values ranged from 0 to 1, the higher the value had a greater reliability (Shavelson, 1988). The index of Cronbach's Alpha from the questionnaire was 0.928 which represented the questionnaire was reliable.

3.6 Research Instrument for collecting qualitative data

This study uses pre-focus group interview, diary record and post-interview to collect qualitative data. In order to enlarge the full picture of the qualitative data collected, three qualitative data collection methods - pre-focus group interview, diary record and post-interview - were being adopted. The reason of using these three research instruments to collect qualitative data is because triangulation is necessary to capture valid and reliable multiple and diverse realities when collecting qualitative data

(Creswell & Miller, 2000).

3.6.1 The Pilot Study

The pilot study assisted to determine the individuals in the sample are capable of completing the survey (Creswell, 2007). Therefore, two students are invited to participate in the pilot study in the forms of interview and diary record. These two students, studied in higher institution, had been invited to do a one-week diary record. One of them is a Mainland student studied in The Hong Kong Institution of Education. The other one is a Hong Kong student studied in the Institution of Vocational Education. After the first week of the pilot study, they gave comments in revising the diaries such as how to classify the types of knowledge and how to define the time range. They obtained the feedbacks prior to formal implementation so that the daily structure was refined before the full launch. Furthermore, these two students' one-week diary record could be provided as the sample for the participants in Guangzhou to fill in their four weeks diary record. Therefore, the pilot study is very important for this study.

3.6.2 Pre-focus group interview

Focus group interviews provided interaction among interviewees, collection of extensive data and participation by all individuals in a group (Krueger, 2009). Krueger and Casey (2000) defined focus groups as "a carefully planned series of discussions designed to obtain perceptions which was defined as of interest in a permissive, non-threatening environment" (p.5). Actually, students had their own

learning practice of using mobile devices, but they might not be familiar to use mobile devices to learn. Therefore, through the focus group interviews, participants identified and shared their experiences and/or suggestions of using mobile devices to promote learning.

The pre-focus group interviews were semi-structured and conducted in Cantonese or Putonghua because some participants spoke in Putonghua only. The pre-focus group interview took approximately 30 minutes per session. There were 4 pre-focus group interviews. Each pre-focus group interview had 3 to 4 interviewees to share their practices of using mobile device in formal and informal learning. Each group's interviewees are come from similar major discipline. Table 3.5 summarized the qualitative data of participants in the 4 pre-focus group interviews. The questions of pre-focus group interview, in simplified Chinese and English version, are listed in Appendix C. All data were to be kept in private and the results of interviews were being used for research purposes only. The interviews were being scripted and sent to the interviewees for confirmation prior to review.

Table 3.5: Qualitative data participant list

Group	Major of Studied	Gender	No. of participant
A	Arts	Female	4
B	Business	Female	3
E	Engineering	Male	4
S	Sciences	Male	3

51

Pre-focus group interviews were mainly required to answer Research Questions 1, 2, 3 and 6.

- Research Question 1: What were the Guangzhou university students' learning strategies of using mobile devices for formal and informal learning?

- Research Question 2: What were the Guangzhou university students' learning reasons of using mobile devices?

- Research Question 3: What were the Guangzhou university students' learning practices of using mobile devices?

- Research Question 6: Did the types of mobile devices affect mobile learning?

3.6.3 Diary records

Diary records provided accessibility to people's interpretations of their words (Alaszewski, 2006), created a complete record of actions and words (Willig, 2013), developed realistic pictures and provided sensitive descriptions of an individual's daily life (Polit & Hungler, 1994). Diaries were used in the studies to explore changes occurring over time and collected behaviours, lifestyle patterns and symptom management data (Moule & Goodman, 2009). Koch (2006) indicated the use of a field diary helped in establishing rigor in qualitative research and it was also used to clarify thoughts and feelings.

In order to ensure participants writing down their mobile learning practices consistently and systematically, well-designed and structured diaries were given.

52

Structured diaries provided an analytically focused data-gathering instrument which enables the researcher to collect data on every specific feature (Gibson & Brown, 2009). Based on the FRAME model, the rationale of structured diaries was designed. There are three aspects of mobile learning: the device usability aspect (D), the learner aspect (L) and the social aspect (S).

3.6.2.1 Device Usability Aspect

From the device usability aspect, participants had to state the features of their mobile devices such as the brand name, model, size, weight, memory storage, system platform, price and the bandwidth.

3.6.2.2 Learner Aspect

From the learner aspect, participants had to jot down their current study level and the major of study in order to let the researcher understand their education backgrounds. Moreover, participants had to record their learning activities by mobile devices. The learning activities included the following extents:

- Digital Reading / Watching

- Record information

- Digital searching

- Module learning

The participants did not only have to record what type of learning had been performed by mobile devices, but also recorded the time range and the place of using mobile devices to do the above-mentioned learning activities. And, they had to answer

53

whether the activities were related to their current studies or what sort of knowledge had been acquired. The type of knowledge was categorized by the Dewey decimal classification. Moreover, the participants had to record their learning processes and contents.

3.6.2.3 Social Aspect

From the social aspect, participants had to record their learning interactions with peers by mobile devices. The learning interaction activities included:

- Sharing learning resources
- Online discussion

Participants did not only need to record their learning interaction activities with peers by mobile devices; but also had to record the time range and the area of using mobile devices; and had to answer whether the activities were related to their current studies and identified with whom to discuss. Furthermore, the participants needed to record their discussion contents.

From the mobile learning practices, each participant's percentage of time range, percentage of device usage, percentage of formal and informal learning, and percentage of mobile learning activities were found. All information was presented by figures because the figures were suitable for presenting information visually (Creswell, 2007). The second section of the summary diary report contained this piece of information. This information helped to find the practices of using mobile in learning and was responding to the Research Question 3: What were the Guangzhou

university students' learning practices of using mobile devices?

The content and process of mobile learning were parts of the log sheet from student diary record. Actually, the full diary record was too long. The review of the diary report listed only a specific case or a highly frequent mobile learning content and process from student's diary record. The mobile learning content and process listed the detailed records such as mobile learning activities, learning types, date, time, and learning content and process. The information helped to answer the Research Question 5: What was the ratio of students' using mobile devices for formal and informal learning? The Chinese and English version of the diary record showed in Appendix D and Appendix E accordingly.

A diary was used to provide primary research data, as a precursor to interview or to follow up on interview data (Bray, 2007). All participants needed to record their learning activities and interaction in the four weeks into the structured diaries so that it could reflect their m-learning activities fairly. A total of fourteen participants completed a four weeks diary record in May of 2003. In order to present the findings of the diary record comprehensively, this study had reviewed the diary recording report of each student's personal background, mobile learning practices and mobile learning content and process. After completed the structured diaries, participants are invited to have interviews on face-to-face basis.

3.6.4 Post-interview

Qualitative interview was often considered as a favorite methodological tool for qualitative researchers (Denzin, 2009) because this approach could easily obtain

55

useful information. It allowed researchers asking questions and giving responses face-to-face. Researchers could hold the interview in a close contact situation with the interviewees (McMillan, 1996). The quality of the information obtained during the interview was strongly depended on the interviewer (Patton, 1990). Through the post-interview, the interviewees had the opportunities to express their views and feel sophisticatedly, the researcher could easily follow up the unexpected results or go deeper into the motivation of respondents and their reasons for responding as they did (Kerlinger & Lee, 1999). In addition, it was easily comprehended by people and enriched the meaning rather than quantified data (E. Babbie, 2012a). In research, the use of interview marked a move away from obtaining knowledge primarily through external observation and experimental manipulation of human subjects, towards an understanding by means of conversation with the human beings to be understood (Kvale, 1996). Furthermore, interviewees were most likely welcomed to talk rather than to write. Therefore, successful interviewers should build up a reliable relationship with interviewees and let the interviewees express their views or opinions intrinsically (Best & Kahn, 2005).

Patton (1990) suggested that during the interview process, the questions should be short and precise, and asked only one question at a time. Additionally, the interview process should explicit interviewees' feelings, thoughts, opinions, or beliefs rather than express imposed responses predetermined by the qualitative researcher.

After observed the participants' practices in the four weeks diary record, it was found that different participant had different practice of using mobile device to learn.

56

Therefore, the purpose of the post-interview is to let participants explaining in details the reasons for choosing mobile devices to do those learning activities and the types of interaction so that the researcher could have an in-depth understanding of why, what, how and when they participated in m-learning activities. Besides, after the post-interview, what the expectation of mobile learning was and how the mobile devices could be integrated to lifelong learning for the future would be understood. The questions of the post-interview showed in Appendix F.

The post-interview had been held in Guangzhou Higher Education Mega Center after completed the diary for two weeks. Based on the diary record, students' post-interview questions were found to be different. Higher ratio of mobile learning activities or interest and experience were asked in the post-interview. Each student's post-interview questions were based on his/her mobile learning activities from his/her diary and those were designed for answering different types of questions. Post-interview was mainly used to answer Research Questions 1, 2, 3 and 6.

- Research Question 1: What were the Guangzhou's university students' learning strategies of using mobile device for formal and informal learning?

- Research Question 2: What were the Guangzhou's university students' learning reasons of using mobile device?

- Research Question 3: What were the Guangzhou's university students' learning practices of using mobile device?

- Research Question 6: Did the type of mobile device affect mobile learning?

The interview was conducted in Cantonese or Putonghua and took approximately 30 minutes per session. All data would be kept in confidential and the participants would give their written consent to their interviewers for research purposes. The transcription would be sent to the interviewees for confirmation prior to analysis.

3.6.5 Trustworthiness

This study had used multiple data collection methods from fourteen participants within two months. Based on the participants' education backgrounds, they were divided into four groups in the pre-focus group interview. Moreover, all scripts and records were kept confidentially. Before collecting qualitative data (pre-focus group interview, diary and post-interview), all interviewees needed to sign a consent form as to provide the true and detailed information for this study and the form was in simplified Chinese version (Re: Appendix G). The aim of signing the consent form was to ensure all the interviewees clearly understood the purpose of the research and knew all personal data were being kept with high security.

3.7 Data Analysis

This study used a mixed methodology research approach. In the research process, the quantitative and qualitative data were collected. For the mixed method, data analysis involved the integration of statistical and thematic data analytic techniques, plus other strategies unique to mixed-method (Teddlie, 2009).

Quantitative data were analyzed by The IBM predictive analytics software "Statistical Package for Social Sciences (SPSS)" version 19 which is an updated and powerful

statistical software. In this study, SPSS provides the answers of descriptive statistics and inferential statistics such as correlation. In Chapter 4 section 4.4.1 the practices for learner aspect and section 4.5.1 the practices for social aspect, the quantitative percentages equal to the number of interviewees respond what they did in mobile learning activities over the total number of interviewees. The mean was the average of frequency using mobile devices to learn in each learning activity. Besides, the 5 point Likert scale was adopted.

Pre-focus group interview and post-interview were being transcribed. Transcription was probably the best approach to generate analytic focus, and allowed researchers to focus on data, and draw out particularly relevant features (Gibson & Brown, 2009). Moreover, transcribing the interviews from an oral form to a written model allowed the interview conversations for closer analysis (Kvale, 1996). On the other hand, diary was used to summarize data for descriptive statistics.

In the dairy record, six major mobile learning activities, namely, discussion, reading/watching, searching, learning, recording, and sharing were recorded. Each participant had to record his/her mobile learning activities in four sections for four consecutive weeks. The four sections are the midnight section (00:00 – 06:00), morning section (06:00 – 12:00), afternoon section (12:00 – 18:00) and evening section (18:00 – 24:00). Therefore, the total timeslots are 4 timeslots per day × 28 days (4 weeks) = 112 timeslots in research period.

Qualitative percentage is the number of all students' mobile learning activities over

59

total timeslots. In each mobile learning activity of qualitative findings, it separated two percentages of formal and informal learning, and practices of mobile learning activities from diary record. The purpose of calculating the percentage of the time range is to find out the percentage of each mobile learning activity in each time section, and compared with the mobile learning activities in each time range. Below is the equation of calculating the percentage of qualitative. This equation was used to calculate the time of using mobile devices of Guangzhou university students. Detailed information will be mentioned in Chapter 4 section 4.4.1 the practices for learner aspect and section 4.5.1 the practices for social aspect.

Percentage of Qualitative

$$= \frac{Times\ of\ time\ range\ on\ each\ mobile\ activity}{All\ mobile\ learning\ activity\ on\ each\ time\ range} \times 100\%$$

Second, the purpose of calculating the percentage of formal and informal learning is to find out the percentage of the learning type as to compare with each mobile activity. Below is the equation of calculation to calculate the percentage of formal and informal learning. This equation is used to calculate the ratio of using mobile devices for formal and informal learning of the Guangzhou university students. The percentages are shown in Chapter 4 section 4.4.1 the practices for learner aspect and section 4.5.1 the practices for social aspect.

Percentage of formal and informal learning

$$= \frac{Times\ of\ mobile\ activity\ for\ formal\ or\ informal\ learning}{All\ mobile\ learning\ activity}$$

$$\times\ 100\%$$

Table 3.6 lists the data source for each Research Question. Refer to Chapter 1 section 1.4 for the details of each Research Question. This study collects the data in the questionnaire - quantitative data - to answer Research Questions 3, 4 and 6. On the other hand, this study also collects qualitative data to answer Research Questions 1, 2, 3, 5 and 6. In summary, Research Questions 1, 2 and 5 use the qualitative method for the analysis, Research Question 4 uses the quantitative method, and Research Questions 3 and 6 use mixed-method to analysis. The analysis plan for the six Research Questions is listed in Table 3.7.

Table 3.6: Data source for each Research Question

Data Source / RQ	Questionnaire	Pre-focus group interview	Dairy Record	Post-Interview
1		✓		✓
2		✓		✓
3	✓		✓	
4	✓			
5			✓	
6	✓	✓		✓

This study uses the descriptive statistics and correlation to analyze quantitative data. Then, use transcription and the quantified qualitative data to analyze qualitative data.

In Research Questions 3 and 6, use quantitative variables and qualitative theme with Text Data Quotes to build up the matrix for analysis.

Table 3.7: The analysis plan for the six Research Questions

RQ	Quantitative Data Analyze	Qualitative Data Analyze	Merge Quantitative and Qualitative datasets
1		● Transcription	
2		● Transcription	
3	● Descriptive Statistics ● Correlation	● Transcription ● Quantify the qualitative data	Matrix using quantitative variables and qualitative theme with Text Data Quotes
4	● Descriptive Statistics		
5		● Transcript ● Quantify the qualitative data	
6	● Descriptive Statistic	● Transcript	Matrix using quantitative variables and qualitative theme with Text Data Quotes

3.8 Ethical Consideration

Many researchers had raised issues, formulated guidelines and principles and concerned the ethics of researching human subjects in respect to different phases of the research process (American Psychological Association, 1992; Bassey, 2000; Miles & Huberman, 1994). Merriam (1998) cautioned that the burden of producing a study that had been conducted and disseminated in an ethical manner lied with the

62

individual investigator.

Listed below is the action taken for ethical consideration:

- All interviewees signed consensus letter. Appendix G showed the consensus letter in simplified Chinese version and English version.

- Consensus letter and questionnaires were being stored separately. Therefore, researcher could not identify the questionnaires by only having the consensus letter.

- All data files were encrypted by strong password.

- Each questionnaire was being assigned in a unique identification digit as to identify questionnaire.

- Using aliases for pre-focus group interview and post-interview. Disclosure of real name was not required in the conversation.

- Aliases are used to identify participants for all scripts. The matching list of the real names and aliases was encrypted by strong password in another file.

- All scripts were confirmed by participants.

- If the data files were being attached and sent via e-mails, the passwords of the data files would not be disclosed.

- All data files should have its unique strong password

3.9 Summary

This chapter illustrates how to use mixed-method research approach to collect quantitative and qualitative data. In related to the quantitative, this study collected 490 valid sets of questionnaires from the Guangzhou Education Mega Centre which

was higher than the sample size in table 3.4. Moreover, the index of Cronbach's Alpha from the questionnaire was 0.928. As related to the qualitative, this study invited 14 Guangzhou university students to participate 4 times of the focus group interview, a consecutive 4-weeks diary record, and 14 times of post-interview record within 2 months. Therefore, it implied that this study was reliable and trustworthiness.

The rationales of design research instruments were based on the FRAME model. The pilot study, data collection procedures, data analysis and ethical consideration were also discussed in this chapter. Chapter 4 will discuss the findings in this study.

Chapter 4: Analysis of findings

4.1 Introduction

The purpose of this chapter is to present the quantitative and qualitative findings in light of the FRAME model. For quantitative findings, all questionnaires' data are being analyzed by descriptive statistics. For qualitative findings, all pre-focus group interviews, diary record, and post-interviews are transcript for analysis. Through the mixed-method analysis, find out the learning practices, learning strategies, learning attitudes and characteristics of mobile devices for formal and informal learning under each aspect. This chapter has five sections. The first section discusses the demographic of collecting quantitative and qualitative data.

The second section discusses the findings in related to the device aspect. Device aspect refers to the physical, technical and functional characteristics of a mobile device (M. Koole & Ally, 2006; M. L. Koole, 2009). This section would like to find out how the students' attitudes and characteristics of using a mobile device affect learning under the device aspect.

The third section discusses the findings in related to learner aspect. Learner aspect refers to how the learners use what they already know and how they encode, store and transfer information (M. Koole & Ally, 2006; M. L. Koole, 2009). Hence, this section investigated mobile learning practices, strategies and attitudes of Guangzhou university students by learner aspect.

65

The fourth section discusses the findings in related to social aspect. Social aspect is a process of social interaction and cooperation (M. Koole & Ally, 2006; M. L. Koole, 2009). Hence, this section investigated mobile learning practices, strategies and attitudes of Guangzhou university students by social aspect.

The fifth section summaries the findings. This section summarizes the qualitative and quantitative findings of using mobile devices for formal and informal learning.

4.2 Demographics of collecting quantitative and qualitative data

In this study, table 4.1 lists the population of quantitative and qualitative data. All quantitative data are valid and reliable (Chapter 3, sections 3.5.3 and 3.5.4) and qualitative data are trustworthiness (Chapter 3 section 3.6.5). As for comparison and discussion, four categories are being classified in table 4.1. The four categories are: Age Group, Gender, Study Level and Major of Study

Table 4.1: The population of quantitative and qualitative data (in percentage)

	Quantitative Data	Qualitative Data
No. of interviewees	490	14
Age Group		
Below 18	1%	--
19-20	32%	29%
21-22	53%	71%
23-24	11%	--
25 or Above	3%	--
Gender		
Female	46%	50%

Male	54%	50%
Study Level		
Bachelor	92%	100%
M.Phil.	7%	--
Doctoral	1%	--
Major of Study		
Arts	22%	29%
Business	17%	21%
Engineering	21%	29%
Sciences	34%	21%
Others	6%	--

From the table 4.1, under the age group, it showed that the highest proportion of age group was between 21 and 22 for both quantitative and qualitative data. The percentages for quantitative data and qualitative data are 53% and 71% correspondingly. The second highest proportion age group was between 19 and 20, whereas the quantitative data was 32% and the qualitative data was 29%.

In the gender group, it showed that the proportion of gender for female and male was similar in both quantitative and qualitative data. From the quantitative data, it indicated that 54% of the interviewees are male while 46% are female. In the side of qualitative data, 50% of the interviewees are male and 50% are female.

According to the study level, it showed that the bachelor degree was with the highest proportion, 92% for quantitative data and 100% for qualitative data.

In the major of study, based on the number of interviewees' major of study, table 4.1 stated four major study groups: Arts, Business, Engineering and Sciences. In collecting quantitative data, the interviewees who are not studied in the above major groups may be considered as "Others". The reason of listing these four major study groups for data analyze was to ensure the data being analyzed by inferential statistics was accurate (Fraenkel, Wallen, & Hyun, 1993). From the collecting of qualitative data, according to the ethical consideration, all of the interviewees are assigned to have a specific code. All codes had three digits. The first digit indicates student's major study - alphabet "A" represents the student is studying in Arts, alphabet "B" represents in Business, alphabet "E" represents in Engineering and alphabet "S" represents in Sciences. The second digit is "0". The third digit is the student's number. For example, "A01" refers to the first student studying in Arts. In table 4.1, the quantitative and qualitative data showed that the proportion of students with the major of study in Arts, Business, Engineering and Sciences are nearly similar.

Clearly, the percentages of age group, gender group, study level and major of study are consistent between quantitative and qualitative data.

4.3 The findings of Device Aspect

Device aspect refers to the physical, technical and functional characteristics of a mobile device (M. Koole & Ally, 2006; M. L. Koole, 2009). This section discusses how the students' attitudes and characteristics of using a mobile device affect their learning.

4.3.1 Characteristics

Table 4.2 shows the technical preference of device aspect from questionnaire's respondents and interviewers. In this study, the result of respondents showed that 93.3% Guangzhou university students have their own smartphones, and the result of interviewers showed that 100% Guangzhou university students have their own smartphones. Thus, both showed that Guangzhou university students are highly using mobile devices to do online activities.

Table 4.2: Technical preference of device aspect from questionnaire's

respondents and interviewer

	Questionnaire respondents	**Interviewers**
Collected Data approach	Questionnaires	Pre-focus group interview Diary Post-interview
Smartphone Owner	93.3%	100%
Tablets Owner	18.4%	7.1%
Smartphone owner used smartphone to do online activities	98.2%	100%
The highest percentage of		
Smartphone price range	¥1,000 to ¥2,000 (48.6%)	¥1,000 to ¥2,000 (57.1%)
Smartphone display size	3 – 4 inches (45.8%)	3 – 4 inches (71.4%)
Smartphone operating system	Android (75.1%)	Android (64.3%)

69

On the other hand, it meant that Guangzhou university students are with lower percentage rates of using tablets. In table 4.2, the percentages were 18.4% for questionnaire's respondents and 7.1% for interviewers. It seems that the population rate of using smartphone is higher than using tablets. Thus, smartphone is a major mobile learning tool of Guangzhou university students.

Although the usage rate of tablets is much lower, this study result is still similar to the China Tablet PC Market Analysis Report issued in November 2012 (Gong, 2012). For example, questionnaire respondents indicated that most of the students spent a higher tablet price which is from ¥3000 to ¥4000. Besides, The China Tablet PC Market Analysis Report issued in November 2012 found that Chinese people do not mind to pay a higher price for the tablet and the price is also from ¥3000 to ¥4000. Second, interviewers showed that the highest percentage of the tablet's size using is between 8 to 10 inches. Meanwhile, the China Tablet PC Market Analysis Report issued in November 2012 also discovered the same result. Third, the questionnaires responded that 10 – 20GB models are mostly being used. In the China Tablet PC Market Analysis Report issued in November 2012, it showed that the tablet with higher capacity size is more favorable and the favorable capacity size is between 10 and 20GB. Besides, in the survey, the respondents indicated that the tablets with iOS-shaped had a large proportion whereas the China Tablet PC Market Analysis Report issued in November 2012 found that Apple has a higher popularity. Both results found that users preferred to use Apple tablet. The above findings proved that this study result is similar to the China Tablet PC Market Analysis Report issued in

70

November 2012.

Questionnaire respondents revealed that 63.4% interviewees use Wi-Fi to connect internet, 58.7% use 2G and 35.8% use 3G to connect internet. However, the Chinese Smartphone Market analysis report issued in November (Wang, 2012) indicated 65.2% Smartphone owners use 3G to connect internet. Both results indicated that 3G is not so popular in China.

Moreover, as shown in table 4.2, it was found that 75.1% smartphone owners used android operating system under the questionnaire respondents. For the interviewers, it was found that 64.3% smartphone owners used android operating system. Both results are consistent and persistent with the Chinese Smartphone Market analysis report issued in November. This analysis report indicated that 58.2% smartphone owners use android operating system. Obviously, android operating system is the most popular mobile operating system.

Furthermore, questionnaires respondents showed that 48.6% of the interviewees and qualitative findings indicated that 57.1% smartphone owners used the smartphone with the price between ¥1000 and ¥2000. Both findings are consistent, and the results are consistent with the Chinese Smartphone Market analysis report issued in November (Wang, 2012). This analysis report found that 44.3% smartphone owners used around ¥1000 to ¥2000 on smartphone too. Obviously, the price of smartphone between ¥1000 and ¥2000 is the most popular. The above findings proved that the result of this study is similar to the Chinese Smartphone Market analysis report issued

in November (Wang, 2012) and the 34th China Internet Development Statistical Report (China Internet Network Information Center, 2014)

Questionnaires respondents revealed that 60.4% of them used below 200MB usage per month, and 72.2% used the amount for the usage below ¥49 per month. The survey also respectively reflected that 71.2% and 81% used mobile device to access internet at home or hostel and university. Most of them have 1 – 3 years experiences of using smartphone or tablets. It seems that the interviewees did not prefer using too much for the cost of mobile surfing. They would prefer using Wi-Fi service to access to the internet.

4.3.2 Student's attitudes

Table 4.3 lists the attitudes of factor in device aspect of Guangzhou university students. According to the 5 point Likert scale, all of the factors are over 3 which ranging from 3.25 to 3.81. Thus, the results found that Guangzhou university students regarded all the factors related to device aspect affect learning and the results were very positive. Interviewers responded that Guangzhou university students agreed that bandwidth was the highest factor to affect learning. Questionnaires respondents and interviewers' replies were consistent. Five students agreed poor bandwidth affects their learning performance and the frame of mind. High and stable quality broadband can let them learn smoothly in the whole learning process. Hence, they preferred using Wi-Fi to access internet for mobile learning because Wi-Fi is not expensive and has stable quality of accessing internet. Most of university students may not afford the price of 3G or 4G because 3G or 4G are quite expensive in Guangzhou. As a

result, they preferred using Wi-Fi to access internet in school, home or hostel, and they wish more free Wi-Fi access point in public.

Table 4.3: The Attitudes of factors in device aspect

Quantitative Findings			Qualitative Findings from Pre-focus group interview/ Post-interview Findings	
Factors	M	S.D.	Supported Evidence	Not supported Evidence
Bandwidth	3.81	1.091	• High quality of mobile device affects positive learning. • Poor bandwidth quality affects poor learning attitudes	• The mobile device quality may not affects learning performance
Capacity	3.47	1.079		
Screen Size	3.25	1.141		

Findings from the questionnaire, compared with bandwidth, capacity and the screen size, Guangzhou university students agreed screen size is the lowest factor to affect learning. Students B03 and E04 believed that reading through desktop is more

73

comfortable than mobile device because the screen size of desktop is larger than mobile device, but student E01 expressed that he did not want to stay in a fixed position for a long time to operate the computer. Portability is the power of mobile devices, but the weakness of mobile devices is that the screen is too small which limited the process of obtaining information, and the users could not read many characters in one page. Students B03, E01 and E04 commented that the mobile devices are not suitable for long time operation because the battery could not support the power for long period, and the screen size is not suitable for long time reading. They believed desktop should be more suitable for long time working, especially typing.

Figure 4.1: Qualitative findings for supporting higher quality mobile device may affect positive learning
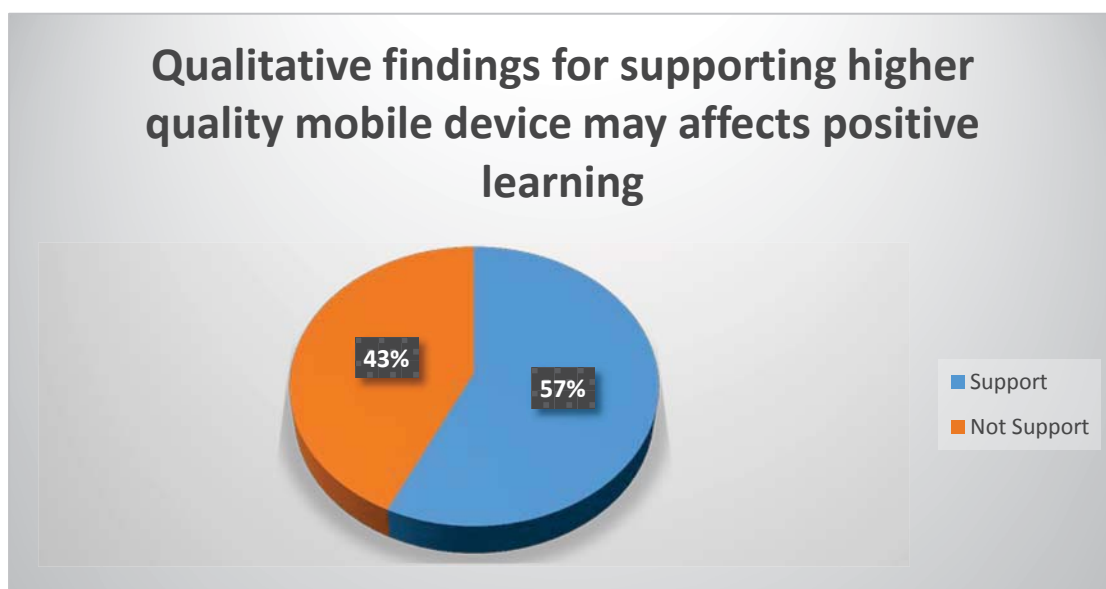

Figure 4.1 shows that 57.1% Guangzhou university students supported higher quality

74

mobile device may affects positive learning. They believed using the higher-ranking mobile device is better for learning, and the value for money is the most concerned issue. They concerned that if they paid five thousand dollars for the mobile devices, but there is no difference for the effectiveness in learning of the mobile devices with lower monetary value, they preferred to buy the one with only three thousand dollars.

On the other hand, figure 4.1 shows 42.9% Guangzhou university students supported that higher quality mobile devices may not affects positive learning. They disagreed that the higher-ranking mobile devices affects positive learning because they believed there is no difference between high quality mobile device and low quality mobile device such as electronic reading. Students concerned more for the content of an e-book rather than the quality of e-books. Most of them agreed the speed of network connection is more important than the price of mobile devices. Hence, this study could not conclude that higher technical ranking mobile devices had positive impact on mobile learning.

4.4 The Findings of Learner Aspect

Learner aspect refers how learners use what they already know and how they encode, store, and transfer information (M. Koole & Ally, 2006; M. L. Koole, 2009). Hence, this section investigated mobile learning practices, strategies, and attitudes from Guangzhou university students.

Table 4.4: The percentages of formal and informal learning under the

questionnaires and diary findings in the learner aspect of mobile learning

activities

Mobile learning activities	Questionnaires Findings			Diary Findings		
	%	M	S.D.	%	Learning	
					Type	%
Electronic Reading	94.3	3.77	1.172	62.4	Formal	6.25
					Informal	93.75
Searching	92	3.69	1.233	27.4	Formal	39.5
					Informal	60.5
Learning	89	3.59	1.216	12.7	Formal	88.3
					Informal	11.7
Digital Recording	80.2	3.14	1.339	21.9	Formal	37.8
					Informal	62.2

Table 4.4 lists the percentages of formal and informal learning under the questionnaires and diary findings in the learner aspect of mobile learning activities. Detailed analyze process is described in Chapter 3 section 3.7 data analysis section. The correlation of the percentage and mean of the frequency on each mobile learning activity is 0.8945. It showed that it has a strong correlation (Creswell, 2007). Therefore, it means the higher the percentage of mobile learning activity, the higher the mean of the frequency using mobile device to learn in mobile learning activity. The mean of all mobile learning activities is over 3 by 5 point Likert scale. The range is from 3.14 to 3.77 and percentage of all mobile learning activities is over 80% by questionnaires findings. Thus, the results showed that Guangzhou university students are highly participated in using mobile devices to learn.

4.4.1 The practices of electronic reading

Table 4.4 shows that, in questionnaires findings, 94.3% of Guangzhou university students have used mobile devices to read or watch for learning. The mean of frequency is 3.77. Diary findings find that Guangzhou university students spend 62.4% timeslot of using mobile devices to read or watch for learning. The percentages of formal learning and informal learning are 6.25% and 93.75% correspondingly. Clearly, the findings indicate that using mobile device to read or watch for informal learning are the major practices of Guangzhou university students.

Table 4.5: Sub-activities for reading

Mobile learning activities	Questionnaires Findings			Diary Findings		
	%	M	S.D.	%	Learning	
					Type	%
Reading Websites	91	3.69	1.261	46.9	Formal	5.36
					Informal	94.64
Reading News	88.4	3.38	1.286	35.0	Formal	8.21
					Informal	91.79
Reading Books	83.1	3.19	1.206	25.2	Formal	5.31
					Informal	94.69
Watching Video	76.5	3.1	1.177	22.0	Formal	5.41
					Informal	94.59

Table 4.5 lists the sub-activities of electronic reading for reading websites, news, books, and watching video of questionnaires and diary findings. The questionnaires findings find that 91% Guangzhou university students have used mobile devices to read websites for learning. The mean of frequency is 3.69. Diary findings find that

Guangzhou university students spend 46.9% timeslot of using mobile devices to read websites for learning. And, the percentages of formal learning and informal learning are 5.36% and 94.63% accordingly. Besides, based on the questionnaires findings, watching video has the lowest percentage (76.5%) and the mean of frequency is 3.1 for Guangzhou university students to use for learning. Moreover, diary findings find that Guangzhou university students spend 22% timeslot of using mobile devices to watch online movies for learning, and the percentages of formal learning and informal learning are 5.41% and 94.59% respectively. Actually the findings between questionnaires and diary are consistent. Explicitly, the findings indicate that Guangzhou university students most commonly used mobile devices to read for acquiring knowledge. And, the results revealed that websites to be a major reading media for mobile devices.

4.4.2 The strategies of electronic reading

For formal learning, students use mobile devices to read websites, news, and books or watch movies for doing assignments. Students A04, B01, B02 and B03 read the recommended websites by their teachers. Students B01, E03 and S03 read news as to update their information in community or finance. Students A01 and S03 watch online movies to do assignments. Student A04 was interviewed and stated:

> "My teacher always requests me to do book report. So, I downloaded e-books from internet to my smartphone for reading. The advantage is that I can download many e-books without purchase and read without place and time limitation.

And, I can search the key words from e-books which improve

my efficient in reading."

Thus, students use mobile devices to read websites, news, and books or watch movies for study. Students B01 and S03 read the e-books recommended by their teachers such as "STATA". Student S03 watches online movies for learning national geographic. Student B01 was interviewed and stated:

"I read teaching materials in the lesson because my teachers

upload teaching notes to the school's learning platform.

Therefore, I downloaded notes to my smartphone and read during

the lesson. So, no need to print and bring notes to my lesson."

Additionally, students watch online movies can learn professional computer software which assists them in doing assignments. Student B01 was interviewed and stated:

"I watch online movies in learning business data analyse software

"STATA" and computer software skills such as editing online

movies for assisting doing assignments. Actually, the advantage

of watching online movies to learn is that I can learn step by step.

I watch online movies from smartphone and use desktop to

practice. This learning method can improve my learning

performance."

79

For informal learning, students read weibo or news to update daily knowledge or news. Nine students expressed that they read weibo to update daily knowledge or news. Eleven students mentioned they read for updating community news.

In addition, students read websites, books or watch movie to enhance their knowledge of hobbies such as sports, travels, technologies and literature. Students E01, E02 and S03 read websites for learning sports. Student B03 read websites for learning travel information. Students E01, E03 and S03 read news for updating sports news. Students A03 and A04 read news for updating technology information. Seven students have the practices of reading electronic novels. Students A04 and B03 watch online TV or movies for learning pop music technique.

Furthermore, six students read websites, news, books or watch movies to enhance learning skills such as computer software or languages. Student B01, B02 and B03 read websites to learn computer software skills. Student B02 read websites and electronic books to learn French and English. Student A01 read electronic books for learning Chinese literature. Student S01 read electronic books for learning sciences. Student A04, B01 and B02 watch online TV or movies for learning English and French. Student A01, B01 and B03 watch online TV or movies for learning presentation skills. Student B01 and S01 watch online TV or movies for learning computer software skills such as "Photoshop" and "Flash".

Besides, students read websites, news and books or watch movies for gaining extensive knowledge for formal learning such as financial knowledge, sciences,

80

history, Chinese literature, etc. Students B01 and B03 read websites for learning financial knowledge. Student S03 was interviewed and stated:

> "I watch online TV or movies for learning history. Although I am studying sciences, I have interest to learn more deeply in Chinese History. My school cannot offer me to study Chinese history. Therefore, I watch online TV or movies in order to understand the Chinese history deeply."

4.4.3 The practices of searching

Table 4.4 shows that searching is the second higher mobile learning activities. Questionnaires findings find that 92% Guangzhou university students have used mobile search function in learning. The mean of the frequency is 3.69. Diary findings find that Guangzhou university students spend of 27.4% timeslot using mobile search function for learning. The percentages of formal learning and informal learnings are 39.5% and 60.5%. Although the percentage of informal learning is higher than the formal learning, the percentage gap between informal and formal learning is less than electronic reading.

Table 4.6: Sub-activities of searching

Mobile learning activities	Questionnaires Findings	Diary Findings

	%	M	S.D.	%	Learning	
					Type	%
Search from knowledge Website	88.8	3.41	1.232	7.5	Formal	47.3
					Informal	52.7
Search engines websites	86.5	3.24	1.246	18.9	Formal	34.5
					Informal	65.5
Search from Library Websites	70.6	2.97	1.364	3.0	Formal	62.2
					Informal	37.8

Table 4.6 lists the sub-activities of searching from knowledge websites, search engines websites, and library websites. The questionnaires findings find that 88.8% Guangzhou university students have used mobile devices to search knowledge websites for learning. Moreover, the mean of frequency is 3.41. Diary findings find that Guangzhou university students spend 7.5% of timeslot using mobile devices to search knowledge websites for learning. Besides, the percentage for formal learning is 47.3% and 52.7% for informal learning. On the contrast, the questionnaires findings find that 86.5% Guangzhou university students have used mobile devices to search from search engines websites for learning. And, the mean of frequency is 3.24. The findings find that the percentage of Guangzhou university students use mobile devices to search from engine websites for learning is 18.9% and the percentages of formal learning and informal learning are 34.5% and 65.5%. The results between the questionnaires and diary findings of the highest searching platform are mixed. However, the diary findings show that the percentages of formal learning and informal learning are close. Clearly, the findings indicate that using mobile devices to search no matter from web engines or knowledge websites are the major practices of Guangzhou university students for formal and informal learning.

82

4.4.4 The strategies of searching

For formal learning, students use mobile devices to search information, knowledge or data for doing assignments. Six students expressed that they searched from Baidu professional knowledge websites or China knowledge resources integrated database to acquire professional knowledge for studying or doing assignments.

Students use mobile devices to search learning researches, books, professional articles, papers, and learning apps for study. Students B01, E01 and E04 search formal learning resources from Baidu, student A03 and S01 search professional articles and papers. Student S02 was interviewed and stated:

> "I always search learning apps from my smartphone because most
> learning apps assisting me for my study. Moreover, the learning
> apps are updated which can demonstrate the experimental results
> by graphs or animation."

Twelve students search from Baidu websites in acquiring professional knowledge for study. Students A04, B01 and B03 search professional mock papers for preparing professional examinations. Six students search books in university library website. Students B02, S01 and S03 search academic journals.

Students use mobile devices to search learning materials such as learning professional computer software to assist in doing assignments. Student B01, B02 and B03 search from Baidu websites for learning business data analyze software "STATA".

Sometimes, students use mobile devices to search in the lessons. Student A03, A04 and S02 search during lessons. Students A03, A04 and S02 use mobile devices to search in the lesson when they do not understand the context in the lesson or would like to find out more extendable knowledge. Baidu professional knowledge websites (http://baike.baidu.com) and China knowledge resources integrated database (http://www.cnki.net) are the major searching platforms for formal learning.

For informal learning, students use mobile devices to search knowledge for solving daily life problems. Students A01 and A02 search knowledge for solving their daily life problems; students B01, B02, S02 and S03 search from Baidu websites to find the routes; and students B01, B02, S02 and S03 search from Baidu websites to find healthy problems. Six students search from Baidu websites to find out the solution of computer technical problems.

Ten students search books or information to enhance their knowledge of hobbies such as movies, sports, singing, travels, technologies and handcrafts. Student B01 was interviewed and stated:

> "I always use the apps of Baidu websites in my smartphone to search the travel information on the streets. Smartphone became

my good navigator on the street. "

Student B02 was interviewed and stated:

> "I always search Baidu websites to find the updated information of handcrafts and search the Baidu zhidao to acquire updated information of sports."

Students A01 and B01 search the Baidu zhidao to acquire updated movie information; and students S02 and S03 search from Baidu zhidao to acquire knowledge in singing. Five students search books from university library websites as interest.

Students use mobile devices to search learning skills such as computer software skills or languages. Students A01, S01 and S02 search computer skills from Baidu zhidao for acquiring updated information; students B01 and B02 search for language techniques from Baidu websites.

For formal learning, students use mobile devices to search extensive knowledge such as Chinese literature financial knowledge, sciences, history, etc. Students B01, E01 and E04 search extensive knowledge for formal learning from Baidu websites. To conclude, Baidu websites are the major searching platforms no matter for formal and informal learning.

4.4.5 The practices of Learning

Table 4.4 shows that learning is the third one with higher percentage of mobile learning activities. Questionnaires findings find that 89% Guangzhou university students have used mobile devices to learn with the mean of frequency 3.59. The findings also find that Guangzhou university students spend 12.7% of timeslot using mobile devices to learn. The percentages of formal learning and informal learning are 88.3% and 11.7% accordingly. The percentage of informal learning is lower than formal learning.

Table 4.7: Sub-activities of learning

Mobile learning activities	Questionnaires Findings			Diary Findings		
	%	M	S.D.	%	Learning	
					Type	%
Translate	82.9	3.19	1.322	2.7	Formal	87.8
					Informal	12.2
Apps	74.5	3.05	1.228	5.0	Formal	91.1
					Informal	8.9
Assessment	50.6	2.43	1.286	1.2	Formal	89.5
					Informal	10.5

Table 4.7 lists the sub-activities of learning and the sub-activities are translate, apps and assessment. The questionnaires findings find that 82.9% Guangzhou university students have used the translation functions from mobile devices to translate vocabulary or sentence and the mean of frequency is 3.19. Diary findings find that Guangzhou university students spend 2.7% of timeslot using mobile devices for translation and the percentages of formal and informal learning are 87.8% and 12.2%

86

correspondingly. Besides, the questionnaires findings find that 74.5% Guangzhou university students have used the apps functions from mobile devices for learning with the mean of frequency 3.05. Diary findings find that Guangzhou university students spend 5% of their time use apps functions from mobile devices for learning. The percentages of formal and informal learning are 91.1% and 8.9%. The results between the questionnaires and diary findings of the highest searching platform are mixed.

4.4.6 The strategies of learning

For formal learning, mobile devices have roles of multi-functions and can be the learnings tools in the lesson or out of lesson because they can download different types of learning apps for learning. Guangzhou university students believed mobile devices can be a tool of translator. Students A03, E01, E02, E04, S01 and S02 mentioned that they always download different types of learning apps (Safko, 2012) such as translation apps to learn English. They always use mobile devices to translate vocabulary or sentence for study. Student A03 was interviewed and stated:

> "I always use mobile devices to check online dictionary in the lesson."

Student E01 was interviewed and stated:

> "Practicality, entertainment, and multi-functionality are the benefits of mobile devices."

87

Additionally, students E04, S01, S02 and S03 downloaded the apps of scientific or engineering calculator into their smartphones for calculation in the lesson. Student E04 was interviewed and stated:

> "I download engineering equation apps to find a solution. The benefits of downloaded the apps are no need to bring calculator and save time to search the equation from books."

Furthermore, seven students use apps to learn professional knowledge. Students E02 and E03 use apps to learn writing programs. Students B02, B03 and S02 use mobile devices to do online assessments for professional examinations.

For informal learning, students A01, A02, B02 and B03 use mobile devices to do the translation when reading foreign newspapers, magazines or websites. Students B01, E02 and S01 use apps of mobile devices for learning the knowledge of hobbies; students B03 and S03 do online assessments to assess knowledge standard of hobbies. Nine students downloaded and used the learning apps to acquire the knowledge of hobbies. Student S03 was interviewed and stated:

> "I believe Smartphone has become a powerful tool, and Apps can be expanded the functions of Smartphone. I like to download different types of apps for learning the knowledge of my hobbies. "

4.4.7 The practices of digital recording

Table 4.4 shows that digital recording is the lowest mobile learning activity as with the lowest percentage. Questionnaires findings find that 80.2% Guangzhou university students use digital recording function of mobile devices to learn. The mean of frequency is 3.14. Diary findings find that Guangzhou university students spend 21.9% of their timeslot to use the digital recording function of mobile devices for learning. Besides, the percentages of formal and informal learning are 37.8% and 62.2%. The percentage of informal learning is higher than formal learning.

Table 4.8: Sub-activities for digital storage

Mobile learning activities	Questionnaires Findings			Diary Findings		
	%	M	S.D.	%	Learning	
					Type	%
Photo shooting	74.9	3.05	1.316	9.9	Formal	47.0
					Informal	53.0
Video capture	59.8	2.74	1.254	3.1	Formal	10.6
					Informal	89.4

Table 4.8 lists the sub-activities for digital storage such as photo shooting and video capture. Questionnaires findings find that 74.9% Guangzhou university students use mobile devices for photo shooting. The mean of frequency is 3.05. On the other hand, diary findings find that Guangzhou university students spend 9.9% of timeslot using mobile devices in photo shooting. The percentages of formal and informal learning are 47% and 53% whereas the percentage of informal learning for photo shooting is higher than formal learning. Additionally, the questionnaires findings find that 59.8% Guangzhou university students use mobile devices for video capture and the mean of frequency is 2.74. Meanwhile, diary findings find that Guangzhou

university students spend 3.1% of timeslot using mobile devices for video capture. The percentages of formal and informal learning are 10.6% and 89.4%. Clearly, the findings indicate that using mobile devices for photo shooing is the major practices of Guangzhou university students for formal and informal learning.

4.4.8 The strategies of digital recording

For formal learning, students use mobile devices for data organization. Students B01, B03, A02, A04, E04, E03 and S02 took photos of teacher's handwriting in lesson. Student E03 was interviewed and stated:

> "I always use smartphone to take photos during the lesson for capturing teacher's hand-written notes because my teacher's teaching speed is too fast. So, I use my smartphone to capture the notes on the blackboard. After photo shooting in the lesson, I rewrote the notes in my notebook for further study. I believed taking photos in the lesson is a good practice for study."

Student B02 was interviewed and stated:

> "I always use my smartphone to jot down important notes in the lesson. As comparing with using pen and paper notes to jot down important notes, using smartphone to jot down notes is more flexible for editing. Digital notes can keep for a long time and convenient to edit. Smartphone allowed me to insert sentences or

90

keywords into the middle of paragraph. Also, important sentences could be highlighted for easy memory. After editing, records would be converted into different digital format such as Words and PowerPoint formats for record. After the lesson, I use the edited notes for studying purpose or doing assignments. In the lesson, the table size for students is limited. Therefore, the size of smartphone is an advantage to record or to edit notes because smartphone is lighter and smaller than notebook. So, smartphone is the most suitable learning tool in the lesson."

Thus, students A01 and A02 prefer to store e-articles into mobile devices for study as it does not have time and location limitation. They can download lecturer's notes, webpages, and search result files into their mobile devices for study in any time and place.

Moreover, student E02 was interviewed and stated:

"There are many apps to help student's memory in China. I believed those apps are the most useful tools, for examples, towords (http://towords.com/) and baicizhan (http://www.baicizhan.com) which could be downloaded to my smartphone and the apps can frequently show the words on the smartphone for learning vocabulary. The apps are free of charge but need to register on the website before using. I agreed those

apps could help students to learn effectively and efficiently, if there are no apps, I could not remember as much vocabularies as in a short period. If I have no assistance from smartphone, I believed I need to spend more time to learn vocabulary and memorize the English words."

For informal learning, students B01, B02, B03, E02, E03, S01, S02 and S03 use mobile devices for record their daily life experiences for memorize. Students A01 and A03 use mobile devices for diary recording; students A02, B02 and E03 also have the practices of using Smartphone to record their personal diaries or to study notes. Moreover, student A02 was interviewed and stated:

"I downloaded a famous Chinese Apps which is called fenfen diary (http//:www.fenfenriji.com/) to record my daily life experience. I post the feeling by text, photo, and video to record my daily life. I believed smartphone is a convenient tool for recording because it does not have time and location limitation, and I could immediately record any sudden incident."

4.4.9 The attitude for learner aspect

Table 4.9 lists the attitudes of using mobile devices for formal and informal learning for learner aspect. The means for all the attitudes of using mobile devices for formal and informal learning are over 3 by 5 point Likert scale. The range is from 3.42 to 4.00 and the results are very positive. Thus, for learner aspect, the findings show that

Guangzhou university students agreed that mobile learning practices are positive to affect learning.

Table 4.9: The attitudes of using mobile devices for formal and informal learning

Questionnaires Findings		
Attitudes	M	S.D.
Searching	4.00	.973
Record Data	3.92	.971
Learning	3.78	.999
Informal	3.91	.980
Formal	3.65	1.001
Reading	3.75	1.044
Apps	3.42	1.092

Guangzhou university students agreed that using mobile devices to search can facilitate in learning. Second is to record data. There are mixed results on mobile learning practices and attitudes because the record data from mobile learning practices had the lowest rank. The reason may be complicated because in the learning process of Guangzhou university students, they rarely need to record data as their assignments or study methods may not always use this learning technique. However, they agreed mobile devices can be facilitated in recording their learning process.

4.4.10 Advantages and Disadvantages

Collected from pre-focus group interview and post-interview, the following sections will elaborate on the advantages and disadvantages of using a mobile device to learn.

93

The learning activities are using mobile device for searching, data recording, formal and informal learning, reading, and using apps.

Searching

Guangzhou university students agreed there are four advantages of using mobile device to search for formal and informal learning.

The first advantage is mobility. Guangzhou university students believed mobility is the major key for helping them to learn. Seven students agreed that mobile searching can let them search in lesson or out of lesson immediately. Therefore, they can acquire the knowledge without time and place limitation.

The second advantage is to improve learning effectiveness and efficiency. Student B01 and E01 agreed that using mobile device to search is the most effective study mode and saving time. Their smartphones turn on 24 hours. If they did not use smartphone for searching, they would need to turn on their personal computers. Therefore, they prefer using smartphone for searching.

The third advantage is learning autonomy. Holec (1979) defined learner autonomy as the "ability to take charge of one's own learning". Student A02 was interviewed and stated:

> "I search different types of learning materials such as video or websites to learn English. I used my mobile device to watch

English online movies, listen to English music, translate any unknown vocabulary, and record my English speaking practices. I believed mobile device can facilitate learning autonomy."

The fourth advantage is to acquire updated information. Student A04 was interviewed and stated:

"I search most updated learning materials for formal learning, because I discovered teaching books or lecturer notes are not up-to-dated, and I search the webs or knowledge websites to acquire updated knowledge and accurate information. I believed up-to-dated knowledge is very important for my learning. Thus, mobile device can facilitate in acquiring updated information."

Nonetheless, student B01 has the experience of searching false information from search engine of Baidu when doing assignment. Thus, she got low marks of her assignment. Finally, she searches knowledge websites to find professional information when doing assignments or projects.

Data recording

Guangzhou university students agreed that two advantages of using mobile device to search for formal and informal learning existed.

The first advantage is mobility. Guangzhou university students believed the mobility is the major factor for helping them to learn. Students A01, A02, B02 and E03 agreed mobile recording can let them record what are happened via photo, video or text format immediately no matter in the lesson or not. Recording data function can facilitate Guangzhou university students to keep knowledge record highly frequency of learning experiences by photo, video or text format for formal and informal learning.

The second advantage is to improve learning effectiveness and efficiency. Student B02 was interviewed and stated:

> "I prefer using mobile device to record text format information because mobile device is flexible in editing text information. I can immediately insert paragraph or delete words when edited my diary or study notes. Moreover, I use the functions of copy and paste to avoid input many characters so as to save time."

Furthermore, student A02 was interviewed and stated:

> "All data files no matter what sort of formats can be encrypted, so it can protect my data avoiding other persons' copy."

And,

"The function of inputting characters is the strength of mobile device. The user may not need to familiar with Chinese characters input method and input Chinese characters in high speed because there are many assisting Chinese character input method such as free hand writing apps or voice input apps. Hence, the speed for input characters is faster than writing. Besides, most mobile devices can replace external data disk to store data such as SD card so the data storage is unlimited."

In addition, students A02, B02 and E03 agreed that mobile devices are effective for information storage. Consequently, they do not need to spend time on memorize information.

Nonetheless, student A02 has the experience when she is doing assignment. She was interviewed and stated:

"I use the copy and paste functions for copy text from web and paste to my assignment. Actually, I did not clearly understand about the copy of whole context, and may be easily violated plagiarism."

Student A02 agreed that data conversion and data classification are the troubles when using mobile devices to record data. In fact, different types of mobile device recorded data format may not be consistent. As a result, users need to familiar with the

97

computer skills and spend a lot of time for data conversion if they expected to use those data in different types of computers or mobile devices. Also, student A02 stored many e-books and photos in her mobile device, and she spent a lot of time for doing data classification in order to search easier for what she wants and the results.

Formal and informal learning

Guangzhou university students agreed there are five advantages of using mobile devices to learn for formal and informal learning.

The first advantage is mobility. Nowadays, acquiring knowledge should not be limited for learning in the lesson. Acquiring knowledge should be happening anytime and anywhere (Dew, 2010; Gimenez López, Magal Royo, Laborda, & Garde Calvo, 2009). All Guangzhou university students expressed that they use mobile devices to learn because mobile devices are convenient for them in gaining formal and informal knowledge without time and place constraints.

The second advantage is to improve learning effectiveness and efficiency. Students A01, A02, A03 and A04 agreed informal learning could be a complement for formal learning. Students use mobile devices to gain formal knowledge in the lesson and have further study such as finding supplementary information related to formal knowledge for informal learning. Therefore, students could learn professional knowledge comprehensively. The example of informal learning complementing with formal learning is that student can gain knowledge in the lesson and use mobile devices to search information from the web afterwards. Besides, they would discuss

98

with classmates and friends after the lesson. Mobile devices could store high amount and various files types of data. Therefore, mobile devices could improve their learning effectiveness and efficiency (Motiwalla, 2007; Quinn, 2000).

The third advantage is to acquire knowledge. Student E03 expressed that he always uses mobile device for acquiring knowledge in different formats such as video, audio and text format. Student E03 was interviewed and stated:

> "Informal learning acquired knowledge in daily life such as watching movie or listening to music. Informal learning is an important learning approach because I listen to English music or watch American movies to learn English."

The fourth advantage is enjoyable learning. Seven students agreed that mobile devices can enhance their motivation in formal and informal learning because mobile devices are the tools for their daily life. Hence, student S03 stated mobile device is a suitable learning tool for formal and informal learning. Indeed, students enjoyed to use mobile devices to learn, because the learning process is full of fun. Mobile devices are suitable learning tools for formal and informal learning. Student S03 was interviewed and stated:

> "Mobile device is suitable for formal and informal learning because mobile device is not restricted by place and time. Furthermore, mobile device is a powerful tool for self-learning. I

99

enjoyed using mobile device to learn".

The fifth advantage is the learning autonomous. Students B03, B04, E02 and S03 believed informal learning is a kind of autonomous learning, self-learning, out of formal lesson to learn and student-oriented learning approach (Schugurensky, 2000; Smith, Sadler-Smith, Robertson, & Wakefield, 2007; Watkins & Marsick, 1992). Based on the students' own interests, professions or career perspectives, and enlarge the view of global knowledge (Livingstone, 2001; Merriam, Caffarella, & Baumgartner, 2012), mobile devices are suitable tools in helping them to plan their learning schedules and learning tasks. It could broaden their horizons and enrich their knowledge no matter in their daily life or professional and industrial knowledge.

Nonetheless, student E02 worried mobile device reduces his concentration of learning because he had an experience - he played online games when he used mobile devices for study. So, students E02 believed self-discipline is the major factor for a successful mobile device learner.

Reading

For formal and informal learning, Guangzhou university students mentioned there are four advantages of using mobile devices to learn.

The first advantage is mobility. All students expressed that they always use mobile devices to read, especially for reading academic notes. It is because they believed the power of mobile devices is the mobility (El-Hussein & Cronje, 2010; Zurita &

100

Nussbaum, 2007). They could read and search information anytime and anywhere. Student E01 has the practice to read electronic books in bus, restaurant, library or coffee shop. Student A01 was interviewed and stated:

> "I like to read the information of social sciences. So, I frequently read social sciences articles or electronic books. The benefit of reading electronic books is that I can read the updated internet articles."

The second advantage is to improve learning effectiveness and efficiency. Students S03 and E01 agreed that the speed of start-up a smartphone is faster than a personal computer. Therefore, they highly prefer to use smartphone for reading electronic papers as they would like to read immediately, effective and efficiently. Furthermore, six students said smartphone could store many electronic books so that they could read electronic papers anytime and anywhere. Student S02 was interviewed and stated:

> "Comparing with traditional reading books, electronic reading allows me to read many types of books which could be downloaded from Internet."

Students E04 and A03 like to use smartphone for reading because smartphone could adjust the shininess and lightness for comfortable reading. They live in hostel and could not always turn on all the lights in the room. So, the function of adjusting the

101

shininess and brightness of smartphone is very important to them. Reading must be progressed under the condition with adequate lighting.

The third advantage is to acquire updated information. Student S02 expressed that using smartphone could let him absorb the updated information such as news or articles, because most apps provided updated news to him for understanding what are happening in the world.

The fourth advantage is to acquire knowledge. Six students used mobile devices to read their study notes, digital books, websites, and watch video for acquiring knowledge.

Although electronic reading has many advantages, students A01 and S03 felt reading paper books is more comfortable and casual. Maybe, they like the practice of turning pages when reading paper books. However, students A01 and S02 have practices to highlight or to bookmark important messages in the paper books. They did not know how to bookmark or highlight the important message in the electronic books. Student A01 was interviewed and stated:

> "I read paper books for a long time, but I cannot read electronic books for a long time because I felt tired after reading electronic books for a long time."

Students E04 and S02 indicated that they prefer reading paper books to gain formal

102

knowledge. Seven students agreed e-reading is more flexible for reading, but they prefer reading paper books rather than e-books for study because books provided comprehensive knowledge. Furthermore, students B01, E01, E02 and S02 felt reading paper books and/or newspapers are better than e-books and e-news. Students E04 and S02 indicated that they prefer using smartphone to read for informal learning, but they prefer reading books for formal learning. Students A02 was interviewed and stated:

> "I agreed mobile devices could provide wide and variety knowledge, but paper books allow people to gain a depth knowledge."

Apps

The first advantage is learning diversification. Six students believed the function of mobile device can be empowered through the different apps or software. It can also expand learning expansibility.

The second advantage is learning expansibility. Student S03 was interviewed and stated:

> "I believed apps can expand the functions of smartphone, and I can download learning apps for learning different types of knowledge for formal and informal learning"

103

4.5 The Findings of Social Aspect

Social aspect is the process of social interaction and cooperation (M. Koole & Ally, 2006; M. L. Koole, 2009). Hence, this section investigates two mobile learning practices, strategies, and attitudes from Guangzhou university students. The two mobile learning practices and attitudes are discussion and sharing.

4.5.1 Practices

Table 4.10 lists the percentages of formal and informal learning from the questionnaires and diary findings for the social aspect of mobile learning activities. Detailed analyze process is described in Chapter 3 section 3.8 analysis section. The correlation of the percentage and mean of the frequency on each mobile social interaction of learning is 0.9544. It is a strong correlative (Creswell, 2007) which means the higher the percentage of mobile social interaction of learning should have the higher the mean of frequency of using mobile devices to social interaction of learning.

Table 4.10: The percentages of formal and informal learning from the questionnaires and diary findings for the social aspect of mobile learning activities

Mobile learning activities	Questionnaires Findings			Diary Findings		
	%	M	S.D.	%	Learning	
					Type	%
Discussion	90.6	3.59	1.227	23.7	Formal	14.1
					Informal	85.9
Sharing	84.7	3.38	1.247	13.2	Formal	53.1

104

					Informal	46.9

From the questionnaires findings in table 4.10, it shows that 90.6% Guangzhou university students use mobile devices for discussion learning with the mean of frequency 3.59. Diary findings find that the percentage of Guangzhou university students using mobile devices for discussion learning is 23.7%. The percentages of formal and informal learning are 14.1% and 85.9%. Furthermore, questionnaires findings find that 84.7% Guangzhou university students use mobile devices to share for learning. The mean of frequency is 3.38. Besides, diary findings find that Guangzhou university students spend 13.2% of timeslot using mobile devices to share for learning. The percentages of formal learning and informal learning are 53.1% and 46.9%. Obviously, the findings indicated that using mobile devices to discuss and share for formal and informal learning are the major practices of Guangzhou university students.

Table 4.11: Sub-activities for discussion and sharing

Mobile learning activities	Questionnaires Findings			Diary Findings		
	%	M	S.D.	%	Learning Type	%
Instant Message	87.3	3.88	1.245	12.6	Formal	20.9
					Informal	79.1
Email	79.2	3.45	1.366	6.5	Formal	78.6
					Informal	21.4

Table 4.11 lists the sub-activities of using instant message and email for discussion and sharing. Questionnaires findings find that 87.3% Guangzhou university students use the software of instant messages in mobile devices for learning with the mean of

105

frequency 3.88. Diary findings find that 12.6% Guangzhou university students use the software of instant messages in mobile devices for learning. Besides, the percentages of formal and informal learning are 20.9% and 79.1%. The most popular instant message software is QQ. On the other hand, questionnaires findings find that 79.2% use email in mobile devices for learning whereas diary findings is 6.5%. The mean of frequency is 3.45. The percentages of formal and informal learning are 78.6% and 21.4%. So, the results revealed that Guangzhou university students prefer using instant message to discuss and share learning process and outcome for informal learning. They also prefer using email to discuss and share learning process and outcome for formal learning. Clearly, the findings indicated that Guangzhou university students have practices of using mobile devices to discuss and share for formal and informal learning.

4.5.2 Learning Strategies

In social aspect for formal and informal learning, this section lists out the mobile learning strategies of Guangzhou university students.

For formal learning, types of assignment are the major factors of using mobile devices. Six students expressed that they formed the QQ group and four students indicated that they formed the email group for sharing and discussion to do group projects. Students S01 was interviewed and stated:

> "I joined the sciences competition with my classmates. So, I need
> to discuss frequently with my group mates. Using mobile devices

can send or receive messages on time."

Sometimes, they invited teachers to add to the QQ or email group as a channel of consultation in giving opinion and instruction for doing projects. Additionally, teachers can keep track of the records and status of the projects and monitor each student's contribution. Student A01 formed a group in QQ private group and invited classmates and teachers to discuss an assignment. QQ private group is a popular online social networking platform in Mainland China. User can form a private group for discussing and sharing information. Student A01 was interviewed and stated:

"If there is no QQ group, I cannot achieve the same learning performance."

Therefore, mobile devices can allow users to write down details with explanation to all group mates in order to ensure all group mates understand what and how should do. Moreover, all email system has functions of tracing records for conversion. Therefore, group mates should clearly understand the process and status in completing the project.

For informal learning, students mostly use QQ or email for sharing and discussing with common interests in order to border their horizons. Six students expressed they would like to share with friends or classmates on online social networking platform such as weibo for interesting news or hobbies. Weibo is not only a platform for students to share news or articles, and also an online social networking platform for

107

learning different kinds of knowledge such as sports, politics, music, beauty and make-up skills etc. (Bugeja, 2006; Green & Hannon, 2007; Jones, 2002; Mazer, Murphy, & Simonds, 2007; Mazer, Murphy, & Simonds, 2009; Safko, 2012; Vockley, 2007). Weibo is not only text-based, but also posted audio and video onto the platform. Therefore, students are able to read or watch different types of media to gain knowledge.

4.5.3 Attitude

Table 4.11 lists the attitude in the social aspect of using mobile device for formal and informal learning. Adopted the 5 point Likert scale, the range for all attitudes of questionnaires findings is from 3.67 to 3.77. The results of questionnaires findings show that interviewees strongly agreed mobile devices can facilitate communication, sharing learning process and outcome. Overall, the results are very positive.

Table 4.11: The attitude in the social aspect of using mobile device for formal and informal learning

Questionnaires Findings		
Attitudes	M	S.D.
Communication	3.77	1.007
Sharing Learning Outcome	3.72	0.980
Sharing Learning Process	3.67	0.978

4.5.4 Advantages and Disadvantages

Collected from pre-focus group interview and post-interview, the following sections will elaborate the advantages and disadvantages of using mobile devices to share for learning.

The first advantage is the cooperative learning. Students A01 and B03 agreed a mobile device is a suitable learning tool for collaborative learning. As university students, the learning style will be different from the secondary students. Collaborative learning is a major learning approach for university students. They need to discuss and share data files such as news, parts of group project and articles with group mates for doing group project. Hence, they believed sharing and discussion are a win-win approach for friends and classmates because both of them received the knowledge clearly and deeply. Student B03 was interviewed and stated:

> "The advantage of using mobile devices to share is no time and
>
> place limitation. If she does not have mobile devices, it is not
>
> convenient for her to share information with others. "

The second advantage is expanding social network. Student A01 was interviewed and stated:

> "I always browse douban.com (http://www.douban.com/)
>
> because douban.com is a famous public discussion board in
>
> Mainland China. This platform lets netizens share their views

109

and discuss different topics. For example, people could share their skills of using MacBook Air. Through the discussion, discussants could understand specified topic comprehensively. Comparing with QQ private group, douban.com can do the sharing publicly with all netizens. Therefore, any netizen could express his/her opinion. I have some net friends discuss some common hobbies. The strength of public discussion board could gather a high amount of people for discussion, but the weakness is that the validity of the information could not be verified."

The third advantage is to improve learning effectiveness and efficiency. Students B03, E01 and E04 agreed mobile devices can reduce the communication time for discussion and sharing with teachers or classmates. Student B03 was interviewed and stated:

"I frequently use QQ (one popular instant message in Mainland China) to discuss with classmates about the group project because QQ allows discussion immediately and has a record to trace discussion. I believed discussion with classmates is very an important in the learning process. Through the interaction, we can express our point of views in different topics and listen to classmates' different opinions. "

Students A01, A02 and B03 indicated that mobile devices can enhance their learning

110

performance especially learning more effective and efficient. Without mobile devices, they may not prefer to ask questions to teachers or classmates for the problems of study. Without mobile devices, they cannot join the virtual study group with classmates before examination. Students B03 and S01 expressed they can ask and answer questions, or sharing data files promptly, by using mobile devices. As mobile devices became more popular, teachers prefer to use mobile technology to communicate with students. Students A02 was interviewed and stated:

"My teacher used QQ group to discuss with students."

Student A01 believed QQ private group is an effective and efficient method for collaborative learning (Huang, Huang, & Hsieh, 2008; 2009; Järvelä, Näykki, Laru, & Luokkanen, 2007; Zurita & Nussbaum, 2007). She was interviewed and stated:

"My classmates posted the questions on the QQ private group for discussion, and teachers gave us guidance for doing the assignment in the group. The power of using QQ private group is that all discussants did not need to discuss at the same time and same place, but they could observe all the discussion procedures."

The other strength of using QQ private group is the privacy. All of the discussants must be invited by the group administrators. Therefore, no outsiders are allowed to participate in the QQ private group discussion, discussants might feel free to share in

111

the group. Although many online electronic learning platforms are also providing platforms for sharing and discussion, students still prefer using QQ private group for discussion. One of the reasons to explain that is QQ group is not only a platform for classmates' learning discussion, but also is a part of their daily life. They use their QQ accounts contacting with their personal friends and read updated news on the QQ online platform. Sometimes, they share their feelings, photos, opinions, and articles on their QQ online platforms with their friends. So, smartphones are very important for students to read the QQ message spontaneously. The weakness of electronic learning platforms is not only receiving the message as quick as possible, and also the platform is only able to provide learning materials and activities for their formal learning. Therefore, students may not have a strong motivation to do their discussion on electronic learning platforms.

The fourth advantage is mobility. All students believed that the strength of using mobile devices is that they can express their opinions without time and place limitation. If teachers or classmates are busy and cannot reply immediately, they can read the message and reply when they are available. Therefore, they did not need to consider their availability to ask their questions as they can answer whenever they are available. So, this communication approach may not affect their works. On the contrary, using desktop to communicate may not reply the message immediately if learners are out of home. Using phones for voice communication may affect teachers or classmates if they are working. Therefore, they prefer using this communication approach.

Nonetheless, students B03 and S01 believed face-to-face teaching is better than virtual teaching. When they face study problems, they have the priority to ask questions with teachers or classmates. However, they use mobile devices for virtual teaching if time and place are restricted. Additionally, student E01 mentions some assessment methods may not suitable by using mobile devices for discussion such as an individual assignment. If he discusses with classmates in doing individual assignment, most students may receive the same individual result. Thus, his teacher will remind them not to discuss with other classmates when doing individual assignment.

4.6 Summary findings

This chapter provides comprehensive qualitative and quantitative findings based on the FRAME model. The findings comprised Guangzhou university students' mobile learning practices, attitudes, strategies, and characteristics of mobile devices for formal and informal learning.

With regards to the device aspect, it was found that Guangzhou university students are with higher percentage of smartphone owners but lower of tablets owners. Thus, smartphones are the major mobile learning tools of Guangzhou university students. However, this study is not able to conclude that higher technical ranking mobile device has a positive effect on mobile learning.

With regards to the learner and social aspects, the results found that Guangzhou

113

university students are highly participated in using mobile devices to learn, and all learning attitudes are positive. This also lists out learning strategies for formal and informal learning. The detail data sheet from questionnaire and diary record showed in Appendix H accordingly.

Chapter 4 sections 4.4.2, 4.4.4, 4.4.6 and 4.4.8 of learner aspect and 4.5.2 of social aspect support to answer the Research Question 1: What are the Guangzhou university students' learning strategies of using mobile device for formal and informal learning?

For the learner aspect and social aspect as mentioned in Chapter 4 sections 4.4.10 and 4.5.4, both support to answer the Research Question 2: What are the Guangzhou university students' learning reasons of using mobile devices?

Chapter 4 sections 4.4.1, 4.4.3, 4.4.5 and 4.4.7 of learner aspect and 4.5.1 of social aspect support to answer the Research Question 3: What are the Guangzhou university students' learning practices of using mobile devices?

Chapter 4 section 4.3.2 of device aspect; section 4.4.9 of learner aspect and section 4.5.3 of social aspect support to answer the Research Question 4: What are the Guangzhou university students' learning attitudes of using mobile devices for formal and informal learning?

Chapter 4 section 4.4.1 of learner aspect and section 4.5.1 of social aspect support to answer the Research Question 5: What are the ratios of students using a mobile device for formal and informal learning?

Chapter 4 sections 4.3.1 and 4.3.2 of device aspect support to answer the Research Question 6: Did the types of mobile devices affect mobile learning?

Next chapter is the section "Conclusions, Discussions, and Recommendations". This chapter will answer the six Research Questions. Compare the findings and methodology between this study and other research papers of using FRAME model to investigate mobile learning. To develop new mobile learning model based on the findings and will discuss possible future research directions.

Chapter 5: Conclusions, Discussions, and Recommendations

5.1 Introduction

In the preceding chapters, the presentation and analysis of data have been reported. This chapter summarizes the major findings to answer six research questions. Discuss with Koole's FRAME model and revise the FRAME model. Besides, suggestion and recommendation in pedagogy and technical level will be provided. Lastly, the future direction of the research will be listed out.

5.2 Research Questions

This study has six research questions. Below listed out the six research questions and answers for discuss.

5.2.1 Research Question 1: What were the Guangzhou university students' learning strategies of using mobile devices for formal and informal learning?

Chapter 4 sections 4.4.2, 4.4.4, 4.4.6, 4.4.8 and 4.5.2 provide many mobile learning strategies for Guangzhou university students for formal and informal learning.

Students have learning strategy of using mobile devices to study for formal learning. Chapter 4, section 4.4.2 provides learning strategy for students of using mobile devices to read websites, news, and books or watch online movies. Besides, section 4.4.4 explains how to use mobile devices of students in searching learning resources, books, professional articles and papers, learning apps, and searching from Baidu websites for acquiring professional knowledge. However, section 4.4.6 explains

116

students believed that mobile devices act as the role of multi-functions learning tools because they can download different types of learning apps for learning. Section 4.4.8 provides students the strategy of using mobile devices to store learning resources. Moreover, sections 4.4.2, 4.4.4, 4.4.6, and 4.4.8 also show that students use mobile devices for learning in their lessons.

Furthermore, mobile devices are the important learning tools when doing assignment for formal learning. Section 4.4.2 provides example of teacher's request of reading book report. Students watch online movies for learning computer techniques. In addition, section 4.4.4 provides some learning strategies for students by using mobile devices to search learning resources. Section 4.5.2 lists some learning strategies when students are doing group projects, for example, students using QQ group or email group for sharing and discussion when doing group projects. Sometimes, they invite teachers to join their QQ group for online discussing. Mobile devices can allow users to write down details with explanation to all group mates in order to ensure all group mates understand what and how should do.

Students have learning strategy of using mobile devices to acquire knowledge for informal learning. Section 4.4.2 provides students' learning strategy such as reading weibo, news, books, or watching online movies. Besides, section 4.4.4 provides that students using mobile devices to search updated information from internet, documents or apps. Furthermore, sections 4.4.2 and 4.4.4 provide the learning strategy in gaining knowledge for formal learning such as financial knowledge, sciences, history etc. Section 4.5.2 provides learning strategy for students using mobile devices to send QQ

117

or email for sharing and discussing with common interests in order to border their horizons. Section 4.4.6 shows that mobile devices are learning tools for students solving their daily life problems. For example, students use mobile devices for translation when reading foreign newspapers, magazines or websites. Section 4.4.8 illustrates that students use mobile devices for recording daily life experience for memory.

5.2.2 Research Question 2: What were the Guangzhou university students' learning reasons of using mobile devices?

Summarize all mobile learning advantages from sections 4.4.10 and 4.5.4; it was found that there are ten reasons of the Guangzhou university students using mobile devices for formal and informal learning. Below are the ten learning reasons.

1. Acquire knowledge

2. Acquire updated information

3. Cooperative learning

4. Enjoyable learning

5. Expanding social network

6. Improve learning effectiveness and efficiency

7. Learning autonomy

8. Learning diversity

9. Learning expansibility

10. Mobility

Table 5.1: Reasons of mobile learning

Reasons	Apps	Communicate & Sharing	Formal & informal learning	Reading	Record	Search
Improve learning effectiveness and efficiency		✓	✓	✓	✓	✓
Mobility		✓	✓	✓	✓	✓
Acquire knowledge			✓	✓		
Acquire updated information				✓		✓
Learning autonomy			✓			✓
Cooperative learning		✓				
Enjoyable learning			✓			
Expanding Social Network		✓				
Learning Diversity	✓					
Learning Expansibility	✓					

Table 5.1 combines all of the reasons from different learning activities. Improve learning effectiveness and efficiency and mobility are the major reasons for students using mobile devices to learn. Furthermore, the second major reason is to acquire knowledge, acquire updated information and learning autonomy. However, learning diversity and learning expansibility are also the reasons but not the major one for students using mobile devices to learn.

5.2.3 Research Question 3: What were the Guangzhou university students' learning practices of using mobile devices?

Figure 5.1 shows the quantitative findings for mobile learning activity. The percentage is equal to the number of interviewees' responds what mobile learning activities they did over total number of interviewees. The mean is the average frequency of using mobile devices to learn in each learning activity, and 5 point Likert scale is adopted. This figure shows that reading has the highest rank of mobile learning activity and participate rate. Although sharing has the lowest rank of mobile learning activity and participate rate, the percentage is over 80% and the mean is more than 3.35. Therefore, it shows that Guangzhou university students are highly participated in using mobile devices to learn

Figure 5.1: Quantitative findings for mobile learning activity
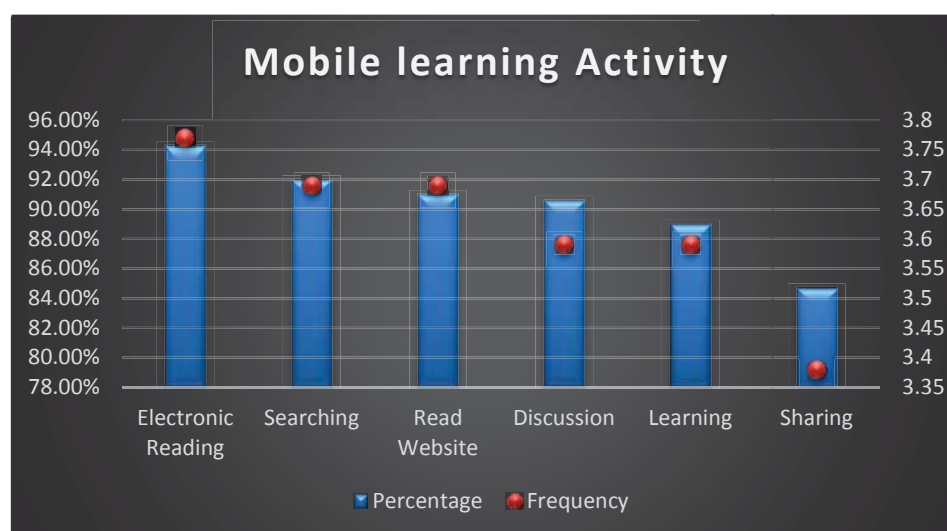
Figure 5.2 shows the practices of mobile learning activities from quantitative and

120

qualitative findings. It seems that the results between quantitative and qualitative findings are consistent. Electronic reading for learning has the highest rank between the mobile learning activities and searching is the second highest. Besides, the percentages of time using mobile devices for all mobile learning activities are over 10% from qualitative findings. Thus, the results proved that Guangzhou university students are highly participated in using mobile devices to learn.

Figure 5.2: Practices of mobile learning activities from quantitative and qualitative findings
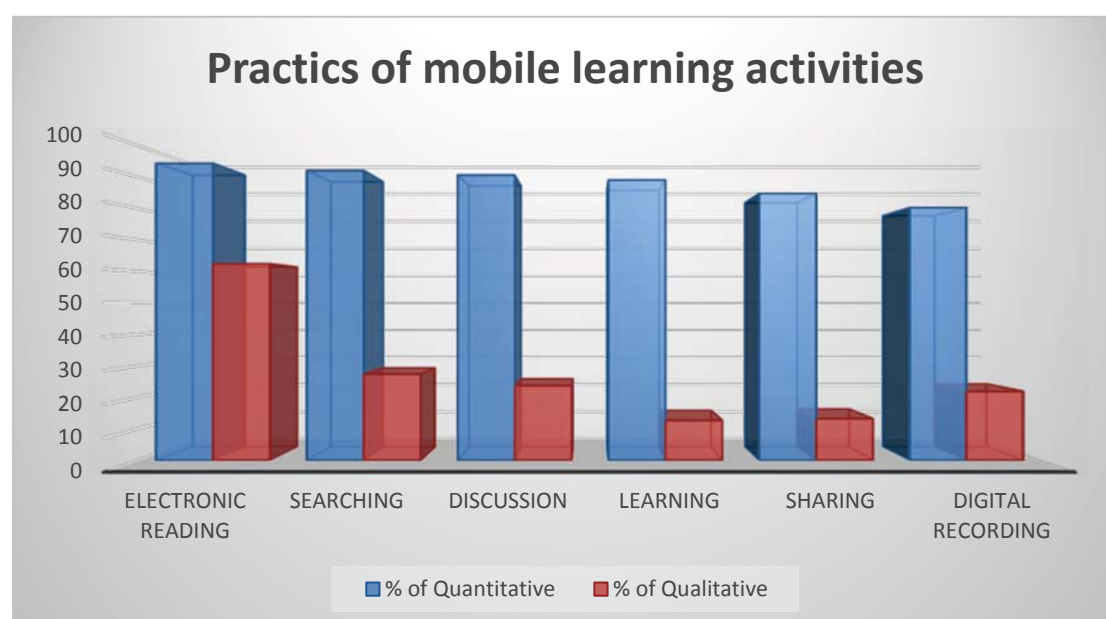
Figure 5.3 shows the comparative for this study and 34th China Internet Development Statistical Report (China Internet Network Information Center, 2014). This study mainly focused on using mobile devices to learn by each learning activity, but not for the 34th China Internet Development Statistical Report. The result of this study found that Guangzhou university students used mobile devices to learn and do activities.

121

For some activities, such as searching, reading news, and watching video, the percentages are much higher than the entire country.

Figure 5.3: Comparative for this study and the 34th China internet development statistical report
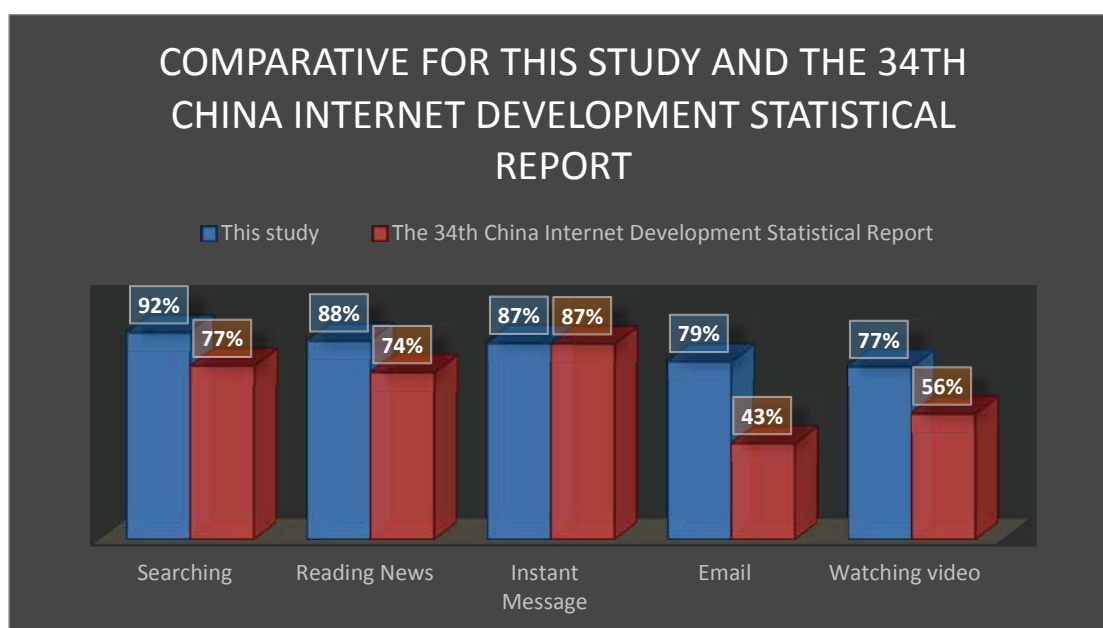
Chapter 4 sections 4.4.1, 4.4.3, 4.4.5, 4.4.7 and 4.5.1 list a detailed analysis of the Guangzhou university students' learning practices of using mobile devices.

5.2.4 Research Question 4: What were the Guangzhou university students' learning attitudes of using mobile devices for formal and informal learning?

Figure 5.4 shows the attitudes of mobile learning activities of Guangzhou university students. The scale for all the attitudes was over 3 under the 5 point Likert scale and

the results were positive. It seems that Guangzhou university students mostly agreed that searching has the highest scale of using mobile for learning. The second is the data record.

Figure 5.4: The attitudes of mobile learning activities
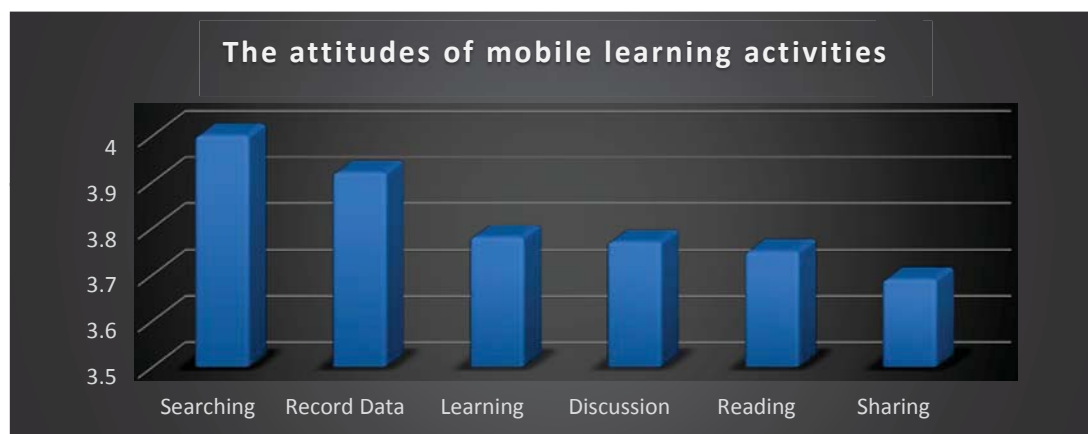
Figure 5.5 shows the attitudes of factor by device aspect. Using the 5 point Likert scale, the scale of all the attitudes in Figure 5.5 was over 3 and the results were positive. It seems that Guangzhou university students mostly agreed that bandwidth is the most important factor for mobile learning.

Figure 5.5: The attitudes of factor by device aspect

123
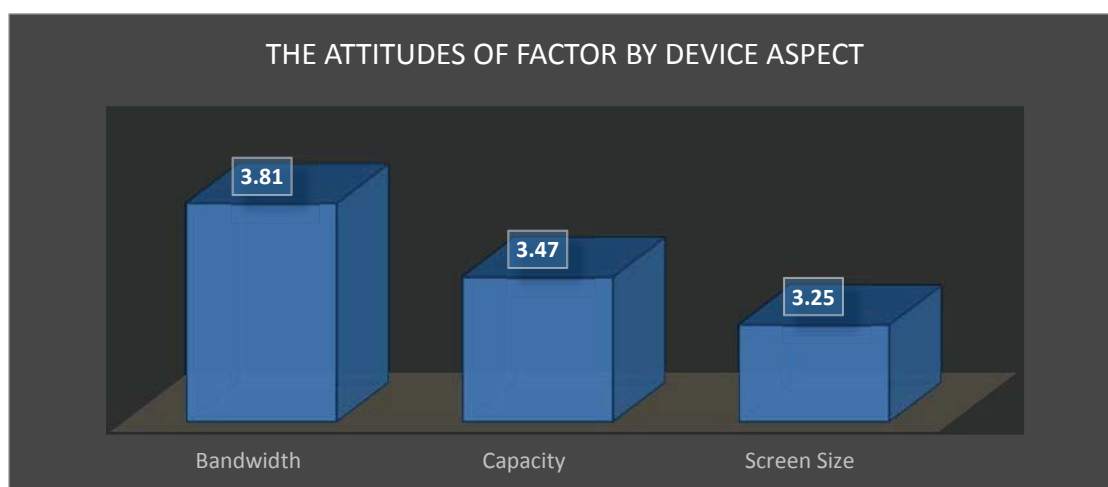
Figure 5.6 shows the attitudes of mobile learning, the scale of all the attitudes was over 3 by 5 point Likert scale, and the results were positive. It seems that Guangzhou university students mostly agreed that mobile devices may enhance their learning ability, learning interest, learning efficient and learning itself.

Figure 5.6: The attitudes of mobile learning
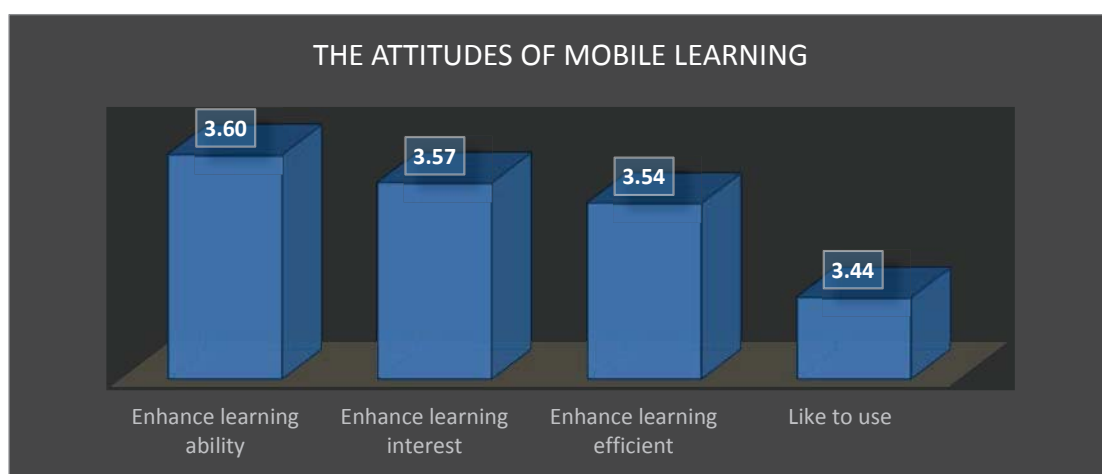
Figure 5.7 shows the attitudes of using mobile devices for formal and informal learning. The reasons show that most of the Guangzhou university students agreed that mobile devices can facilitate the formal and informal learning. However, informal learning is more suitable than formal learning of using mobile devices.

Figure 5.7: The attitudes of using mobile devices for formal and informal learning

124

THE ATTITUDES OF USING MOBILE DEVICES FOR FORMAL AND INFORMAL LEARNING

3.91

3.65

Formal learning   Informal learning
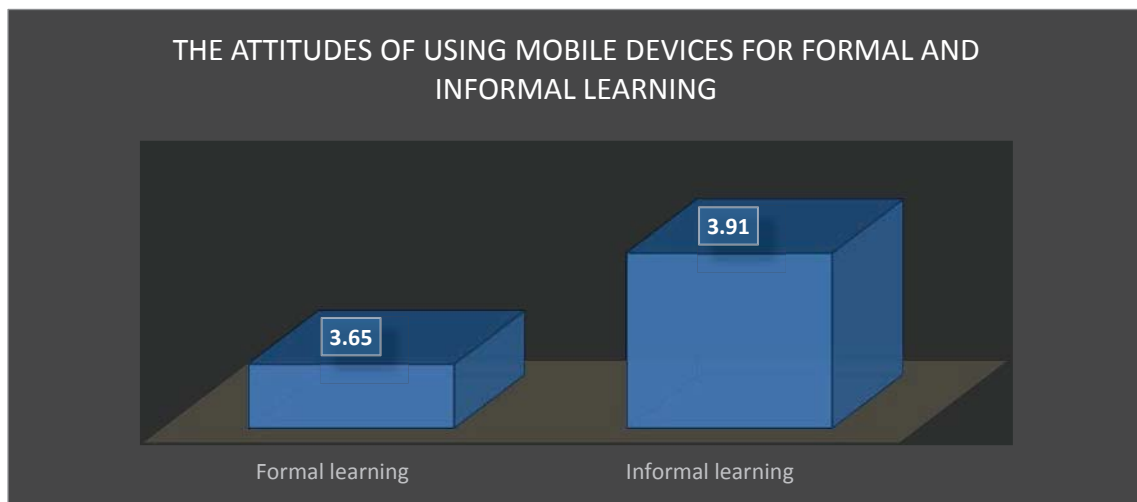
Sections 4.4.9 and 4.5.3 state the detailed analysis of Guangzhou university students' learning attitudes of using mobile devices.

5.2.5 Research Question 5: What was the ratio of students' using mobile devices for formal and informal learning?

Figure **5.8** lists the percentages for formal and informal learning from diary record. It found that the percentages of formal and informal learning were 27.65% and 72.35%. Therefore, it illustrated that the percentages of Guangzhou university students using mobile devices for informal learning was higher than formal learning. Banks (2007) indicated the percentage of university students' formal learning was 8%. However, this study found that Guangzhou university students used mobile devices for formal learning was 28%. Therefore, we can conclude that mobile devices have a positive effect to university students in formal learning.

Figure 5.8: Percentages for formal and informal learning from diary record

125

Percentages for formal and informal learning

Formal learning
28%

Informal learning
72%
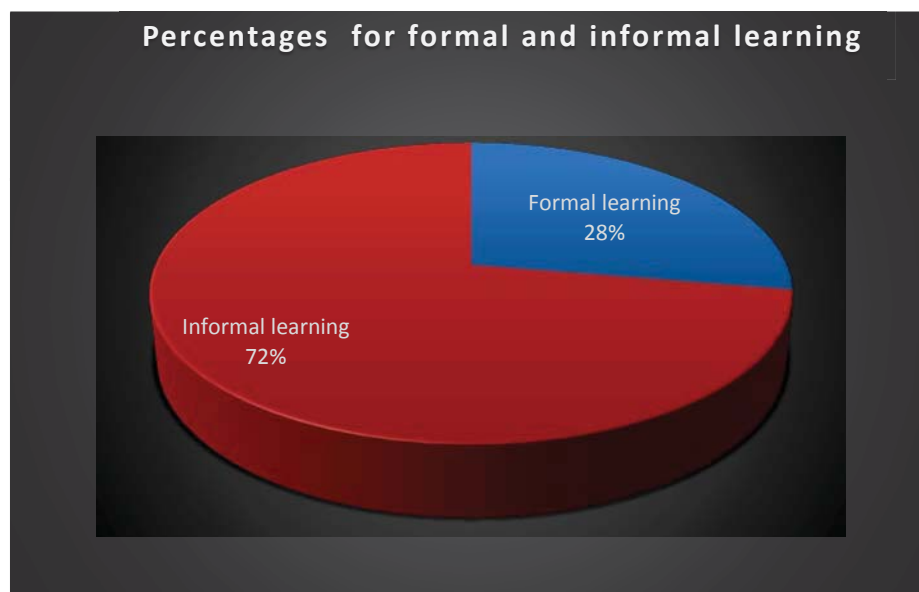
Figure 5.9 shows the percentages for formal and informal learning on each mobile learning activity from diary record. It seems that the percentages of learning and sharing for formal learning are higher than informal learning. Searching and Digital record have around 40% for formal learning whereas electronic reading and discussion are the fewest.

Figure 5.9: Percentages for formal and informal learning on each mobile learning activity

126

Percentages for formal and informal learning on mobile learning activity
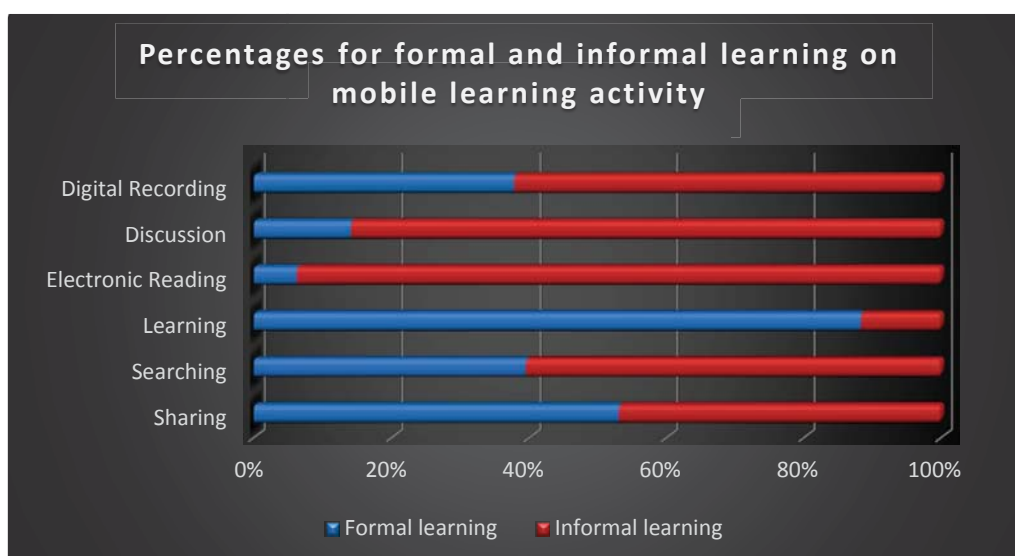
Chapter 4 sections 4.4.1, 4.4.3, 4.4.5, 4.4.7 and 4.5.1 detail the analysis for formal and informal learning.

5.2.6 Research Question 6: Did the type of mobile device affect mobile learning?

Chapter 4, section 4.3.2 shows that Guangzhou university students agreed that bandwidth was the highest factor of affecting learning and screen size was the lowest factor. High and stable quality broadband can let students learn smoothly in the whole learning process. Therefore, 63.4% interviewees responded that their first priority is to use Wi-Fi to access internet. Although the weakness of the mobile device is that the screen was too small which limited the process of obtaining information and they could not read many characters at the same page, 57.7% interviewees reported the display size of smartphone they used was smaller than four inches.

The results showed that a mobile device with higher quality affects positive learning

127

is mixed. According to the result, 57.1% Guangzhou university students support and 42.9% did not support. Therefore, this study could not conclude that higher technical ranking had positive affect on mobile learning.

5.3 Discussions

This section would like to discuss the difference between Koole's FRAME model and this study, and also compare with other papers' findings or methodology by using Koole's FRAME model and this study. Besides, since the Koole's FRAME model does not describe how to use mobile devices for formal and informal learning based on the curriculum, so the Koole's FRAME model will be revised. Therefore, this study would like to add the curriculum aspect into the FRAME model which is called "the Framework for the Rational Analysis of mobile Education model 2015" (FRAME model 2015).

5.3.1 Koole's FRAME Model

Koole's study had two main purposes. The first is defining theoretical mobile model (FRAME model) and the second is to differentiate the aspects of the model being used to evaluate the potential and suitability of a set of mobile devices as a tool of distance learning. (M. L. Koole, 2006). Koole focused on investigating how the device aspect affected the mobile learning, and paid less attention on exploring the learner aspect and social aspect. Therefore, this study provides a comprehensive investigation on how the learner aspect, social aspect, and device aspect affect the mobile learning, especially the learner aspect.

128

For the methodology, Koole's study provides seven mobile devices for expert reviewer to comment and compares through questionnaires and face-to-face discussions. However, this study did not only collect quantitative and qualitative data through questionnaires and discussions, but also invited fourteen Guangzhou university students to do diary records in four consecutive weeks. Table 5.1 is a comparative table of methodology between Koole's study and this study.

Table 5.2: Comparative table of methodology between Koole's study and this study

	Koole's study	This Study
Framework	FRAME Model	FRAME Model
Collecting Data	● Questionnaire (Device Evaluation Questionnaire) ● Discussion	● Questionnaire (Mobile learning activity) ● Pre-focus group interview ● Diary Record ● Post-interview
Target of investigate Mobile Device	● Netbook ● Ultra personal Computer	● Smartphone ● Tablets ● Notebook/ Netbook
Participant Selection	● Familiar with distance education and computer technology	● The Guangzhou's University students
Aspect	● Device	● Learner ● Social ● Device

Mobile devices technology was rapidly developed. So, the findings of Koole study and this study must be widely different. Listed below are major findings from Koole study and the comparison of Koole major findings with this study.

First, Koole's study found that mobile devices could not replace desktop computers. It was mentioned that mobile devices remained to be the complementary to the larger desktop and laptop computers. This study found that mobile devices become a powerful tool of learning devices. Although this study did not compare the frequency between desktops and mobile devices, the result from research question 4 found that students had a positive attitude of using mobile devices to facilitate different types of learning. Furthermore, the result from research question 1 found that students had a lot of strategies of mobile learning, and research question 3 found that students had good practices of using mobile devices to learn. To conclude, mobile devices become powerful learning devices. It was predicted that mobile devices would replace traditional computers.

Second, learner could access the course materials to read or edit in any situation. The result from research question 3 found that reading is the major mobile learning activity. Besides, the result from research question 2 found that mobility has the advantage of using mobile devices to learn. This study found that mobility is not the unique reason using mobile devices to learn. Acquiring knowledge, updating information, autonomous learning, cooperative learning, enjoyable learning, expanding social networking, learning expansibility, learning diversity, and improving learning effectiveness and efficiency are also the advantages of using mobile devices

130

to learn. To conclude, mobile devices are major learning tools in the future.

Third, Koole' study found that there was an inverse relationship between the number of cables and peripherals necessary for basic operation and perceived mobility of the device. Besides, there was a direct relationship between the ubiquity of network accessibility and the perceived ability to access information. Nowadays, mobile devices integrated with the touch screen technique. Thus, the number of cables was reduced. However, this study did not find the relationship between the number of cables and the frequency of mobile learning. The result of research questions 1 and 6 found that different operating system might affect different learning attitudes and practices. To conclude, the trend of mobile learning study should focus on the software that assists learning rather than the competency of the device.

Below is the discussion of four papers which using FRAME model to invest mobile learning. First is the "Mobile learning in Nursing Practice Education: Applying Koole's FRAME model" (Kenny et al., 2009), this paper was to evaluate whether the implementation of mobile devices in an independent nursing practice education setting would be feasible and practical, and to assess if nursing students and instructors would find the use of such devices in the context to be comfortable and helpful in assisting their learning. The study of this paper was highly focused on device aspect - Hewlett Packard (HP) iPAQ mobile device and did not investigate deeply on how student uses mobile devices to learn. Compared with my study, Kenny's study did not describe detailed in nursing students' learning performance, practices, and attitudes when they are using HP iPAQ mobile device. Furthermore,

131

this study collected rich data as compared to Kenny's study.

Second is the "Mobile learning in distance education: Utility or Futility?" (Koole, McQuilkin, & "MAlly, 2010), it reported that the results of an innovative study exploring the usability, learning, and social interaction of mobile accessing to online course materials at a Canadian distance education university. This paper also highly focused on the device aspect and nine participants completed the post-questionnaires. Compared with my study, the methodology may not be comprehensive. The majority findings of Koole, McQuilkin, & Ally's study showed that mobile access would not increase users' motivation to interact or their sense of connectedness. On the other hand, mobile access would be helpful for those who are traveling and did not have computer access or network connections. The result of this paper is different from my study because my study showed that Guangzhou university students are highly motivated in using mobile devices to learn no matter for formal and informal learning. Moreover, if the place provides stable computer assess or network connections, Guangzhou university students would prefer using mobile devices to learn.

Third is the "Mobile device intervention for student support services in distance education context – FRAME model Perspective" (Kumar, Jamatia, Aggarwal, & Kannan, 2011), this paper reported that the findings of the study conducted to analyze the effect of mobile devices' intervention for student support services and gauge its use for enhancing teaching and learning process as future study in the context of offering distance education programs. The findings showed that learners have expressed high level of satisfaction in relation to the use of learner support services

132

through exchange information and the confidence in welcoming content delivery through mobile devices. The study just only focused on formal learning of Indira Gandhi National Open University's students. However, my study is not only mentioned the Guangzhou university students' formal learning, and also focus on informal learning. Besides, the study of this paper did not deeply describe how social aspect affects students' learning attitudes and performance.

Fourth, "an Empirical study on mobile learning of college English B: Deisgn and development based on Koole's FRAME model" (Yongquan, 2012) investigated students' English learning performance in the Beijing Open University. This paper would like to find out whether using mobile devices to learn is better than not using mobile devices. This paper found that those students used mobile devices to learn had a better English learning performance than the others who did not use mobile devices. Besides, students are most welcome to use mobile devices for learning and communicating with teachers and students. This paper just only focused on formal learning of Beijing Open University's students. My study is not only mentioned the Guangzhou university students formal learning, and also focused on informal learning. Moreover, the technology of mobile devices may be out-of-date, this study investigated the functions of SMS and MMS but the mobile's functions are not used now. Thus, Guangzhou university students use QQ for instant communication and sharing.

133

5.3.2 Revise FRAME model

From the findings of this study, it found that learner aspect is the most important aspect for mobile learning. From the answer of Research Question 3, it shows that mobile learning activities such as reading and searching are of the highest frequency of mobile learning activities. However, the frequency of discussion and sharing are lower than reading and searching when using mobile devices to learn. From the Research Question 4, it shows that the attitudes of the mobile learning activities from learner aspect are higher than social aspect. And, from the answer of Research Question 6, it shows that the mobile devices with higher quality may not positively affect mobile learning. Therefore, it can conclude that learner aspect is the most important aspect and follows by social aspect. Device aspect is the minimal importance of mobile learning.

Figure 5.10: Ranking of aspects
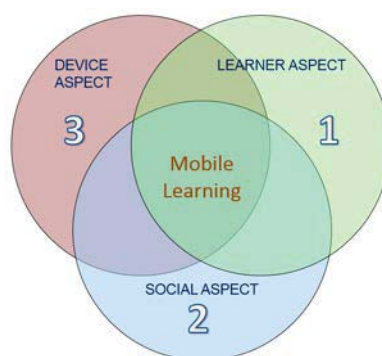
Although the Framework for the Rational Analysis of Mobile Education (FRAME) model describes mobile learning as mobile technologies, human learning capacities, and social interaction, this model does not describe how to use mobile devices for formal and informal learning according to the curriculum. Therefore, this study

134

would like to add the curriculum aspect into the FRAME model which is called the Framework for the Rational Analysis of mobile Education model 2015 (FRAME model 2015). Figure 5.11 shows the FRAME model 2015.

Figure 5.11: The Framework for the Rational Analysis of mobile Education model 2015
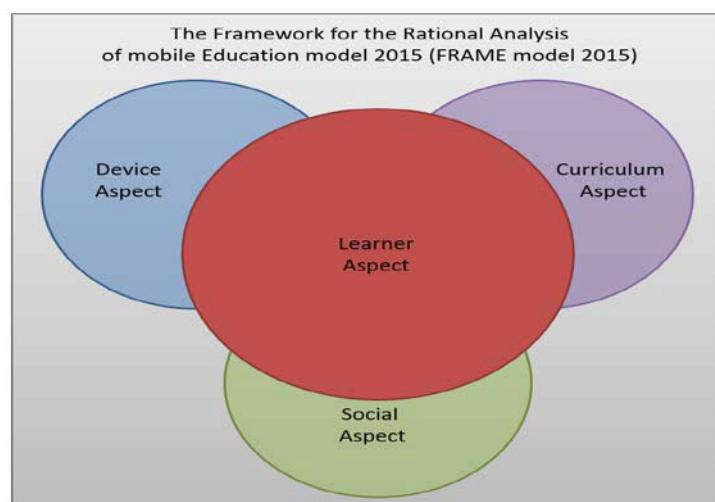
Bobbitt (1918) defined the curriculum encompasses the entire scope of formative deed and experience occurring in and out of the school. Egan (1978) expressed that curriculum is the study of any and all educational phenomena. Besides, Kelly (2009) determined curriculum should be the range of courses from which students choose what subject matters to study, and the course should be included the teaching, learning, and assessment materials. Defined by Morris (1995), curriculum can be including formal curriculum and informal curriculum. Formal curriculum is planned and goes on during the timetabled periods, and informal curriculum is those school activities which are not part of the subject timetable such as extra curriculum activities, sports activities, outside speakers and school trips. The answer of Research

135

Question 5 ensures that mobile informal learning is higher than formal learning. Therefore, curriculum aspect should be evaluated as to find out how mobile informal learning experience or activities can assist students for formal learning.

Based on the above discussions, this study concluded that learner aspect is the most important aspect in the FRAME model. Moreover, many scholars agreed that technology is an effective learning tool for student-centered learning environment (Chen, 2010; Glogoff, 2005; Hannafin & Land, 1997; Land & Hannafin, 2000; Sandholtz, 1997). Therefore, this study suggests put the learner aspect into the center of the FRAME model 2015. So, there will be no interaction between social aspect, curriculum aspect and mobile aspect. The role of social aspect, curriculum aspect and mobile aspect is to support learner using mobile devices for formal and informal learning.

5.4 Recommendations

This section would like to provide recommendations for pedagogy level and technical level.

5.4.1 Pedagogy Level

For the pedagogy level, this study provides two recommendations. First is the integrating social networking into traditional e-learning platform. Traditional e-learning platform might not fulfill existing university students' learning practices. They expected integrating social networking into traditional e-learning platform. For example, university lecturer might setup personal Weibo for student to comprehend

136

the updated learning information. In the Weibo, lecturers might post articles, news, teaching schedule for students to follow. Therefore, students might check the learning status anytime and anywhere. Teaching resources such as PowerPoints, notes, teaching videos and past papers are the properties of the University. So, it was suggested to post those resources into traditional e-learning platform. This could be mentioned on the Weibo for students to understand.

Second is that teachers might become facilitators who have the role to facilitate students' learning. Student-centered learning should be the trend in the world in the university. This study ensures that mobile devices should be the effective and efficient learning devices for students' learning. Therefore, teachers should use the strength of mobile devices to facilitate students' learning such as design learning activities by using mobile devices for students' learning. Moreover, teachers may also design learning assessment in using mobile devices for students' self-learning.

5.4.2 Technical Level

This study ensures that mobile learning is a trend in China. Therefore, this might provide a golden chance for selling all types of learning packages from the Apps stores. This study ensures that mobile devices are suitable for informal learning. It was recommended that education service providers should develop informal learning Apps for systematical learning.

The first step is to setup the learning target. The learners could input what skills or knowledge they would like to learn. The system will automatically search all possible

137

learning packages which are related for learners to choose according to the input from learners. The learning packages should include learning activities, learning contents, and learning schedules. For example, if a learner would like to learn photography, the Apps can search all photography learning packages for the learner. The learning packages would include the learning contents such as articles for learner to read or videos to watch. After reading or watching each content, a record "list-to-do" should be made to record the learner's learning process. Moreover, the learning packages should include suggested learning schedule for learners. So, learners could rearrange their learning schedules subject to their availability. After the learner confirmed the schedule, the software would remind the learner on time. In addition, learners could interact with other users who are also using the same learning package to share their learning problems. Moreover, learners could also interact with the coach or learning package developer in order to ask questions.

Finally, learners could tailor-make his/her own learning package. Learners might read articles from the websites, and the software would allow learners to import any related learning contents into the software. Sometimes, learners could have photo taking, video shooting or audio recording to enhance their own learning packages. Therefore, it could let the learners recording their learning progress.

5.5 Further Directions for Research

This study focuses on the research of Guangzhou university students. A further research should be focused on different cities such as Hong Kong, Singapore, Taipei or Shanghai. It is because these cities also paid high attention to the Higher

Education. Moreover, this study proved that mobile operating system affected students' learning practices and attitudes. However, this study did not focus on the usability and performance from different mobile operating systems. Therefore, a further research should focus on how operating systems could affect the formal and informal learning.

Last, the coming research direction should measure the learning performance when using mobile devices for formal and informal learning. This research could know that how mobile learning improved students' formal and informal learning performance.

5.6 Summary

This chapter answers six research questions and discusses the difference between this study and Koole's study. Moreover, use Koole's FRAME model, compared with other papers and revised the model namely "FRAME model 2015". Embed curriculum aspect into the Koole's FRAME model and put the learner aspect into the center of the FRAME model. Moreover, this chapter suggests some ideas and made recommendations to pedagogy and technical level for mobile learning. Last, this chapter lists out the further research direction.

References

Alaszewski, A. (2006). *Using diaries for social research* Sage.

Albaum, G. (1997). The likert scale revisited. *JOURNAL-MARKET RESEARCH SOCIETY, 39*, 331-348.

Altman, D., Burton, N., Cuthill, I., Festing, M., Hutton, J., & Playle, L. (2006). Why do a pilot study. *National Centre for Replacement, Refinement and Reduction of Animal in Research, ,* 1-2.

Alvarez, C., Alarcon, R., & Nussbaum, M. (2011). Implementing collaborative learning activities in the classroom supported by one-to-one mobile computing: A design-based process. *Journal of Systems and Software, 84*(11), 1961-1976.

Ambrose, S. A., Bridges, M. W., DiPietro, M., Lovett, M. C., & Norman, M. K. (2010). How learning works: Seven research-based principles for smart teaching.

American Psychological Association. (1992). *Ethical principles of psychologists and code of conduct* American Psychological Association.

Anderson, T. (2008). *The theory and practice of online learning* Athabasca University Press.

Babbie, E. (2012a). *The practice of social research* CengageBrain. com.

Babbie, E. (2012b). *The practice of social research* CengageBrain. com.

Babbie, E. R. (1990). *Survey research methods*

Balakrishnan, V., & Yeow, P. H. (2007). Texting satisfaction: Does age and gender make a difference? *International Journal of Computer Science and Security, 1*(1), 85-96.

Bandalaria, M. (2007). Impact of ICTs on open and distance learning in a developing country setting: The philippine experience. *International Review of Research in Open and Distance Learning, 8*(1)

Banks, J. A. (2007). *Learning in and out of school in diverse environments: Life-long, life-wide, life-deep* LIFE Center, University of Washington, Stanford University, and SRI International.

Barlow, T. (2008). Web 2.0: Creating a classroom without walls. *Teaching Science, 54*(1), 46-48.

Bassey, M. (2000). *Case study research in educational settings* Taylor & Francis.

Berg, B. L. (2004). *Qualitative research methods for the social sciences* Pearson Boston.

Best, J., & Kahn, J. (2005). Research in education .

Black, T. R. (1999). *Doing quantitative research in the social sciences: An integrated approach to research design, measurement and statistics* Sage.

Blaxter, L., Hughes, C., & Tight, M. (2010). *How to research* McGraw-Hill International.

Bobbitt, J. F. (1918). *The curriculum* Houghton Mifflin.

Bogdan, R. C., & Biklen, S. K. (1998). *Qualitative research in education. an introduction to theory and methods* ERIC.

Börner, D., Glahn, C., & Specht, M. (2009a). Mobile informal learning.

Börner, D., Glahn, C., & Specht, M. (2009b). Mobile informal learning.

Bray, L. (2007). Experiences of young people admitted for planned surgery. *Paediatric Nursing, 19*(5), 14-18.

Brittain, S., Glowacki, P., Van Ittersum, J., & Johnson, L. (2006). Podcasting lectures. *Educause Quarterly, 3*, 24-31.

Bryer, T. A., & Zavattaro, S. M. (2011). Social media and public administration. *Administrative Theory & Praxis, 33*(3), 325-340.

Bugeja, M. J. (2006). Facing the facebook. *The Chronicle of Higher Education, 52*(21), C1.

Carroll, J., & Ryan, J. (2005). *Teaching international students: Improving learning for all* Routledge.

Chen, G., Chang, C., & Wang, C. (2008). Ubiquitous learning website: Scaffold learners by mobile devices with information-aware techniques. *Computers & Education, 50*(1), 77-90.

Chen, P. D., Lambert, A. D., & Guidry, K. R. (2010). Engaging online learners: The impact of web-based learning technology on college student engagement. *Computers & Education, 54*(4), 1222-1232.

Chen, R. (2010). Investigating models for preservice teachers' use of technology to support student-centered learning. *Computers & Education, 55*(1), 32-42.

Chen, Y., Kao, T., & Sheu, J. (2003). A mobile learning system for scaffolding bird watching learning. *Journal of Computer Assisted Learning, 19*(3), 347-359.

China Internet Network Information Center. (2012a). *2011 年中国青少年上网行为 调查报告 englsih translation name : The china juvenile online behavior survey report in 2011*. ().China Internet Network Information Center.

China Internet Network Information Center. (2012b). 第 30 次中国互联网络发展状 况统计报告 English translation name：The 30th china internet development statistical report. Retrieved from http://www.cnnic.net.cn/hlwfzyj/hlwxzbg/hlwtjbg/201207/t20120723_32497.htm

China Internet Network Information Center. (2014). 第 34 次中国互联网络发展状况 统计报告 english translation name：The 34th china internet development

statistical   report.   Retrieved   from

http://www.cnnic.net.cn/hlwfzyj/hlwxzbg/hlwtjbg/201407/t20140721_47437.htm

Clough, G., Jones, A. C., McAndrew, P., & Scanlon, E. (2008). Informal learning

with PDAs and smartphones. *Journal of Computer Assisted Learning, 24*(5),

359-371.

Corbeil, J. R., & Valdes-Corbeil, M. E. (2007). Are you ready for mobile learning?

Educause Quarterly, 30(2), 51.

Coyle, H. E., & Ellinger, A. D. (2001). Learning beliefs and strategies of female

entrepreneurs: The importance of relational context in informal and incidental

learning. *Proceedings of the Academy of Human Resource Development,*

Oklahoma, , 27-33.

Creswell, J. W. (2007). Educational research: Planning, conducting, and evaluating

quantitative and qualitative research.

Creswell, J. W. (2013). *Research design: Qualitative, quantitative, and mixed*

methods approaches Sage Publications, Incorporated.

145

Creswell, J. W., & Clark, V. L. P. (2007). *Designing and conducting mixed methods research* Wiley Online Library.

Creswell, J. W., & Miller, D. L. (2000). Determining validity in qualitative inquiry. *Theory into Practice, 39*(3), 124-130.

Creswell, J. W., Plano Clark, V. L., Gutmann, M. L., & Hanson, W. E. (2003). Advanced mixed methods research designs. *Handbook of Mixed Methods in Social and Behavioral Research,* , 209-240.

De Vaus, D. (2002). *Surveys in social research* Psychology Press.

de Winter, J., Winterbottom, M., & Wilson, E. (2010). Developing a user guide to integrating new technologies in science teaching and learning: Teachers' and pupils' perceptions of their affordances. *Technology, Pedagogy and Education, 19*(2), 261-267.

DeMaio, T. J. (1980). Refusals: Who, where and why. *Public Opinion Quarterly, 44*(2), 223-233.

Denzin, N. K. (2009). *The research act: A theoretical introduction to sociological methods* Transaction Publishers.

Derry, S. J. (1999). A fish called peer learning: Searching for common themes. *Cognitive Perspectives on Peer Learning, , 197-211.

Dew, J. (2010). Global, mobile, virtual, and social: The college campus of tomorrow. *Futurist, 44*(2), 46-50.

Dewey, J. (2007). *Experience and education* Simon and Schuster.

Doctorow, C. (2002). *Essential blogging: Selecting and using weblog tools* Oreilly & Associates Incorporated.

Egan, K. (1978). What is curriculum? *Curriculum Inquiry, , 65-72.

El-Hussein, M. O. M., & Cronje, J. C. (2010). Defining mobile learning in the higher education landscape. *Educational Technology & Society, 13*(3), 12-21.

Enriquez, A. G. (2010). Enhancing student performance using tablet computers. *College Teaching, 58*(3), 77-84.

Epstein, Z. (2013). Samsung galaxy note 3 sales hit 10 million in two months | BGR. Retrieved from http://bgr.com/2013/12/10/samsung-galaxy-note-3-sales-10-million/

Eraut, M. (2004). Informal learning in the workplace. *Studies in Continuing Education, 26*(2), 247-273.

Fenwick, T., & Hutton, S. (2000). Women crafting new work: The learning of women entrepreneurs. *Proceedings of the 41st Adult Education Research Conference,* 2-4.

Ferdig, R. E. (2007). Editorial: Examining social software in teacher education. *Journal of Technology and Teacher Education, 15*(1), 5-10.

Foley, G. (1999). *Learning in social action: A contribution to understanding informal education. global perspectives on adult education and training.* ERIC.

Fowler, F. J. (2009). *Survey research methods* Sage.

Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (1993). How to design and evaluate research in education.

FRAMINGHAM, M. (September 12, 2011). IDC: More mobile internet users than wireline users in the U.S. by 2015 - bloomberg. Retrieved from http://www.bloomberg.com/apps/news?pid=newsarchive&sid=ajHX5zSNs33E

Gall, M. D., Borg, W. R., & Gall, J. P. (1996). *Educational research: An introduction* . Longman Publishing.

Gibson, W., & Brown, A. (2009). *Working with qualitative data* Sage.

Gimenez López, J., Magal Royo, T., Laborda, J. G., & Garde Calvo, F. (2009). Methods of adapting digital content for the learning process via mobile devices. *Procedia-Social and Behavioral Sciences, 1*(1), 2673-2677.

Glahn, C., & Börner, D. (2010). Mobile informal learning.

Glogoff, S. (2005). Instructional blogging: Promoting interactivity, student-centered learning, and peer input.

Gong, Y. (2012). **2012 年 11 月中国平板电脑市场分析报告 english translation name: The** China tablet PC market analysis report in november 2012. Retrieved from http://zdc.zol.com.cn/341/3413916.html

Green, H., & Hannon, C. (2007). Their space education for a digital generation.

Greene, J. C., Caracelli, V. J., & Graham, W. F. (1989). Toward a conceptual framework for mixed-method evaluation designs. *Educational Evaluation and Policy Analysis, 11*(3), 255-274.

Guangzhou Bureau of Statistics. (2011). Guangzhou statistics information sites. Retrieved from http://www.gzstats.gov.cn/

Guri-Rosenblit, S. (2005). Eight paradoxes in the implementation process of e-learning in higher education. *Higher Education Policy, 18*(1), 5-29.

Hannafin, M. J., & Land, S. M. (1997). The foundations and assumptions of technology-enhanced student-centered learning environments. *Instructional Science, 25*(3), 167-202.

Hanson, J. M., & Sinclair, K. E. (2008). Social constructivist teaching methods in australian universities–reported uptake and perceived learning effects: A survey of lecturers. *Higher Education Research & Development, 27*(3), 169-186.

Hara, N. (2002). Formal and informal learning: Incorporating communities of practice into professional development.

Harris, H., & Park, S. (2008). Educational usages of podcasting. *British Journal of Educational Technology, 39*(3), 548-551.

Herrington, A., & Herrington, J. (2007). Authentic mobile learning in higher education.

Hoepfl, M. C. (1997). Choosing qualitative research: A primer for technology education researchers.

Holec, H. (1979). *Autonomy and foreign language learning.* ERIC.

Horvath, A., & Teles, L. (1999). Novice users reactions to a web-enriched classroom. *Virtual University Journal, 2*(2), 49-57.

Huang, J. J., Yang, S. J., Huang, Y., & Hsiao, I. Y. (2010). Social learning networks: Build mobile learning networks based on collaborative services. *Educational Technology & Society, 13*(3), 78-92.

Huang, Y., Huang, T., & Hsieh, M. (2008). Using annotation services in a ubiquitous jigsaw cooperative learning environment. *Educational Technology & Society, 11*(2), 3-15.

Huang, Y., Jeng, Y., & Huang, T. (2009). An educational mobile blogging system for supporting collaborative learning. *Educational Technology & Society, 12*(2), 163-175.

Hughes, G. (2009). Social software: New opportunities for challenging social inequalities in learning? *Learning, Media and Technology, 34*(4), 291-305.

Järvelä, S., Näykki, P., Laru, J., & Luokkanen, T. (2007). Structuring and regulating collaborative learning in higher education with wireless networks and mobile tools. *Educational Technology & Society, 10*(4), 71-79.

Johnson, L., Smith, R., Willis, H., Levine, A., & Haywood, K. (2005). The 2011 horizon report. *The New Media Consortium, Austin, Texas,*

Johnson, R. B. (1997). Examining the validity structure of qualitative research. *Education, 118*(2), 282-292.

Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed methods research: A research paradigm whose time has come. *Educational Researcher, 33*(7), 14-26.

Johnson, S. (1995). Will our research hold up under scrutiny? *Journal of STEM Teacher Education, 32*(3)

Jonassen, D. H., Howland, J., Moore, J., & Marra, R. (2003). Learning to solve problems with technology: A constructive perspective. *Learning to Solve Problems with Technology,* , 2-15.

Jones, S. (2002). The internet goes to college: How students are living in the future with today's technology.

Joo, K. H., & Kim, S. H. (2009). Development and application of an efficient ubiquitous teaching and learning model. *Advanced Communication Technology, 2009. ICACT 2009. 11th International Conference On,* , *3* 2165-2168.

Kadirire, J. (2009). Mobile learning demystified. *The Evolution of Mobile Teaching and Learning,* , 15-56.

Kang, O. (2004). Higher education reform in china today. *Policy Futures in Education, 2*(1), 141-149.

Kaplan, A. M., & Haenlein, M. (2010). Users of the world, unite! the challenges and opportunities of social media. *Business Horizons, 53*(1), 59-68.

Kaptelinin, V., & Nardi, B. (2006). Activity theory in a nutshell.

Kelly, A. V. (2009). *The curriculum: Theory and practice* Sage.

Kenny, R. F., Neste-Kenny, V., Jocelyne, M., Park, C. L., Burton, P. A., & Meiers, J. (2009). Mobile learning in nursing practice education: Applying koole's FRAME model. *Journal of Distance Education, 23*(3)

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

Koch, T. (2006). Establishing rigour in qualitative research: The decision trail. *Journal of Advanced Nursing, 53*(1), 91-100.

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development* Prentice-Hall Englewood Cliffs, NJ.

Koole, M. L. (2009). A model for framing mobile learning. *Mobile Learning: Transforming the Delivery of Education and Training,* , 25-47.

Koole, M. L. (2006). *The framework for the rational analysis of mobile education (FRAME) model: An evaluation of mobile devices for distance education.* Citeseer). *The Framework for the Rational Analysis of Mobile Education (FRAME) Model: An Evaluation of Mobile Devices for Distance Education,*

Koole, M., & Ally, M. (2006). Framework for the rational analysis of mobile education (FRAME) model: Revising the ABCs of educational practices. *Networking, International Conference on Systems and International Conference on Mobile Communications and Learning Technologies, 2006. ICN/ICONS/MCL 2006. International Conference On,* 216-216.

Koole, M., McQuilkin, J. L., & Ally, M. (2010). Mobile learning in distance education: Utility or futility. *International Journal of E-Learning & Distance Education, 24*(2)

Krueger, R. A. (2009). *Focus groups: A practical guide for applied research* Sage.

Krueger, R. A., & Casey, M. A. (2000). A practical guide for applied research. *A Practical Guide for Applied Research,*

Kukulska-Hulme, A., & Traxler, J. (2007). *Mobile learning: A handbook for educators and trainers* Routledge.

Kumar, L. S., Jamatia, B., Aggarwal, A., & Kannan, S. (2011). Mobile device intervention for student support services in distance education context--FRAME model perspective. *European Journal of Open, Distance and E-Learning,*

Kumaravadivelu, B. (2003). Problematizing cultural stereotypes in TESOL. *Tesol Quarterly, 37*(4), 709-719.

Kvale, S. (1996). *InterViews: An introduction to qualitative research interviewing* SAGE.

Laird, T. F. N., & Kuh, G. D. (2005). Student experiences with information technology and their relationship to other aspects of student engagement. *Research in Higher Education, 46*(2), 211-233.

Land, S. M., & Hannafin, M. J. (2000). Student-centered learning environments. *Theoretical Foundations of Learning Environments, ,* 1-23.

Laouris, Y., & Eteokleous, N. (2005). We need an educationally relevant definition of mobile learning. *Proceedings of mLearn, , 2005*

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation* Cambridge university press.

Li, H. (2010). Higher education in china. *American Universities in a Global Market, ,* 269.

Liu, J., Yu, S., & Ran, M. (2008). Research on the communicative mobile english learning model. *Wireless, Mobile, and Ubiquitous Technology in Education, 2008. WMUTE 2008. Fifth IEEE International Conference On,* 60-64.

Livingstone, D. W. (2001). Adults' informal learning: Definitions, findings, gaps and future research.

Lohman, M., Wang, P., & Woolf, N. (1996). A case study of informal learning in the workplace. *Proceedings of the Academy of Human Resource Development, Minneapolis, MN,* , 605-607.

Lundin, J., & Magnusson, M. (2003). Collaborative learning in mobile work. *Journal of Computer Assisted Learning, 19*(3), 273-283.

Macneil, C. (2001). The supervisor as a facilitator of informal learning in work teams. *Journal of Workplace Learning, 13*(6), 246-253.

Marshall, C., & Rossman, G. B. (2010). *Designing qualitative research* Sage.

Marsick, V. J., & Volpe, M. (1999). The nature and need for informal learning. *Advances in Developing Human Resources, 1*(3), 1-9.

Marsick, V. J., & Watkins, K. E. (1990). Informal and incidental learning in the workplace.

Matusik, S. F., & Hill, C. W. (1998). The utilization of contingent work, knowledge creation, and competitive advantage. *Academy of Management Review, 23*(4), 680-697.

Maxwell, J. A. (2012). *Qualitative research design: An interactive approach* Sage.

Mazer, J. P., Murphy, R. E., & Simonds, C. J. (2007). I'll see you on "Facebook": The effects of computer-mediated teacher self-disclosure on student motivation, affective learning, and classroom climate. *Communication Education, 56*(1), 1-17.

Mazer, J. P., Murphy, R. E., & Simonds, C. J. (2009). The effects of teacher self-disclosure via facebook on teacher credibility. *Learning, Media and Technology, 34*(2), 175-183.

McMillan, J. H. (1996). *Educational research: Fundamentals for the consumer* ERIC.

Merriam, S. B. (1998). *Qualitative research and case study applications in education. revised and expanded from" case study research in education.".* ERIC.

158

Merriam, S. B., Caffarella, R. S., & Baumgartner, L. M. (2012). *Learning in adulthood: A comprehensive guide* John Wiley & Sons.

Mertler, C. A., & Charles, C. M. (2005). *Introduction to educational research* Pearson/A & B.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook* Sage.

Miller, P. (2005). Web 2.0: Building the new library. *Ariadne, 45*(30), 10.

Miller, P. (2003). Workplace learning by action learning: A practical example. *Journal of Workplace Learning, 15*(1), 14-23.

Morse, J. M. (1991). Approaches to qualitative-quantitative methodological triangulation. *Nursing Research, 40*(2), 120-123.

Motiwalla, L. F. (2007). Mobile learning: A framework and evaluation. *Computers & Education, 49*(3), 581-596.

Moule, P., & Goodman, M. (2009). *Nursing research: An introduction* Sage.

Naimie, Z., Siraj, S., Abuzaid, R. A., & Shagholi, R. (2010). HYPOTHESIZED
LEARNERS'TECHNOLOGY PREFERENCES BASED ON LEARNING
STYLE DIMENSIONS. *TOJET, 9*(4)

Naismith, L., Sharples, M., Vavoula, G., & Lonsdale, P. (2004). Literature review in
mobile technologies and learning.

National Statistical Service. (2014). National statistical service § sample size
calculator. Retrieved from
http://www.nss.gov.au/nss/home.nsf/pages/Sample+size+calculator

Neuman, W. L., & Kreuger, L. (2003). *Social work research methods: Qualitative
and quantitative approaches* Allyn and Bacon.

Ng, E. M., & Wong, H. C. (2013). Facebook: More than social networking for at-risk
students. *Procedia-Social and Behavioral Sciences, 73*, 22-29.

Ninnes, P., Aitchison, C., & Kalos, S. (1999). Challenges to stereotypes of
international students' prior educational experience: Undergraduate education in
india. *Higher Education Research and Development, 18*(3), 323-342.

160

Norman Kent Denzin, & Yvonna Sessions Lincoln. (2005). *The sage handbook of qualitative research* Sage.

O'Driscoll, T. (2003). Improving knowledge worker performance. *Performance Improvement, 42*(4), 5-11.

Oppenheim, A. N. (2000). *Questionnaire design, interviewing and attitude measurement* Continuum International Publishing Group.

O'Reilly, T. (2005). What is web 2.0 - O'reilly media. Retrieved from http://oreilly.com/web2/archive/what-is-web-20.html

Park, Y. (2011). A pedagogical framework for mobile learning: Categorizing educational applications of mobile technologies into four types. *The International Review of Research in Open and Distance Learning, 12*(2), 78-102.

Patton, M. Q. (1990). *Qualitative evaluation and research methods* . SAGE Publications, inc.

Peters, K., & Framework, A. F. L. (2005). Learning on the move: Mobile technologies in business and education.

161

Polit, D., & Hungler, B. (1994). Essentials of nursing research: Methods, appraisal, asid utilization.

Punch, K. F. (2005). *Introduction to social research: Quantitative and qualitative approaches* Sage.

Quinn, C. (2000a). LiNE zine - mLearning: Mobile, wireless, in-your-pocket learning. Retrieved from http://www.linezine.com/2.1/features/cqmmwiyp.htm

Quinn, C. (2000b). mLearning: Mobile, wireless, in-your-pocket learning. *LiNE Zine, 2006*

Ractham, P., & Zhang, X. (2006). Podcasting in academia: A new knowledge management paradigm within academic settings. *Proceedings of the 2006 ACM SIGMIS CPR Conference on Computer Personnel Research: Forty Four Years of Computer Personnel Research: Achievements, Challenges & the Future,* 314-317.

Raffo, C., Lovatt, A., Banks, M., & O'Connor, J. (2000). Teaching and learning entrepreneurship for micro and small businesses in the cultural industries sector. *Education Training, 42*(6), 356-365.

Rogelberg, S. G., & Stanton, J. M. (2007). Introduction understanding and dealing with organizational survey nonresponse. *Organizational Research Methods, 10*(2), 195-209.

Rossman, G. B., & Wilson, B. L. (1985). Numbers and words combining quantitative and qualitative methods in a single large-scale evaluation study. *Evaluation Review, 9*(5), 627-643.

Ryan, J. (2010). "The chinese learner": Misconceptions and realities. *International Education and the Chinese Learner, ,* 37-56.

Ryan, J., & Louie, K. (2005). Dichotomy or complexity: Problematising concepts of scholarship and learning. *Proceedings of the Critical Thinking and Learning Conference: Values, Concepts and Issues, 34th Annual Conference of the Philosophy of Education Society of Australia,* 24-27.

Safko, L. (2012). *The social media bible: Tactics, tools, and strategies for business success (third ed.)* John Wiley & Sons.

Sandholtz, J. H. (1997). *Teaching with technology: Creating student-centered classrooms.* ERIC.

Sawchuk, P. H. (2001). Trade union-based workplace learning: A case study in workplace reorganization and worker knowledge production. *Journal of Workplace Learning, 13*(7/8), 344-351.

Schneidawind, J. (1992). Big blue unveiling. *USA Today, November, 23*, 2B.

Schugurensky, D. (2000). The forms of informal learning: Towards a conceptualization of the field.

Sharples, M. (2000). The design of personal mobile technologies for lifelong learning. *Computers & Education, 34*(3), 177-193.

Sharples, M., Taylor, J., & Vavoula, G. (2005a). Towards a theory of mobile learning. *Proceedings of mLearn 2005, 1*(1), 1-9.

Sharples, M., Taylor, J., & Vavoula, G. (2005b). Towards a theory of mobile learning. *Proceedings of mLearn 2005, 1*(1), 1-9.

Shavelson, R. J. (1988). Statistical reasoning for the behavioral sciences.

Shuler, P., Hutchins, G., & LaShell, B. (2010). Student perceptions of tablet computers in a cooperative learning environment. *NACTA Journal,*

164

Skipper, M. (2006). Would mendel have been a blogger? *Nature Reviews Genetics, 7*(9), 664-664.

Smith, M. C., & Smith, T. J. (2008). Low-education adults' participation in informal learning activities: Relationships with selected demographic characteristics. *Adult Basic Education and Literacy Journal, 2*(2), 67-73.

Smith, P. J., Sadler-Smith, E., Robertson, I., & Wakefield, L. (2007). Leadership and learning: Facilitating self-directed learning in enterprises. *Journal of European Industrial Training, 31*(5), 324-335.

Stockwell, G. (2010). Using mobile phones for vocabulary activities: Examining the effect of the platform. *Language Learning & Technology, 14*(2), 95-110.

Straka, G. A. (2004). *Informal learning: Genealogy, concepts, antagonisms and questions* ITB.

Surowiecki, J. (2004). The wisdom of crowds: Why the many are smarter than the few and how collective wisdom shapes business. *Economies, Societies and Nations,*

Taylor, J. (2010). A theory of learning for the mobile age. *Medienbildung in neuen kulturräumen* (pp. 87-99) Springer.

Teddlie, C. (2009). *Foundations of mixed methods research: Integrating quantitative and qualitative approaches in the social and behavioral sciences* Sage Publications Inc.

The Department of Guangzhou Statistical. (2012). *Guangzhou statistical year 2011*. Retrieved from http://data.gzstats.gov.cn/gzStat1/chaxun/njsj.jsp

Tight, M. (2002). *Key concepts in adult education and training* Psychology Press.

Traxler, J. (2007). Defining, discussing and evaluating mobile learning: The moving finger writes and having writ.... *The International Review of Research in Open and Distance Learning, 8*(2)

Traxler, J., & Kukulska-Julme, A. (2005). Mobile learning in developing countries.

Tuckman, B. W. (1994). Conducting educational research fifth edition.

Uzunboylu, H., Cavus, N., & Ercag, E. (2009). Using mobile learning to increase environmental awareness. *Computers & Education, 52*(2), 381-389.

Vockley, M. M. (2007). *Creating & connecting: Research and guidelines on online social and educational networking* National School Boards Association.

Vygotskiĭ, L. L. S. (1978). *Mind in society: The development of higher psychological processes* Harvard university press.

Wan, Y. (2006). Expansion of chinese higher education since 1998: Its causes and outcomes. *Asia Pacific Education Review, 7*(1), 19-32.

Wang, H. (2011). Access to higher education in china: Differences in opportunity. *Frontiers of Education in China, 6*(2), 227-247.

Wang, X., & Liu, J. (2011). China's higher education expansion and the task of economic revitalization. *Higher Education, 62*(2), 213-229.

Wang, Y. (2012). **2012 年 11 月中国智能手机市场分析报告 english translation name: The chinese smartphone market analysis report on november 2012** . Retrieved from http://zdc.zol.com.cn/340/3409503.html

Watkins, K. E., & Marsick, V. J. (1992). Towards a theory of informal and incidental learning in organizations∗. *International Journal of Lifelong Education, 11*(4), 287-300.

Willig, C. (2013). *Introducing qualitative research in psychology* Open University Press.

Yan, F., & Lin, J. (2010). Commercial civil society: A perspective on private higher education in china. *Frontiers of Education in China, 5*(4), 558-578.

Yarmey, K. (2011). Student information literacy in the mobile environment. *Educause Quarterly, 34*(1), n1.

Yongquan, L. (2012). An empirical study on mobile learning of college english B: Design and development based on koole's FRAME model. *Open Education Research, 18*(3), 76-82.

Yousuf, M. I. (2007). Effectiveness of mobile learning in distance education. *Turkish Online Journal of Distance Education, 8*(4), 114-124.

Zhao, G. (2009). Higher education scale and employment relationship in china. *Online Submission,*

Zurita, G., & Nussbaum, M. (2007). A conceptual framework based on activity theory for mobile CSCL. *British Journal of Educational Technology, 38*(2), 211-235.

Zywno, M. S., & Waalen, J. K. (2002). The effect of individual learning styles on student outcomes in technology-enabled education. *Global J.of Engng.Educ., Australia, 6*(1)

唐章蔚, 王连英, 代玲玲, & 赵宁. (2014). 农村教师微型移动教研可行性研究——基于 FRAME 框架的调查分析. *电化教育研究, 35*(001), 38-44.

孙赢, 张欣, & 王勤宏. (2013). 高职高专学生移动学习现状调查分析. *计算机教育,* (21), 53-56.

张珑, 王建华, 张军, & 邸佳奇. (2010). 移动学习在高等学校教学改革中的应用 [J]. *计算机教育, 6*, 34-37.

朱哲, & 甄静波. (2010). 基于社会性软件的大学生非正式学习模式构建 [J]. *电化教育研究, 2*, 84-87.

李桂英, 马力, 宁玉文, & 李贵明. (2012). 基于云教育平台的自主移动学习模型研究. *现代教育技术, 21*(11), 76-79.

杨文阳. (2013). 终身学习理念下的移动学习框架探究. *中国远程教育,* (7), 78-82.

柴阳丽. (2012). Web2. 0 环境下大学生非正式学习现状调查与对策研究. *电化教育研究*, (12), 63-68.

海伦, & 彭一为. (2013). 探索一种有效, 可持续的高等教育移动学习框架. *中国远程教育*, (17), 16-24.

王嘉琦, 徐朝军, 钟柏昌, & 李艺. (2013). 基于强化理论的移动学习资源推送平台的设计与实现. *电化教育研究, 5*, 013.

范晨晓. (2012). 基于高校数字图书馆联盟的移动图书馆建设 SWOT 分析. *浙江高校图书情报工作, 2*

陈义勤. (2013). 成人学习者移动学习现状调查与研究. *中国远程教育*, (19), 47-52.

马运朋. (2010). 大众传媒对大学生非正式学习的影响. *学理论*, (3), 142-143.

流动学习问卷调查

注意事项：请在选择的答案上打☑，或按要求填写答案

1. 你有没有智能电话

   ☐ 有   ☐ 无 (请回答第 8 题)

2. 你会否使用智能电话上网?

   ☐ 会   ☐ 不会

3. 你的智能电话制式属于: (可选多于一项)

   ☐ 无线网络 (Wifi)   ☐ 3G

   ☐ 2G   ☐ 4G

4. 你使用的智能电话屏幕尺寸约:

   ☐ 低于 3 寸 (低于 7.6cm)   ☐ 4 - 5 寸(10.2-12.7cm)

   ☐ 3 - 4 寸(7.6-10.2cm)   ☐ 大于 5 寸(大于 12.7cm)

5. 你使用的智能电话价钱约：

   ☐ 低于¥1000   ☐ ¥3000 - ¥4000

   ☐ ¥1000 - ¥2000   ☐ ¥4000 - ¥5000

   ☐ ¥2000 - ¥3000   ☐ 多于¥5000

6. 你使用的智能电话操作系统平台是:

   ☐ ios   ☐ Android

171

☐ Window   ☐ 其他 (请注明) : _____

7. 你使用的智能电话内存量约:

☐ 低于 1GB   ☐ 10GB - 20GB

☐ 1GB - 5GB   ☐ 大于 20GB

☐ 5GB - 10GB

8. 你有没有平板计算机

☐ 有   ☐ 无 (请回答第 14 题)

9. 你使用的平板计算机屏幕尺寸约:

☐ 低于 6 寸(低于 15.2cm)   ☐ 8 - 10 寸(20.3-25.4cm)

☐ 6 - 8 寸(15.2-20.3cm)   ☐ 大于 10 寸(大于 15.2cm)

10. 你使用的平板计算机价钱约：

☐ 低于¥1000   ☐ ¥3000 - ¥4000

☐ ¥1000 - ¥2000   ☐ ¥4000 - ¥5000

☐ ¥2000 - ¥3000   ☐ 多于¥5000

11. 你使用的平板计算机内存量是:

☐ 低于 1GB   ☐ 10GB - 20GB

☐ 1GB - 5GB   ☐ 大于 20GB

☐ 5GB - 10GB

12. 你的平板计算机属于 [可选多于一项]

☐ 无线网络 (Wifi) ☐ 3G

☐ 2G ☐ 4G

13. 你使用的平板计算机操作系统平台是:

☐ ios ☐ Window

☐ Android ☐ 其他 (请注明) : _____

14. 你平均每月流动上网费用(包括电话通话费用)约

☐ ¥0 - ¥49 ☐ ¥200 - ¥249

☐ ¥50 - ¥99 ☐ ¥250 - ¥299

☐ ¥100 - ¥149 ☐ ¥300 或以上

☐ ¥150 - ¥199

15. 你平均每月流动上网数据量约

☐ 200MB 以下 ☐ 1GB – 2GB

☐ 200MB – 500 MB ☐ 2GB – 5GB

☐ 500MB – 1GB ☐ 5GB 以上

16. 你会在以下那种地方透过无线网络(Wifi)进行流动上网 [可选多于一项]

☐ 家/宿舍 ☐ 街道

☐ 商场 ☐ 餐厅

☐ 学校 ☐ 其他 (请注明:_____)

☐ 公共交通工具

17. 你已使用平板计算机或智能电话

- ☐ 少于 1 年　　　　　　　　　☐ 3 - 5 年
- ☐ 1 - 3 年　　　　　　　　　　☐ 大于 5 年

18. 你曾否使用智能电话/平板计算机/笔记本计算机进行下列活动作***学习用途***							
	有	否	如***有***，你使用该学习活动的经常程度为:				
			极少				经常
			1	2	3	4	5
A. 电子阅读	☐	☐	☐	☐	☐	☐	☐
i. 网站	☐	☐	☐	☐	☐	☐	☐
ii. 文件/书	☐	☐	☐	☐	☐	☐	☐
iii. 视频 (如土豆网)	☐	☐	☐	☐	☐	☐	☐
iv. 新闻	☐	☐	☐	☐	☐	☐	☐
B. 数据记录数码化	☐	☐	☐	☐	☐	☐	☐
i. 影像	☐	☐	☐	☐	☐	☐	☐
ii. 短片	☐	☐	☐	☐	☐	☐	☐
iii. 音讯档案	☐	☐	☐	☐	☐	☐	☐
C. 电子搜寻数据	☐	☐	☐	☐	☐	☐	☐
i. 搜寻网站	☐	☐	☐	☐	☐	☐	☐
ii. 知识网站(如百度百科)	☐	☐	☐	☐	☐	☐	☐
iii. 图书馆网站	☐	☐	☐	☐	☐	☐	☐
D. 学习	☐	☐	☐	☐	☐	☐	☐

i. 在线评核	☐	☐	☐	☐	☐	☐	☐
ii. 实时翻译	☐	☐	☐	☐	☐	☐	☐
iii. 应用程序 (Apps)	☐	☐	☐	☐	☐	☐	☐
E. 分享学习资源	☐	☐	☐	☐	☐	☐	☐
i. 电子邮件	☐	☐	☐	☐	☐	☐	☐
ii. 网上储存空间(如 QQ 空间)	☐	☐	☐	☐	☐	☐	☐
iii. 实时档案传送	☐	☐	☐	☐	☐	☐	☐
F. 讨论	☐	☐	☐	☐	☐	☐	☐
i. 实时通讯(如 QQ)	☐	☐	☐	☐	☐	☐	☐
ii. 视频会议	☐	☐	☐	☐	☐	☐	☐
iii. 群组	☐	☐	☐	☐	☐	☐	☐

题目	绝不同意 1	2	3	4	绝对同意 5
19. 我同意使用流动学习工具能帮助阅读	☐	☐	☐	☐	☐
20. 我同意使用流动学习工具能加强沟通	☐	☐	☐	☐	☐
21. 我同意使用流动学习工具能分享学习过程	☐	☐	☐	☐	☐
22. 我同意使用流动学习工具能分享学习成果	☐	☐	☐	☐	☐
23. 我同意使用流动学习工具能帮助记录数据	☐	☐	☐	☐	☐
24. 我同意使用流动学习工具能帮助搜寻数据	☐	☐	☐	☐	☐
25. 我同意使用流动学习能提升学习能力	☐	☐	☐	☐	☐
26. 我同意使用流动学习能提高学习兴趣	☐	☐	☐	☐	☐
27. 我同意使用流动学习能提升学习效率	☐	☐	☐	☐	☐

28. 我同意使用流动学习能帮助学习与课堂相关的知识	☐	☐	☐	☐	☐
29. 我同意使用流动学习能帮助学习课堂以外的知识	☐	☐	☐	☐	☐
30. 我同意流动学习工具的容量对学习是有影响的	☐	☐	☐	☐	☐
31. 我同意流动学习工具的屏幕大小对学习是有影响的	☐	☐	☐	☐	☐
32. 我同意流动学习工具的网络速度对学习是有影响的	☐	☐	☐	☐	☐
33. 我同意应用程序(Apps) 能帮助学习	☐	☐	☐	☐	☐
34. 我透过流动学习工具学习没有遇上任何困难	☐	☐	☐	☐	☐
35. 我使用流动学习工具与信息性互动是流畅的	☐	☐	☐	☐	☐
36. 我喜爱流动学习	☐	☐	☐	☐	☐

流动学习工具的例子如智能电话/平板计算机/笔记本计算机

37. 你对流动学习有什么其他意见?

_____

_____

个人资料

年龄

☐ 18 岁或以下　　　☐ 19 岁 --- 20 岁　　　☐ 21 岁 --- 22 岁

☐ 23 岁 --- 24 岁　　　☐ 25 岁或以上

性别

☐ 男　　　　　　　　　☐ 女

现就读课程程度

☐ 本科生　　　☐ 研究生　　　☐ 博士生　　　其 他 :_____

主修科目

☐ 哲学　　　☐ 法学　　　☐ 文学　　　☐ 理学

☐ 经济学　　　☐ 教育学　　　☐ 历史学　　　☐ 工学

176

- ☐ 管理学
- ☐ 艺术学
- ☐ 其

  他:＿＿＿＿＿

Appendix B: Questionnaire (English Version)

<u>Mobile Learning Questionnaire</u>

1. Do you have a smartphone?

   ☐ Yes   ☐ No (Please refer to Q.8)

2. Do you use smartphones to do online activities?

   ☐ Yes   ☐ No

3. What is your smartphones data transfer mode? (allow multiple selection)

   ☐ Wifi   ☐ 3G

   ☐ GPRS   ☐ 4G

4. What is your smartphones display size?

   ☐ below 3 inches (< 7.6cm)   ☐ 4 - 5 inches (10.2 – 12.7cm)

   ☐ 3 - 4 inches (7.6 – 10.2cm)   ☐ above 5 inches(>12.7cm)

5. What is your smartphones price ranges?

   ☐ below ¥1000   ☐ ¥3000 - ¥4000

   ☐ ¥1000 - ¥2000   ☐ ¥4000 - ¥5000

   ☐ ¥2000 - ¥3000   ☐ above¥5000

6. What is your smartphones operation system platform?

   ☐ ios   ☐ Android

☐ Window   ☐ Other : _____

7. What is your smartphones capacity?

☐ below 1GB   ☐ 10GB - 20GB

☐ 1GB - 5GB   ☐ over 20GB

☐ 5GB - 10GB

8. Do you have a tablet?

☐ Yes   ☐ No (Please refer to Q.14)

9. What is your tablets display size?

☐ below 6 inches (<15.2cm)   ☐ 8 - 10 inches (20.3-25.4cm)

☐ 6 - 8 inches (15.2-20.3cm)   ☐ above 10 inches (>25.4cm)

10. What is your tablet price ranges?

☐ Below ¥1000   ☐ ¥3000 - ¥4000

☐ ¥1000 - ¥2000   ☐ ¥4000 - ¥5000

☐ ¥2000 - ¥3000   ☐ above¥5000

11. What is your tablets capacity?

☐ below 1GB   ☐ 10GB - 20GB

☐ 1GB - 5GB   ☐ above 20GB

☐ 5GB - 10GB

179

12. What is your tablets data transfer mode? (allow multiple selection)

☐ Wifi ☐ 3G + wifi

☐ GPRS + wifi ☐ LTE + wifi

13. What is your tablets operation system platform?

☐ ios ☐ Window

☐ Android ☐ Other : _____

14. What is your average price of data package per month?

☐ ¥0 - ¥49 ☐ ¥200 - ¥249

☐ ¥50 - ¥99 ☐ ¥250 - ¥299

☐ ¥100 - ¥149 ☐ ¥300 or above

☐ ¥150 - ¥199

15. What is your average data usage per month?

☐ 200MB or below ☐ 1GB – 2GB

☐ 200MB – 500 MB ☐ 2GB – 5GB

☐ 500MB – 1GB ☐ 5GB or above

16. Where have you used wifi to access the internet [may multiple selection]

☐ Home/Hostel ☐ Public Transportation

☐ Shopping Mall ☐ Street

☐ University ☐ Restaurant

180

☐ Other：

17. How many years you have used?

☐ <1 years ☐ 3 – 5 years

☐ 1 – 3 years ☐ > 5 years

18. Have you use smartphone or tablet or notebook to do the following learning activities?							
	Yes	**No**	If Yes, please indicate the frequency				
			Rarely				Always
			1	2	3	4	5
A. Electronic reading or watching	☐	☐	☐	☐	☐	☐	☐
i. Websites	☐	☐	☐	☐	☐	☐	☐
ii. Articles/Books	☐	☐	☐	☐	☐	☐	☐
iii. Video	☐	☐	☐	☐	☐	☐	☐
iv. News	☐	☐	☐	☐	☐	☐	☐
B. Digital Recording	☐	☐	☐	☐	☐	☐	☐
i. Photo	☐	☐	☐	☐	☐	☐	☐
ii. Video	☐	☐	☐	☐	☐	☐	☐
iii. Audio	☐	☐	☐	☐	☐	☐	☐
C. E-Searching	☐	☐	☐	☐	☐	☐	☐
i. Search Engine	☐	☐	☐	☐	☐	☐	☐
ii. Knowledge Websites	☐	☐	☐	☐	☐	☐	☐
iii. Library Websites	☐	☐	☐	☐	☐	☐	☐
D. Module Learning	☐	☐	☐	☐	☐	☐	☐
i. Online assessment	☐	☐	☐	☐	☐	☐	☐
ii. Translation	☐	☐	☐	☐	☐	☐	☐
iii. Apps	☐	☐	☐	☐	☐	☐	☐
E. Sharing learning resources	☐	☐	☐	☐	☐	☐	☐

i.	email	☐	☐	☐	☐	☐	☐	☐
ii.	iCloud	☐	☐	☐	☐	☐	☐	☐
iii.	Instant Files Transfer	☐	☐	☐	☐	☐	☐	☐
F. Online discussion		☐	☐	☐	☐	☐	☐	☐
i.	Instant Messaging	☐	☐	☐	☐	☐	☐	☐
ii.	Video Conference	☐	☐	☐	☐	☐	☐	☐
iii.	Group	☐	☐	☐	☐	☐	☐	☐

Questions	Strongly Disagree 1	2	3	4	Strongly Agree 5
19. I agree mobile device can facilitate reading	☐	☐	☐	☐	☐
20. I agree mobile device can facilitate communication	☐	☐	☐	☐	☐
21. I agree mobile device can share my learning process	☐	☐	☐	☐	☐
22. I agree mobile device can share my learning outcome	☐	☐	☐	☐	☐
23. I agree mobile device can facilitate record data	☐	☐	☐	☐	☐
24. I agree mobile device can facilitate searching information	☐	☐	☐	☐	☐
25. I agree mobile device can enhance learning ability	☐	☐	☐	☐	☐
26. I agree mobile device can enhance learning interest	☐	☐	☐	☐	☐
27. I agree mobile device can enhance learning efficiency	☐	☐	☐	☐	☐
28. I agree mobile device can facilitate learning from the formal curriculum	☐	☐	☐	☐	☐
29. I agree mobile device can effective to learn the outside of the formal curriculum	☐	☐	☐	☐	☐
30. I agree the capacity of mobile device affects learning	☐	☐	☐	☐	☐
31. I agree the screen size of mobile device affects learning	☐	☐	☐	☐	☐
32. I agree the bandwidth of mobile device affects learning	☐	☐	☐	☐	☐
33. I agree Apps affects learning	☐	☐	☐	☐	☐
34. I have no any difficulty when using mobile device to learn	☐	☐	☐	☐	☐
35. I am good interactive with mobile device	☐	☐	☐	☐	☐
36. I like using mobile devices to learn	☐	☐	☐	☐	☐

Personal Information

Age

☐ 18 or below ☐ 19 --- 20 ☐ 21 --- 22

☐ 23 --- 24 ☐ 25 or above

Sex

☐ Male   ☐ Female

Education level of your study

☐ Bachelor   ☐ Master   ☐ Doctor   ☐ Other:_____

Major Study

☐ Arts

☐ Science

☐ Engine

☐ Economic

☐ Education

☐ Language

☐ Medical

☐ Fine Arts

☐ Media

☐ Other : ____

184

<u>小组访谈 Pre-focus group interview</u>

题目:

Question:

1. 可否讲解你平时如何透过流动学习装置如智能电话/平板计算机等学习?

    Can you explain how do you use mobile device such as smartphone or tablet to learn?

2. 你的学习内容是什么?

    What is your learning content?

3. 那个地方和时段是你使用流动学习学习? 为什么?

    When and where will you used mobile device to learn? Why?

4. 为什么你选择流动装置学习?

    Why do you choose mobile device to learn?

5. 你如何定义「非正式学习」模式是什么?你认为这种学习模式对你重要吗? 为什么?

    How can you define informal learning? Do you think informal learning is important? Why?

6. 你同意流动学习装置的性能和价钱对你学习重要吗?为什么?

Do you agree the technical specific and price of mobile device are important for your learning? Why?

7. 你同意流动学习装置能提升与同学/朋友/老师沟通，加强学习吗？

Do you agree mobile device can enhance your communication with classmates, friends or teacher for your learning?

8. 当你购买流动学习装置，你会考虑那些因素？为什么?

What factors will you consider when you buy new mobile device? Why?

9. 你认为流动学习装置能有效协助你学习吗?

Do you agree mobile device have positive affect to your learning?

10. 与其他学习装置(如座枱式计算机)比较，你喜欢透过流动学习装置学习模式吗？ 为什么？

Compare with other learning device such as desktop, do you prefer using mobile device to learn? Why?

11. 与传统学习模式比较(如阅读课本、面对面学习)，你喜欢透过流动学习装置学习模式吗？ 为什么？

Compare with traditional learning model such as reading books, face to face learning, do you prefer using mobile device to learn? Why?

12. 你同意流动学习装置能提升非正式学习？

Do you agree mobile device can enhance your informal learning?

Appendix D: Diary Log Book (Chinese Version)

🗑 流动学习个案记录簿

目的：记录受访者连续四星期使用流动学习工具学习实况

基本个人资料

姓名

年龄:

性别:

籍贯:

就读学校:

就读课程:

(学士/硕士/博士)

主修科目:

流动网络供货商

平均每月数据量

平均每月流动上网费

（包括电话通话费用）

网络速度：

学习兴趣:　1.

　　　　　　2.

　　　　　　3.

189

居住宿舍　　　　　　　*是/否

4.

流动学习工具基本数据

智能电话

牌子：
_____

型号：
_____

屏幕尺寸：
_____

操作系统平
台：
_____

内存记忆：
_____

重量：
_____

平板计算机

牌子：
_____

型号：
_____

屏幕尺寸：
_____

操作系统平
台：
_____

内存记忆：
_____

重量：
_____

笔记本计算机

牌子：
_____

型号：
_____

屏幕尺寸：
_____

操作系统平台：
_____

内存记忆：
_____

重量：
_____

191

购买时价钱：_____ 购买时价钱：_____ 购买时价钱：_____

购买日期：_____ 购买日期：_____ 购买日期：_____

个案记录事件簿

进度表

开始日期:

第一星期	
天	已完成
第 1 天	☐
第 2 天	☐
第 3 天	☐
第 4 天	☐
第 5 天	☐
第 6 天	☐
第 7 天	☐

第二星期	
天	已完成
第 1 天	☐
第 2 天	☐
第 3 天	☐
第 4 天	☐
第 5 天	☐
第 6 天	☐
第 7 天	☐

第三星期	
天	已完成
第 1 天	☐
第 2 天	☐
第 3 天	☐
第 4 天	☐
第 5 天	☐
第 6 天	☐
第 7 天	☐

第四星期	
天	已完成
第 1 天	☐
第 2 天	☐
第 3 天	☐
第 4 天	☐
第 5 天	☐
第 6 天	☐
第 7 天	☐

193

第＿＿＿＿＿天 时段: ☐ 00:00 - 06:00　☐ 06:00 - 12:00　☐ 12:00 - 18:00　☐ 18:00 - 24:00

电子学习行为	学习类型 (可选多于一项)	学习工具 (可选多于一项)	学习地点 （如有，可选多于一项）	学习内容和过程
☐　电子阅读	☐　网站 ☐　文章 ☐　书 ☐　社交网络 ☐　视频 ☐　图片 ☐　新闻 ☐　其他：	☐　智能电话 ☐　平板计算机 ☐　笔记本计算机 ☐　其他：	☐　课室 (课堂时段) ☐　学校（非课堂时段） ☐　家/宿舍 ☐　公共交通工具 ☐　街道 ☐　餐馆 ☐　其他：	知识相关性: 与课堂知识*相关/无关 知识类型: 　*计算机科学、信息/哲学与心理学/宗教/社会科学/语言/科学/技术/艺术与休闲/文学/历史、地理与传记 电子阅读过程和内容：

电子学习行为	学习类型 (可选多于一项)	学习工具 (可选多于一项)	学习地点 （如有，可选多于一项）	学习内容和过程
☐ 数据记录数码化	☐ 影像 ☐ 短片 ☐ 音讯档案 ☐ 文本文件 ☐ 个人行事记录 ☐ 其他：	☐ 智能电话 ☐ 平板计算机 ☐ 笔记本计算机 ☐ 其他：	☐ 课室 (课堂时段) ☐ 学校（非课堂时段） ☐ 家/宿舍 ☐ 公共交通工具 ☐ 街道 ☐ 餐馆 ☐ 其他：	知识相关性: 与课堂知识*相关/无关 知识类型: 　*计算机科学、信息/哲学与心理学/宗教/社会科学/语言/科学/技术/艺术与休闲/文学/历史、地理与传记 数据记录过程和内容:
☐ 电子搜寻数据	☐ 搜寻网站 ☐ 知识网站 ☐ 图书馆网站 ☐ 其他：	☐ 智能电话 ☐ 平板计算机 ☐ 笔记本计算机 ☐ 其他：	☐ 课室 (课堂时段) ☐ 学校（非课堂时段） ☐ 家/宿舍 ☐ 公共交通工具	知识相关性: 与课堂知识*相关/无关 知识类型: 　*计算机科学、信息/哲学与心理学/宗教/社会科学/语言/科学/技术/艺术与休闲/文学/历史、地理与传记

195

		其他：	□ 街道 □ 餐馆 □ 其他：	搜寻过程和内容：
电子学习行为	**学习类型** **(可选多于一项)**	**学习工具** **(可选多于一项)**	**学习地点** **（如有，可选多于一项）**	**学习内容和过程**
□ **课程学习**	□ 在线评核 □ 实时翻译 □ 应用程序 □ 其他：	□ 智能电话 □ 平板计算机 □ 笔记本计算机 □ 其他：	□ 课室 (课堂时段) □ 学校（非课堂时段） □ 家/宿舍 □ 公共交通工具 □ 街道 □ 餐馆 □ 其他：	学习相关性: 与课堂学习*相关/无关 学习类型: *计算机科学、信息/哲学与心理学/宗教/社会科学/语言/科学/技术/艺术与休闲/文学/历史、地理与传记 学习过程和内容：
□ **分享学习资源**	□ 电子邮件 □ 社交网络 □ 实时档案传送 □ 其他：	□ 智能电话 □ 平板计算机 □ 笔记本计算机 □ 其他：	□ 课室 (课堂时段) □ 学校（非课堂时段） □ 家/宿舍 □ 公共交通工具 □ 街道	分享资源相关性: 与课堂知识*相关/无关 分享对象: *老师/同学/朋友/家人/其他(请注明) 分享资源过程和内容：

电子学习行为	学习类型 (可选多于一项)	学习工具 (可选多于一项)	学习地点 （如有，可选多于一项）	学习内容和过程
			☐ 餐馆 ☐ 其他：	

电子学习行为	学习类型 (可选多于一项)	学习工具 (可选多于一项)	学习地点 （如有，可选多于一项）	学习内容和过程
☐ 在线讨论	☐ 实时通讯 ☐ 视频会议 ☐ 社交网络 ☐ 其他：	☐ 智能电话 ☐ 平板计算机 ☐ 笔记本计算机 ☐ 其他：	☐ 课室 (课堂时段) ☐ 学校（非课堂时段） ☐ 家/宿舍 ☐ 公共交通工具 ☐ 街道 ☐ 餐馆 ☐ 其他：	讨论内容相关性: 与课堂知识*相关/无关 讨论对象: *老师/同学/朋友/家人/其他(请注明) 讨论过程和内容:
☐ _____	☐ _____ ☐ _____	☐ 智能电话 ☐ 平板计算机 ☐ 笔记本计算机	☐ 课室 (课堂时段) ☐ 学校（非课堂时段） ☐ 家/宿舍 ☐ 公共交通工具	

197

		☐　　其他：	☐　　　　街道	
			☐　　　　餐馆	
			☐　　　　其他：	

198

Appendix E: Diary Log Book (English Version)
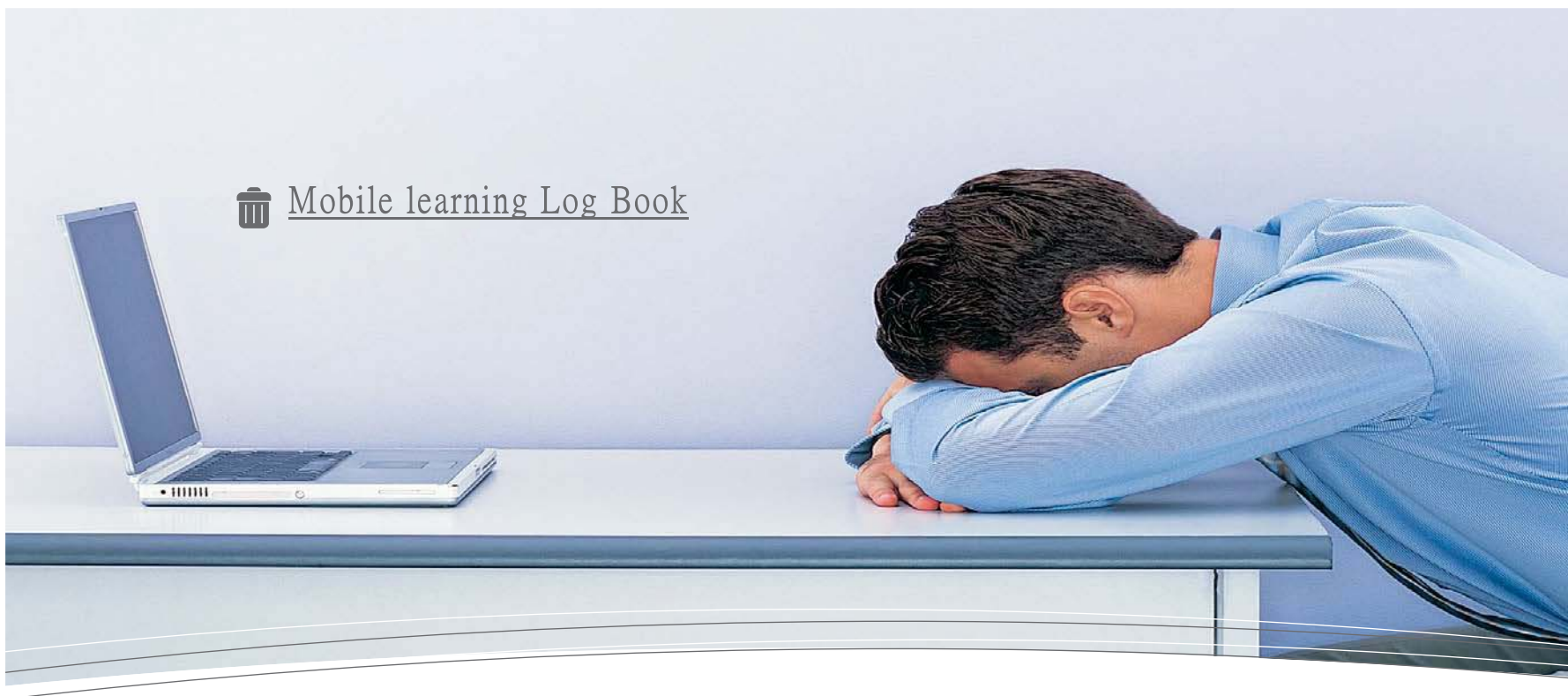
🗑 <u>Mobile learning Log Book</u>

Aims：Record four consecutive weeks using mobile learning device to learn

Basic Personal Information

Name: _____   Mobile service provider _____

Age: _____   Average data packages per
month _____

Gender: _____   Average internet fee
（Including the fee of
telecommunication）
_____

Birth of City: _____   Speed of Internet : _____

School: _____

Learning Interest: 1 _____

Study Level: _____   2. _____

200

Major of Study: _____

3. _____

Is live in hostel: *Yes/No

4. _____

Basic data of mobile learning devices

Smartphone	**Tablet**	**Notebook**

Smartphone

Brand :

_____

Model :

_____

Screen Size：

_____

Operating

System：

_____

RAM：

_____

Weight：

_____

Tablet

Brand :

_____

Model :

_____

Screen Size：

_____

Operating

System：

_____

RAM：

_____

Weight：

_____

Notebook

Brand :

_____

Model :

_____

Screen Size：

_____

Operating

System：

_____

RAM：

_____

Weight：

_____

Price：

Price：

Price：

Purchase date：

Purchase date：

Purchase date：

203

Log Book Record Status

Date of Start:

First Week	
Day	**Completed**
1	☐
2	☐
3	☐
4	☐
5	☐
6	☐
7	☐

Second Week	
Day	**Completed**
1	☐
2	☐
3	☐
4	☐
5	☐
6	☐
7	☐

Third Week	
Day	**Completed**
1	☐
2	☐
3	☐
4	☐
5	☐
6	☐
7	☐

Fourth Week	
Day	**Completed**
1	☐
2	☐
3	☐
4	☐
5	☐
6	☐
7	☐

Date : _____ Period: ☐ 00:00 - 06:00 ☐ 06:00 - 12:00 ☐ 12:00 - 18:00 ☐ 18:00 - 24:00

E-Learning Activities	Types of Learning （May multiple selection)	Learning Tools （May multiple selection)	Learning Places （May multiple selection)	Learning Contents and Process
☐ **Electronic reading**	☐ websites ☐ articles ☐ books ☐ social networking ☐ video ☐ graph ☐ news ☐ other：	☐ Smartphone ☐ Tablets ☐ Notebooks ☐ Other：	☐ Classroom (in lesson) ☐ School (Out of Lesson) ☐ Home/Hostel ☐ Public Transportation ☐ Street ☐ Restaurant ☐ Other：	Knowledge Relevant: * relative to lesson / Not relative to lesson Knowledge Types: *Computer Science, Library and Information Science & General Work/ Philosophy and psychology/ Religion/ Social Sciences/ Language/ Science/ Technology/ Arts/ Literature/ history, geography & biography Reading Contents and Process:

205

E-Learning Activities	Types of Learning （May multiple selection)	Learning Tools （May multiple selection)	Learning Places （May multiple selection)	Learning Contents and Process
☐ **Digital Recording**	☐ Photo ☐ Video ☐ Audio ☐ Text ☐ Personal Diaries ☐ Other：	☐ Smartphone ☐ Tablets ☐ Notebooks ☐ Other：	☐ Classroom (in lesson) ☐ School (Out of Lesson) ☐ Home/Hostel ☐ Public Transportation ☐ Street ☐ Restaurant ☐ Other：	Knowledge Relevant: * relative to lesson / Not relative to lesson Knowledge Types: *Computer Science, Library and Information Science & General Work/ Philosophy and psychology/ Religion/ Social Sciences/ Language/ Science/ Technology/ Arts/ Literature/ history, geography & biography Digital Recording Contents and Process:
☐ **E-Searching**	☐ Search Engine ☐ Knowledge Websites	☐ Smartphone ☐ Tablets ☐ Notebooks	☐ Classroom (in lesson) ☐ School (Out of	Knowledge Relevant: * relative to lesson / Not relative to lesson Knowledge Types: *Computer Science, Library and Information Science & General Work/ Philosophy and psychology/ Religion/ Social Sciences/ Language/ Science/ Technology/ Arts/ Literature/ history, geography & biography

E-Learning Activities	Types of Learning（May multiple selection)	Learning Tools（May multiple selection)	Learning Places（May multiple selection)	Learning Contents and Process
	☐ Library Websites ☐ Others：	☐ Other：	Lesson) ☐ Home/Hostel ☐ Public Transportation ☐ Street ☐ Restaurant ☐ Other：	Searching Content and Content:
☐ **Module Learning**	☐ online assessment ☐ Translation ☐ Apps ☐ Other：	☐ Smartphone ☐ Tablets ☐ Notebooks ☐ Other：	☐ Classroom (in lesson) ☐ School (Out of Lesson) ☐ Home/Hostel ☐ Public Transportation ☐ Street ☐ Restaurant ☐ Other：	Knowledge Relevant: *relative to lesson / Not relative to lesson Knowledge Types: *Computer Science, Library and Information Science & General Work/ Philosophy and psychology/ Religion/ Social Sciences/ Language/ Science/ Technology/ Arts/ Literature/ history, geography & biography Learning Contents and Process :

207

E-Learning Activities	Types of Learning（May multiple selection)	Learning Tools（May multiple selection)	Learning Places（May multiple selection)	Learning Contents and Process
☐ **Sharing learning resources**	☐ email ☐ social networking ☐ Instant files transfer ☐ Other：	☐ Smartphone ☐ Tablets ☐ Notebooks ☐ Other：	☐ Classroom (in lesson) ☐ School (Out of Lesson) ☐ Home/Hostel ☐ Public Transportation ☐ Street ☐ Restaurant ☐ Other：	Sharing Relevant: relative to lesson / Not relative to lesson Sharing Target: *Teacher/ Classmates/ Friends/ Family/ Other: Sharing learning resources contents and process :
☐ **online discussion**	☐ Instant Messaging ☐ video conference ☐ Social Networking ☐ Other：	☐ Smartphone ☐ Tablets ☐ Notebooks ☐ Other：	☐ Classroom (in lesson) ☐ School (Out of Lesson) ☐ Home/Hostel ☐ Public Transportation ☐ Street	Sharing Relevant: relative to lesson / Not relative to lesson Sharing Target: *Teacher/ Classmates/ Friends/ Family/ Other: Sharing learning resources contents and process :

			☐ Restaurant ☐ Other：	
☐ _____	☐ _____ ☐ _____	☐ Smartphone ☐ Tablets ☐ Notebooks ☐ Other：	☐ Classroom (in lesson) ☐ School (Out of Lesson) ☐ Home/Hostel ☐ Public Transportation ☐ Street ☐ Restaurant ☐ Other：	

面谈 Post - Interview

受访者: A01

Participant: A01

- 你认为使用 QQ 群对你学习或日常生活重要吗？为什么？

  What do you think QQ Group is important for your learning or daily life? Why?

- 如果没有网上群网，你认为能否达到同样的效果吗？为什么？

  If no online group, do you believe have the same learning performance? Why?

- 你认为同学之间互相分享学习过程和分享学习成果重要吗？为什么？

  Do you agree sharing learning process or outcomes with classmates are important for your learning? Why?

- 你希望将来流动装置如何能帮你学习？

  What functions of mobile device do you want to expect for your learning in future?

- 你认为终身学习重要吗？请问你认为流动学习装置如何帮助你终身学习？

  Do you agree lifelong learning is important? How mobile device assist your lifelong learning?

受访者 : A02

Participant: A02

- 何否解释如何用手机写日记？为什么要要用手机写日记呢？

  How can you use Smartphone to do daily diary? Why was you used Smartphone to do daily diary?

- 在用手机写日记过程中有什么困难？

  What were difficulties when using Smartphone to do daily diary?

- 装置的性能对你写日记有无影响？什么因素如装置重量、功能、性能、

性能等影响你选择用何种工具写日记呢？

What technical specific factors affected using Smartphone to do daily diary?

● 你希望将来流动装置如何能帮你学习？

What functions of mobile device do you want to expect for your learning in future?

● 你认为终身学习重要吗？请问你认为流动学习装置如何帮助你终身学习？

Do you agree lifelong learning is important? How mobile device assist your lifelong learning?

受访者 : A03

Participant: A03

● 你觉得用流动装置阅读和拿着实物如书本或纸张阅读有什么分别？各有什么好处？

What are the different between reading mobile device and papers or books? What are advantages for each type of reading?

● 如果学校将所有图书馆内的书本变为数码化，你们可以透过手机无限次借阅，你喜欢吗？为什么？

Do you like the library convert all books to digital? Why?

● 理论上屏幕越大阅读越好，但流动装置越大就越不方便，你会怎样取舍？为什么？

If the screen size is larger, the reading performance should be better. However, the size of mobile device will be increased. So, what do you prefer? Why?

● 你希望将来流动装置如何能帮你学习？

What functions of mobile device do you want to expect for your learning in future?

● 你认为终身学习重要吗？请问你认为流动学习装置如何帮助你终身学习？

Do you agree lifelong learning is important? How mobile device assist your lifelong learning?

受访者 : A04

Participant: A04

- 你觉得用使用智能电话/平板计算机和笔记本计算器对学习过程和成果有什么分别？

  What are the different learning process and outcomes between using different type of mobile devices such as Smartphone, tablets or notebooks?

- 什么因素令你决定何时用智能电话/平板计算机和笔记本计算器来进行学习？为什么？

  What factors for you to choose Smartphone, tablets or notebooks for your learning?

- 市场上有些产品结合流动电话和平板计算机功能，即平板计算机可以打电话（如 Samsung Note 8.0），你会考虑吗？为什么？

  Do you have an interested using phablet for learning? Why?

- 你希望将来流动装置如何能帮你学习？

  What functions of mobile device do you want to expect for your learning in future?

- 你认为终身学习重要吗？请问你认为流动学习装置如何帮助你终身学习？

  Do you agree lifelong learning is important? How mobile device assist your lifelong learning?

受访者 : S01

Participant: S01

- 在过去四星期，你经常都会透过 QQ 分享你学习过程或成果，为什么你愿意与人分享呢？

Why do you prefer using QQ to share your learning process or outcomes?

- 为什么你会选择透过流动装置来分享吗？如果无流动装置，你仍会乐意与人分享你的学习过程或分果吗？为什么

  Why do you use mobile device to share your learning process or outcomes? If haven't mobile device, will you also willing to share your learning process or outcomes? Why?

- 你认为分享知识重要吗？对你有什么影响？

- Do you agree sharing knowledge is important?

- 你希望将来流动装置如何能帮你学习？

  What functions of mobile device do you want to expect for your learning in future?

- 你认为终身学习重要吗？请问你认为流动学习装置如何帮助你终身学习？

  Do you agree lifelong learning is important? How mobile device assist your lifelong learning?

受访者 : S02

Participant: S02

- 你觉得用流动装置阅读和拿着实物如书本或纸张阅读有什么分别？各有什么好处？

  What are the different between reading mobile device and papers or books? What are advantages for each type of reading?

- 如果学校将所有图书馆内的书本变为数码化，你们可以透过手机无限次借阅，你喜欢吗？为什么？

  Do you like the library convert all books to digital? Why?

- 理论上屏幕越大阅读越好，但流动装置越大就越不方便，你会怎样取舍？为什么？

  If the screen size is larger, the reading performance should be better. However,

the size of mobile device will be increased. So, what do you prefer? Why?

- 你希望将来流动装置如何能帮你学习？

  What functions of mobile device do you want to expect for your learning in future?

- 你认为终身学习重要吗？请问你认为流动学习装置如何帮助你终身学习？

  Do you agree lifelong learning is important? How mobile device assist your lifelong learning?

受访者 : S03

Participant: S03

- 你觉得用流动装置阅读和拿着实物如书本或纸张阅读有什么分别？各有什么好处？

  What are the different between reading mobile device and papers or books? What are advantages for each type of reading?

- 如果学校将所有图书馆内的书本变为数码化，你们可以透过手机无限次借阅，你喜欢吗？为什么？

  Do you like the library convert all books to digital? Why?

- 理论上屏幕越大阅读越好，但流动装置越大就越不方便，你会怎样取舍？为什么？

  If the screen size is larger, the reading performance should be better. However, the size of mobile device will be increased. So, what do you prefer? Why?

- 你希望将来流动装置如何能帮你学习？

  What functions of mobile device do you want to expect for your learning in future?

- 你认为终身学习重要吗？请问你认为流动学习装置如何帮助你终身学习？

Do you agree lifelong learning is important? How mobile device assist your lifelong learning?

受访者 : B01

Participant: B01

- 你觉得用流动装置阅读和拿着实物如书本或纸张阅读有什么分别？各有什么好处？

  What are the different between reading mobile device and papers or books? What are advantages for each type of reading?

- 如果学校将所有图书馆内的书本变为数码化，你们可以透过手机无限次借阅，你喜欢吗？为什么？

  Do you like the library convert all books to digital? Why?

- 理论上屏幕越大阅读越好，但流动装置越大就越不方便，你会怎样取舍？为什么？

  If the screen size is larger, the reading performance should be better. However, the size of mobile device will be increased. So, what do you prefer? Why?

- 你希望将来流动装置如何能帮你学习？

  What functions of mobile device do you want to expect for your learning in future?

- 你认为终身学习重要吗？请问你认为流动学习装置如何帮助你终身学习？

  Do you agree lifelong learning is important? How mobile device assist your lifelong learning?

受访者 : B02

Participant: B02

- 何否解释如何做《金融学》电子笔记？是老师要求或是对自己要求？

为什 么要这样做？

How did you do the financial electronic notes? Was requested by teacher or yourself? Why did you need to do?

- 在制作过程中有什么困难？

  What were difficulties when doing electronic notes?

- 装置的性能对你写日记有无影响？什么因素如装置重量、功能、性能、性能等影响你选择用何种工具写日记呢？

  What technical specific factors affected to do electronic notes?

- 你希望将来流动装置如何能帮你学习？

  What functions of mobile device do you want to expect for your learning in future?

- 你认为终身学习重要吗？请问你认为流动学习装置如何帮助你终身学习？

  Do you agree lifelong learning is important? How mobile device assist your lifelong learning?

受访者 : B03

Participant: B03

- 在过去四星期，你经常都会透过网站（如２２３）、QQ 等分享你学习过程或成果，为什么你愿意与人分享呢？

- In the last 4 weeks, you always browsed the websites such as 223.com and used QQ to share you learning process and outcome. Why did you share your learning process or outcomes?

- 为什么你会选择透过流动装置来分享吗？如果无流动装置，你仍会乐意与人分享你的学习过程或分果吗？为什么

  Why do you use mobile device to share your learning process or outcomes? If haven't mobile device, will you also willing to share your learning process or outcomes?

- 你认为分享知识重要吗？对你有什么影响？

  Do you agree sharing knowledge is important?

- 你希望将来流动装置如何能帮你学习？

  What functions of mobile device do you want to expect for your learning in future?

- 你认为终身学习重要吗？请问你认为流动学习装置如何帮助你终身学习？

  Do you agree lifelong learning is important? How mobile device assist your lifelong learning?

受访者 : E01

Participant: E01

- 你觉得用流动装置阅读和拿着实物如书本或纸张阅读有什么分别？各有什么好处？

  What are the different between reading mobile device and papers or books? What are advantages for each type of reading?

- 如果学校将所有图书馆内的书本变为数码化，你们可以透过手机无限次借阅，你喜欢吗？为什么？

  Do you like the library convert all books to digital? Why?

- 理论上屏幕越大阅读越好，但流动装置越大就越不方便，你会怎样取舍？为什么？

  If the screen size is larger, the reading performance should be better. However, the size of mobile device will be increased. So, what do you prefer? Why?

- 你希望将来流动装置如何能帮你学习？

  What functions of mobile device do you want to expect for your learning in future?

- 你认为终身学习重要吗？请问你认为流动学习装置如何帮助你终身学习？

Do you agree lifelong learning is important? How mobile device assist your lifelong learning?

受访者 : E02

Participant: E02

- 如何透过智能电话背单词？何否详细讲解过程？
- How can use Smartphone to enhance your memory for learning?
- 这样做有什么好处？为什么你会想到用这种方法来背单词？
  What are the advanguges when using Smartphone to enhance your memory?
- 如果无智能电话，你会怎样背单词？与智能电话相比，效果有分别吗？
  What are the different using Smartphone or not to enhance your memory?
- 你希望将来流动装置如何能帮你学习？
  What functions of mobile device do you want to expect for your learning in future?
- 你认为终身学习重要吗？请问你认为流动学习装置如何帮助你终身学习？
  Do you agree lifelong learning is important? How mobile device assist your lifelong learning?

受访者 : E03

Participant: E03

- 为什么你会选择魅族这个国内牌子作为你的手提电话呢？为什么不选择国外较出名的牌子如三星或苹果呢？
  Why do you use Mainland China brand name smartphone? Have you tried to consider use famous brand land such as Apple or Samsung?
- 过去四星期看见你有很多次都用手机拍摄课件和作业，你觉得这种方

式有什么好处？如果你不能拍摄，你会如何记录课作和作业呢？

In last 4 weeks, you always used Smartphone to take photos for recording assignment. What are advantages? If you cannot take photos, how do you do?

- 当你拍摄课件和作业后，你会如何处理？

  How do you do after take photos for recording assignment?

- 你希望将来流动装置如何能帮你学习？

  What functions of mobile device do you want to expect for your learning in future?

- 你认为终身学习重要吗？请问你认为流动学习装置如何帮助你终身学习？

  Do you agree lifelong learning is important? How mobile device assist your lifelong learning?

受访者 : E04

Participant: E04

- 你觉得用流动装置阅读和拿着实物如书本或纸张阅读有什么分别？各有什么好处？

  What are the different between reading mobile device and papers or books? What are advantages for each type of reading?

- 如果学校将所有图书馆内的书本变为数码化，你们可以透过手机无限次借阅，你喜欢吗？为什么？

  Do you like the library convert all books to digital? Why?

- 理论上屏幕越大阅读越好，但流动装置越大就越不方便，你会怎样取舍？为什么？

  If the screen size is larger, the reading performance should be better. However, the size of mobile device will be increased. So, what do you prefer? Why?

- 你希望将来流动装置如何能帮你学习？

What functions of mobile device do you want to expect for your learning in future?

- 你认为终身学习重要吗？请问你认为流动学习装置如何帮助你终身学习？

  Do you agree lifelong learning is important? How mobile device assist your lifelong learning?

Appendix G: Consent Form

香港教育学院

博文及社会科学学院

数学与资讯科技学系

参与研究同意书

研究题目:**To investigate the extent of using mobile devices to facilitate formal and informal learning for university students studying at Guangzhou**

本人＿＿＿＿＿＿＿＿＿同意参加由吴美华博士负责监督,王骏雄先生执行的研究项目。

本人理解此研究所获得的资料可用于未来的研究和学术发表。然而本人有权保护自己的隐私, 本人的个人资料将不能泄漏。

本人对所附资料的有关步骤已经得到充分的解释。本人理解可能会出现的风险。本人是自愿参与这项研究。

本人理解我有权在研究过程中提出问题,并在任何时候决定退出研究, 更不会因此引致任何不良后果。

参加者姓名:

参加者签名:

日期:

221

研究题目:To investigate the extent of using mobile devices to facilitate formal and informal learning for university students studying at Guangzhou

诚邀阁下参加吴美华博士负责监督,王骏雄先生负责执行的研究计划。他是香港教育学院学生。

目的: 研究广州大学生如何透过流动装置进行正式学习或非正式学习

研究方法: 收集数据将采用质性及量化的混合方法，量化的数据将收集自问卷调查；至于质性的数据将收集自访谈、日记记录和焦点小组会议。

阁下享有充分的权利在任何时候决定退出这项研究,更不会因此引致任何不良后果。凡有关阁下的数据将会保密,一切数据的编码只有研究人员得悉。

如阁下对这项研究有任何意见,可随时与香港教育学院人类实验对象操守委员会联络(电邮: hrec@ied.edu.hk; 电话: 2948-6318; 地址:香港教育学院研究与发展事务处)。

如阁下想获得更多有关这项研究的资料,请与王骏雄先生 联络,电话(852) 9722 8843 或联络她的导师 吴美华博士 ,电话(852) 2948 7645。

谢谢阁下有兴趣参与这项研究。

王骏雄先生
首席研究员

5.4.1 Data from Questionnaires

Question 1: Do you have a Smartphone?

Percentage of Yes	Percentage of No
93.30%	6.70%

Question 2: Have you used smartphones to do online activities?

Percentage of Yes	Percentage of No
98.20%	1.80%

Question 3: What is your Smartphones data transfer mode?

Option	Percentage
Wi-Fi	63.40%
GPRS	58.70%
3G	35.80%
4G	0.40%

Question 4: What is your Smartphones display size?

Option	Percentage
below 3 Inches	11.90%
3 - 4 Inches	45.80%
4 - 5 Inches	39.40%
above 5 Inches	2.90%

Question 5: What is your Smartphones price ranges?

Option	Percentage
below ¥1,000	13.0%
¥1,000 - ¥2,000	48.6%
¥2,000 - ¥3,000	24.4%
¥3,000 - ¥4,000	5.5%

¥4,000 - ¥5,000	7.3%
above ¥5,000	1.3%

Question 6: What is your Smartphone operation system?

Option	**Percentage**
ios	12.1%
Android	75.1%
Window	5.7%
Symbian	6.8%
Java	0.2%

Question 7: What is your Smartphone capacity?

Option	**Percentage**
below 1GB	15.2%
1GB - 5 GB	42.2%
5GB - 10GB	19.3%
10GB - 20GB	18.9%
Above 20GB	4.4%

Question 8: Do you have a Tablet

Percentage of Yes	Percentage of No
18.40%	81.60%

Question 9: What is your display size of Tablets?

Option	**Percentage**
below 6 Inches	6.70%
6 - 8 Inches	30.00%
8 - 10 Inches	38.90%
above 10 Inches	24.40%

Question 10: What is your Tablet price ranges?

Option	Percentage
below ¥1,000	12.2%
¥1,000 - ¥2,000	8.9%
¥2,000 - ¥3,000	17.8%
¥3,000 - ¥4,000	33.3%
¥4,000 - ¥5,000	23.3%
above ¥5,000	4.4%

Question 11: What is your Tablet capacity?

Option	Percentage
below 1GB	2.2%
1GB - 5 GB	21.1%
5GB - 10GB	12.2%
10GB - 20GB	38.9%
Above 20GB	25.6%

Question 12: What is your Tablet data transfer mode?

Option	Percentage
Wi-Fi	86.70%
GPRS	17.30%
3G	33.70%
4G	6.60%

Question 13: What is your Smartphone operation system?

Option	Percentage
ios	51.1%
Android	21.6%
Window	27.3%

Question 14: What is your average price of data package per month?

Option	Percentage
¥0 - ¥49	72.2%
¥50 - ¥99	21.8%
¥100 - ¥149	3.9%
¥150 - ¥199	1.0%
¥200 - ¥249	0.4%
¥250 - ¥299	0.4%
¥300 or above	0.2%

Question 15: What is your average data usage per month?

Option	Percentage
200MB or below	60.4%
200MB – 500 MB	23.5%
500MB – 1GB	6.5%
1GB – 2GB	5.9%
2GB – 5GB	2.2%
5GB or above	1.4%

Question 16: Where do you use Wi-Fi to access the internet?

Option	Percentage
Home/Hostel	71.2%
Shopping Mall	17.8%
University	81.0%
Public Transportation	13.3%
Street	7.4%
Restaurant	35.2%

Question 17: How many years have you used Smartphone or tablets?

Option	Percentage

<1 years			19.6%
1 – 3 years			52.9%
3 – 5 years			19.0%
> 5 years			8.5%

Question 18 A - D

Mobile learning activities	Percentage	Frequency	Std. Deviation
Electronic Reading	94.30%	3.77	1.172
Searching	92%	3.69	1.233
Read Website	91%	3.69	1.261
Learning	89%	3.59	1.216
Search Knowledge Website	88.80%	3.41	1.232
Read News	88.40%	3.38	1.286
Search Web	86.50%	3.24	1.246
Read Book	83.10%	3.19	1.206
Translate	82.90%	3.19	1.322
Digital Recording	80.20%	3.14	1.339
Watch Video	76.50%	3.1	1.177
Storage Picture	74.90%	3.05	1.316
Apps	74.50%	3.01	1.228
Search Library Website	70.60%	2.97	1.364
Storage Video	65.90%	2.74	1.254
Storage Audio	59.80%	2.68	1.334
Assessment	50.60%	2.43	1.286

Compare with different major studied students

227

Major of Study	Arts	Business	Engineering	Sciences
Electronic Reading	98.10%	96.50%	91.30%	91.60%
Browse Website	95.20%	91.80%	87.40%	89.20%
Read Book	88.60%	82.40%	77.70%	81.90%
Watching Video	85.70%	76.50%	68.00%	73.50%
Read News	97.10%	87.10%	82.50%	86.10%
Digital Recording	88.60%	89.40%	68.90%	77.70%
Storage Picture	81.90%	82.40%	65.00%	73.50%
Storage Video	70.50%	75.30%	56.30%	63.90%
Storage Audio	66.70%	57.60%	54.40%	59.60%
Searching	95.20%	91.80%	89.30%	90.40%
Search Web	95.20%	83.50%	78.60%	85.50%
Search Knowledge Website	95.20%	83.50%	85.40%	87.30%
Search Library Website	76.20%	68.20%	60.20%	73.50%
Learning	91.40%	90.60%	87.40%	86.70%
Assessment	51.40%	44.70%	48.50%	51.20%
Translate	88.60%	83.50%	81.60%	78.90%
Apps	74.30%	77.60%	76.70%	71.70%

Mobile learning activities	Arts	Business	Engineering	Sciences	$\leq \alpha$
Electronic Reading	3.64	3.07	3.46	3.41	*
Read Website	3.8	3.46	3.68	3.76	
Read Book	3.35	3.36	3.29	3.1	
Read Video	3.11	3.58	2.79	3.09	*
Read News	3.46	3.32	3.51	3.35	
Digital Recording	3.09	2.92	2.96	3.07	
Storage Picture	2.99	3.13	3.03	3.12	
Storage Video	2.62	2.7	2.66	2.92	

Storage Audio	2.69	2.37	2.66	2.89	
Searching	3.76	3.26	3.61	3.66	*
Search Web	3.69	3.55	3.77	3.78	
Search Knowledge Website	3.82	3.56	3.84	3.8	
Search Library Website	3.11	2.79	2.95	2.9	
Learning	3.38	3.01	3.17	3.24	
Assessment	2.39	2.29	2.94	2.28	*
Translate	3.02	2.97	3.21	3.18	
Apps	3.13	3.09	3.32	3.29	

Compare with gender

Mobile learning activities	Percentage		Frequency		≤α
	Male	Female	Male	Female	
Electronic Reading	92.00%	96.90%	3.41	3.41	
Read Website	88.60%	93.80%	3.71	3.67	
Read Book	80.70%	85.80%	3.26	3.23	
Read Video	74.60%	78.70%	3.15	3.14	
Read News	84.80%	92.40%	3.51	3.24	*
Digital Recording	76.90%	84.00%	2.95	3.07	
Storage Picture	72.70%	77.30%	3.05	3.06	
Storage Video	64.40%	67.60%	2.76	2.72	
Storage Audio	56.40%	64.00%	2.74	2.61	
Searching	90.90%	93.30%	3.55	3.65	
Search Web	84.50%	88.90%	3.73	3.66	
Search Knowledge Website	87.50%	90.20%	3.72	3.82	
Search Library Website	64.40%	78.20%	2.89	3.05	
Learning	87.10%	91.10%	3.17	3.21	
Assessment	51.90%	49.30%	2.5	2.34	
Translate	80.30%	85.80%	3.08	3.11	

229

	74.20%	74.70%	3.19	3.18	
Apps					

Compare with OS

	Percentage		Frequency		
Q 13 : OS	**iOS**	**Windows / Android**	**iOS**	**Windows / Android**	**≤α**
Electronic Reading	97.80%	88.40%	3.64	3.45	
Read Website	93.30%	86.00%	4.02	3.78	
Read Book	97.80%	83.70%	3.57	3.42	
Read Video	97.80%	79.10%	3.43	3.68	
Read News	91.10%	81.40%	3.88	3.46	
Digital Recording	88.90%	74.40%	3.48	2.81	*
Storage Picture	88.90%	69.80%	3.45	2.6	*
Storage Video	77.80%	65.10%	3.23	2.64	*
Storage Audio	77.80%	58.10%	2.94	2.6	
Searching	97.80%	86.00%	3.8	3.62	
Search Web	95.60%	81.40%	3.95	3.4	*
Search Knowledge Website	95.60%	86.00%	4.02	3.73	
Search Library Website	84.40%	74.40%	2.47	3.16	*
Learning	93.30%	86.00%	3.45	3.14	
Assessment	48.90%	60.50%	2.64	2.42	
Translate	88.90%	76.70%	3.4	3.06	
Apps	88.90%	72.10%	3.8	3.13	*

The Findings of Question 18 E - F

Mobile social interactive for	**Percentage**	**Frequency**	**Std. Deviation**

230

learning activities			
Sharing	84.70%	3.38	1.247
Email	79.20%	3.45	1.366
iCloud	74.10%	3.27	1.325
Data Transfer	67.30%	3.1	1.376
Discussion	90.60%	3.59	1.227
Instant Message	87.30%	3.88	1.245
Video Conference	45.70%	2.38	1.304
Group	79.60%	3.46	1.276

Compare with different major studied students

Mobile social interactive for learning activities	**Arts**	**Business**	**Engineering**	**Sciences**
Sharing	87.60%	89.40%	78.60%	81.90%
Email	83.80%	84.70%	71.80%	75.30%
iCloud	76.20%	65.90%	69.90%	76.50%
Data Transfer	69.50%	65.90%	68.00%	64.50%
Discussion	96.20%	87.10%	87.40%	89.80%
Instant Message	93.30%	82.40%	83.50%	87.30%
Video Conference	43.80%	42.40%	37.90%	50.00%
Group	84.80%	69.40%	78.60%	80.70%

Mobile social interactive for learning activities	**Arts**	**Business**	**Engineering**	**Sciences**	**<α**
Sharing	3.55	3.01	3.35	3.46	*
Email	3.63	3.13	3.23	3.66	*
iCloud	3.36	3	3.06	3.46	
Data Transfer	2.99	2.86	3.06	3.36	

231

Discussion	3.69	3.32	3.56	3.69	
Instant Message	3.88	3.64	3.9	4.02	
Video Conference	2.13	2.06	2.41	2.67	*
Group	3.4	3.42	3.31	3.63	

Compare with gender

Mobile social interactive for learning activities	Percentage		Frequency		≤α
	Male	**Female**	**Male**	**Female**	
Sharing	80.70%	89.30%	3.29	3.47	
Email	75.00%	84.00%	3.46	3.44	
iCloud	72.00%	76.40%	3.18	3.37	
Data Transfer	65.90%	69.30%	3.09	3.12	
Discussion	87.50%	94.20%	3.51	3.69	*
Instant Message	84.10%	91.10%	3.81	3.97	
Video Conference	43.90%	48.00%	2.43	2.33	
Group	78.00%	81.30%	3.38	3.56	

The findings of Question 19 to 36

Questions	Mean	Std. Deviation
19. I agree mobile device can facilitate reading	3.75	1.044
20. I agree mobile device can facilitate communication	3.77	1.007
21. I agree mobile device can share my learning	3.67	.978

232

Questions	Mean	Std. Deviation
process		
22. I agree mobile device can share my learning outcome	3.72	.980
23. I agree mobile device can facilitate record data	3.92	.971
24. I agree mobile device can facilitate searching information	4.00	.973
25. I agree mobile device can enhance learning ability	3.60	1.033
26. I agree mobile device can enhance learning interest	3.57	1.037
27. I agree mobile device can enhance learning efficiency	3.54	1.050
28. I agree mobile device can facilitate learning from the formal curriculum	3.65	1.001
29. I agree mobile device can effective to learn the outside of the formal curriculum	3.91	.980

Questions	Mean	Std. Deviation
30. I agree the capacity of mobile device affects learning	3.47	1.079
31. I agree the screen size of mobile device affects learning	3.25	1.141
32. I agree the bandwidth of mobile device affects learning	3.81	1.091
33. I agree Apps affects learning	3.42	1.092

Questions	Mean	Std. Deviation
34. I have no any difficulty when using mobile device to learn	2.56	1.227

233

35. I am good interactive with mobile device	3.26	.993
36. I like using mobile devices to learn	3.44	1.016

Compare with different major studied students

Attitudes of using mobile device	Arts	Business	Engineering	Sciences	≤α
Reading	3.87	3.62	3.81	3.73	
Communication	3.97	3.55	3.75	3.80	*
Sharing Learning Process	3.74	3.61	3.71	3.68	
Sharing Learning Outcome	3.79	3.64	3.76	3.73	
Record Data	4.05	3.88	3.87	3.92	
Searching	4.20	3.80	4.02	4.01	*
Enhance Learning Ability	3.70	3.54	3.57	3.60	
Enhance Learning Interest	3.58	3.51	3.64	3.54	
Enhance Learning Efficiency	3.70	3.36	3.50	3.60	
Formal Learning	3.67	3.59	3.66	3.67	
Informal Learning	3.97	3.86	3.90	3.93	

Key factors and feeling of using mobile device	Arts	Business	Engineering	Sciences	<α
Capacity	3.51	3.29	3.51	3.53	
Screen Size	3.24	3.12	3.40	3.23	
Speed	3.92	3.76	3.83	3.79	
Apps	3.38	3.35	3.59	3.41	
Difficult	2.33	2.39	2.80	2.61	*
Interactive	3.25	3.19	3.27	3.29	
Like	3.45	3.49	3.50	3.36	

Compare with gender

Attitudes of using mobile device	Male	Female	T	Sig.	≤α
Reading	3.68	3.82	-1.506	0.067	
Communication	3.74	3.8	-0.692	0.245	
Sharing Learning Process	3.66	3.68	-0.317	0.376	
Sharing Learning Outcome	3.73	3.7	0.308	0.379	
Record Data	3.86	3.98	-1.356	0.088	
Searching	3.95	4.05	-1.166	0.122	
Enhance Learning Ability	3.66	3.52	1.407	0.080	
Enhance Learning Interest	3.58	3.55	0.355	0.362	
Enhance Learning Efficiency	3.55	3.54	0.037	0.485	
Formal Learning	3.65	3.65	-0.015	0.494	
Informal Learning	3.85	3.98	-1.485	0.069	

Key factors and feeling of using mobile device	Male	Female	≤a
Capacity	3.47	3.47	
Screen Size	3.29	3.19	
Speed	3.82	3.79	
Apps	3.57	3.24	*
Difficult	2.70	2.40	*
Interactive	3.29	3.23	
Like	3.44	3.42	

Compare with OS

Tablets user	iOS	Android	T	Sig.	≤α
Searching	4.40	4.00	1.683	0.049	*
Enhance Learning Ability	3.96	3.32	2.266	0.014	*

235

Enhance Learning Interest	4.07	3.42	2.371	0.011	*
Enhance Learning Efficiency	3.93	3.32	2.277	0.013	*
Informal Learning	4.38	3.68	2.921	0.003	*

Mobile user	iOS	Android	T	Sig.	<α
Difficult	2.96	2.40	3.218	0.001	*
Interactive	3.54	3.18	2.53	0.006	*

236

5.4.2 Student A01 Summary Diary Report

Personal background

A01 was a 21 years old girl, and her major study was Chinese Language. Her smartphone was bought in 2009. The price of smartphone was RMB¥1,100, and the model was Nokia 6120c. The operating system of this Smartphone was Symbian. The screen size and weight were 2 inches and 89 grams.

She did not have a tablet, but she had a notebook which was bought in 2011. The price of the notebook was RMB¥3,199, and the model was Acer AS4253. The operating system of this tablet was Windows 7. Furthermore, the screen size and weight were 14 inches and 2.2 kg.

Mobile learning Practices

The figure below showed student A01's mobile learning practices. Reading or watching had the highest mobile learning activity percentages of student A02. Search came second, and learning or discussion had the least percentages of mobile learning activity. She had high percentage of using mobile device to read or watch in each section. Indeed, she used notebooks for mobile learning much more than using Smartphones genuinely. However, the percentages of using smartphone for discussion or reading/watching were nearly 40%. So, she had practices of using smartphone for discussion and reading or watching. Her formal learning of discussion, sharing and learning were higher than informal learning.

Figure 2: Student A01 Mobile learning practices

Table 2 : Student A01 Mobile learning content and process

Mobile Learning Activities	Learning Type	Date	Time	Learning Content and Process
Discussion	Formal	4/5/2013	1200-1800	Discussed education curriculum syllabus by SMS
		5/5/2013	1800-2400	Internship applications for discussion with the students through the QQ group
	Informal	19/5/2013	1200-1800	Douban.com discussed in the novel "Blade" in the creation of conceptual problems with friends
		27/5/2013	0600-1200	Douban.com discuss an article in Commentary viewpoint problems with net friends

238

Reading/ Watching	Formal	15/5/2013	1200-1800	Read about the new urbanization in Xinhua, Sina, Sohu Finance and other sites, to understand the CPC eighteen and two Sections and other political news
		30/5/2013	0600-1200	Read Western writers Anton Chekhov article on Douban.com
	Informal	3/5/2013	0600-1200	Read editorial articles on Douban.com
Searching	Formal	5/5/2013	1800-2400	Searched the language training relevant information
		22/5/2013	1200-1800	Searched document writing new regulations information in Baidu Encyclopedia
Learning	Formal	5/5/2013	1200-1800	The use of "high school textbooks research" PowerPoint courseware learning course content
		15/5/2013	0000-0600	Saw "Situation and Policy" PowerPoint courseware
Record	Formal	3/5/2013	1200-1800	Edited several articles for the junior high school language reading by words
		13/5/2013	0000-0600	Recorded information Sections within a week of each respondent will graduate this year on the phone calendar
	Informal	4/5/2013	1800-2400	Texted file records with the idea

239

				of perspective
		30/5/2013	1200-1800	Marked reading list in Douban.com
Sharing	Formal	13/5/2013	0000-0600	Downloaded courseware in the QQ group
		4/5/2013	1200-1800	Sending "language teaching research" courseware to students by e-mail
	Informal	18/5/2013	0000-0600	Sharing information to QQ group

5.4.3 Student A02 Summary Diary Report

Personal background

A2 was a 22 years old girl, and her major study was Chinese Language. Her smartphone was bought in 2010. The price of the smartphone was RMB¥1,000, and the model was Nokia 5230. The operating system was Symbian. The screen size and weight were 3.2 inches and 115 grams.

She did not have a tablet, but she had a notebook which was bought in 2010. The price of the notebook was RMB¥4,200, and the model was ASUS A42J. The operating system of the notebook was Windows 7. Furthermore, the screen size and weight were 14 inches and 2.2kg.

Mobile learning Practices

The figure below showed the student A02's mobile learning practices. Reading or watching had the highest mobile learning activity percentages of A02. Search came second, and learning had the least percentages of mobile learning activity. Her percentages of reading or watching on each section were 30% to 40%, but the percentage of sharing at midnight section was around 65%. The percentage of sharing at midnight was higher than other activities in all section. Indeed, the percentage of using notebooks was higher than using Smartphone for mobile learning. However, the percentages of using a smartphone to record were higher than notebook, and the percentages of using a smartphone to record were around 50%. Her formal learning of sharing and learning were higher than informal learning.
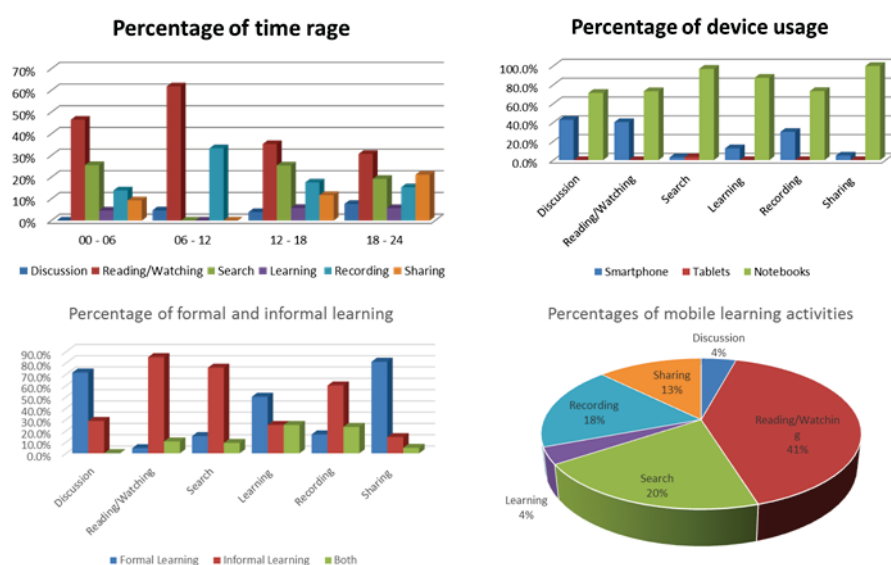
Figure 3: Student A02 Mobile learning practices

Table 3 : Student A02 Mobile learning content and process

Mobile Learning Activities	Learning Type	Date	Time	Learning Content and Process
Discussion	Formal	14/5/2013	0600-1200	Exchanged views on a lecture by weixin
		5/5/2013	1200-1800	Discussed assignment and lesson problem by QQ group
	Informal	15/5/2013	1200-1800	Discussed with her brother the problem to purchase new smartphone by QQ
		22/5/2013	1200-1800	Enquired taibao.com customer service to purchase new smartphone

Reading/ Watching	Formal	30/5/2013	1800-2400	Reading paradigm in plans of psychology lesson on web
	Informal	3/5/2013	0000-0600	Using a mobile phone to see books (Boy's Love)
		10/5/3013	1800-2400	Watched online video for reporting Ya'an victims
Searching	Formal	9/5/2013	0600-1200	Used Baidu search on "China's current situation surrounding" the article for doing assignment
		15/5/2013	1800-2400	Searching for some articles about modern literature
Learning	Formal	20/5/2013	1200-1800	Translated the simplified Xiaozhuan by web
Record	Formal	12/5/2013	0600-1200	Took photos to record PowerPoint notes on lesson
	Informal	30/5/2013	0600-1200	Wrote diary by smartphone
Sharing	Formal	9/5/2013	1800-2400	Downloaded assignments through QQ group
		5/5/2013	1200-1800	Received School notices by QQ group

5.4.4 Student A03 Summary Diary Report

Personal background

A03 was a 20 years old girl, and her major study was Chinese Literature. Her smartphone was bought on 2012. The price of the smartphone was RMB¥2,600, and the model was Samsung i900. The operating system of the Smartphone was Android. Moreover, the screen size and weight were 4.3 inches and 116 grams.

She did not have a tablet, but she had a notebook which was bought in 2011. The price of the notebook was RMB¥3,900, and the model was Acer 4750. The operating system of the notebook was Windows 7. Furthermore, the screen size and weight were 14 inches and 2.25kg.

Mobile learning Practices

The figure below showed the mobile learning practices of student A03. Reading or watching had the highest mobile learning activity percentages of student A03. Search came second, and discussion had the least percentages among all the mobile learning activities. Her percentages of reading or watching in morning section were around 90%. She used smartphone to read or watch and learn much more frequently than using notebook. Her formal learning of search, learning and sharing were higher than informal learning.
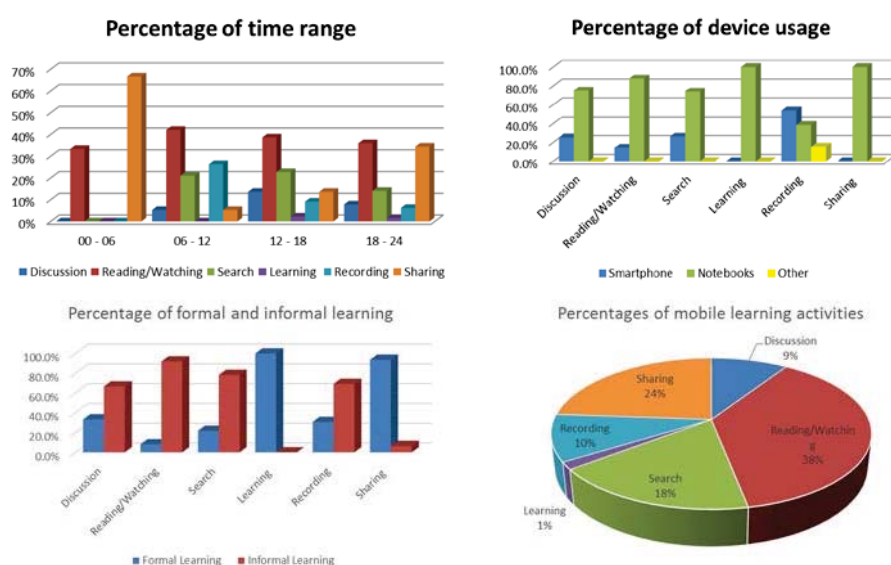
Figure 4: Student A03 Mobile learning practices

Table 4 : Student A03 Mobile learning content and process

Mobile Learning Activities	Learning Type	Date	Time	Learning Content and Process
Discussion	Informal	10/5/2013	1800-2400	Discussions with team members using QQ group
Reading/ Watching	Formal	14/5/2013	1800-2400	Read the relevant literature of "Network literature and popular culture", and made notes
	Informal	18/5/2013	1200-1800	Browsed news on Sina
		21/5/2013	0600-1200	Using mobile digital reading software to read novels
Searching	Formal	2/5/2013	1200-1800	Searched some articles about modern literature in the sixties and seventies were

245

				born population characteristics, and behavior on Baidu
		13/5/2013	1800-2400	Searched for "Sayings and Chinese cultural values." on China Knowledge Resources Integrated Database (CNKI).
Learning	Formal	2/5/2013	1200-1800	English Writing
		25/5/2013	1200-1800	Translated Chinese into English
Record	Formal	20/5/2013	1200-1800	Recorded information literature
	Informal	3/5/2013	1200-1800	Recorded personal thoughts
Sharing	Formal	5/5/2013	1800-2400	Downloaded assignments through QQ group
		16/5/2013	1800-2400	Received School notices by email

246

5.4.5 Student A04 Summary Diary Report

Personal background

A04 was a 21 years old girl, and her major study was Chinese Language. Her smartphone was bought in 2012. The price of the smartphone was RMB¥2,300, and the model was Sony Ericsson Lt18i. The operating system was Android. Furthermore, the screen size and weight were 4.2 inches and 117 grams.

She had a tablet which was bought in 2013. The price of the tablet was RMB¥4,100, and model was iPAD 4. iOS was the operating system. Furthermore, the screen size and weight were 9.7 inches and 652 grams.

She had a notebook which was bought in 2012. The price of a notebook was RMB¥4,200, and the model was Dell inspiron1464. The operating system of the notebook was Windows 7. Moreover, the screen size and weight were 14 inches and 2.4kg.

Mobile learning Practices

The figure below showed student A04's mobile learning practices. Reading or watching had the highest mobile learning activity percentages of student A04. Search came second, and discussion had the least percentages of mobile learning activity. Her percentages of reading or watching in each section were 45% to 60%. Indeed, she used notebooks for mobile learning more frequently than using Smartphone genuinely. However, the percentages of using a Smartphone to record were higher than notebook, and the percentages of using a smartphone to record were around 50%. Her formal learning of discussion, search, recording and sharing was higher than informal learning.
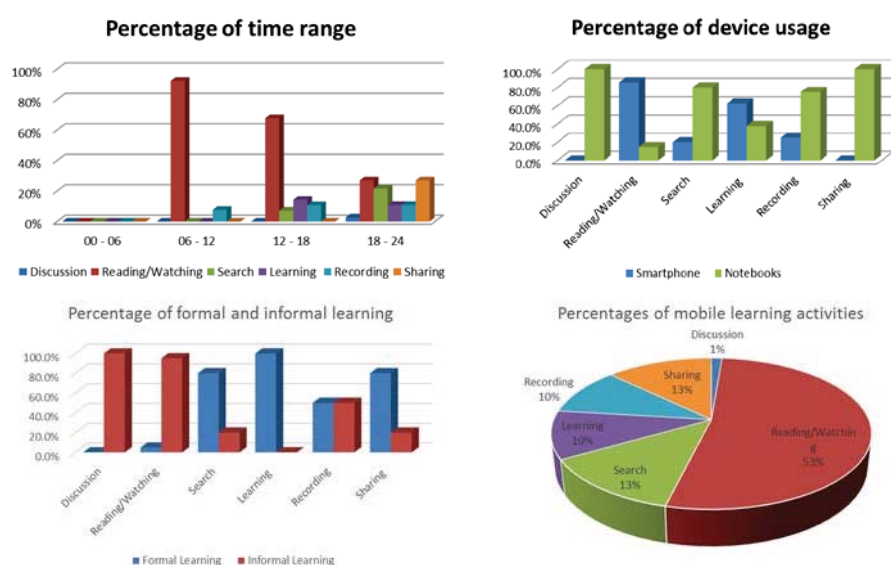
Figure 5 : Student A04 Mobile learning practices

Table 5 : Student A04 Mobile learning content and process

Mobile Learning Activities	Learning Type	Date	Time	Learning Content and Process
Discussion	Formal	17/5/2013	1200-1800	Discussed and answered in the QQ group with classmates
Reading/ Watching	Formal	12/5/2013	1800-2400	downloaded high school political courseware in Baidu library
		15/5/2013	1800-2400	Read online papers on current affairs and international relations
	Informal	4/5/2013	1200-1800	Watched American TV to learn English
		7/5/2013	1200-1800	Watched Japanese animation to learn Japanese

248

		18/5/2013	0600-1200	Searched journal articles in knowledge websites
Searching	Formal	21/5/2013	0600-1200	Searched for exam courseware in Baidu
	Informal	8/5/2013	1200-1800	Searched some acronym meaning on Baidu Encyclopedia
Learning	Formal	25/5/2013	1200-1800	Looking for and having professional learning using PowerPoint related courseware
Record	Formal	8/5/2013	0600-1200	Wrote down the course of study by mobile device
		5/5/2013	1800-2400	Photographed the blackboard in the lesson
Sharing	Formal	5/5/2013	1200-1800	Uploaded and downloaded assignments to classmates through QQ group
		29/5/2013	1200-1800	Read classmates notifications by email

249

5.4.6 Student B01 Summary Diary Report

Personal background

B01 was a 21 years old girl, and her major study was Management. Her smartphone was bought in 2012. The price of the smartphone was RMB¥1,700, and the model was Nokia 700. The operating system of the Smartphone was Symbian. Furthermore, the screen size and weight were 3.2 inches and 96 grams.

She did not have a tablet, but she had a notebook which was bought in 2012. The price of the notebook was RMB¥3,800, and the model was Lenovo G470. The operating system of the notebook was Windows 7. Moreover, the screen size and weight were 14 inches and 2.2kg.

Mobile learning Practices

The figure below showed student B01's mobile learning practices. Reading or watching had the highest mobile learning activity percentages of student B01. Discussion came second, and learning had the least percentages of mobile learning activity. Her percentages of mobile learning activities averaged in each section. Although she did not have a tablet, the percentages of using tablets to learn were higher than other devices. Furthermore, the percentages of using a Smartphone to read or watch and to record were higher than using notebooks. Her formal learning of learning was higher than informal learning, but other mobile learning activities were higher than formal learning.
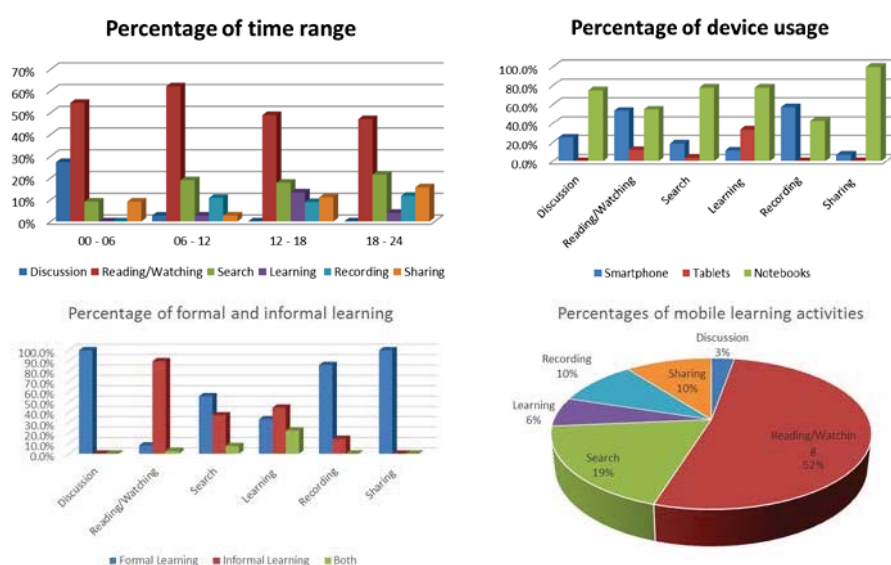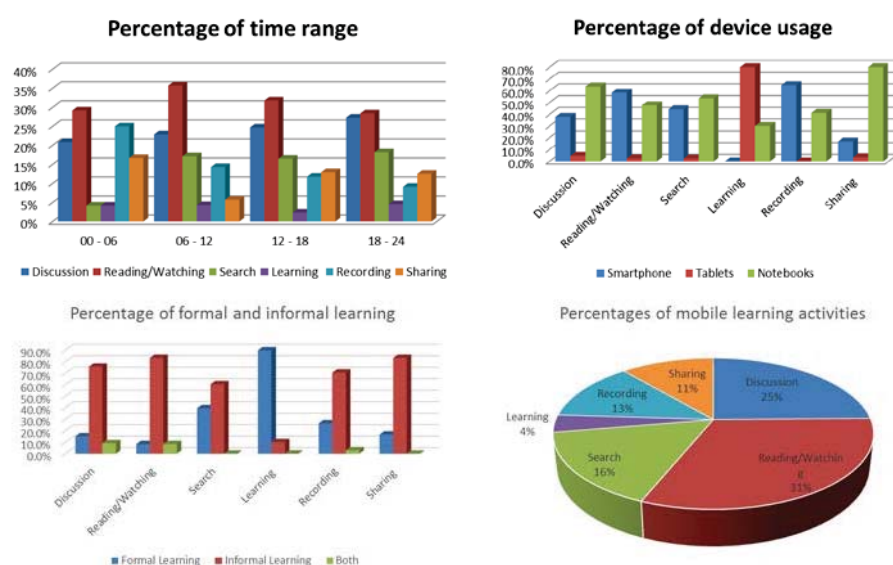
Figure 6 : Student B01 Mobile learning practices

Table 6 : Student B01 Mobile learning content and process

Mobile Learning Activities	Learning Type	Date	Time	Learning Content and Process
Discussion	Formal	5/5/2013	1200-1800	Discussed economic assignment with classmates by QQ
		9/5/2013	0600-1200	Discussed and edited group project with classmates by email
	Informal	8/5/2013	1200-1800	Discussed the travel time, site selection and analyzed the reasons with group mates
		11/5/2013	1200-1800	Movie recommendation
Reading/ Watching	Formal	5/5/2013	1200-1800	Using a laptop computer to browse the website

251

				"STATA" text, picture and video description
		9/5/2013	0600-1200	Read the latest financial news, and read the article on gold slump
	Informal	8/5/2013	1200-1800	Read recent news (Finance, lifestyle, entertainment, etc.)
		11/5/2013	1200-1800	Used Wifi browsing Weibo in the restaurant
Searching	Formal	5/5/2013	1200-1800	Searched STATA relating operations in Baidu
		25/5/2013	0600-1200	Searched the calculation of "Shanghai index"
	Informal	28/5/2013	1200-1800	Searched movie premiere date on Baidu
Learning	Formal	11/5/2013	1800-2400	Wrote an English essay
		16/5/2013	1800-2400	Translated professional term to Chinese
	Informal	23/5/2013	1800-2400	Checked the route on Baidu Map
Record	Formal	4/5/2013	0600-1200	Recorded key points in psychology lesson
		9/5/2013	0600-1200	Video Recorded the Finance lesson for revision
Sharing	Formal	10/5/2013	1200-1800	Sent group assignment to group member for editing

252

	Informal	14/5/2013	1800-2400	Shared video link and feelings with friends and

5.4.7 Student B02 Summary Diary Report

Personal background

B02 was a 20 years old girl, and her major study was Management. Her Smartphone was bought in 2013. The price of the smartphone was RMB¥2,599, and the model was Samsung i9268. The operating system of the Smartphone was android. Furthermore, the screen size and weight were 4.65 inches and 350 grams.

She did not have a tablet, but she had a notebook which was bought in 2011. The price of the notebook was RMB¥3,730, and the model was Lenovo B460. The operating system of the notebook was Windows 7. Moreover, the screen size and weight were 14 inches and 2.2kg.

Mobile learning Practices

The figure below showed student B02's mobile learning practices. Reading or watching had the highest mobile learning activity percentages of student B02. Discussion came second, and sharing was the least percentages of mobile learning activity. She was active to read or watch and having discussion in evening section. Furthermore, the percentages of using Smartphone for discussing, reading or watching, and learning were higher than using notebooks. Her formal learning of search, learning and recording were higher than informal learning.
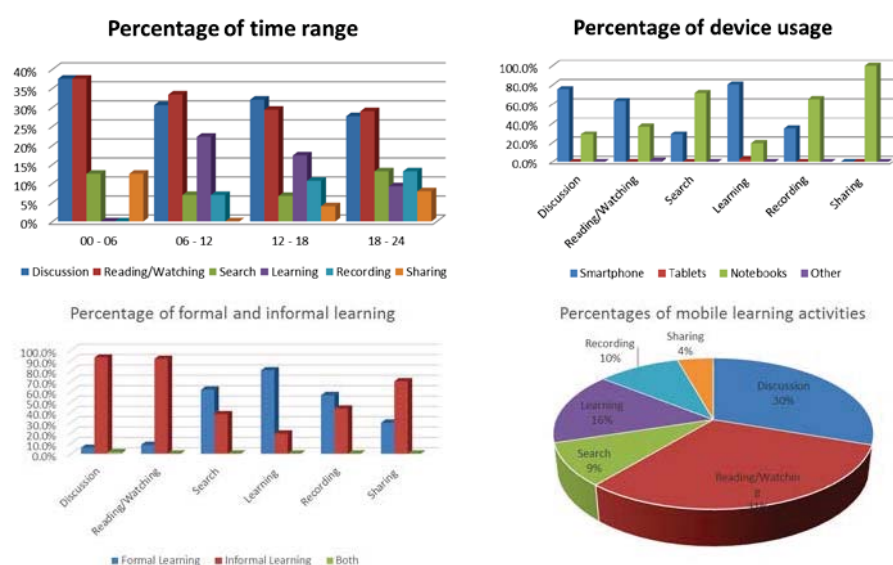
Figure 7 : Student B02 Mobile learning practices

Table 7 : Student B02 Mobile learning content and process

Mobile Learning Activities	Learning Type	Date	Time	Learning Content and Process
Discussion	Formal	10/5/2013	1200-1800	Discussed assignment and assign job duties to group members.
	Informal	13/5/2013	0000-0600	Discussed activity by QQ
Reading/ Watching	Formal	5/5/2013	0600-1200	Learnt French
	Informal	19/5/2013	0600-1200	Reading novels
		8/5/2013	1200-1800	Looked at the English word
Searching	Formal	2/5/2013	0600-1200	Searched STATA tutorial on Baidu
		5/5/2013	0600-1200	Searched Professional knowledge

254

				on Baidu
	Informal	28/5/2013	1200-1800	Searched route on Baidu map
Learning	Formal	16/5/2013	1200-1800	Listened English MP3 to learn English
		23/5/2013	1200-1800	Translated English word to Chinese
	Informal	4/5/2013	0600-1200	Listened French music
Record	Formal	16/5/2013	1800-2400	Implemented financial notes
	Informal	5/5/2013	0600-1200	Worked memo recording
				Videoed shooting for record class activities
Sharing	Formal	9/5/2013	1800-2400	Shared literature paper with friends
	Informal	11/5/2013	1800-2400	Shared photo with friends
		4/5/2013	1200-1800	Sent activities with friends

5.4.8 Student B03 Summary Diary Report

Personal background

B03 was a 20 years old girl, and her major study was Management. Her smartphone was bought in 2010. The price of the smartphone was RMB¥1,500, and the model was Nokia 5233. The operating system of the Smartphone was Symbian. Moreover, the screen size and weight were 3.2 inches and 115 grams.

She did not have a tablet, but she had a notebook which was bought in 2011. The price of the notebook was RMB¥3,900, and the model was Acer 4752G. The operating system of the notebook was Windows 7. Furthermore, the screen size and weight were 14 inches and 2.25kg.

Mobile learning Practices

The figure below showed student B03's mobile learning practices. Reading or watching had the highest mobile learning activity percentages of student B03. Discussion came second, and learning or search had the least percentages of mobile learning activity. She was active to search or share at midnight section. Other mobile learning activities in the section of morning, afternoon and evening were averaged. The percentages of using smartphone for discussion were higher than using notebooks, and the percentages of using smartphone to read or watch were close with notebooks. Her formal learning of search and learning were higher than informal learning.
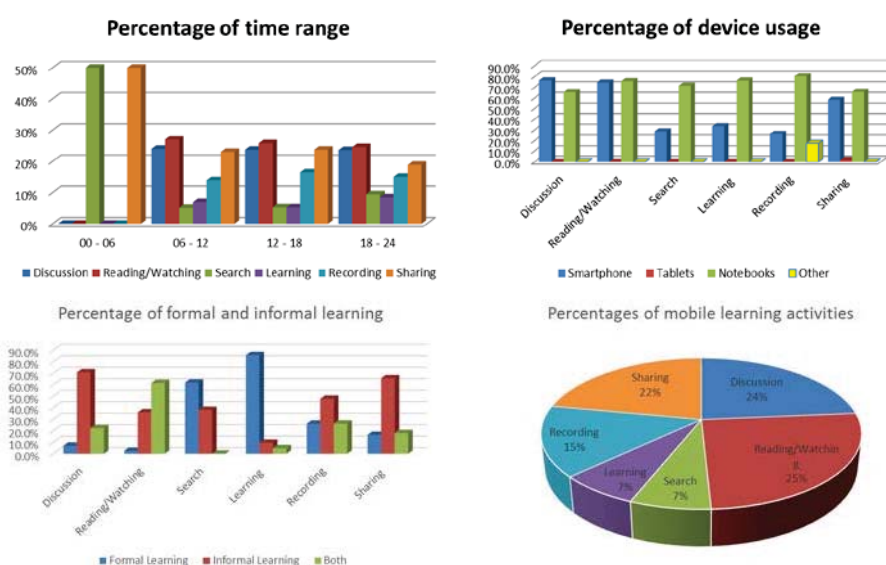
Figure 8 : Student B03 Mobile learning practices

Table 8 : Student B03 Mobile learning content and process

Mobile Learning Activities	Learning Type	Date	Time	Learning Content and Process
Discussion	Formal	10/5/2013	1800-2400	Discussed English assignment
		9/5/2013	1800-2400	Discussed experience for doing Stata
	Informal	11/5/2013	0600-1200	Discussed plan to trips on weekend
		13/5/2013	0600-1200	Discussed daily life experience with friends
Reading/ Watching	Formal	9/5/2013	0600-1200	Reading Stata online help
		14/5/2013	1800-2400	Read past exam paper on 223.com
	Informal	18/5/2013	0600-1200	Browsed Sina Weibo

257

		28/5/2013	1200-1800	Read friends online status
Searching	Formal	9/5/2013	0600-1200	Searched STATA tutorial on Baidu
		6/5/2013	1800-2400	Searched financial knowledge
	Informal	23/5/2013	0600-1200	Searched Professor Weibo online posting
Learning	Formal	7/5/2013	1800-2400	Doing accounting question on 233.com
		18/5/2013	1200-1800	Translated finance vocabulary
	Informal	26/5/2013	1800-2400	Learning using applications library database
Record	Formal	3/5/2013	1200-1800	Downloaded English Learning package from library websites
		22/5/2013	1200-1800	Downloaded video for learning accounting from youku.com
	Informal	29/5/2013	1800-2400	Downloaded and save Weibo picture
		11/5/2013	1800-2400	Downloaded movie for entertainment
Sharing	Formal	9/5/2013	1800-2400	Exchanged Stata data
		22/5/2013	1200-1800	Transfered accounting learning video by QQ
	Informal	25/5/2013	1800-2400	Shared food information with friends by Weibo
		24/5/2013	1200-1800	Shared articles with friends by QQ

258

259

5.4.9 Student E01 Summary Diary Report

Personal background

E01 was a 20 years old boy, and his major study was engineering. His smartphone was bought in 2010. The price of the smartphone was RMB¥1,100, and the model was Nokia 5230. The operating system of the smartphone was Symbian. Moreover, the screen size and weight were 3.2 inches and 115 grams.

He did not have a tablet, but he had a notebook which was bought in 2011. The price of the notebook was RMB¥4,000, and the model was HP G32. The operating system of the notebook was Windows 7. Moreover, the screen size and weight were 13.3 inches and 2.145kg.

Mobile learning Practices

The figure below showed student E01's mobile learning practices. Reading or watching had the highest mobile learning activity percentages of student E01. Search came second. He did not use mobile device for discussion, learning and sharing. He had a high percentage to read or watch at midnight section. Furthermore, the percentages of using Smartphone to read or watch were higher than using notebooks. His formal learning of search was higher than informal learning.

Figure 9 : Student E01 Mobile learning practices

Table 9 : Student E01 Mobile learning content and process

Mobile Learning Activities	Learning Type	Date	Time	Learning Content and Process
Reading/ Watching	Informal	3/5/2013	1200-1800	Reading news
		19/5/2013	1800-2400	Reading novels
Searching	Formal	9/5/2013	0600-1200	Searched Mechanical concepts on Baidu
		10/5/2013	0600-1200	Searched Theoretical knowledge
	Informal	18/5/2013	1200-1800	Searched popular novels
		23/5/2013	0600-1200	Searched tablets information
Record	Informal	18/5/2013	1800-2400	Downloaded movie for entertainment

261

5.4.10 Student E02 Summary Diary Report

Personal background

E02 was a 21 years old boy, and his major study was engineering. His smartphone was bought on 2012. The price of the Smartphone was RMB¥921, and the model was Jiavu JY-G2. The operating system was Android. Moreover, the screen size and weight were 4 inches and 140 grams.

He did not have a tablet, but he had a notebook which was purchased in 2011. The price of the notebook was RMB¥3,700, and the model was Asus X42J. The operating system was Windows 7. Furthermore, the screen size and weight were 14 inches and 2.2kg.

Mobile learning Practices

The figure below showed student E02's mobile learning practices. Reading or watching had the highest mobile learning activity percentages of student E02. Search came second. He did not use mobile device to share. He had a high percentage to read or watch in evening section. Furthermore, the percentages of using smartphone to read or watch were higher than using notebooks. His formal learning of search and learn were higher than informal learning.
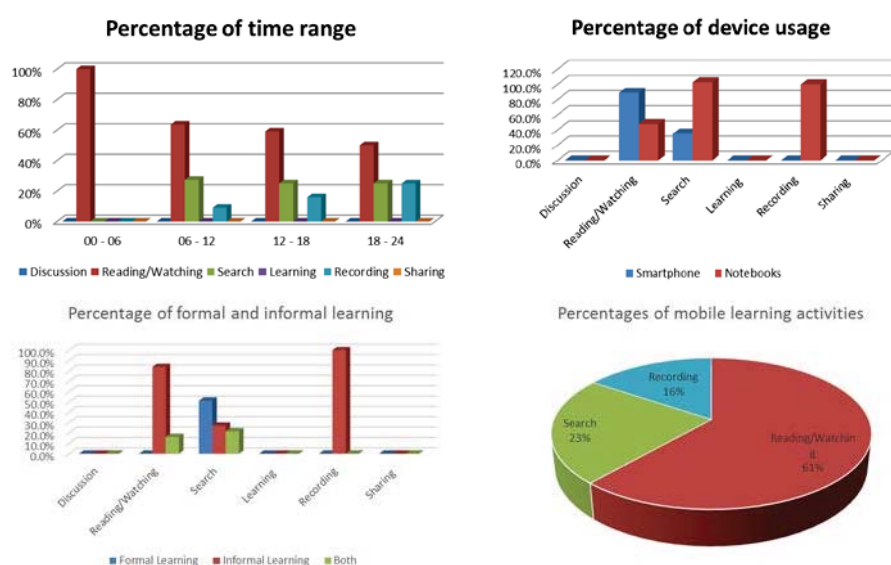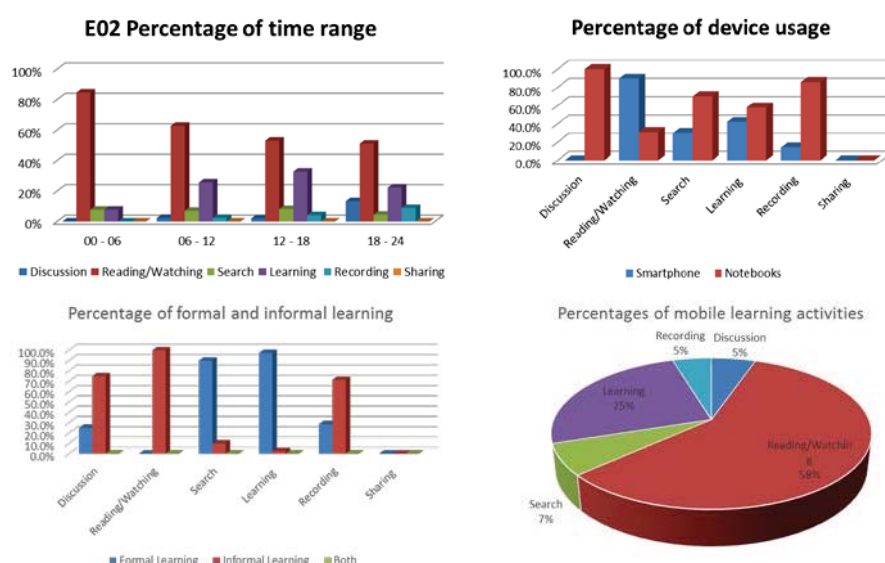
Figure 10 : Student E01 Mobile learning practices

Table 10 : Student E01 Mobile learning content and process

Mobile Learning Activities	Learning Type	Date	Time	Learning Content and Process
Discussion	Formal	21/5/2013	1800-2400	Discussed structural model
Reading/ Watching	Informal	4/5/2013	0600-1200	Browsed news
		13/5/2013	0600-1200	Watched online sport
Searching	Formal	28/5/2013	1200-1800	Searched Seismic design of structures
		15/5/2013	1800-2400	Searched online help for Fortran program
Learning	Formal	7/5/2013	1200-1800	Programs designed in Fortran
		28/5/2013	1200-1800	CAD design structure model
Record	Formal	2/5/2013	0600-1200	Arranged schedule

The Hong Kong Institute of Education Library
For private study or research only.
Not for publication or further reproduction.

5.4.11 Student E03 Summary Diary Report

Personal background

E03 was a 22 years old boy, and his major study was engineering. His Smartphone was bought in 2012. The price of the smartphone was RMB¥2,999, and the model was Meizu MX2. The operating system of the smartphone was Android. Furthermore, the screen size and weight were 4.4 inches and 142 grams. Besides, he did not have a tablet and notebook.

Mobile learning Practices

The figure below showed student E03's mobile learning practices. Reading or watching had the highest mobile learning activity percentages of student E03. Recording came second. He did not use mobile device to share and learn. He did not use mobile device at midnight section. He was active in discussion and reading or watching in evening section. Furthermore, his formal learning of search and record were higher than informal learning.

Figure 11 : Student E03 Mobile learning practices

Table 11 : Student E03 Mobile learning content and process

264

Mobile Learning Activities	Learning Type	Date	Time	Learning Content and Process
Reading/ Watching	Formal	10/5/2013	0600-1200	Read professional concept on web
	Informal	15/5/2013	1800-2400	Reading news
Record	Formal	11/5/2013	1200-1800	Photo shooting learning package on lesson

5.4.12 Student E04 Summary Diary Report

Personal background

E04 was a 21 years old boy, and his major study was engineering. His Smartphone was bought in 2012. The price of the smartphone was RMB¥1,600, and the model was Motorola ME525+. The operating system of the Smartphone was Android. Furthermore, the screen size and weight were 3.7 inches and 142 grams. Besides, he did not have a tablet and notebook.

Mobile learning Practices

The figure below showed student E04's mobile learning practices. Reading or watching had the highest mobile learning activity percentages of student E04. Search came second, and sharing had the least percentages of mobile learning activities. Each section learning practices were averaged. Furthermore, His formal learning of discussion, search, learning, recording and sharing were higher than informal learning.
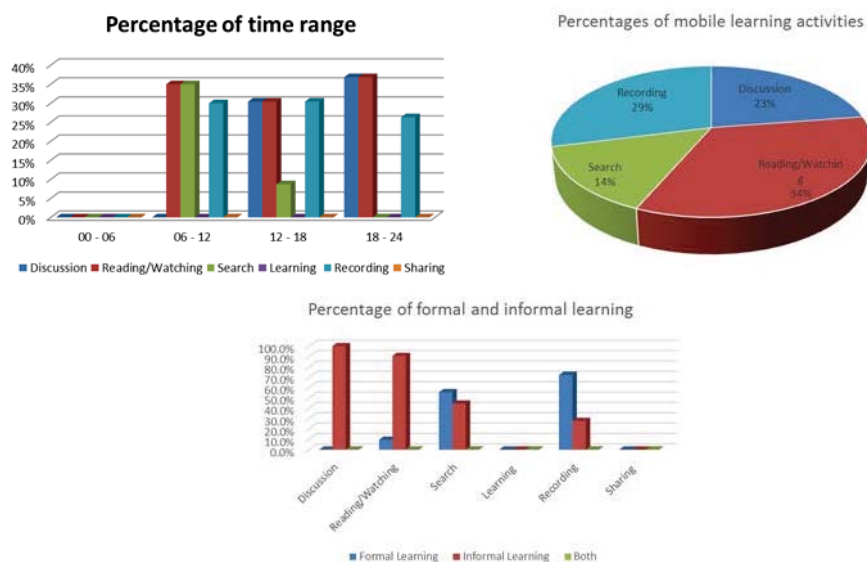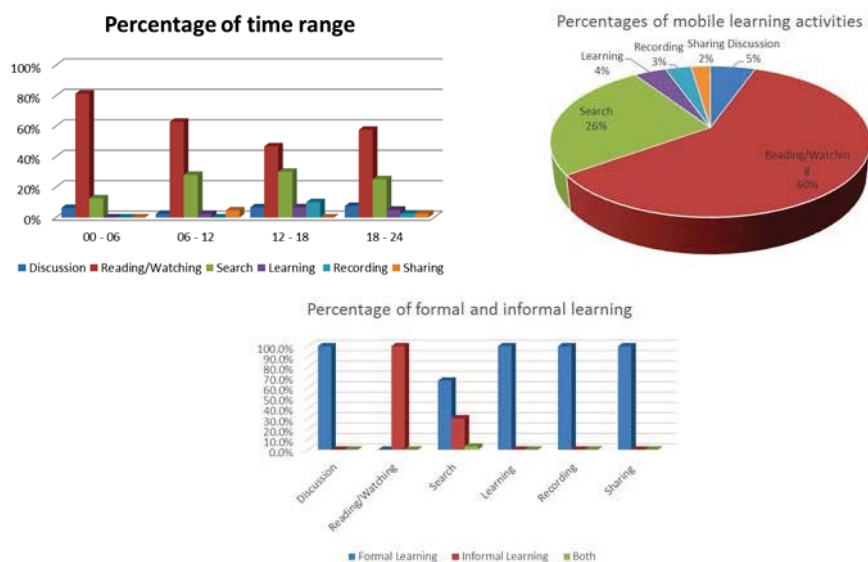

Figure 12 : Student E04 Mobile learning practices

Table 12 : Student E04 Mobile learning content and process

266

Mobile Learning Activities	Learning Type	Date	Time	Learning Content and Process
Discussion	Formal	2/5/2013	0000-0600	Discussed assignment with classmates by QQ
Reading/ Watching	Informal	7/5/2013	0600-1200	Read news
		16/5/2013	0000-0600	Read novels
Searching	Formal	15/5/2013	0600-1200	Searched Fortune command
		22/5/2013	1800-2400	Searched professional knowledge
	Informal	29/5/2013	1200-1800	Searched law knowledge
		17/5/2013	1800-2400	Searched movie information
Learning	Formal	9/5/2013	1200-1800	Learned engineering word
		20/5/2013	1800-2400	Learned program command
Record	Formal	14/5/2013	1800-2400	photographed teachers PowerPoint on lesson
Sharing	Formal	4/5/2013	1800-2400	Sent learning notes to classmates by QQ

5.4.13 Student S01 Summary Diary Report

Personal background

S01 was a 21 years old boy, and his major study was Physics. His smartphone was bought in 2012. The price of the smartphone was RMB¥1,500, and the model was Xiaomi 1S. The operating system of the Smartphone was android. Moreover, the screen size and weight were 4 inches and 149 grams.

He did not have a tablet, but he had a notebook which was purchased in 2012. The price of the notebook was RMB¥3,999, and the model was Hasee K480. The operating system of the notebook was Windows 7. Moreover, the screen size and weight were 14 inches and 2.28kg.

Mobile learning Practices

The figure below showed student S01's mobile learning practices. Reading or watching had the highest mobile learning activity percentages of student S01. Search came second, and sharing had the least percentages of mobile learning activity. Each section of the mobile learning practices was averaged. The percentages of using notebooks on each mobile learning activity were higher than using smartphone. Furthermore, his formal learning of learning and recording was higher than informal learning.
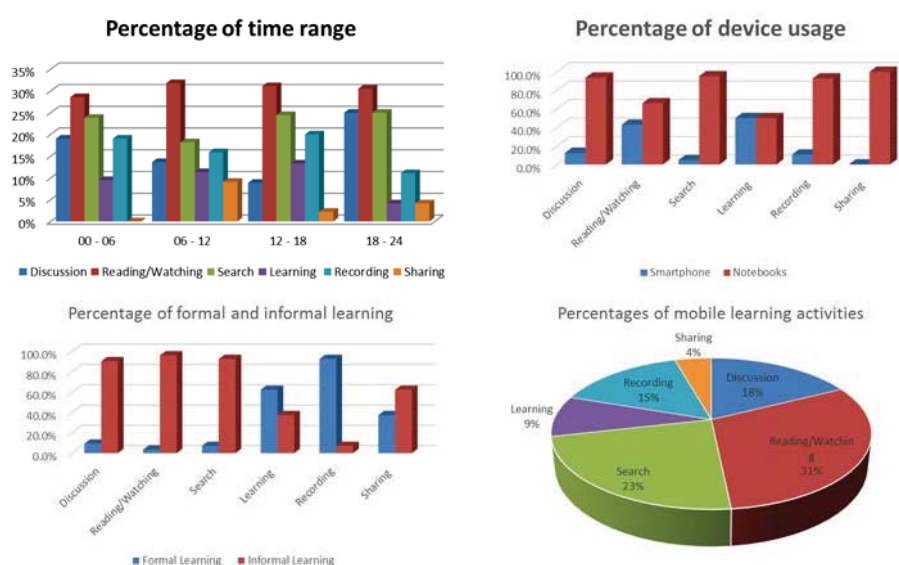
Figure 13 : Student S01 Mobile learning practices

Table 13 : Student S01 Mobile learning content and process

Mobile Learning Activities	Learning Type	Date	Time	Learning Content and Process
Discussion	Formal	28/5/2013	1800-2400	Discussed learning method with classmates by QQ
		27/5/2013	0600-1200	Discussed lesson preparation with classmates by QQ
	Informal	5/5/2013	1200-1800	Expressed personal opinion on social networking
		4/5/2013	1800-2400	Asking video editing technique on Yahoo discussion group
Digital Reading	Formal	12/5/2013	0000-0600	Read digital Science Books
	Informal	4/5/2013	1800-2400	Watched online video for teaching programming design
		20/5/2013	0600-1200	Read digital books

269

Searching	Formal	9/5/2013	1800-2400	Searched information on China Knowledge Resources Integrated Database (CNKI).
	Informal	5/5/2013	1200-1800	Searched online video for entertainment
		22/5/2013	1800-2400	Searched the method for doing eBook
Learning	Formal	6/5/2013	0000-0600	Studied digital book
		25/5/2013	1200-1800	Studied notes by smartphone
	Informal	24/5/2013	1200-1800	Watched online video for doing flash
Record	Formal	9/5/2013	0000-0600	Downloaded documents from China Knowledge Resources Integrated Database (CNKI)
		27/5/2013	0600-1200	Downloaded study notes from baidu
	Informal	3/5/2013	1200-1800	Downloaded digital book
Sharing	Formal	3/5/2013	1800-2400	Sharing learning resources to classmates by QQ
	Informal	2/5/2013	0600-1200	Introduced America movie to classmates by QQ

5.4.14 Student S02 Summary Diary Report

Personal background

S02 was a 20 years old boy, and his major study was Physics. His Smartphone was bought in 2012. The price of the smartphone was RMB¥2,400, and the model was HTC Incredible S. The operating system of the Smartphone was Android. Furthermore, the screen size and weight were 4 inches and 135.5 grams.

He did not have a tablet, but he had a notebook which was purchased in 2011. The price of the notebook was RMB¥5,800, and the model was Asus N43S. The operating system of the notebook was Windows 7. Furthermore, the screen size and weight were 14 inches and 2.7kg.

Mobile learning Practices

The figure below showed student S02's mobile learning practices. Reading or watching had the highest mobile learning activity percentages of student S02. Search came second. He did not use mobile device to share. The percentages of recording at midnight section were nearly 60%. Other mobile learning practices in morning, afternoon and evening sections were averaged. The percentages of using notebooks for each mobile learning activity were higher than using Smartphone. Furthermore, his formal learning of learning was higher than informal learning.
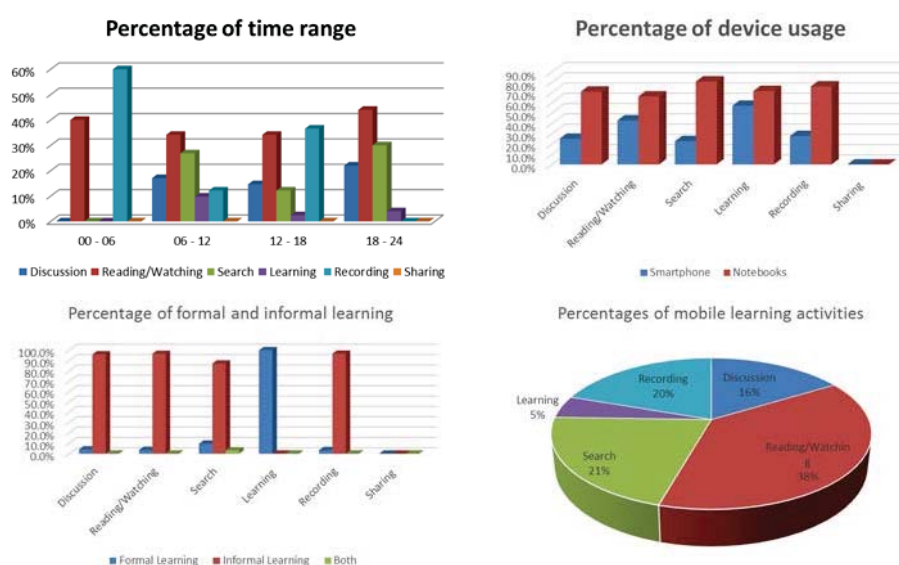
Figure 14 : Student S02 Mobile learning practices

Table 14 : Student S02 Mobile learning content and process

Mobile Learning Activities	Learning Type	Date	Time	Learning Content and Process
Discussion	Formal	14/5/2013	1800-2400	Discussed activities with classmates by QQ
Digital Reading	Formal	22/5/2013	1200-1800	Read digital Science Books
	Informal	18/5/2013	1200-1800	Read digital novels
Searching	Formal	16/5/2013	1200-1800	Searched learning resources
	Informal	21/5/2013	0600-1200	GPS navigation
Learning	Formal	10/5/2013	1200-1800	English Translation
Record	Informal	07/05/2013	0600-1200	Arranged personal diary

272

5.4.15 Student S03 Summary Diary Report

Personal background

S03 was a 21 years old boy, and his major study was Physics. His smartphone bought on 2012. The price of the smartphone was RMB¥1,500, and the model was HTC My touch 4G. The operating system of the Smartphone was Android. Furthermore, the screen size and weight were 3.8 inches and 153 grams.

He did not have a tablet, but he had a notebook which was purchased in 2011. The price of the notebook was RMB¥3,100, and the model was Asus 4743G. The operating system of the notebook was Windows 7. Furthermore, the screen size and weight were 14 inches and 2.5kg.

Mobile learning Practices

The figure below showed student S03's mobile learning practices. Reading or watching had the highest mobile learning activity percentages of student S03. Search came second, and learning had the least percentages of mobile learning activities. All mobile learning practices in each section were averaged. The percentages of using notebooks for each mobile learning activity were higher than Smartphone. Furthermore, his formal learning of learning and sharing were higher than informal learning.
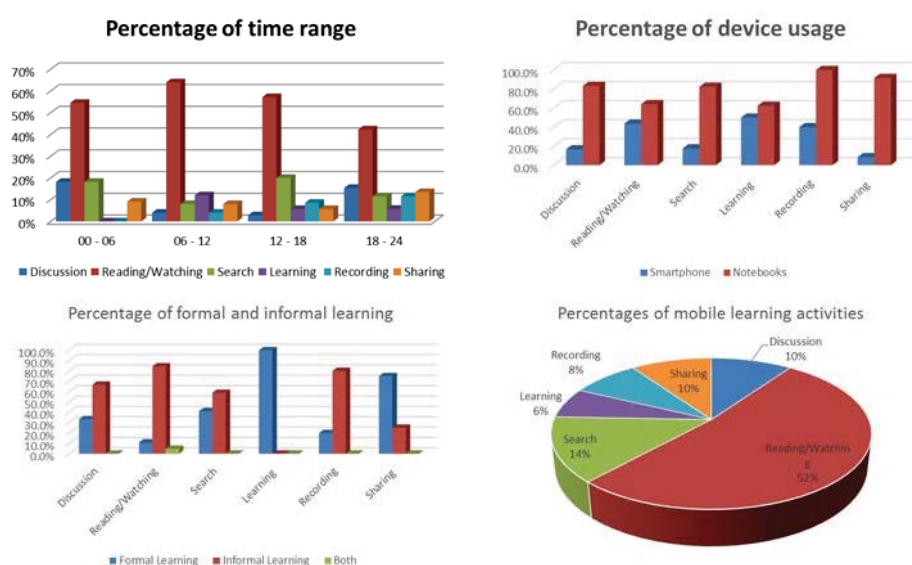
Figure 15 : Student S03 Mobile learning practices

Table 15 : Student S03 Mobile learning content and process

Mobile Learning Activities	Learning Type	Date	Time	Learning Content and Process
Discussion	Formal	4/5/2013	1800-2400	Discussed paper progress with group mates by QQ
	Informal	24/5/2013	0000-0600	Discussed summer activities with classmates by QQ
Digital Reading	Formal	14/5/2013	1800-2400	Watched French movie to learn French
	Informal	12/5/2013	0000-0600	Read science articles
Searching	Formal	21/5/2013	1200-1800	Searched learning resources by library websites
Learning	Formal	19/5/2013	1200-1800	Studied PowerPoint notes
Record	Formal	24/5/2013	1200-1800	Recorded the experimental

				preparation process
	Informal	18/5/2013	1800-2400	Arranged personal diary
Sharing	Formal	26/5/2013	1800-2400	Sharing experimental PowerPoint