



**This electronic thesis or dissertation has been  
downloaded from Explore Bristol Research,  
<http://research-information.bristol.ac.uk>**

*Author:*

**Charm, Yee Chong C**

*Title:*

**A Mobile Learning Model for Clinical Learning in Hong Kong**

*A Case Study*

**General rights**

Access to the thesis is subject to the Creative Commons Attribution - NonCommercial-No Derivatives 4.0 International Public License. A copy of this may be found at <https://creativecommons.org/licenses/by-nc-nd/4.0/legalcode>. This license sets out your rights and the restrictions that apply to your access to the thesis so it is important you read this before proceeding.

**Take down policy**

Some pages of this thesis may have been removed for copyright restrictions prior to having it been deposited in Explore Bristol Research. However, if you have discovered material within the thesis that you consider to be unlawful e.g. breaches of copyright (either yours or that of a third party) or any other law, including but not limited to those relating to patent, trademark, confidentiality, data protection, obscenity, defamation, libel, then please contact [collections-metadata@bristol.ac.uk](mailto:collections-metadata@bristol.ac.uk) and include the following information in your message:

- Your contact details
- Bibliographic details for the item, including a URL
- An outline nature of the complaint

Your claim will be investigated and, where appropriate, the item in question will be removed from public view as soon as possible.

**University of Bristol, School of Education**

**A Mobile Learning Model for Clinical Learning in Hong Kong: A  
Case Study**

**Charm Yee Chong**

A dissertation submitted to the University of Bristol in accordance with the requirements for award of the degree of Doctor of Education in the School of Education. January 2020

Word count: 37,289

## **ABSTRACT**

This dissertation reports on the experience of using mobile learning among different stakeholders during the clinical practicum in a local university in Hong Kong. It aims to explore a sustainable mobile learning model for clinical learning in Hong Kong.

A semi-structured interview guide based on the Framework for the Rational Analysis of Mobile Education (FRAME) model was used for the individual interviews to collect the opinions and experience on using mobile learning from the perspectives of nursing students, university staff and clinical tutors. Sixteen final year nursing students in two cohorts, two Clinical Tutors, two Clinical Course Coordinators, two Technical Support Staff and the Head of the Division of Nursing and Health Studies at a local university in Hong Kong participated in this study.

The rationales for the introduction of mobile learning from the university staff were explored. Core elements and factors affecting the use of mobile learning from the device (D) aspect, learner (L) aspect and social (S) aspect of the FRAME model were identified. Through the participants' critiques and utilization of the mobile device, different intersections of the FRAME model were also verified. However, the important role of the university staff and the learning environment could not be reflected from the FRAME model. Applying critical and reflective thinking on the use of mobile learning was also essential, and this should also be indicated in the mobile learning model.

To conclude, mobile learning is applicable for the nursing students as a learning support intervention. In respect of the FRAME model, it partially covers mobile learning in the local clinical practicum context. With the information from the cognitive presence, teaching presence and social presence of the Community of Inquiry Framework (CoI), it supplemented with the FRAME model in facilitating clinical learning in Hong Kong.

## **AUTHOR'S DECLARATION**

I declare that the work in this dissertation was carried out in accordance with the requirements of the University's *Regulations and Code of Practice for Research Degree Programmes* and that it has not been submitted for any other academic award. Except where indicated by specific reference in the text, the work is the candidate's own work. Work done in collaboration with, or with the assistance of others, is indicated as such. Any views expressed in the dissertation are those of the author.

31<sup>st</sup> January, 2020

SIGNED: ..... DATE:.....

## **ACKNOWLEDGEMENTS**

I would like to express my sincere thanks to my supervisor, Dr. Helen Manchester, for her expert guidance, constructive advice, continuous support and patience throughout my dissertation writing process. Her valuable comments together with her ongoing encouragement kept up my spirits to complete the dissertation. Special thanks must be given to Dr. Jocelyn Wishart for providing her expert guidance and support on this study before her retirement.

I would also like to express my appreciation to Prof. Joseph Lee, Prof. Linda Lee, Dr. K. F. Wong, and Prof. Mimi Tiu for their support and expert advice to me during the whole studying process. Without their extraordinary support, this study would not have been possible.

I give thanks to all my current colleagues, nursing students and graduates. Many of them have participated in this study. Some of them have shared their experience and thoughts in the early stage of this study which have helped me find a better focus and direction for this research. Their participation in this study is much appreciated.

Last but not least, I would like to express my heartfelt gratitude to my husband and greatest parents for their unremitting love, continuous encouragement and understanding. Without their enduring support, I would not have been able to overcome all the difficulties and concentrate on my doctoral study.

## TABLE OF CONTENTS

1. INTRODUCTION .....	10
1.1 Background of the Study .....	10
1.2. Application of Information and Communication Technology into Nursing Education.....	11
1.3 Theoretical Framework: the FRAME Model of Mobile Learning .....	13
1.4 Significance of the Study .....	14
1.5 Aim and Objectives.....	14
1.6 Research Questions.....	15
1.7 Personal Background .....	15
1.8 Organization of the Dissertation .....	16
1.9 Summary.....	16
2. LITERATURE REVIEW.....	17
2.1 Introduction.....	17
2.2 Nursing Education .....	17
2.2.1 Understanding of Nursing Education.....	17
2.2.2 Importance of Clinical Learning in Clinical Education.....	20
2.2.3 Insights from the Development of Nursing Education .....	23
2.3 Previous Studies of Mobile Learning into Clinical Learning .....	26
2.4 Understanding of Mobile Learning.....	29
2.4.1 Concepts of Mobile Learning .....	29
2.4.2 Underlying Learning Theories for Mobile Learning Applied into Clinical Learning .....	33
2.5 Mobile Learning Theoretical Model: the Framework for the Rational	

Analysis of Mobile Education (FRAME) model .....	41
2.6 Summary .....	45
3. METHODOLOGY .....	46
3.1 Introduction.....	46
3.2 Methodological Approach.....	46
3.3 Research Design.....	48
3.3.1 Different Types of Case and Case Study .....	49
3.4 The Participants .....	51
3.4.1 Sampling .....	51
3.4.2 Clinical Practicum Arrangement.....	53
3.4.3 The Mobile Device provided by the University .....	54
3.4.4 Clinical Tasks and Information for which the Mobile Device could be used .....	57
3.5 Data Collection Procedures.....	61
3.5.1 Pilot Study.....	62
3.5.2 Interview Schedule.....	63
3.5.3 Setting .....	63
3.6 Data Analysis .....	64
3.7 Ethical Consideration.....	66
3.7.1 Voluntary Informed Consent .....	66
3.7.2 Privacy .....	67
3.7.3 Authorship.....	67
3.7.4 Power Relation.....	67
3.8 Trustworthiness of the Study .....	68
3.8.1 Credibility .....	68
3.8.2 Transferability .....	70



3.8.3 Dependability.....	70
3.8.4 Confirmability.....	70
3.9 Summary.....	71
4. FINDINGS AND DISCUSSION.....	72
4.1 Introduction.....	72
4.2 Rationales of the Introduction of Mobile Learning.....	72
4.2.1 Enhancing Situated and Experiential Learning.....	72
4.2.2 Data Gathering.....	75
4.3 Affordances of Mobile Device.....	78
4.3.1 Critiques on the Mobile Device.....	78
4.3.2 Utilisation of Mobile Device.....	99
4.4 Learning Participants.....	114
4.4.1 Learning Attitude.....	114
4.4.2 Critical Thinking.....	116
4.4.3 Emotion.....	118
4.5 Learning Environment.....	123
4.5.1 Technical Support.....	124
4.5.2 Everyday Digital Culture.....	127
4.5.3 Teacher-learner Relationship in Chinese Culture.....	131
4.5.4 Working and Staff Culture of the Hospital Ward.....	133
4.6 The Application of the FRAME Model in Facilitating Clinical Learning... 140	
4.6.1 The FRAME Model Supported the Use of Mobile Learning during the Clinical Practicum.....	140
4.6.2 Supplemented by The Community of Inquiry (CoI) Framework.....	146
5. CONCLUSION.....	151
5.1 Summary of the Study.....	151

5.1.1 The Core Elements and Factors Affecting the Use of Mobile Learning as a Clinical Learning Platform .....	151
5.1.2 The Applicability of the FRAME Model on the Use of Mobile Learning in the Local Clinical Practicum Context .....	155
5.1.3 Recommendations for the Application of the FRAME Model in Facilitating Clinical Learning in the Local Clinical Practicum Context .....	156
5.2 Implications of the Study .....	158
5.3 Strengths and Limitations of the Study.....	160
5.4 Recommendations for Future Studies.....	161
REFERENCES .....	163
Appendix 1: Semi-structured Interview Guide for the Nursing Students.....	191
Appendix 2: Semi-structured Interview Guide for the Practicum Course Coordinators (Coordinators) & Clinical Tutors.....	193
Appendix 3: Semi-structured Interview Guide for the Head of Division of Nursing and Health Studies (HoD).....	195
Appendix 4: Semi-structured Interview Guide for the Technical Support Staff (Technicians).....	197
Appendix 5: Letter of Access.....	199
Appendix 6: Sample Transcript .....	200
Appendix 7: Information Sheet.....	221
Appendix 8: Consent Form.....	222
Appendix 9: Approval of Using the FRAME model .....	223

# **1. INTRODUCTION**

This study explores the use of mobile learning in the clinical practicum of university nursing students in Hong Kong. It aims to identify the core elements and factors for sustainable clinical learning with mobile learning devices, and thus to identify a mobile learning model for clinical learning by these means. This introductory chapter discusses the background of the study, along with its significance, aim and objectives.

## **1.1 Background of the Study**

Nursing education involves both classroom teaching of theoretical knowledge and the clinical practicum with the aim of helping nursing students to prepare for their future clinical duties as professional nurses (Cheraghi, Salsali & Ahmadi, 2008). The clinical practicum can only be successful when students are able to apply their theoretical knowledge from the classroom in their real ward practice (Elliot, 2002a). Clinical practicum is therefore viewed as essential to professional competence in most professional healthcare training programmes, included nursing programmes (Melrose, Park & Perry, 2015). During the clinical practicum, students can observe role models, practice and develop their nursing care and problem-solving skills, reflect on what they see, and learn experientially (Thorell-Ekstrand & Björvell, 1995). Hence, clinical learning through the clinical practicum is important in nursing education.

Although the demands with respect to nursing care have changed significantly, with increasing emphasis on working in multi-disciplinary teams and coordinating complex care, the methods of clinical teaching and learning employed with nursing

students have not changed (Tanner, 2006) before the 1990s in Hong Kong. Besides, the conventional apprenticeship training method depends on the performance of and motivation for teaching from clinical tutors (Metz & Sari, 2008). This situation constrains nursing students to planning or initiating their learning entirely within the confines of the clinical practicum. It is increasingly recognised, however, that the support provided to nursing students in this apprenticeship training model is often inadequate. In addition to other issues related to the difficulty of identifying clinical settings, staff shortages and the consequent burdens placed on clinical staff (Robinson, Andrews-Hall & Fassett, 2007), and conditions for nursing students' clinical learning are not promising. Requisition arose from nursing students for more support in clinical learning during the clinical practicum.

With the development of local nursing education following the demand from the trend of professionalism, nursing education shifted from the hospital-based apprenticeship training model to the university-based orientation. Although the university-based programmes are now dominant in nursing education in Hong Kong, clinical learning through the clinical practicum remains crucial for nursing students if they are to become competent nurses in the future. One possible solution to enhance the betterment of clinical learning is that nurse educators might develop innovations, advanced technology and informatics, such as learning through mobile devices, so as to facilitate and support nursing students during the clinical practicum.

## **1.2. Application of Information and Communication Technology into Nursing**

### **Education**

Advanced technology and informatics have been applied in clinical care, including, but not limited to, medical devices used by nurses or patients to support self-care, clinical information retrieval and management, as well as documentation technologies. Consequently, clinical staff are familiar with using advanced technologies, and, as a result, information and communication technology (ICT) is also commonly used in clinical learning. For nursing students, they have to understand the use of different technologies for nursing care as well as patient education, such as insulin pumps or pain management machinery which patients would use at home after discharge from hospital. Besides using ICT for patient care and education, ICT also enhanced nursing students' clinical learning. The use of personal digital assistants (PDAs) in the clinical practicum is an example. The PDA immediately supports nursing students in information access, searching for laboratory values, medical terminology and evidence-based information. It has been shown that clinical judgment of nursing students is improved by the use of PDAs (Newman & Howse, 2007).

Familiarity with advanced technology and informatics is not the only reason to use ICT to enhance clinical learning. Applying the concept of electronic learning (e-learning) and mobile learning in clinical learning also caused the implementation of mobile devices for clinical learning. Cheng, Cheung & Wan (2010) highlighted that e-learning in higher education had been gaining popularity in Hong Kong. This was because e-learning programmes are structured, formal, and constrained by time. They were primarily used to deliver in-depth knowledge or impart specific skills on a subject, for example, e-lecture in classroom and text- and graphics-based instructions. Besides, due to the push toward a "knowledge-based economy society" by the Hong Kong Government, the e-learning technologies development and application had

become popular in Hong Kong (Cheng, Cheung, Wan, 2010).

On the other hand, mobile learning is denoted as a subset of e-learning (Georgiev, Georgieva & Smrikarov, 2004). The application of mobile learning followed the increased use of e-learning. Mobile learning is understood as “*any sort of learning that happens when the learner is not at a fixed, predetermined location, or learning that happens when the learner takes advantage of the learning opportunities offered by mobile technologies*” (O’Malley et al., 2005, p.7). It means that students are able to learn anywhere and at any time with the use of mobile devices (Crescente and Lee, 2011), which is applicable to the nursing students’ situated and experiential learning during the clinical practicum. Therefore, mobile learning was considered as being able to support teaching and learning by the use of mobile devices, which was perfectly matched with its application in clinical learning as explored in this study.

### **1.3 Theoretical Framework: the FRAME Model of Mobile Learning**

Up until now, there have been many models of mobile learning to effectively facilitate clinical learning. Among these models, Koole’s (2009) Framework for the Rational Analysis of Mobile Education (FRAME) Model, is holistic and comprehensive as it provides an intuitive and concise way for considering and designing mobile learning activities. The three aspects, named as device (D), Learner (L), and Social (S), allow designers and educators to gain a deeper level of consideration of these three aspects and their intersection as well as their implications when designing mobile learning. In addition, this model emphasised the constructivist learning theory (Koole, 2009), which was based on the assumption that knowledge is constructed by learners as they try to make sense of their experiences (Wong, 2013).

Hence, it was relevance for this study to explore a sustainable mobile learning model for clinical learning while nursing students underwent the clinical practicum.

#### **1.4 Significance of the Study**

In the past, although several studies on mobile learning and the FRAME model had been conducted, there was limited insight towards studying related to the FRAME model applied in clinical learning in Hong Kong. This is a great opportunity for the researcher to comprehensively explore experiences of nursing students, clinical tutors and university staff in the clinical practicum with the FRAME model. It is hoped that this study can build on the FRAME model to provide the recommendation of a local mobile learning model for clinical learning.

#### **1.5 Aim and Objectives**

This study aims to explore a sustainable mobile learning model for clinical learning in Hong Kong. To achieve this, a case study with students in two cohorts from the same nursing programme, clinical tutors, and university staff of a local university was adopted with the specific objectives being as follows:

1. To identify the core elements and factors affecting the use of mobile learning as a clinical learning platform;
2. To explore the applicability of the FRAME model on the use of mobile learning in the local clinical practicum context;
3. To make recommendations for the application of the FRAME model in facilitating clinical learning in the local clinical practicum context.

## **1.6 Research Questions**

1. What are different stakeholders' experiences on mobile learning while nursing students underwent the clinical practicum?
2. How does the FRAME model support the use of mobile learning during the clinical practicum?
3. What is missing when applying the FRAME model in relation to the context of clinical learning in Hong Kong?

## **1.7 Personal Background**

The researcher is a registered nurse and currently working for a local self-financing university. She is responsible for teaching in the nursing programmes, coordinating nursing students' clinical practicum and the licensing procedures for the Nursing Council of Hong Kong.

Through the coordination work of the clinical practicum, the researcher encountered different queries or opinions from colleagues, clinical tutors and students on the existing use of mobile devices during the clinical practicum, which triggered the idea of evaluating the use of mobile learning in the clinical practicum. The researcher trusts that enhanced learning through different kinds of ICT is the trend in the 21<sup>st</sup> century. The senior managers of the university also support further development on the use of ICTs to enhance teaching and learning, and university staff should make use of ICTs not only in the classroom but also outside the institution to enhance teaching and learning. Moreover, as the use of mobile learning in the clinical



practicum had been applied for over ten years, it was the time to evaluate the experience on the use of mobile learning among the nursing students to understand the current situation and inform improvement or future development of mobile learning.

### **1.8 Organization of the Dissertation**

This dissertation includes five chapters. This chapter has provided the background, significance, aim and objectives of the study. Chapter 2 reviews the literature regarding the importance of clinical learning, concepts and the frameworks of mobile learning, followed by Chapter 3, which discusses the methodology of the study. The findings and the discussion of this study are revealed in Chapter 4. After this, Chapter 5 presents the conclusion arising from this study.

### **1.9 Summary**

With an increase in advanced technology and informatics applied on patient care, technological innovation in nursing education could not be ignored. Nursing is a practice-based profession. Nowadays, nursing education has evolved to be conducted in universities. Clinical learning is important to nursing students in order that they can be trained as competent nurses. There have been many models for mobile learning, of which probably the best known was the FRAME model, which had offered a success story for mobile learning. The findings from this study have important implications for the development of an effective mobile learning model with local characteristics for nursing students' clinical learning.

## **2. LITERATURE REVIEW**

### **2.1 Introduction**

This chapter aims to review and explore previous literature related to the purpose of this study, that is, to explore a sustainable mobile learning model for clinical learning in Hong Kong.

Before conducting the study, related literature is reviewed for insights into nursing education and its impacts towards learning approaches, the understanding of mobile learning and its possible application as well as the frameworks of mobile learning. Related studies on mobile learning are also critically analysed.

### **2.2 Nursing Education**

In order to locate this study in context it is first important to discuss the broader context of nursing education and its development, specifically the importance of clinical learning in nursing education.

#### **2.2.1 Understanding of Nursing Education**

Nursing is regarded as a practice-based profession (McBrien, 2006). Kirk (2007) defines a profession as acquisition and application of a body of knowledge and technical skills. This definition indicates that both theoretical knowledge and practical skills are important in the definition of a profession, and this is applicable to the

nursing profession. To sustain a professional presence, nurses should have a unique body of knowledge, independent decision-making in practice, be involved in reflective practice, act in line with professional standards and codes of ethical practice, and demonstrate behaviours that articulate with a positive role and professional image (Chambliss, 1996; Liaschenko & Peter, 2004; Ruty, 1998). This emphasises the importance of a standard of practice in the nursing profession. Besides, collaboration with colleagues and other medical professionals is also important in the nursing profession, as nurses must invoke their professionalism while providing a nursing service, collaborating with other colleagues of the health care team and the public, promoting the development of other nurses, endeavouring for improvements in the workplace and system, and advocating for the policy of health (Association of Registered Nurses of Newfoundland and Labrador [ARNNL], 2014).

To achieve the above requirement of the nursing profession, nursing education is critical to enhancing the scientific knowledge, practical skills and professional judgement of nurses (Kenney, 2013). So then, what is nursing education? The definition of nursing education listed below not only points out the purposes of nursing education through theoretical and practical training, but also indicates the significance of collaboration with other colleagues in the nursing profession:

*Nursing education refers to formal learning and training in the science of nursing. This includes the functions and duties in the physical care of patients, and a combination of different disciplines that both accelerate the patient's return to health and help maintain it. (Narins & Gale, 2013, p.2374)*

The above definition indicates that nursing education is professional training because

it is vocationally oriented and aims to prepare competent nursing students who can transmit scientific knowledge successfully to professional practice (Williams, 2001). Nursing education includes teaching students not only *what to do* but also *why* and *how to do it* (Johnson, 2013). To achieve these objectives, nursing education activities comprise formal academic teaching as well as impromptu teaching that arises in day-to-day work. These activities are delivered by nurses such as university staff, mentors and students themselves in different settings, including universities, hospitals, clinics, prisons, nursing homes and clients' own homes (Quinn, 2000b). Although the practical training and collaboration with different people is essential in nursing education, the practical training and collaboration with others are challenging for nursing students and become important issues for nurse educators to assist nursing students in dealing with.

Meanwhile, scientific knowledge is the root of a professional nursing practice which supports nurses to solve problems, make decisions and define the nature of opportunities within nursing practice (ARNNL, 2014). In the classroom, nursing students learn theoretical nursing knowledge to develop intellectual skills in determining and implementing nursing care. In fact, the scientific knowledge is transferred not only through formal education, but also through social significance when providing nursing service to clients, nursing laboratory practice and the clinical practicum. In the nursing laboratory and clinical practicum under different settings, nursing skills are demonstrated, practised and applied to real practice. In other words, nursing laboratory practice and the clinical practicum provide opportunities for nursing students to establish their ability to apply nursing knowledge to practice and gain experience by collaborating with others.

Among nursing laboratory practice and the clinical practicum, the clinical practicum is a key component in nursing education that requires considerable support from the nurse educators to enhance students' clinical learning. The next section further explains the concept of clinical education in which teaching and learning activities occur between the clinical tutor and nursing students in clinical settings.

### **2.2.2 Importance of Clinical Learning in Clinical Education**

As mentioned above, clinical education through the clinical practicum is essential for nurse training programmes because an effective clinical practicum allows students to blend conceptual and procedural pre-occupational knowledge and transfer this into practice, and enhancing the development of competent practitioners (McBrien, 2006). In fact, the clinical nursing practicum can take place in different venues where patient care is needed, such as inpatient wards in hospitals or medical centres, emergency and operating rooms, ambulatory care settings, nursing homes, family practice and community centres (AlHaqwi, van der Molen, Schmidt, & Magzoub, 2010). Thus, nursing students have to adapt to different environments and work with different staff in different contexts during the clinical practicum. The definition of clinical education also illustrates the diversity of settings within which nurses are trained to work.

The term 'clinical education' comprises a wide spectrum of experiences from observational visits, simulated experiences and student practicum in different health care settings where students provide patient care under the supervision of a qualified practitioner or clinical mentor (Cantatore, Crane & Wilmoth, 2016). Moreover, clinical education should also be provided while students are developing their abilities

to seek knowledge that they can use in managing patients (Rothstein, 2002). Therefore, various accreditation bodies of health professions require minimum exposure to appropriate clinical settings for different programmes. To meet the required exposure set by the accreditation body, students must also demonstrate professional competency during their practica in order to obtain the professional degree. All of these reflect that the clinical practicum is critical to professional competence in most healthcare professional programmes, including medicine, pharmacy, nursing, paramedics, such as physical therapy, occupational therapy, radiation therapy and dietetics (Melrose et al., 2015). Hence, training institutions or universities should employ qualified clinical teachers to offer supervision (Murray, Gruppen, Catton, Hays & Woolliscroft, 2000) and provide resources in clinical settings to support students' clinical learning during the clinical practicum.

Clinical tutors have a particularly important role in the effectiveness of clinical education. The support from the clinical tutors to the learners includes providing constructive and regular feedback, encouraging reflection and providing a clinical learning opportunity to the learners. Moreover, clinical learning entails learning activities implemented by students in the clinical practicum which, most of the time, have been assigned by their clinical tutors. The clinical tutors are important in clinical learning. Further, many factors also influence the clinical learning of nursing students and subsequently affect the development of their clinical competence. These factors include the exposure to different hospital wards or clinical centres, self-directed learning, learning in authentic clinical settings and provision of a supportive environment (Littlewood et al., 2005). Clinical tutors can assist students to address these factors and enhance students' development in the clinical practicum through different kinds of support. However, if the clinical tutors simply follow the structured

clinical learning outcomes of the curriculum to facilitate students' clinical learning and achieve the purposes of clinical education, the contents of clinical learning will not be maximised (Elliot, 2002b; Napthine, 1996). This is because the clinical cases may be different from time to time, the nursing students may not only rely on their clinical tutors but also have to initiate and be active in clinical learning to search for information and deal with different cases in the clinical environment.

In addition, clinical learning is unpredictable and dependent on the availability of clinical cases, manpower of the clinical settings and the changes in health care delivery systems. Moreover, the interaction between the nursing students' characteristics and the availability and engagement of clinical tutors also leads to variability in students' clinical learning (AlHaqwi et al., 2010). These features contribute to the difficulty of planning clinical learning during the clinical practicum and indicated the necessity of an effective supporting method to enhance clinical learning.

In the current study, clinical learning is an important component of clinical education. To facilitate effective clinical learning, the nursing students should be adequately prepared and should have attained the required clinical competence. All of the above discussed influencing factors, such as clinical tutors, the exposure to different clinical settings, learning in authentic clinical settings and provision of a supportive environment, trigger nursing educators to improve the quality of clinical learning through the clinical practicum and apply methods to support the clinical practicum, such as using a mobile device to support clinical learning, especially to enhance situated and experiential learning, as explored in the current study.

### **2.2.3 Insights from the Development of Nursing Education**

Within the above context, internationally, nursing education has increasingly begun to take advantage of informatics and advanced technology in clinical learning. The development of nursing education from the traditional hospital-based apprenticeship training model to the current university provided professional training also explains the reasons for the trend of using advanced technology in clinical learning.

With the increasing number of hospitals in the late 19<sup>th</sup> century, diploma nursing began with its original name of “hospital nursing” (Goldmark, 1923). Improved medical and nursing knowledge also led to the growth in the number of hospitals and an associated demand for more nurses. At that time, the apprenticeship training model was adopted to train hospital nurses. Under the apprenticeship training model, nursing students received on-the-job training, with a monthly allowance, in hospital diploma schools. They provided direct patient care on the ward in exchange for a few weeks of educational lectures in hospital diploma schools, which was known as room and board (King, 1987). Despite the benefits of the apprenticeship training model, such as improved patient care and the reduced cost of nursing services, this training model was later subject to criticism from nursing education leaders. As the nursing students were paid a minimal allowance and provided a source of cheap labour to the hospitals, many policy analysts and nurse historians also commented that this training system undervalued the contribution of nursing to patient care and that the hospital training of nurses was unbalanced (Goldmark, 1923).

In the 1980s, nursing students in Western countries increasingly began to be



educated in universities. Changes in healthcare, for instance, the rapid development of healthcare technology and the knowledge explosion in respect to different kinds of treatment, required nurses to have a more comprehensive theoretical preparation (Melosh, 1982). These changes marked the end of hospital-based nursing diploma programmes and a new era of nursing education predominantly located at universities.

Nursing education in Hong Kong faced similar challenges to those mentioned above. This was because nursing education in Hong Kong adopted the British apprenticeship training model in its early stages. Nursing students were rostered as paid employees and as part of the regular workforce (Chan 1996). Since the first hospital was opened in 1873, more hospitals have been developed in Hong Kong. From the 1900s to 1980s, many British nurses were employed to Hong Kong as nurse tutors and managers. Since then, minimum periods of classroom study and long periods of clinical practicum in specified clinical areas have been required in a hospital-based training system that was divided into a two-year training period for enrolled nurses and a three-year period for registered nurses (Chan & Wong, 1999). Nurse educators could only provide theoretical knowledge to their students in brief under such an arrangement.

In the mid-1980s, due to the rapid economic growth in Hong Kong, people had reduced preference to become a nurse because nurses were required to do “dirty” work, for example, take care of incontinent patients, in the hospitals. Recruiting students to the apprenticeship nursing training programme became difficult for hospital-based nursing schools, and the dropout rate was extremely high (Hong Kong Hospital Authority Working Group on Nursing Education, 1992). At the same time, similar to the situation in the West, demand for nurses with better academic

preparation increased to deal with the development in scientific and technical knowledge, with emphasis on promotion and maintenance of health (Chan & Wong, 1999). The expansion of nurses' roles and the explosion of knowledge also uncovered the ineffective traditional apprenticeship training model in preparing nurses to face upcoming challenges. Therefore, promoting the ability of critical thinking and decision making became necessary for nursing students. A strong desire also arose from the nurses in Hong Kong for upgrading the traditional nursing education system to degree level (College of Nursing Hong Kong, 1992). As a result, the first university degree nursing programme was started in 1996 (Chan & Wong, 1999). The hospital Authority officially closed all hospital-based programmes in Hong Kong in 1999, and degree programmes offered by different universities took on the role of nurse training.

The development of international and local nursing education followed the demand from the trend of professionalism and advanced technology applied to patient care outcomes. Nursing education shifted from hospital-based to university-based orientation. Well-structured academic programmes provided by universities that emphasised both theoretical and practical training were continuously required. Although nursing education carried out at universities are dominant nowadays in Hong Kong, clinical learning through the clinical practicum remains crucial for students to become competent nurses in the future. In addition, during clinical practicum, guidance or support to the nursing students to integrate the newly learned theoretical nursing care concepts and skills into the real situation is important (Wu, Hwang, Tsai, Chen & Huang, 2011). Therefore, development is necessary of supportive measures that can be used by students when they are not at the university, such as mobile devices, that can enhance nursing students' clinical learning.

### **2.3 Previous Studies of Mobile Learning into Clinical Learning**

In fact, many previous studies supported the use of mobile device for learning purposes. Many studies found that the students' perceptions of mobile learning are positive (Garrett & Jackson, 2006; Clarke, Keing, Lam & McNaught, 2008; Al-Fahad, 2009; Wang, Shen, Novak & Pan, 2009). Students appraised that their learning experiences were improved by mobile learning and the mobile learning process is highly interesting (Venkatesh, Nargundkar, Sayed & Shahaida, 2006; Rogers, Connelly, Hazlewood, & Tedesco, 2010; Wang, Xiang & Fesenmaier, 2014).

It is not surprised that nurse educators are one of the early adopters in PDA and developing PDA software to be innovative educational tools (George, Davidson, Serapiglia, Barla, & Thotakura, 2010) as the use of mobile device is not only benefit to the students but also to the educators. Lehman (2003) reported that nursing instructors used PDAs as a source of point-of-care reference (drug software), a physical assessments checklists, and student assignments records. This idea eliminates the need of carrying bulky drug references. Lehman (2003) also stated that the nurse educators used the PDA to document students' learning progress on-the-spot. Lehman's report indicated that using mobile device not only benefit to the nursing students but also to the nursing instructors. Goldsworthy, Lawrence and Goodman (2006) also examined the relationships between the use of PDA, the preparation for medication administration and the self-efficacy of 36 second-year baccalaureate nursing students. The participated students were randomly assigned to either a PDA or control group. Significant increase in self-efficacy of the PDA group was shown in. All of these indicated that PDA, in certain aspect, is useful and helpful for both nursing students and nursing instructors. In the meantime, the mobile device can assist

the nursing students to be more efficient (Daniel, 2010) and also help them to remember detailed information (Lai, Wu & Chen, 2006). The above information indicated that nursing students are benefit from using the mobile device and the policy of using mobile learning for nursing students is good for both the nursing students and educators.

Moreover, handheld computers or personal digital assistants (PDA) had been used for medical and nursing students for more than a decade (Ducut & Fontelo, 2008). Actually, from the literatures on using mobile device in nursing education, there are many advantages of using mobile device in nursing education. The advantages included increasing student self-efficacy, saving time to access information resources, decreasing clinical information stress, increasing students' confidence, improving patient safety and promoting the quality of care (Doyle, Garrett & Currie, 2014; Johansson, Petersson & Nilsson, 2013; Johansson, Petersson, Saveman & Nilsson, 2014; Goldsworthy et al, 2006; Lai & Yen, 2018; Lai et al., 2006; O'Connor & Andrew, 2015). On the other hand, a few barriers or disadvantages on using mobile learning in clinical practicum had been identified, included afraid of the loss of patient data, small screen size of the mobile device which limit the amount and type of information that can be displayed, lack of information technology training and support, difficult in finding a spare socket in ward to recharge their device, cost of mobile devices, poor computer literacy and negative attitudes of nursing students or staff (Altmann & Brady, 2005; Farrell & Rose, 2008; Garrett & Jackson, 2006; Hudson & Buell, 2011; Johansson et al., 2013; Lai et al., 2006; O'Connor & Andrew, 2015; Wu & Lai, 2009). However, obviously, some of the above difficulties have been solved when the information technology and the function of the mobile device were improved and mobile learning becomes popular. The use of mobile learning in

healthcare discipline is increasing.

A review of mobile learning practices shows that there is a growing proportion of mobile learning practices in healthcare disciplines and most of the practices belong to the nursing discipline (Charm & Hwang, 2017). George et al. (2010) also stated that many software applications specially for the use by nurses were available and marketed, however, studies in using mobile learning of nursing students are still very limited. This situation is same in Hong Kong. Most of the previous studies related to using mobile learning among nursing students were mainly conducted in other countries, for example, Australia (Farrell & Rose, 2008), United Kingdom (Clay, 2011; Dearnley, Haigh & Fairhall, 2008; Dearnley et al, 2009; Lea & Callaghan, 2011), Canada (Daniel, 2010; Kenny, Park, Van Neste-Kenny, Burton & Meiers, 2009a; Kenny, Van Neste-Kenny, Park, Burton & Meiers, 2009b) and United States (George et al, 2010). Due to the cultural difference, perceptions and experiences of students may be different in Asia. Only a limited number of studies have yet been conducted in Asia, for example, Taiwan (Lai & Wu, 2016; Pu, Wu, Chiu, & Huang, 2016; Wu & Lai, 2009; Wu, et al., 2010) and Korea (Lee et al., 2016).

There are limited studies related to the use of mobile learning in healthcare discipline conducted in Hong Kong. Most of the mobile learning studies are target on the medical students, for example Leung et al. (2003) and Johnston et al. (2004) which investigated on the usefulness of mobile device as a clinical decision support tool. The study of Chan et al. (2015) recruited the nursing students to investigate facilitators' and students' perceptions of mobile device usage in problem-based learning (PBL) tutorials. However, the target students of this study included nursing, medicine, dentistry, and speech and hearing sciences students. There is another study

targeted on the nursing students. The study of Sit, Chung, Chow & Wong (2005) focused on students' experiences of online learning and the students were studying a part-time post-registration nursing baccalaureate degree program. Nevertheless, the learning attitudes and perceptions of the full-time undergraduate nursing students may be different from the part-time post-registration nursing students. Besides, Hong Kong has developed a reputation as one of the most sophisticated and dynamic telecommunications markets in the world (Kismihok, 2007), it is worthwhile to explore the use of mobile learning in nursing education.

## **2.4 Understanding of Mobile Learning**

Before justifying mobile learning, which is applied in the current study, the concept of mobile learning and its characteristics are discussed. Further, the most applicable and suitable learning theories and approaches in mobile learning for the clinical practicum are also explained in this section.

### **2.4.1 Concepts of Mobile Learning**

Mobile learning provided certain unique features that were absent from traditional teaching and learning platforms. Firstly, mobility, which provided flexibility of learning in terms of time, place, pace and space (Andrews et al., 2011). This flexibility was not feasible when using cable connected devices. Hence, with the use of mobile devices, learners are able to learn anywhere and anytime (Crescente & Lee, 2011). Secondly, collaboration with others in the learning process is enhanced when the learners are not in the classroom or with their teacher. Learners can interact with other learners and educators through mobile devices at different locations. These

two unique features also make the mobile learning platform different from other technology-based electronic learning platforms (Kukulska-Hulme & Taxler, 2007). The unique features of mobile learning also support the clinical learning of nursing students during clinical practica in the current study, as discussed in section 2.2.2.

Due to the above characteristics of mobile learning, many institutions in higher education are implementing mobile learning (Tan & El-Bendary, 2013). For instance, mobile devices are used for assessment, distance learning and different kinds of educational context. Many institutions even provide students with mobile course materials, including the submission information of assignments and information about different courses (Naismith, Lonsdale, Vavoula, & Sharples, 2004). Students can access learning materials not only inside but also outside classrooms (Messinger, 2011). Although mobile learning is commonly used, it has been variously defined in different fields of literature (Briz-Ponce, Juanes-Méndez, García-Peñalvo & Pereira, 2016; Cobcroft, 2006; Hwang & Tsai, 2011), which are discussed as follows.

Parameters are used to define mobile learning. Among these parameters, many researchers have pointed out the relationship between mobile learning and electronic learning as the definition of mobile learning builds on ideas in the field of electronic learning. For example, Quinn (2000a) stated that the intersection of mobile computing and electronic learning is mobile learning. Motiwalla (2007) also considered mobile learning as an essential extension of electronic learning. Also, mobile learning should not be defined merely as an extension of electronic learning (Winters, 2006). For instance, Keegan (2002), Traxler (2009) and Quinn (2012) defined mobile learning simply as the provision of education and training using mobile and handheld IT devices, such as personal digital assistants (PDAs), laptops, tablet PCs, smartphones

or mobile phones. This definition is anchored on the use of mobile technology (Sharples et al., 2009) and only defines mobile learning as an extension of electronic learning which does not indicate the aforesaid unique nature of mobile learning.

On the other hand, Laouris & Eteokleous (2005) illustrated certain characteristics of mobile learning through its definition. They stated that the definition of mobile learning should not constrain learning through mobile phones, but should also focus on the learner and other factors. They proposed an abstract formulation for the definition of mobile learning:

$$\text{MLearn} = f\{t, s, \text{LE}, c, \text{IT}, \text{MM}, m\}$$

(Laouris & Eteokleous, 2005, p.8)

In the above formula, Laouris & Eteokleous (2005) indicated that mobile learning (MLearn) is the result of summing up all of the parameters including time (t), space (s), learning environment (LE), content (c), technology (IT), learner's mental abilities (MM) and method of presentation or assessment (m). This definition showed that when exploring mobile learning, different parameters should be considered. As different factors affect the use of mobile learning, researchers should pay attention to these factors, which are also applicable to the current study. However, for some of the parameters stated in the above formula, such as the mental status (MM), Laouris & Eteokleous did not provide any further explanation of the term, which makes it difficult for the readers to understand and assess. The characteristics of mobile learning on terms of collaboration with others in the learning process are also not reflected from the above formula.



Similar to the idea of Laouris & Eteokleous (2005), the definition from Sharples et al. (2009) also focused on humans, specifically the learner, and the process of learning. They characterised mobile learning as *“the processes of coming to know through exploration and conversation across multiple contexts, amongst people and interactive technologies.”* (Sharples et al., 2009, p. 5). This definition not only touches on the collaboration and communication of learners with their peers or teacher in the learning process of mobile learning, but also matches with the situation of clinical learning mentioned in section 2.2.2, that is, clinical learning involves students’ interaction with clinical tutors in different contexts. Similarly, the definition of Wexler et al. (2007) and Ally (2009) also indicated the importance of collaboration and communication in mobile learning:

*“Any activity that allows individuals to be more fruitful when consuming, interacting with, or generating information, mediated via a compact digital portable device that the individual carries on a ordered basis, has reliable connectivity, and fits in a pocket or purse”* (Wexler et al., 2007, p. 7)

*“Using a mobile device to access and study learning materials and for communicating with the institution, tutors and fellow students”* (Ally, 2009, p. 287)

The above definitions of mobile learning from Sharples (2005), Wexler et al. (2007) and Ally (2009) also reflected the concept of the constructivist learning theory through the interaction and communication with others, which will be further discussed in the following section.

After consideration of the above definitions of mobile learning, attributing only one fixed meaning to mobile learning is inappropriate (El-Hussein & Cronje, 2010). In addition to indicating the importance of accessing information anywhere and anytime, and the capacity for interacting with others, the definition of mobile learning should indicate these elements. Therefore, in this research, mobile learning is defined as using handheld devices for learning not only by accessing information anywhere and anytime, but also by interacting with others, such as peers, teachers and the learning context. This definition also matched with the learning theories that applied to both mobile learning and clinical learning, which will be discussed in the following section.

#### **2.4.2 Underlying Learning Theories for Mobile Learning Applied into Clinical**

##### **Learning**

After explaining the concepts of mobile learning and the importance of clinical learning in nursing education, learning theories supporting the application of mobile learning in the clinical learning are discussed in this section.

Educators can have more understanding on students' learning progress by means of the technologies in order to grasp what they have learnt in the quality and quantity. Learning is defined as a change in human performance or performance potential and occurs in learners' behaviour (Driscoll, 2005). A change in performance results in learners' interaction with their environment and in practice or other experiences over time (Schunk, 1991; Newby et al., 2011). Although there is no consensus on how

learning occurs amongst educators, various theories concerning the properties of learning have been advocated by different educators and psychologists (Uden & Beaumont, 2006). Amid these theories, constructivist learning approaches seem particularly appropriate to facilitate the understanding of the learning process related to mobile learning.

#### 2.4.2.1 Learning theory of constructivism

There are different educators/psychologists who have influenced the development of constructivism including Jean Piaget (1896-1980), John Dewey (1859-1952) and Lev Semyonovich Vygotsky (1896-1934). Jean Piaget was the first person to point out that learning is a developmental cognitive process in which the students create knowledge rather than receive knowledge from the teacher (Hammond, Austin, Orcutt & Rosso, 2001). Together with Dewey's (1897) argument that "education must be conceived as a continuous reconstruction of experience" (as cited from Newby et al., 2011, p.33) that emphasizing the development of a learner's ability will also be influenced by the stimulation of their social environment. In this line of thought, Vygotsky's social development idea of *the zone of proximal development* also have expressed the importance of the interaction and support from the peers in the social environment and its key role affecting their ability enhancement:

*"the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers"* (Vygotsky, 1978, p.36)

The above ideas from Piaget, Dewey and Vygotsky not only support the development of constructivist learning theory, but also illustrate the characteristics of social learning and collaboration. They are the cornerstone for understanding the key feature of mobile learning which I have defined in the previous section.

Constructivist learning is based on the assumption that knowledge is constructed by learners as they attempt to make sense of their experiences. Learners actively construct knowledge based on prior experiences and further build on their known and get progress forward. Learning entails complex interactions amongst various elements, however learning in context and collaboration are two particular important characteristics associated with constructivism (Newby et al., 2011). In constructivist learning theory, learning in context means that learners are instructed to put their knowledge to work within the context of solving realistic and meaningful problems. While students begin to collaborate with others at the learning context, educators can serve as models, guides and show students how to reflect upon their evolving knowledge and possible direction whenever they encounter difficulties. Essentially, thinking activities are central to constructivism in the whole process. Constructivists believe that students should be exposed to complex tasks that they would be expected to face in real life. Therefore, learning environments must be provided such that learners can experience the full complexity and authenticity of the real problems. This idea coincides with the situated experiential learning that will be further explained in the following section.

In addition, it is important to help students develop meta-cognition skills and foster them to be self-directed learners. Meta-cognition is generally described as the awareness of one's own thinking and learning process (Driscoll 1993). In

constructivism, reflexivity is more than meta-cognition. According to Driscoll (1993), reflexivity is a critical attitude exists in learners that promotes awareness of how and what structures create meaning and knowledge. Some of the contemporary learning theories acknowledge the key roles in which the experience and reflection playing in the development of ideas and skills. Together with social negotiation, reflection and interaction, it was essential for nursing students' learning process in the ward. In relation to this study, because of ever-changing circumstance happening in the ward situation, different learning episodes could be taken place at the clinical practicum, including learning through skills practice, the continuous reflection and the focus on sharing or discussion with peers. In the next sub-section, it will come to the discussion on the approach of situated and experiential learning as they help constructing the ideas and knowledge through incessant interaction, it will further support why it is appropriate for mobile learning applied to clinical learning.

#### 2.4.2.2 Learning approach for mobile learning applied into clinical learning: From apprenticeship learning to situated and experiential learning

Along with the pursuit of professional education, nursing education has been moved from the previous conventional apprenticeship training, where the study is mainly in the hospital nursing school, to today's university education. Clinical learning is important to nursing education. Throughout the years, the concept that apprenticeship cannot be overlooked for learning at work appeared in the clinical practicum. Nurse educators have to understand the possibility of learning theory and an approach that can effectively applied to adult education, especially clinical learning in the clinical practicum. Constructivism has also been identified, as this approach to learning emphasizes the importance of the students being actively involved in the

learning process, unlike in the work of previous learning theorists, where the responsibility rested on clinical teachers to teach and where students played a passive, receptive role. Von Glasersfeld (1989) emphasized that students construct their own understanding in which they do not simply mirror but also reflect what they read and what they learn. Students look for meaning and will try to find regularity and order in the events of the world, even in the absence of complete information. Owing to the profound linkage of the features of clinical learning and constructivism, the approach of the situated and experiential learning is sought to be appropriate in this study.

#### *2.4.2.2.1 Experiential learning*

Experiential learning is the process of learning through experience and is more specifically defined as "*learning through reflection on doing*" (Kolb, 1984). A four-step process of learning is involved, including engagement in a concrete experience, reflective observation, abstract conceptualisation and active experimentation. These components are generally consistent with the constructivists' view of the world and specifically echo the need for critical self-reflection. Experiential learning supports students in redefining and discussing the practical issues relating to the theory discussed (Burnard, 1989). This learning approach stresses student outcomes that include critical thinking, effective communication and students' ability to reflect on their own learning (Glendon & Ulrich, 1997; Jarvis 1992), which chimes with the concept of clinical learning.

Mobile application can engage students more in the learning process and it connects the underpinning idea of experiential learning. Chen et al. (2008) corroborated that the essence of experiential learning is profoundly placing student in

the centre and through experience they can learn by themselves actively. In this sense, the mobile application facilitated the students construct their own knowledge more easily as the device extended the learning experience outside the traditional classroom, such as in the clinical practicum, and it amplified students' thinking by supporting and guiding their thought processes throughout. Therefore, the researcher is able to confirm that experiential learning is indeed an effective learning approach for clinical educators. Although experiential learning has supported clinical learning well, we should still require to consider some of factors will affect its implementation effectiveness, such as its emphasis on *social participation*, especially in the clinical practicum, which involves interchange of ideas, problem solving and engagement of the students and *community* that helps students to create, interpret, reflect and form meanings. It provides opportunities to share experiences amongst students and also to interact with their peers for learning purposes. Hence, the approach of situated learning is discussed next.

#### *2.4.2.2.2 Situated learning*

Situated learning focuses on how individuals acquire professional skills, extending research on apprenticeship into how legitimate peripheral participation leads to membership in a community of practice (Lave and Wenger, 1991). Situated learning requires students to form social co-participation. Instead of asking what types of cognitive process and conceptual structure are involved, they ask what types of social engagement provide the proper context in which learning can take place.

Lave and Wenger (1991) differentiated situated learning from the traditional notion of apprenticeships by claiming that it is more than learning by doing. Instead,

they affirmed that learning is an “integral and inseparable” aspect of social practice. Situated learning stresses the relationship between knowledge and learning because it concerns itself with the “negotiated” character of meaning and the “concerned” nature of learning activity amongst all participants. With regard to “personal reflection”, another important concept of traditional constructivists’ notion of learning, Lave and Wenger (1991) confirmed a consistency with their model and their views on personal reflection as “individualised moments” show displaying imperative especially when applying on the various episodes of social experiences.

Situated learning carries the concept that learning is happened and rooted in a social context. The relationships among students, the tools they use, the makeup of the action and the social environment can hinder or facilitate the learning process (Hansman, 2001). However, Lave (1988) contended that only situated contexts to the learning process is insufficient. She asserted that practitioners more focus should be placed on the connections among students, tools and activities as seen in a given social situation. Lave (1988) added that the ideal learning situation involves real-life actions that include the exercise of good social connections and the use of appropriate tools. Hansman (2001) drew similarities between situated learning and experiential learning and he specified the experiential learning place premier focus on performing an activity and that can building up the new knowledge. Experiential assignments can be a self-directed activity in which students obtain guidelines in advance and are expected to perform the activity on their own pace without supervision. Most important, the situated learning not only entails self-direction and “doing” but also highlight the relationship between the learner, their peers and the tools existed in the sociocultural environment. Students, for instance, may form studying groups and carry the continuous learning in different locations, more experienced participants



may share their knowledge with less experienced ones. It strives the students to develop their knowledge out of the rigid frame that they can learn not only by themselves or the existing current issues but they can extend more to a flexible and adjustable learning mode for them from the upcoming changing issues.

The clinical practicum aims to provide nursing students with optimal opportunities to observe role models, to practice and to reflect on what is seen, heard, sensed and done (Thorell-Ekstrand & Bjorvell, 1995). The competencies of nursing students in the application of knowledge, skills, attitudes and values to clinical situations can be developed through the clinical practicum (Chan, 2001; 2003). These indicate that the purpose of the clinical practicum for nursing students is learning through practice, which echoes the idea of Lave and Wenger (1991) that *“Learning viewed as situated activity has as its central defining characteristic a process that we call legitimate peripheral participation”* (p.29). According to Lave and Wenger (1991), situated learning accentuates the process of students involving as the key part of a community of practice thereby learning take place through the process of students turning into the full participants in a sociocultural practice. Situated learning can be applied to their clinical learning, as students should look after patients on the ward and work with other nursing or paramedical staff of the ward.

Evidences showing mobile devices can be well utilized within situated learning and which is also appropriate for applying on problem-based learning, case-based learning, and context-aware learning (Hanewald & Ng 2011). Mobile devices are especially well suited to context-aware applications because they are available in different contexts and, therefore, can support and enhance a learning activity by allowing students to maintain their attention at ward and getting advices and yielding

appropriate assistance when required (Naismith et al. 2004). Bringing together the above core characteristics of experiential learning and situated learning, we can ratify the approach of situated and experiential learning is appropriate for application of mobile learning to clinical learning. Mobile learning supports situated learning (UNESCO, 2013) because it is in time, offer instant help for the student with task at hand (Woodill, 2011) and it also fits to use in the clinical learning environment (Pachler, Bachmair, & Cook, 2010).

## **2.5 Mobile Learning Theoretical Model: the Framework for the Rational**

### **Analysis of Mobile Education (FRAME) model**

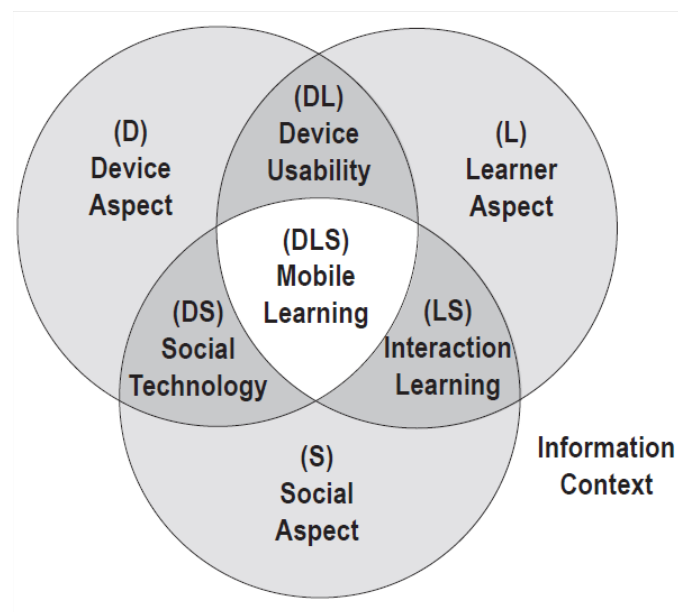
As this study is trying to understand the experience of using mobile learning within different stakeholders, a mobile learning model that can evaluate different process of mobile learning and applicable on different stakeholders is needed. Moreover, a theoretical model can provide guidance for the researcher to address the necessary domains of mobile learning (Power, 2013). Therefore, a mobile learning model, which is applicable to evaluate the use of mobile learning for clinical learning in the current study, is needed.

Given that the use of mobile learning has become popular, different theoretical models have been developed for mobile learning. Among these models, the Framework for the Rational Analysis of Mobile Education (FRAME) model was chosen for application in this study. This is because the FRAME model is useful for guiding the development of future mobile devices, learning materials for mobile learning and its teaching and learning strategies as well as the process of mobile

learning (Koole, 2006; 2009). In addition, the FRAME model emphasise on the constructivist theory, which is anchored with the underlying learning theory applied into clinical learning as mentioned in previous section.

Koole (2006) originally developed the FRAME model to facilitate the understanding of various mobile devices as distance learning tools and the process of mobile learning. It was the first theoretical model to indicate the mobile learning as a process resulting from the convergence of mobile technologies, human learning capacities and social interaction (Koole, 2006; Koole & Ally, 2006). The context for the FRAME model is “information” and within this context, the FRAME model is represented by a Venn diagram as indicated in Figure 2.6.

Figure 1 FRAME model (Koole, 2009)



According to Koole (2009), the mobile learning experiences occurred within a context of information in which the learners consume and create information individually and collectively with the mobile device as a mediator. This concept is

similar to the idea of using mobile device as a mean to enhance clinical learning during the clinical practicum. From the above three circles of the Venn diagram indicate the device aspect (D), learner aspect (L) and the social aspect (S), whilst the intersections where two circles overlap contain attributes that belong to both aspects. The device (D), learner (L), and the social (S) aspects respectively refer to the features of the mobile device, the distinct features of an individual learner and the features required for conversation, cooperation and social interaction (Kumar, Jamatia, Aggarwal & Kannan, 2011). For the overlapping area, device usability (DL) and the social technology (DS) intersections respectively relate the features of the mobile device to learners' characteristics, and represent how a mobile device could facilitate communication and collaboration with different individuals. Finally, the interaction learning (LS) intersection indicates different types of interaction facilitated between learners and other components of the social environment. The three circles converge at the middle of the diagram, which is defined as an ideal mobile learning situation (DLS) (Koole, 2009). Effective mobile learning is occurred by the integration of the three aspects, while each intersection describes additional qualities of the mobile learning process. Moreover, the FRAME model reflected a mode of learning in which learners may participate and interact with one another despite being physically and temporally separated (Koole & Ally, 2006). This mode of learning matched with the situated and experiential learning as mentioned in section 2.4.2.2 that the nursing students have to work together with the clinical staff and learn from the context through communicating not only with the clinical staff but also the university staff and their classmates via the mobile device as a means.

Although the FRAME model was originally designed for evaluating mobile learning in distance learning, using the FRAME model to evaluate the use of mobile

learning to support nursing students in clinical practica is also feasible. This is because as the clinical practicum period lasts from several weeks to several months and most of the time, students must work independently on the hospital ward. In the meantime, university staff need to monitor and facilitate students' clinical performance, where the teaching and learning mode is comparable with distance learning. The FRAME model had also been used by Kenny et al. (2009a; 2009b) to evaluate the success of the integration of mobile learning into a nursing programme. They concluded that using the FRAME model to evaluate mobile learning for nursing students is feasible. This is because the FRAME model points out that learners are able to move within different physical and virtual locations, and they learn from participating and interacting with other people (Koole, 2009). The ideal mobile learning situation and the learning mode as indicated in the FRAME model fit to the learning context of the clinical practicum (Kenny et al., 2009b).

Furthermore, Koole's (2009) FRAME model suggests an approach to designing and evaluating mobile learning activities. The mutual influence of mobile technology, learners' learning capacities, and sociocultural factors are also indicated through the FRAME model. It is indicated that the FRAME model is an all-round, easy to use model for evaluating mobile learning. Mobile learning applied to clinical learning across clinical practica requires learning and knowledge related to experiences through carrying out the works encountered, cognition, reflection and social interaction and participation. The three aspects, namely, device (D), learner (L) and social (S), in the FRAME model allow nursing educators to have a deeper level of consideration on these three aspects and their intersection as well as their implications when integrating mobile learning for clinical learning. In this study, the researcher aims to identify the core elements and factors for sustainable clinical learning with the

mobile learning device and determine an effective model for clinical learning. All these standpoints are mirrored in the FRAME model. The participating university is the only university using the university-provided mobile device for clinical learning and no studies of this model for the nursing student in the local context were found. Hence, the researcher conducted the current study to address this knowledge gap to explore a sustainable mobile learning model for clinical learning while nursing students undergo clinical practicum is relevant.

## **2.6 Summary**

Nursing is a practice-based profession. Clinical learning is important to nursing students in order that they can be trained as competent nurses. With an increase in advanced technology and informatics applied to patient care, it would be clear that mobile learning enhances clinical learning for the nursing students when the university staff are not physically present during the clinical practicum. Various theories were discussed to identify the situated and experiential learning appropriate to mobile learning applied to clinical learning. There are many models for mobile learning, of which probably the best known is the FRAME model, which had offered a success story for mobile learning, and studies of mobile learning in clinical learning were reviewed. Exploring a sustainable mobile learning model for clinical learning while nursing students underwent the clinical practicum was relevant for the current study.

## **3. METHODOLOGY**

### **3.1 Introduction**

This chapter explains and justifies the use of case study for the current study. It discusses the characteristics of case study, the description of the participants, data collection and analysis procedures and ethical considerations. Strategies used to ensure the trustworthiness of the study are also presented.

### **3.2 Methodological Approach**

An appropriate methodological approach of a study is key in order that a researcher can collect appropriate information to solve the research questions. Researchers have to choose an appropriate research paradigm according to their research purpose and the guiding principle must be “fitness for purpose” (Cohen, Manion & Morrison, 2007, p.3). The qualitative research approach was used in this study as the researcher was interested in exploring the experience of using handheld devices for mobile learning opportunities from the perspective of the university nursing students and staff most directly involved.

Denzin & Lincoln (2011) provides a generic definition of qualitative research:

*Qualitative research is a situated activity that locates the observer in the world. It consists of a set of interpretive, material practices that makes the world visible. These practices transform the world. They*

*turn the world into a series of representations, including field notes, interviews, conversations, photographs, recordings, and memos to the self. (p.3)*

Qualitative research involves an interpretive approach to its subject matter in which the “qualitative researchers study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them” (Denzin & Lincoln, 2011, p.3). Qualitative research intends to understand people’s feelings, thoughts, reactions and experiences in realistic environments and take a holistic view of these experiences. It is appropriate to use qualitative research when there is a problem or issue that needs to be explored (Creswell, 2013). In addition, qualitative research can help collect in-depth, rich and detailed data from the participants (Braun & Clarke, 2013), and therefore, the qualitative research approach is appropriate for this study which requires the researcher to collect an in-depth, detailed understanding of the students’ and other stakeholders’ experiences of using mobile learning.

Moreover, qualitative research methods are often used in evaluations which can tell researchers the whole story through capturing and communicating the participants’ own stories (Patton, 2002). A qualitative approach to research on evaluating mobile learning opportunities has been preferred to a quantitative study as it will provide the researcher with a detailed and overall picture of different stakeholders’ experiences of using mobile learning. In addition, using a qualitative approach to evaluate the students’ experience of using mobile learning in a clinical setting is appropriate as qualitative research is especially useful where little is known about the particular problem, setting or situation (Holloway & Wheeler, 1996). As mentioned in the



literature review presented in chapter 2, the information on the experience of using mobile learning among nursing students in Hong Kong is insufficient for further development of mobile learning in nurse education, and thus the qualitative approach was adopted in this study to collect in-depth information in order to provide a holistic and comprehensive understanding of the whole issue (Polit & Beck, 2012).

### **3.3 Research Design**

This study used a descriptive qualitative case study design. This is because a descriptive study documents the factors that describe behaviors, characteristics and conditions of individuals and groups (Portney & Watkins, 2014), which are applicable to collect different stakeholders' experiences in using mobile learning.

Case study design is also a valuable method for health science research to develop theory, interventions and evaluate programmes when the case study approach is applied correctly (Baxter & Jack, 2008). Polit & Beck (2012) define that:

*Case studies are in-depth investigations of a single entity (or small number of entities), which could be an individual, family, group, institution, community, or other social unit. In a case study, researchers obtain a wealth of descriptive information and may examine relationships among different phenomena, or may examine trends over time. (p.503)*

As Patton (2002) states, case studies have all the elements of a good story for evaluation which can tell researchers what happened, when, to whom, and with what

consequences, and thus case study is an appropriate approach for this study. Through case study, the researcher can explore how the nursing students used the mobile device and the consequences of using mobile learning. In addition, a case study design should be considered when the study is focused on answering “how” or “why” questions, the researcher has little or no control over the behavioural events and the study is focused on a contemporary phenomenon (Yin, 2014). This study fit these three conditions as the researcher also sought to explore how and why the students used the mobile device, the relevance of context to mobile learning opportunities and the factors affecting the use of mobile learning which are not be manipulated by the researcher. In addition, the issue of mobile learning is a contemporary issue in education.

### **3.3.1 Different Types of Case and Case Study**

Punch (2009) points out that “almost anything can serve as a case, and the case may be simple or complex.” (p.119). As mentioned in the definition of case study, an individual, a group such as a family, an institution such as a school, or a role, or a community, or a nation may be a case (Punch, 2009). Therefore, the case of this study must be defined. Using boundaries to bind the case can ensure the study remains reasonable in scope and the boundaries can also indicate what will and will not be studied in the scope of the study. The establishment of boundaries is similar to the development of inclusion and exclusion criteria for sample selection in a quantitative study (Baxter & Jack, 2008). The boundary of this study is defined as the stakeholders of the use of mobile learning among the nursing students during the clinical practicum in a local university. As the nursing students are the target user of mobile learning, the current study is mainly focused on two consecutive cohorts of final year nursing

students from the local university who had experiences in using a mobile device as a learning tool during their clinical practicum in Hong Kong. In addition, the Head of the Division of Nursing, the Technicians, Clinical practicum Coordinators and Clinical Tutors are also target cases.

Stake (1995) distinguishes case studies into three types: intrinsic, instrumental and collective. The term 'collective case study' is used when more than one case is being examined. The collective case study is also known as the multiple or comparative case study (Punch, 2009). The collective case study is used to explore the similarities and differences within and between cases (Baxter & Jack, 2008). As the collective case study is considered robust and reliable (Baxter & Jack, 2008), strengthens the precision, validity, and stability of the findings and offers a deeper understanding on the processes and outcomes of cases (Miles & Huberman, 1994), this type of case study was adopted. Creswell (2013) points out that he would not include more than four or five cases in a single study as this number should provide sufficient opportunity to identify themes of the cases and conduct cross-case theme analysis. In view of this and also due to the time limitations and the purpose of the current study, only two cohorts of nursing students were included in this collective case study. Each cohort was treated as a case in this study as they have different models of university-provided mobile device, which will be introduced in section 3.4.3. Other stakeholders included the Head of the Division of Nursing and Health Studies, the Course Coordinators (Coordinators), the Technical Support Staff (Technicians) as the case representing the university staff, while the Clinical Tutors are another case.

### **3.4 The Participants**

#### **3.4.1 Sampling**

Sixteen final year nursing students from two consecutive cohorts, eight from each cohort, from the same bachelor of nursing programme of a local university were recruited for this study through purposive sampling. Purposive sampling means “sampling in a deliberate way, with some purpose or focus in mind” (Punch, 2009, p. 162). According to Polit & Beck (2012), purposive sampling is a nonprobability sampling method in which participants were selected by the researcher based on personal judgment about which of them would be most informative. As the final year nursing students had used the mobile device as a learning tool since their first practicum and all of the participating nursing students had completed more than 1,400 hours of clinical practicum as required by the Nursing Council of Hong Kong before the interview, they were able to provide richer information on the use of mobile learning during the clinical practicum than students from other years. The rich information provided by the final year students can yield insights and in-depth understanding into the practice of using mobile learning during the clinical practicum among nursing students.

Although there is no hidden formula or set rule to determine sample size in a qualitative study (Waltz, Strickland & Lenz, 2010), some research texts often mention that around six to eight participants are needed when the sample consists of a homogeneous group (Holloway & Wheeler, 1996). Therefore, eight nursing students from each cohort were finally recruited on a voluntary basis for interview in this study.

As Yin (2014) points out, the researcher can obtain a broader range of historical and behavioural issues through having multiple sources of data, and thus information from other stakeholders was also collected in this case study. Two Clinical Tutors and university staff including two clinical practicum Course Coordinators (Coordinators), two Technical Support Staff (Technicians) of the Educational Technology and Publishing Unit and the Head of the Division of Nursing and Health Studies (HoD) of the university were also recruited for interview. They have different roles in the clinical practicum and the development of mobile learning in the university. With the information from different stakeholders, the complete picture on the use of mobile learning from its expectation to the actual experience of its use could also be analyzed.

Clinical Tutors are registered nurses, who are hospital staff, work on the ward and are appointed by the university to supervise and assess the nursing students' performance during their clinical practicum. The supervision is an extra workload together with the ordinary nursing care duties of a registered nurse and no honorarium is involved in the role of clinical tutor. Coordinators are academics who have to organise clinical practicum issues and liaise with hospital staff. Technicians are responsible for designing and maintaining the operation system of the mobile devices. Nursing students are able to contact the Technicians if there is any problem related to the mobile device provided by the university. The HoD is the person who introduced the concept of mobile learning into the nursing programme of the university. As these different individuals have different roles in the use of mobile learning in the initiative being explored, they can provide information from different points of view to this study, for example, experience and expectations on developing mobile learning for

nursing students. The data collected from the clinical tutors and different university staff helps to corroborate the findings from different aspects.

### **3.4.2 Clinical Practicum Arrangement**

There are four clinical practicum periods throughout the four-year study in the Bachelor of Nursing programme of the participating university. After having attended the courses of basic nursing skills and nursing care in the autumn and spring terms of the first year, the students start their first four-week clinical practicum in the summer term. After that, they have to attend other courses at the university and conduct the clinical practicum at the hospital alternately. The second, third and fourth clinical practica last for 14, 14 and 18 consecutive weeks respectively in different specialties. Among all of the clinical practicum periods, no more than two hospitals will be involved for each student so that it is easier for the students to become familiarised with the ward setting.

During the clinical practicum, nursing students have to provide nursing care to patients in the ward according to the arrangement and instruction of the nurse in charge. A Clinical Tutor would be assigned to each student to supervise and assess their daily performance. Except for the first clinical practicum, students also have to complete an on-ward clinical assessment during each clinical practicum period. The three clinical assessments include use of aseptic technique, administration of medication and total patient care. Students are required to pass all of these clinical assessments in order to graduate.

Use of the mobile device is compulsory for all of the nursing students in this local university which is unique among the nurse training institutions in Hong Kong.

This university adopted the concept of mobile learning in nurse education in early 2001. Therefore, the evaluation of the substantial experience of using mobile learning in this university is appropriate and essential. The mobile device provided by the university and the tasks for which students would use the mobile device will be briefly introduced in the following two sections.

### **3.4.3 The Mobile Device provided by the University**

A mobile device is given to each nursing student for their use during the clinical practicum. The students own the device once it is given to them before the first clinical practicum and do not need to return it to the university. In previous years, the university provided a Personal Digital Assistant (PDA) as the mobile device for nursing students. Due to the rapid development of mobile devices, the model of the mobile device provided to students would be reviewed by the Technicians each year. The students participating in this study are the first two cohorts who adopted the iPod Touch as the mobile device.

For the first cohort (Cohort A) students in this study, the second generation of iPod Touch with eight gigabytes (GB) of memory capacity was provided by the university. The device has the following dimensions: width 2.4 inches, height 4.33 inches and weight 4.05oz, with a multi-touch display of 3.5-inches (diagonal) screen size and 320 x 480 screen resolution (Apple Inc., 2015). With this small size, students can put it into the pocket of their uniform. For the Random-Access Memory (RAM) and Central Processing Unit (CPU), the second generation of iPod Touch has 128 megabytes (MB) of RAM with a 620 megahertz (MHz) CPU. Moreover, the audio battery life of the device is 36 hours while the video battery life is 6 hours. When the

Cohort A students received the iPod Touch in year one, this device used the “iPhone OS” 3.1 operating system, which is currently called the iOS system since 2010. Through this operating system, calendar, phone books, calculator, clock with alarms, stopwatch and timer functions are provided by the device. Students can also use the device to get music, video and applications (Apps) through the App Store, access internet through WiFi, send, receive and organize emails, store and share photos and videos, as well as write and read notes and voice memos (Apple Inc., 2009). As the iPod Touch would be owned by the students, they can personalize the device through downloading any Apps or ebooks provided by the App Store on to their device as needed, but students were advised to set up the university e-mail account on the device and only download useful references of nursing care to the device. Students were also advised not to update the iOS of the device once any new iOS version was launched until the university technical support staff had informed students to do so. This was because the second generation of iPod Touch only support up to iOS 4.2.1 and it has not been possible to update most of the Apps since early 2011, meaning that those old Apps that were downloaded by the students to the device may not function properly on their device before their graduation.

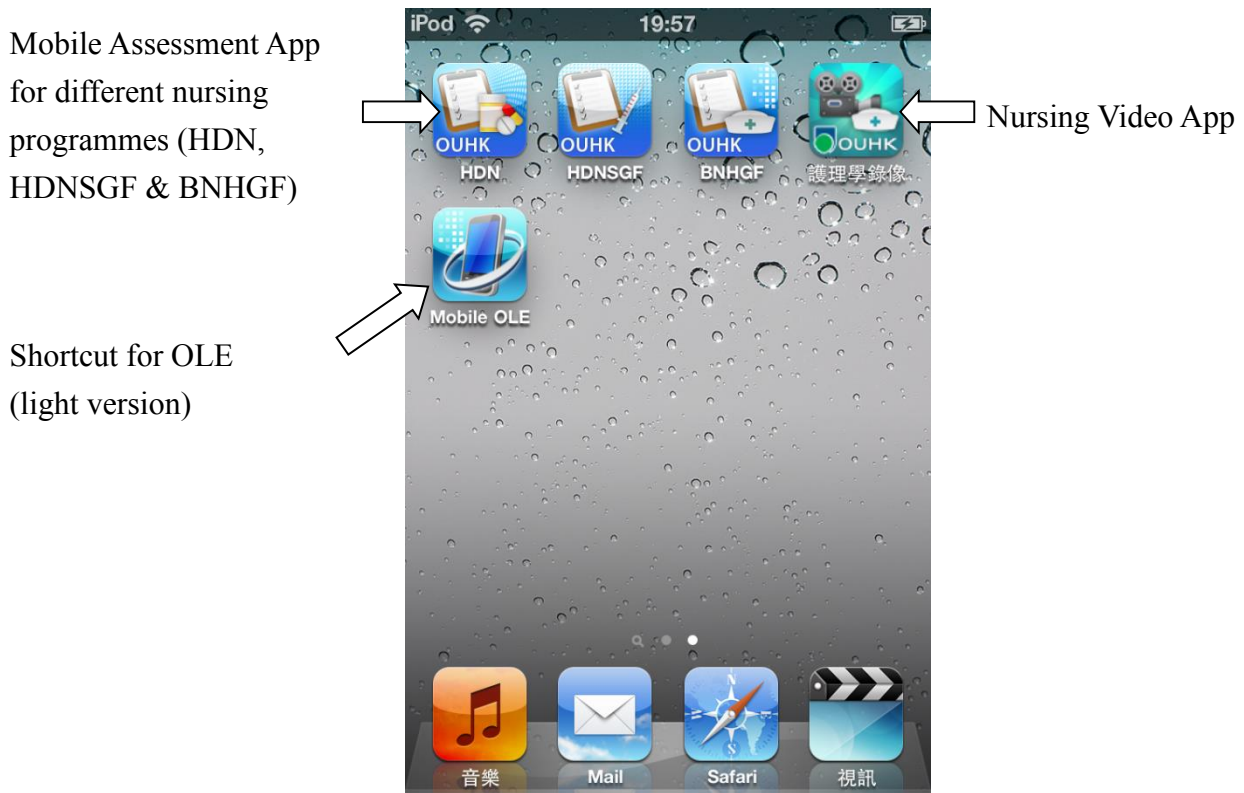
For the second cohort (Cohort B) students, the fourth generation of iPod Touch, also with 8 GB memory capacity, was provided. Except for the higher screen resolution (960 x 640) and camera function provided by the fourth generation of iPod Touch (Apple Inc., 2010), other functions and the design of this device are similar to the second generation of iPod Touch described above. For the RAM and CPU, the fourth generation adopted 256MB of RAM and a 1 gigahertz (GHz) CPU, meaning that this device can run slightly faster than the second generation with the same App and other functions. Similar to the Cohort A students, when the Cohort B students



received the fourth generation iPod Touch in year one, their device used the iOS 4.1 version. This device can support up to iOS 6.1.6 version only and it was not possible to update most of the Apps since late 2012. Similar advice was also given to Cohort B students for iOS version updates. In summary, the design and function of the devices for both Cohort A and Cohort B students are similar to each other and, therefore, the behaviour and practice of using the device for the students of these two cohorts are comparable.

To encourage the students using this mobile device during the clinical practicum, the Technicians of the university developed the Mobile Assessment App and the Nursing Video App (as indicated in Figure 2) for the nursing students. The Mobile Assessment App includes an assessment recording system customized for completion via the mobile device. In this app, required clinical skills, nursing care procedures and learning outcomes in each specialty are listed in the system. For example, bed making in basic nursing care, caring for angina patients in the medical ward and caring for patients with appendicitis in the surgical ward. Students should also use this app to record their clinical practicum in different specialties with dates and venues, the three clinical assessment results, night duties and record of leave taken during the clinical practicum. Another App, the Nursing Video App, included all the video clips produced by the university teaching staff of the nursing programme to demonstrate the procedures of different clinical skills and nursing care so that students are able to review the information whenever necessary.

Figure 2 Applications as provided by the university



### 3.4.4 Clinical Tasks and Information for which the Mobile Device could be used

Before the start of the first clinical practicum period, a briefing session was arranged for the delivery and introduction of the iPod Touch to make sure that all of the students realised how to use the device. This briefing session was compulsory for each student, and those who were absent from the briefing session would have his or her clinical practicum suspended. During the 3-hour briefing session, the procedures of setting up accounts to use the device, iTunes, e-mail account and how to download the university-provided apps, especially the Mobile Assessment App, from the App Store were outlined to all students.

During the briefing session, students were also reminded to rate their own

performance on each clinical skill for that specialty towards the end of the clinical practicum at each venue. After the self-rating, students were expected to ask the Clinical Tutor to rate their performance through the Mobile Assessment App (as indicated in Figure 3). Both the students and Clinical Tutors rated students' performance according to the scoring system from 0 to 4, where 0 means the student never encountered the item, 1 means the student encountered the item but did not become involved in it, 2 means the student completed the item together with the clinical tutor, 3 means the student completed the item under the verbal guidance of the clinical tutor, and 4 means the student completed the item independently under the supervision of the clinical tutor (as indicated in Figure 4). Students were expected to ensure that they had completed all of the required clinical items listed in the system. The student should then promptly upload these records regularly to the university for monitoring through the WiFi function wherever WiFi was provided. The App would indicate whether the uploading process was successful. The mean score entered by the Clinical Tutors would be counted as the continuous assessment score for the student's clinical practicum. Aside from the three clinical assessments which mentioned in section 3.4.2, students also have to pass the continuous assessment for each clinical practicum.

Students were also reminded to check any information announced by the Coordinator through the Online Learning Environment (OLE) regularly. OLE is one of the communication platforms between the university and students. There was a link provided on the personal computer (PC) version of OLE to facilitate students to set up the shortcut and access the mobile site of OLE (light version), which was designed for accessing OLE via mobile device (as indicated in Figure 2). Students can access the OLE through the mobile device and also download the current course materials from

OLE whenever necessary after connecting via WiFi. As well as OLE, students were encouraged to communicate with the clinical practicum course coordinator by email, which is also accessible through their mobile device. Proper use of the mobile device was also emphasised. The Coordinator always reminded students that use of the mobile device for learning needs on the ward was allowed but students should not use it for taking photos for the patients without the permission of the ward staff, nor should they use it for leisure on the ward.

As the mobile device was essential during the four clinical practica, students were advised to take good care of their device. If the students encountered any problems using the device, they were able to contact the Technicians via the technical support telephone hotline during office hours or via email.

For the Clinical Tutors, training in the use of the mobile device would be provided when he or she was being appointed as the Clinical Tutor of the university. Aside from introducing the nursing programmes of the university, the roles and responsibilities of a Clinical Tutor, the Mobile Assessment App and the scoring system in the App were also included in the 3-hour clinical tutor training. Each Clinical Tutor needs to attend the Clinical Tutor training once only, but they are all welcome to attend the Clinical Tutor training again if they so desire.

Figure 3 Indication of self-rated and tutor-rated items from the Mobile Assessment App

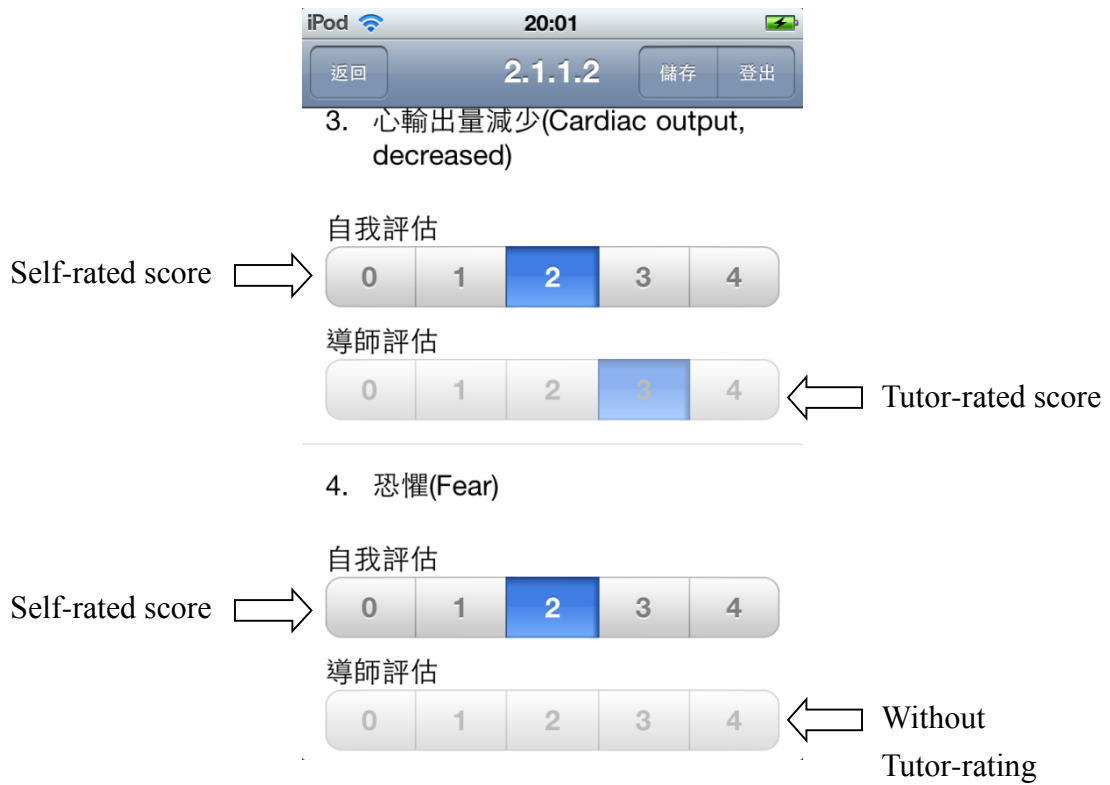
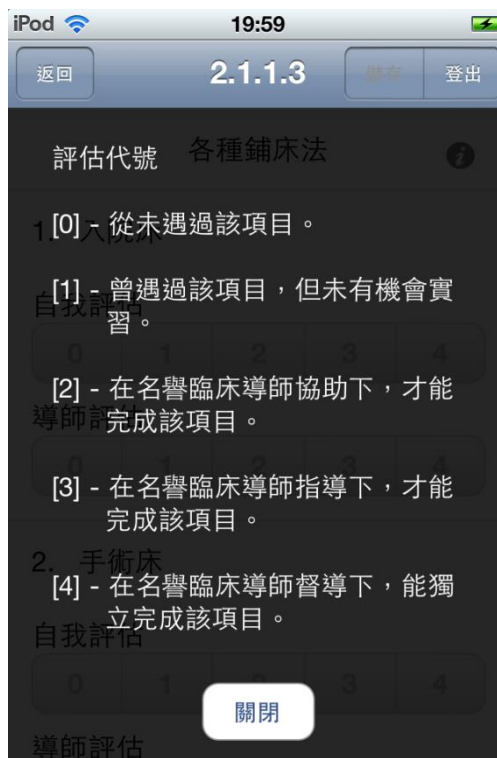


Figure 4 Explanation of the scoring system in the Mobile Assessment App



### **3.5 Data Collection Procedures**

Braun & Clarke (2013) define interview as a ‘professional conversation’ in which the participants talk about their experiences and perspectives so that the researcher can capture the participants’ comments and concepts in relation to the researcher’s topic. This study used interview to collect students’ experiences with and opinions of using mobile learning during their clinical practicum period. This is because interview can yield direct quotations from participants about their opinions, experiences, knowledge and feelings (Patton, 2002).

There are three types of interview, unstructured, semi-structured and structured. Among these, the semi-structured interview is the most common type of interview in qualitative research (Braun & Clarke, 2013). According to Tappen (2011), this kind of interview is used when the researcher cannot predict all the possible responses but wants to keep responses focused on a specific topic. In a semi-structured interview, the researcher prepares a list of questions for the interview but there is scope for the participants to raise issues that the researcher has not anticipated (Braun & Clarke, 2013). Besides, semi-structured interviews employ open-ended questions that allow freer responses from the participant than if a more structured framework were to be used (Tappen, 2011). In the meantime, semi-structured interviews allow the researcher more opportunity to clarify or ask for more in-depth responses to participants’ answers (Tappen, 2011) which, in this study, can provide fruitful information on using the mobile device among the nursing students.

In view of the above reasons, a semi-structured interview guide based on the FRAME model was developed (Appendix 1). The interview guide is intended to

ensure that the same general areas of information will be collected from each participant. In addition, an interview guide will allow a degree of freedom and adaptability for both the interviewer and participants during the interview (Polit & Beck, 2012). Besides the FRAME model, an open-ended question for collecting the participants' opinions on using mobile learning was also included in the interview guide. The interview guides for the Coordinators, Clinical Tutors, HoD and Technicians are similar to the interview guide for the students and only a few amendments were made due to the different roles of the participants (Appendices 2, 3 and 4). The interview guides were validated as to their relevance before they were used for the interviews through discussion with one of the Coordinators who did not participate in the current study. Each face-to-face individual interview lasted for 45-60 minutes and was recorded by means of an audio recorder. The interviews for Cohort A students, the university staff and Clinical Tutors were conducted at the end of 2012 while the interviews for Cohort B students were conducted at the end of 2013.

### **3.5.1 Pilot Study**

A pilot interview was conducted with a Cohort A student and one of the Coordinators. The pilot interview provided the researcher with an opportunity to assess the feasibility of the interview guide, to practise the interview skills and to use the interview guide before the actual data collection. From the pilot interview, the researcher found that the participants could understand the questions and the interviews could be completed within one hour and, therefore, no modification of the interview guide was made after the pilot interview. However, through the pilot interview, the researcher found that the nursing student frequently mixed the concept of mobile learning with that of the mobile device as an assessment tool. The

researcher must therefore pay attention to this issue when the students provide comments on mobile learning.

### **3.5.2 Interview Schedule**

After the approval from the participating university was received (Appendix 5), the researcher contacted the Cohort A students, Coordinators, Clinical Tutors, the HoD and Technicians for individual interviews. All of the students' interviews were conducted after they had completed the final clinical practicum and all of the teaching and grading had been completed and released. Similarly, the Cohort B students were invited for the interview in the following year. All of the interviews were conducted by the same researcher.

### **3.5.3 Setting**

All of the interviews were conducted in Cantonese, the native language of the researcher and all of the participants, in an area with which they were familiar. As the interview environment needs to be private, quiet and physically comfortable to encourage participants to be concentrated in the interview (Legard, Keegan & Ward, 2003), all of the interviews were conducted in an independent room. The students' interviews were conducted in the interview room of the Clinical Nursing Environment Centre (CNEC) at the local university. The CNEC is a simulated ward with which the nursing students were familiar, as most of the nursing care skills were practised there. The interview room was an independent room inside the CNEC but the interview room was not included in the teaching area. There are sofas and a small side table in the interview room, which provided a relaxing atmosphere for the students to talk



with the researcher. As all of the participants' academic results had been finalized before the individual interviews, the students were encouraged to feel free to express their opinions and casual chatting was used as a warm up to create a pleasant atmosphere.

For the university staff and Clinical Tutors, the interview date and venue were arranged with the participants and the researcher. In addition, all interviews were conducted in an independent room at their workplace.

### **3.6 Data Analysis**

To build up a rich description or theory of the phenomenon, researchers have to identify themes through clustering the related narrative information into a coherent scheme (Polit & Beck, 2012). Therefore, thematic analysis was adopted to analyze students' experience of using mobile learning and the expected capabilities of the mobile device for clinical learning according to the FRAME model. Thematic analysis is a method for identifying, analyzing and reporting themes and patterns of meaning across a dataset in relation to a research question (Braun & Clarke, 2006; 2013). Through theoretical thematic analysis, data analysis is guided by an existing theory and theoretical concepts (Braun & Clarke, 2013) which allows the researcher of this study to explore whether the FRAME model effectively covers the use of mobile learning in the local context.

After each interview, the researcher listened to the audio recording and recorded field notes immediately. A transcriber transcribed all interviews into transcripts verbatim from the audio recording and nothing was rephrased, altered, omitted or

explicated. When the researcher received the transcripts, the researcher verified the accuracy of the transcription by listening to each audio recording and comparing it with the transcripts, rectifying any errors or omissions. The researcher also familiarised herself with the data through this procedure. Once the transcripts had been verified, the audio recordings were destroyed and the transcripts of the interviews were kept in a locked area. A sample transcript is attached in Appendix 6.

Coding was carried out after the transcripts had been verified. The process of coding means organizing the data into meaningful groups (Tuckett, 2005). These codes are used to represent the different themes identified. The researcher used highlighters and written notes on the transcripts to identify the basic themes that appeared interesting or matched with the three aspects and three intersections of the FRAME model. The table below shows an example of coding from an extracted transcript:

Table 1 Example of coding from the transcript

	Extract from the transcript	Coded for
Participant:	For example, it is good if you can put a phone in your pocket. Moreover, it has to be light in your pocket. If it is too heavy, no one will carry it around. We also need to work overnight during the practicum, sometimes for a long period of time, so the battery is also crucial. It has to be durable. The screen has to be clearer.	<ul style="list-style-type: none"> <li>- D: Pocket size is a favourable feature</li> <li>- D: Light weight is another favourable feature</li> <li>- D: Long battery life is essential</li> </ul>
Interviewer:	Clearer?	

Participant:	Yes. If I want to read a book, then having a large screen will be ideal. Otherwise, I have to read close to the screen. As I said, it has to be really fast.	- D: Large screen is ideal and enhances reading experience
--------------	--	--

After coding had been completed for all of the data, the researcher reviewed the coded basic themes and sorted them according to the FRAME model. The researcher also reviewed whether there were any coded basic themes that did not match with the FRAME model. After reviewing all the results from the students of the two cohorts, the results among the two cohorts of students were compared. The results from the Coordinators, Clinical Tutors, HoD and Technicians were also compared with the students' results for triangulation, which was used to ensure completeness and to confirm findings (Carpenter, 2007; Miles & Huberman, 1994).

### **3.7 Ethical Consideration**

This study was started after the approval from the participating university had been received (the procedure is shown in Appendix 5). Ethical issues according to the guidelines from the British Educational Research Association (2011) were considered.

#### **3.7.1 Voluntary Informed Consent**

The purpose of this study was explained to the participants when the researcher approached them. All participants were assured that their participation was voluntary. An information sheet (Appendix 7) and a voluntary informed consent form (Appendix 8), including an explanation of the purpose, main procedures and the right of the

participants to withdraw from the study at any time without any adverse consequences, was given to the participants, and they had to sign this before the interview.

### **3.7.2 Privacy**

The participants were assured that an anonymized code name, would be assigned to them and appear on the transcripts and reports of the study. The information of the participants, the recordings and transcripts of the interviews were kept confidential and could only be accessed by the researcher. Besides, the collected data would only be used for this study and not for any other purposes. All of the information related to the current study would be kept in a locked area and would be destroyed after this study had been completed and published.

### **3.7.3 Authorship**

The researcher contacted Ms. Marguerite Leanne Koole, the author of the FRAME model, to seek permission to use the FRAME model for this study. Approval was received from the author as attached in Appendix 9.

### **3.7.4 Power Relation**

As the researcher of this study is one of the teaching staff and clinical practicum Coordinator of the university, power tension may have existed among the nursing students. The power tension could be resolved through providing a non-threatening and welcoming environment during data collection, so that participants would be willing to share their own stories and personal experiences (Karnieli-Miller, Strier &

Pessach, 2009). The researcher of the current study provided a comfortable interview environment and established trust and a good rapport with the participants before commencement of the interview. The anonymity of participants and the confidentiality of the collected data were also emphasized. Besides, to avoid pre-established judgments and assumptions about the current study by the teacher-researcher in the research process (Hitchcock & Hughes, 1995), a conscious effort was maintained to ensure a fair and unbiased interview and to avoid premature assumptions in the data analysis.

### **3.8 Trustworthiness of the Study**

Trustworthiness or rigour of a study is used to persuade others that the research findings are worth paying attention to (Tappen, 2011). The quality determination measures on reliability and validity in quantitative studies are not applicable in qualitative studies as the qualitative study is targeted at the meaning and interpretation of cases that are context-bound and unique (Yılmaz, 2013). Hence, to establish the trustworthiness of this qualitative study and ensure the rigour of this research process, the data and research process of this study were evaluated using the criteria of credibility, transferability, dependability and confirmability – terms that are appropriate for qualitative research that were introduced by Lincoln & Guba (1985).

#### **3.8.1 Credibility**

Credibility is equivalent to the internal validity of a quantitative research (Tappen, 2011). It refers to the confidence in the truth of the data and whether the interpretations of the data are free from error and distortion (Polit & Beck, 2012).

Prolonged engagement and persistent observation, member checking and triangulation were performed in this study.

According to Long & Johnson (2000), prolonged explanations and persistent observation allow the time and opportunity for the researcher to test possible explanations and develop emerging explanations. As one of the teaching staff of the participating university and being involved in the arrangement of the clinical practicum, the researcher of this study is oriented to the context of the phenomenon which enables the researcher to identify different factors that lead to the participants' experience and provides an opportunity for the researcher to have an in-depth understanding and reflect on the fundamental structures and natures of the context.

Member checking was used to determine the accuracy of the qualitative findings (Creswell, 2003). The researcher returned the basic themes identified in each transcript to each participant to ascertain whether they agreed with the findings. The participants were able to clarify with the researcher if the results did not reflect their thoughts and experience. Most of the participants agreed with the researcher's decisions. A few of the nursing students provided further information or explanations on their thoughts on mobile learning after they had read the basic themes.

Triangulation allows cross-checking of both data and preliminary conclusions. Source (or data) triangulation involves obtaining different points of view to provide multiple perspectives (Tappen, 2011). Data collected from the Coordinators, Clinical Tutors, HoD and Technicians were used for source triangulation in this study.

### **3.8.2 Transferability**

Transferability is equivalent to external validity in a quantitative research. It is the extent the findings from the data can be applied to other situations or people. In qualitative research, a detailed description of the participants and the context of the study allow the readers to decide the extent the findings may be transferred to other situations or people (Tappen, 2011). Potential transferability of this study will be accomplished by providing a clear and rich description, and a broad selection criteria for participants and purposive sampling.

### **3.8.3 Dependability**

Dependability refers to internal reliability, which means data stability over time and over certain conditions in a quantitative research (Polit & Beck, 2012). A colleague of the researcher who was not involved in the current study and was experienced in qualitative research was invited as an auditor to audit the process of this study. The data analysis and transcripts were reviewed and the analysed results were supported by this expert.

### **3.8.4 Confirmability**

Confirmability is equivalent to the effort of maintaining the neutrality or objectivity of the data (Tappen, 2011). The method of documenting the confirmability of the findings by the researcher is to leave an audit trail which is a recording of activities over time so that another individual can follow them (Speziale, 2007). The researcher of this study recorded the activities of the current study in a journal over

time and the auditor, as mentioned above, evaluated and confirmed the records. The procedures of data collection and analysis were also recorded and, therefore, other individuals are able to follow the procedures of this study.

### **3.9 Summary**

This chapter presented the methodological approach and research design of the current study. The procedures of data collection and analysis were discussed and justified. In addition, the participants involved in this study were described and concerns about the trustworthiness and ethical issues were also addressed.



## **4. FINDINGS AND DISCUSSION**

### **4.1 Introduction**

This chapter presents and discusses the findings from the rationales of the university staff to the experience of the final year nursing students on the use of mobile learning during the clinical practicum. In addition, using data exploring the experience from the participants' viewpoint, the chapter also discusses whether the FRAME model effectively covers the design and delivery of mobile learning for the context of nursing students in the local clinical practicum.

### **4.2 Rationales of the Introduction of Mobile Learning**

As mentioned in section 3.4.3, an iPod Touch was provided by the university to each nursing student before the clinical practicum began and the students were expected to use this device during the clinical practicum. There is an interesting question here about why this technology was first introduced. Thus, before exploring the experience of nursing students on the use of mobile learning, the rationales on the use of mobile learning from the university staff are analysed in this section, which could influence the design of mobile learning and also affect the nursing students' perceptions about the use of the device.

#### **4.2.1 Enhancing Situated and Experiential Learning**

The Head of Division of Nursing (HoD) is the person who first suggested and

discussed the concept of using mobile learning during the clinical practicum at the local university. He stated his original rationale for the introduction of mobile learning for the nursing students:

*“Back in 2002, we made an attempt to incorporate this idea into our [students’] clinical practicum not only because it could enhance the learning of our students but also because it is consistent with the philosophy of Distance Learning.” (the HoD)*

The HoD described that his original concept was generated from the philosophy of distance learning because, at that time, the study mode of the nursing programme provided by the university was distance learning. In exploring his ideas about ‘the philosophy of distance learning’ further, it is clear that he is drawing on ideas found in theories of situated and experiential learning such as learning in context. He explained that he expected the students to use the mobile device as reference books during their clinical practicum and clinical assessment so that the students could search for instant information just like a teaching staff was with them:

*“The use of mobile learning during the clinical practicum is, indeed, translating the concept of electronic schoolbag into action, with which students are able to ‘carry’ their professors with them during their clinical practicum.” (the HoD)*

As mentioned in section 2.3.2, ideas within theories of situated and experiential learning is an appropriate learning approach for clinical learning, and, as mobile devices can support and provide appropriate assistance to the students when required

(Naismith et al., 2004), it matched with the HoD's expectation of the use of mobile learning. Students were able to use the mobile device to search for information to answer the queries they encountered during the clinical practicum, thus enabling them to work independently in response to issues that arose.

The above rationale from the HoD on enhancing students' learning through mobile learning coincided with the ideas of other university staff. The participating Technician A, Coordinator A and Clinical Tutors reflected that using mobile learning could enhance students' learning through both the Internet and the university-developed mobile applications. The Clinical Tutors pointed out that both the Clinical Tutors and students could refer to the listed items from the Mobile Assessment App for learning and discussion according to different environments and patient diagnoses in different specialties. Clinical Tutor A said:

*“[Clinical] Tutors are able to point students to what they are learning by referring to the device, which shouldn't be used for the sole purpose of evaluation.” (Clinical Tutor A)*

Coordinator A also thought that using mobile learning could enhance students' learning as students could access information in a timely way by means of the mobile device. From the view of Technician A, another university-developed application, the Nursing Video App, could also enhance students' learning. This was because, through the Nursing Video App, the students were able to review the videos of each nursing care procedure they encountered and apply it to patients during the clinical practicum.

Regardless of whether the nursing students used the online information or the

university-developed apps, the university staff believed that timely information access would enhance the situated and experiential learning. As mentioned by Young (1993), the instructional design for situated learning should comprise four elements. Firstly, an appropriate situation in which to generate learning. Secondly, appropriate support to the tutor's coaching role. Thirdly, novices and experts can work together and, finally, incorporate the interaction of the students with the situation in the students' assessment processes. These four elements matched with the learning situation of the nursing students during the clinical practicum. The students gained experience and learned from different clinical cases or through working with their Clinical Tutors. When the students discussed their clinical assessment results with Clinical Tutors, the Mobile Assessment App also provided a checklist to enhance their discussion. The current university-developed applications fulfilled the required elements, as suggested by Young (1993), for supporting situated learning.

The above rationales of the introduction of mobile learning and the university-developed apps indicate that the instructional design for the device or mobile apps were important for enhancement of situated and experiential learning. The use of mobile learning among the nursing students would be affected by the instructional design of mobile learning that was provided by the university.

#### **4.2.2 Data Gathering**

Different university staff and Clinical Tutors also pointed out that using the iPod Touch to record students' experience during the clinical practicum period would be another of the main purposes for the university delivered device. The HoD also pointed out that, for him, the main purpose for the use of the mobile device was as a

data gathering device to record the assessment items and personal data such as the students' clinical practicum records and reference information:

*“Mostly, I believe students will use the device [iPod Touch] to enhance their learning, and to record their assessment items during the practicum. However, the device can also be used as a personal data recording device.” (the HoD)*

The Technicians also considered that the main purpose for the use of the mobile device was to retrieve students' clinical practicum records for the application of registration to the Nursing Council of Hong Kong, although it was anticipated that more apps for learning would be developed in the future:

*“The Mobile Assessment App is good so far, because it helps the university staff generate the report for getting the license, which is the most important thing.” (Technician B)*

The Technicians' opinion reflected that, aside from teaching, the mobile technologies also enhanced administration issues, such as using the mobile devices for reporting attendance, reviewing students' marks or managing their schedules (Naismith et al., 2004).

Similarly, Coordinator A pointed out that students would only use the iPod Touch for their own clinical learning records, while Coordinator B guessed that students would only use the iPod Touch for clinical records and the assessment. She thought the students may think that:

*“As it’s [the iPod Touch] just for record purposes, I don’t need to carry it with me all the time. Maybe just take it out at the end of the shift.” (Coordinator B)*

Coordinator B claimed that due to the perception of using the iPod Touch as a clinical practicum record, it affected the students’ practice of using the iPod Touch on the ward. Both Coordinators’ comments were actually related to the concept of technology affordances that were affecting the use of the mobile device which will be discussed in section 4.3.

The above responses from the university staff reflected that they expected the students would use the mobile device as a clinical practicum record, which explained why the Mobile Assessment App became the first software provided for the nursing students to use during the clinical practicum. It also indicated that the influence from the university staff, including the HoD, Coordinators and Technicians, on the instructional design of mobile learning was important. In fact, aside from the learners, teachers, system designers and supporting staff are all stakeholders of mobile learning (Barker, Krull & Mallinson, 2005). Higher education institutes should be aware of the important role of faculty members when initiating mobile learning (Cheon, Lee, Crooks, & Song, 2012). The essential role of the university staff should not be forgotten in the whole process of mobile learning. However, this important role was not obviously included in models of mobile learning and is largely missing from the FRAME model.

Whilst the FRAME model does not account for the role of the university staff in

mobile learning experiences, it does provide a clear model for examining the experience of students. The researcher uses the FRAME model to explore the actual experience of using mobile device as a means for clinical learning by the nursing students from in the following section.

### **4.3 Affordances of Mobile Device**

Koole (2009) stated that the device usability (DL) and social technology (DS) intersections of the FRAME model referred to the affordances of mobile technology. Hence, exploration of the nursing students' affordances of mobile technology is necessary. Technology affordances were viewed along a continuum based on how the technology function enables the users' actions to utilize the technology (Vishwanath, 2016). This definition indicated that the function of the mobile device will have an effect, or various effects, on the use of mobile learning during the clinical practicum for the nursing students. Raudaskoski (2003) also pointed out that the mobile device may afford the users' actions. Therefore, the comments from both the students and university staff on the university-provided mobile device and, as a consequence, their experience of utilising the mobile device are important and discussed as follows.

#### **4.3.1 Critiques on the Mobile Device**

The feedback from the users on the mobile device is important as the characteristics of the mobile device can affect the user's sense of satisfaction as well as psychological comfort (Koole, 2009). The required features of the mobile device for mobile learning were also indicated through the comments on the mobile device. In the meantime, the opinions of the device (D) aspect, device usability (DL) and

social technology (DS) intersections of the FRAME model were also found from the participants' comments on the mobile device.

Based on the expectations concerning the use of the mobile device from the university staff as mentioned in section 4.2, the iPod Touch was chosen as the university- provided mobile device. According to the students' responses on their perception of mobile learning, satisfaction with the physical characteristics of the mobile device was the first response of most students. Their satisfaction with mobile learning was mainly influenced by the features of the mobile device. Six and seven of the participating students respectively in Cohort A and B explained that they were satisfied with using mobile learning because the device was “*user-friendly*”, “*easy to carry*” and “*small enough*”. Student I appreciated the use of mobile learning during the clinical practicum:

*“There were many advantages on using mobile learning! It was easy to carry and convenient for us to search for information anytime and anywhere. It would be inconvenient and heavy to bring reference books to the hospital.” (Student I)*

These indicated that the students linked the features, especially the physical components, of the mobile device to the satisfaction of mobile learning. In the FRAME model, the device (D) aspect refers to the physical, technical and functional characteristics of a mobile device (Koole, 2009). The students' comments on the mobile device also showed that the mobile device was one of the important issues in mobile learning and students' opinions on the mobile device served as a significant issue in evaluating mobile learning according to the FRAME model. One of the



features of mobile learning (as defined in this research) is the ability to access information anywhere and anytime, as mentioned in section 2.3.1. The participating students also connected the features of the mobile device to the satisfaction of mobile learning. As accessing information and knowledge anywhere and anytime from devices is the essence of mobile learning (Gikas & Grant, 2013), the features of the mobile device are highly related to the usefulness of mobile learning. It is not surprising that the students associated satisfaction with the features of the mobile device as the students' attitudes towards mobile learning were highly influenced by the usefulness of the mobile devices (Cheon et al., 2012).

In fact, the university staff were also satisfied with the features of the iPod Touch. The HoD was satisfied with the current features of the iPod Touch and he expected that more advanced mobile devices would enhance students' use of mobile learning in the future:

*“I am satisfied with the current features of the iPod Touch. I trust that the new device, for example, iPad Mini, which will be provided to the students in the future, will offer a better platform for the students to use.” (the HoD)*

Clinical Tutors were also satisfied with the iPod Touch due to its small size and user-friendly operating system. This indicates that, as with the students, the university staff and Clinical Tutors' satisfaction with the mobile device was due to its features, which represented the device (D) aspect and device usability (DL) intersection of the FRAME model.

Although, as an impression, most of the participants were satisfied with the university-provided mobile device for mobile learning, further comments on the features of the mobile device, including the hardware and software, its functionality, information accessibility and connectivity, were also provided and are discussed in the following sections. The device (D) aspect, device usability (DL) and social technology (DS) intersection of the FRAME model could also be reflected through the comments on the features of the mobile device.

#### *4.3.1.1 Hardware and Software of the Mobile Device*

The physical, technical and functional characteristics of the university-provided iPod Touch could be indicated through the comments on both the hardware and software features of the mobile device, which also reflected the importance of the device (D) aspect of the FRAME model.

On the hardware of the mobile device, nearly all of the students in both Cohorts suggested that a small, light and portable device would make it easy to carry around and would facilitate one-handed use. Students explained that:

*“I have many things in my pocket already. Another heavy gadget will be too burdensome.” (Student C)*

*“If it [the mobile device] was as big as an iPad and carried to the ward, I wouldn’t know where to put it. If it was put at the nurse station, there would be no one to look after it. The device would be difficult to use on the street as well!” (Student H)*

*“The key point for a mobile device should be the term ‘mobile’, right? Students would not carry a bulky device nowadays. Easy to carry and user-friendly were the most important aspects for a mobile device.” (Student L)*

Both Coordinators and Clinical Tutors’ opinions on the hardware were similar to those of the students. They suggested that a small, handy and light device could enhance students’ use of mobile learning. Clinical Tutor A explained that:

*“The iPad mini is too big to be portable in a pocket. Unless there are lockers in their [nursing students] workplace to store their belongings, students can’t possibly put the big device in their pockets. So, the size of the current iPod Touch is fine for students. A big gadget simply causes more obstruction.” (Clinical Tutor A)*

However, from the perspective of Technicians, the size of the iPod Touch was not ideal for mobile learning as the small screen size would discourage students from using the mobile device, especially for reading an e-book or some websites:

*“The screen of an iPod Touch is far too small for reading an e-book. The small screen size means you cannot see many pages at one time.” (Technician A)*

*“Another problem I want to mention is that some websites or webpages, including the website of the university, aren’t readily*

*accessible on the mobile device. It does support some webpages but you would have to drag this way and that, or scroll up and down.”*

*(Technician B)*

Actually, the screen size of the iPod Touch is small for reading large chunks of data (Jacob & Issac, 2008). Similar to the Technicians' comment, nursing students in Taiwan commented that the small screen of the mobile device, lack of PDA-based webpages and disorder of webpage content hindered their usage of the mobile device on the ward (Lai et al., 2006). This indicates that the physical component of the mobile device is one of the factors affecting the nursing students' use of mobile learning on the ward, which corresponds to the device (D) aspect of the FRAME model.

Other important hardware features that students mentioned which could enhance their use of the mobile device included big memory capacity, durable battery power, and a clear and sharp screen. Besides these features, easy control, user-friendly design, and the stable operating system were also important. More than half of the students pointed out that the operating system of the iPod Touch was easy to use and stable. Students did not need much time to learn the operating system. Students appreciated that:

*“Basically, the size and weight of the iPod Touch was good enough as a device for mobile learning and the operating system was easy to handle even for non-iPhone users like me.” (Student G)*

*“Aside from its convenient and small size, the stable operating*

*system made it reliable. I don't think you would use a device which always crashed or froze, right?" (Student L)*

The above comments on the hardware features of the mobile device showed that the device features affected the use of the mobile device among nursing students. Aside from the hardware, comments on the software features of the mobile device were also similar in both cohorts of students.

On the software, students expressed the view that apps are the most important. Their comments on the software were focused on the university-developed Mobile Assessment App. Three positive comments on the Mobile Assessment App were mentioned by the students. First, students trusted that the app helped the Clinical Coordinators to calculate the marks for the students more easily. Secondly, more than half of both cohort students referred to the items listed in the app for their preparation and revision before and after their clinical practicum in different specialties:

*"The app was only useful for me to prepare the clinical practicum before it started." (Student J)*

*"It (The app) allowed me to review what I was supposed to know and what I didn't yet know. It gave me an idea of what I could expect to come across in, say, Cardiology or Urology." (Student D)*

A third positive comment is that, as the students had to submit their practicum records to the server of the university according to the due date provided by the practicum Course Coordinator, the students were able to save time and money:

*“The use of mobile learning not only saves money but also save time. We just synchronised the practicum records to the university server which saved transportation fees and time.” (Student O)*

*“I lived far away from the campus. I did not want to go to the university for the purpose of form submission only. It would take me two and a half hours for the transportation!” (Student P)*

On the other hand, negative comments on the Mobile Assessment App were also pointed out by the nursing students. Students criticised that there were too many items listed in the app to be assessed in each specialty, which made them very stressed, and a few of the items were outdated or had not been used for a long time in a clinical situation:

*“We had to click on the categories one by one, then, there are the subcategories such as Medical, Surgical, Urology, and various diseases. The clicking seemed never-ending. Some Clinical Tutors were not willing to click on all those buttons and I’ve heard about some Clinical Tutors of our classmates who refused to do it until university teachers from the Division of Nursing intervened.” (Student D)*

The students also received many complaints about the Mobile Assessment App from their Clinical Tutors, which included that the password was difficult to memorize and could not be changed by the user, the font sizes were too small,

unfamiliarity with Chinese medical terms, and difficult to differentiate the letter “I”, “l” and the number “1”. Further comments on the Mobile Assessment App as the assessment system will be discussed in section 4.3.2.4. Among the above complaints, the Technicians and Coordinators also pointed out that Clinical Tutors always forget their password to access the Mobile Assessment App. Clinical Tutor A also echoed that the password was difficult to remember.

The regular updating of the Mobile Assessment App in its function or setting also made it difficult for the students and Clinical Tutors to maintain familiarity with the app:

*“It seems that the Mobile Assessment App was updated at least twice in the past four years which caused chaos each time. The practicum Course Coordinator only used around one hour to brief [the students] on the updated apps, which was not enough. Another problem was that the Clinical Tutors did not know about the amendment.” (Student O)*

Even though both the participating Clinical Tutors in this study were familiar with the Mobile Assessment App and were used to accessing the app, they also provided similar suggestions on the design of the app:

*“The items are difficult to read. If the app could be designed as a booklet format, Clinical Tutors may be familiar with it and able to flip the pages, or otherwise, a search function in the app for searching items.” (Clinical Tutor A)*

*“Our clinical practice is constantly changing and needs to be updated. If we can add something to the existing programme, which is then synchronised with the system [app] of the university, then the system [app] can in turn be updated.” (Clinical Tutor B)*

The above critiques on the software of the mobile device reflected the importance of the software design. It influenced both the impression of mobile learning and the use of the mobile device, which not only corresponded to the device (D) aspect but also conformed to the device usability (DL) intersection of the FRAME model. As the Mobile Assessment App was designed and updated by the Technicians using the information provided by the HoD and Coordinators, the important role of the university staff in the mobile learning process was shown.

#### *4.3.1.2 Device Functionality*

Different functions of the iPod Touch or their own smartphone were used by the students on the ward. Some students used the iPod Touch for taking notes during the briefing of shift handover or patient interview, calculation for the intravenous drip rate or drug dosage when providing nursing care. Some used the device as a dictionary and one of the students audio recorded his own voice to facilitate his self-study. For Cohort B students, as the camera function was only provided on their device, they also used the iPod Touch for photo taking to capture the image of the forms that were used on the ward, for example (the patient admission forms) so as to familiarise themselves with the forms. They also captured the patients’ medical records to prepare the clinical assessments. Another three students also used their own smartphone to



capture the image of the forms and the patients' medical records:

*"I needed to ask the ward staff to photocopy the forms for me but I did not want to trouble them to do so as they were very busy. Now I only need to ask for their permission before the photo taking then I can read the information anytime and anywhere." (Student M)*

*"To save time, I used my smartphone to capture the useful information on the ward for revision and preparing the clinical assessments. Most of the Clinical Tutors allowed us to do so. Of course, the Clinical Tutors always remind us not to photograph the patients or anything that would reveal the patients' identities." (Student P)*

Lai et al. (2006) reported that nursing students used different functions of the mobile device during the clinical practicum. They usually used the mobile device for recording the morning briefing with clinical mentors, audio-taped the conversation with patients after the consent of patients, wrote reflective journals and joined forum discussions on the internet. In this study, similar functions were also used by the nursing students. Shih and Mills (2007) suggested that mobile activities that are familiar to students, such as texting, voice recording, taking pictures, or shooting videos, can be used to accomplish an educational goal. The aforementioned functions are similar to Shih and Mills' suggestion which enhanced clinical learning for the nursing students, especially on the concept of learning in context in situated and experiential learning, which will be further discussed in section 4.3.2.2. However, a few of the functions, such as photo taking, of the mobile device was not predicted by

the university staff when they designed the mobile learning. This indicated that the participating students are familiar with the mobile device and adopted the device to enhance clinical learning.

The information storage function was also commonly used among the students. The information entered by the students for storage included new medical terms or drug names, patients' information for writing nursing care plans, special tasks or the settings in different wards and even the name of clinical staff or as a phone book on the ward especially for the student who did not have his or her own smartphone. This was because students preferred to use the mobile device to store important information rather than using rough paper:

*“Sometimes, I write down the new and useful information in the device because I may throw the rough paper away accidentally after I have left the hospital.” (Student D)*

The Technicians, Coordinators and Clinical Tutors also mentioned that the information storage function, which is paperless and environmentally friendly, was another important measure concerning the use of the mobile device. Clinical Tutor B provided an example of this advantage:

*“It [use of mobile learning] helps students keep track of what they are supposed to be learning, communicate with the university and save paper for printing notes such as the triage guideline, which is some twenty pages per set. It would be a huge waste of paper to give each student a hard copy.” (Clinical Tutor B)*

The information storage function also matched the expectation on the use of mobile learning from the university staff, as mentioned in section 4.2.2.

#### *4.3.1.3 Information Accessibility*

As suggested by the tutors, being highly convenient for getting information or answers by themselves was the most commonly cited comments of using mobile learning among the participating nursing students. Student F stated that:

*“Use of mobile learning is highly convenient for us because we didn’t always get to be on the same shift with the Clinical Tutor and the nurses in the ward were all very busy.” (Student F)*

This use of mobile devices was reinforced by other students, who pointed out that mobile learning opportunities can enhance their learning through instant access to references or downloaded apps. Student E pointed out that:

*“Whenever I needed to find out about something, an abundant amount of data and information could be accessed through the downloaded apps.” (Student E)*

Student A also pointed out that nursing involves a great deal of information. Through the use of the mobile device, nursing students could get up-to-date and free of charge information through the Internet. The students usually searched for information about medical terms or abbreviations, nursing diagnosis for writing

nursing care plans, drug information, and videos or nursing journals related to nursing or operation procedures. All of these indicated that the nursing students commonly used their mobile device to enhance their situated, clinical learning. This was because mobile technology can fulfil the students' immediate needs through the delivering of information and just-in-time support (Traxler, 2009). Although the students appreciated the information accessibility and the importance of it, lack of a WiFi Internet connection prevented the students from using the iPod Touch, which will be further discussed in next section.

#### *4.3.1.4 Information Connectivity*

Mobile learners can access supplementary materials through their mobile devices to clarify ideas that were introduced by a classroom teacher (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2013). However, from previous studies, difficulties of access to the network are the main barriers on using mobile learning in the clinical practicum (Lai et al., 2006). The participating nursing students of the current study faced the similar difficulty.

Students commented that ease of document sharing, information sharing and accessibility to the Internet anywhere are important in mobile learning. As mentioned by Koole (2009), among the social technology (DS) intersection, mobile learners have to exchange information and documents within and across systems to enhance their interaction. Student I used the university provided iPod Touch as a reference and further explained their opinion:

*“The pocket size and the user-friendly features of the iPod Touch*

*were ideal for mobile learning. However, it was not good for document or information sharing: it is also important for us to share academic information with our classmates.” (Student I)*

However, nearly all of the students pointed out that there was no WiFi support in the hospital, which was important for mobile learning. Students had to download the e-books, teaching notes from the teaching staff of the university and other useful information to the device in advance before the clinical practicum.

*“The use [of the mobile device] could have been more frequent had there been access to the Internet in the hospital.” (Student L)*

*“If the iPod Touch could be connected to the Internet at any time, I would have used it more. There was no Internet available at my working hospital, and as far as I could remember only the hospital library had WiFi, which required a password for access but I didn’t have the password.” (Student J)*

The university staff was actually aware this issue. Technician A said:

*“Internet connection is essential for mobile devices. The iPod Touch which we are using requires WiFi network, so we need WiFi hotspots. That isn’t a problem at the campus, for WiFi is everywhere. But it becomes a problem at the hospital, where WiFi is limited to certain spots only. Some homes also do not have WiFi access. One may need to go to Starbucks or similar venues to get the connection*

*to the Internet.” (Technician A)*

Technician A also pointed out that although the WiFi connection was needed for accessing the Internet, students could connect their iPod Touch to the Internet through tethering. However, although a few of the students knew that they could use their smartphone as a WiFi modem for the use of the iPod Touch, they seldom did:

*“Unless I needed to meet with the deadline of the mark entry and I could not find a place with WiFi, I did not try to use my smartphone as a WiFi modem. I preferred to use my smartphone to search for information on the Internet directly if needed.” (Student I)*

Similarly, Clinical Tutors and Coordinators commented that not being able to connect to the Internet was one of the factors affecting students’ use of mobile learning. Both the Clinical Tutors emphasized the importance of having an Internet connection for using the mobile device for mobile learning during the clinical practicum for the students:

*“Access to the Internet is a must if we want them [the students] to be able to raise a question concerning any online materials. It can help those who are really motivated.” (Clinical Tutor B)*

*“Internet connection is vital. Otherwise, it doesn’t matter how proactive the student is.” (Clinical Tutor A)*

The Clinical Tutors not only pointed out the required characteristics of the

mobile learner, which will be further discussed in section 4.4, but also pointed out the relationship between the learner's characteristics and the information connectivity in mobile learning. In fact, through connecting a mobile device to the internet, the relationship between university instructors and nursing students could be enhanced as instructors would be able to quickly understand students' problems and provide proper guidance to the students if the instructors are not together with the students on the ward (Lai et al., 2006). Therefore, connectivity of the mobile device is important.

The students' comments on the difficulty of sharing information also indicated that the students had used the social technology, which is the social technology intersection (DS) of the device for constructivist learning, such as learning through collaboration, during their clinical practicum. More detailed discussion on learning through collaboration will be provided in section 4.3.2.1.2.

#### *4.3.1.5 Choice of Mobile Device*

Although the students appreciated the use of mobile learning during the clinical practicum, some of the students preferred to have their own choice of mobile device. The students further explained:

*“The battery of my iPod Touch ran out quickly in my final year. Not only did the battery get older, but also the model of the iPod Touch was out of date. In the later stages of my study, its processing time became longer and the iPod Touch could not support the most updated software. The device seemed to be useless for other functions aside from the assessment app in the later stage.” (Student*

K)

As the university-provided iPod Touch was delivered to each student before their first clinical practicum, students had to use the same mobile device throughout the duration of their four-year study. Students of both Cohorts complained that the model of the university provided iPod Touch was outdated. As a result, the device battery easily ran out, the processing time of the device became longer and the operating system could not be updated to a newer version, meaning it was not able to support new apps or update most of the apps. Many students complained about this issue:

*“The system of the software can be updated but the hardware of the iPod Touch I used before could not support the updated software. As a result, some apps could not be updated and used.” (Student F)*

*“The one used by our cohort was an older version. The next cohort used a newer version with FaceTime and a camera function. Theirs could be updated but ours was a second version.” (Student H)*

Student H also pointed out that using their own smartphone as an alternative was common among the students because it had the same functions as the iPod Touch. Student F clearly stated the reasons for this:

*“First, I can make phone calls with a smartphone. Most people have a (mobile) phone with them. If the phone can do what an iPod Touch does, the former will replace the latter. It is better to carry one device than two. Second, the hardware design of a smartphone is*



*more up-to-date than that of the iPod Touch, and the functions, including sharper images and faster running of apps, are more advanced. A smartphone can do all other things that an iPod Touch can do except for the mark entry for the clinical practicum. I used an Android phone, so it did not have the mark entry function.”*  
(Student F)

Likewise, even though Cohort B students had a newer version of the iPod Touch than Cohort A students, more than half of the Cohort B students had the same request to use their own smartphone as the mobile learning device:

*“The iPod Touch could have been combined with the smartphone. It would have been more convenient to have an all-in-one device with Internet access.”* (Student K)

*“I would only bring one device when I go out. I used to use an MP3 player to listen to music in the past, but now it is much easier to do different things on a mobile phone, such as to make a phone call, to play music and games, you name it. Therefore, it would be more convenient and ideal if the iPod Touch was combined with the mobile phone.”* (Student L)

Coordinator A and Clinical Tutor A also suggested that students should use their own smartphone for mobile learning:

*“There are just too many limitations and restrictions when using the*

*iPod Touch which was provided by the university.” (Coordinator A)*

*“The mobile phones are more convenient for students because of the instant access to the Internet. It makes things much easier.”*

*(Clinical Tutor A)*

Although the Technicians realised that students preferred to use their own smartphones, both Technicians preferred to provide either the iPod Touch or a consistent mobile device to the students that was favourable to their apps development and programming. The Technicians explained:

*“To developers like me, this is a big plus. They [the devices] use the same operating system, IOS. So, the configuration of an iPod Touch is rather similar. The programme that I’ve written can run on an iPod Touch, an iPhone and an iPad alike. Students will be much happier if the Mobile Assessment App can also be used on an Android device, but it will be much harder for us. And errors are more likely to occur. What works fine on an iPod Touch may not work as well on an Android [device].” (Technician A)*

*“It is easier to fix any problems when all the iPod Touch devices come in the same lot with the same model number...It’s more convenient for students if they can use the Mobile Assessment App on their mobile phone. However, for us, it will be much more difficult to provide technical support. Even though we are only using Apple products now, there is also the variation of software versions. ”*

*(Technician B)*

In addition, according to Technician A, as the interface of an Android device was becoming more similar to the Apple device, it would not be a big problem for an existing Android smartphone user to use the university delivered iPod Touch:

*“The differences [on the interface] aren’t too significant. The differences will be more obvious when it comes to the more complicated settings but students may take only one or two days to get used to the operation of regular functions.” (Technician A)*

The request for the choice of mobile device by the nursing students reflected that the mobile device itself is an important tool in mobile learning. If the students realised the meaningful use of mobile devices for their learning, it would be a key means to encourage students to utilise mobile learning (Liu, Li, & Carlsson, 2010). Therefore, a satisfactory mobile device that could achieve the students’ needs on mobile learning is crucial in mobile learning. In other words, the device (D) aspect of the FRAME model is one of the factors affecting mobile learning.

Although both Technicians gave reasons for providing a consistent mobile device to the nursing students, the request of students to use their own smartphone as a learning device was reasonable. Korucu & Alkan (2011) explained that smartphones are small devices that combine the uses of the conventional mobile phones with those of a pocket PC. Moreover, the constant renewal and updating of the mobile device model oriented the contents and the use to the device user and, due to the fast evolution of the mobile devices, it provide new functions that could make the learning

process easier for the mobile learners (Prieto, Migueláñez, & García-Peñalvo, 2014). Therefore, a mobile device with an updated model could enhance students' learning. Nowadays, nearly all of the tertiary students have their own smartphone, the request of using their own smartphone as a learning device is feasible.

Nevertheless, Technician A and Coordinator A suggested students to use both their own smartphone and the university provided iPod Touch to enhance learning during the clinical practicum:

*“They may only bring their iPod Touch with them during the practicum for learning in hospital but they may use their own smartphone instead when they are off duty for learning purposes.”*

*(Technician A)*

*“Sometimes they may use it [their own smartphone] as a device to access the Internet and online learning.” (Coordinator A)*

The response from Technician A and Coordinator A indicated that aside from the device characteristics, the purpose of using the mobile device also affected the nursing students' usage of the mobile device. Hence, how the nursing students perceived the purposes of using the mobile device through their experience is explored and discussed in the next section.

#### **4.3.2 Utilisation of Mobile Device**

The participating nursing students have used the mobile device for four years.

Based on the participants' experiences and feedback, it indicated that the mobile device was perceived as a tool for different purposes. From the response of the participating students, it found that, in Cohort A students, only student C do not have her own smartphone. For the vast majority of Cohort A students who owned a self-purchased smartphone, they used different devices for different purposes. All of them used the university-provided iPod Touch mainly for assessment and used their own smartphone mainly for communication. For learning and leisure, five out of seven students who owned a self-purchased smartphone preferred to use their own smartphone, however, the other participating students also used the university-provided iPod Touch for learning and leisure. While for the participating Cohort B students, all of them owned a self-purchased smartphone. Except for two of the students who used both the university-provided iPod Touch and their own smartphone for learning and leisure, all of the other participating students only brought and used the iPod Touch for assessment on the ward. All of the participating students used their own smartphone for learning, for communication and for leisure. Detailed information on the utilization is illustrated in the following sections.

#### *4.3.2.1 A Constructivist Learning Tool*

According to Koole (2009), constructivism was emphasised in the FRAME model especially in the interaction learning (LS) intersection. As introduced in section 2.3.2.1, constructivist learners actively constructed their own knowledge, which involved complicated interactions among many elements, but learning in context and collaboration were particularly important. The use of the mobile device for learning in context and collaboration with others during the clinical practicum among the participating nursing students is discussed as follows.

#### *4.3.2.1.1 Learning in context*

Through the response from the participating students, the situations where the students used either the iPod Touch or their own smartphone to searching for information to enrich their knowledge were concluded as follows. The students used the mobile device when they:

- encountered a patient with a diagnosis which was new to them but the other staff were busy on their ward duties and there were no other resources for them to find out the answer;
- wanted to search for more information by themselves;
- wanted to learn more about a patient's condition or diagnosis;
- did not know where the reference books were or the books were not available for the students to use;
- needed information on hand to support them during the total patient care clinical assessment.

It was unquestionable that learning activities occurred in the ward context. Instead of just completing the assigned task from the ward staff, the above situations indicated that the nursing students constructed their own knowledge based on the experience that they encountered on the ward. According to Lave (1988), learning is a reoccurring process in which adults act and interact within their social situations. The participating nursing students reacted in the ward context and also interacted within the social situation, which is also similar to the concept of situated and experiential learning. Further evidence on situated and experiential learning will be discussed in

section 4.3.2.2.

#### *4.3.2.1.2 Learning through collaboration*

The Head of the Division of Nursing did not expect the nursing students use the university delivered iPod Touch for communication:

*“We don’t expect students to do so because they should first of all make use of all the information installed on the device for learning purposes.” (the HoD)*

However, communication with others through the mobile device was common among the nursing students, which also coincided with the social technology (DS) intersection of the FRAME model which described how mobile devices enable information exchange and collaboration between people with various goals and purposes (Koole, 2009).

Both cohorts of participating students informed that during the clinical practicum, the students communicated with their friends, classmates or family members by means of their smartphone by using different apps during meal times, before or after duty. The apps that were commonly used by both cohorts of students for communication included Whatsapp, Facebook, Line and WeChat, while Instagram was only mentioned by Cohort B students. Convenience, fast, instantaneous access, the ability to communicate with others at any time and prevention from disturbing others were the reasons students usually used these apps for communication:

*“If I send a message to that person on a mobile device, s/he will be notified even s/he cannot get back to you right away. Communication is effective. The other person can make a reply at his or her convenience. That’s better than making phone calls, as immediate replies may not be possible. A text message can be sent and responded to later.” (Student E)*

The purposes for which the students communicated among themselves were mainly for casual chatting and scheduling a meeting for an assignment or certain events. From the students’ perspective, they claimed that they rarely used the apps for communication related to their learning:

*“If I’m doing revision or studying, I seldom use the phone or Whatsapp because I don’t want to do too much typing.” (Student B)*

*“I’m used to studying in the library and having face-to-face group discussion.” (Student G)*

However, in fact, learning was included in their communication purposes:

*“I would first seek help through these apps when I encountered a patient with a diagnosis that was new to me. The quickest way is to ask somebody, but you may not get a quick reply, so it may be necessary to use other apps to find the information if this is the case.” (Student H)*



*“Academic discussions are more common when there are upcoming exams or assignments during the clinical practicum period.”*

*(Student D)*

Aside from using the iPod Touch, students were excited by the opportunity to use their own smartphones to share clinical updated information with classmates and communicate with others during meal times:

*“As a student, it is exciting for me to learn new medical knowledge or nursing care procedures in a real situation! I really can’t wait to share my happiness with my classmates...and alternatively, if I was scolded by the ward staff, I also want to express my feelings with my classmates!” (Student G)*

*“I could share photos, my feelings, and interesting issues with my friends immediately through these apps and not only one of them but I could also share with many of them! If others share useful information to me, I could also copy and share the information with other friends. It is very convenient!” (Student K)*

Students also used different functions of the mobile device for learning and sharing, such as sharing photos or documents, arranging meetings for their final year group project, sending voice recordings and sharing their emotions or special cases they encountered on the ward. The ability to chat with many people at the same time also enhanced the peer-to-peer communication through different communication apps.

Johnson & Johnson (1996) listed the major types of behaviours in collaborative learning situations, such as explaining and exchanging resources and information, giving and receiving help, sharing existing knowledge with others, and giving and receiving feedback. The above information indicated that the nursing students were willing to ask and discuss questions, share information and their emotions with peers through the mobile device. It proved that learning through collaboration existed among the nursing students through use of the mobile device.

Besides peer-to-peer communication, the students also interacted with teachers. Moore (1993) stated that learning interaction included interaction with resources, teachers and peers. Koole (2009) also indicated that interaction with other learners and instructors is important in the interaction learning (LS) intersection. Among the Cohort A students, a few of them even communicated with their Clinical Tutors through the mobile device. For other students, they only used phone calls or email communication with teaching staff of the university:

*“Using a phone call to communicate with the teaching staff is better as I only contact the university staff when I have an urgent issue. I can also speak clearly and, usually, the university staff call me back very soon in cases where they are busy or not in the office.”*

*(Student L)*

Another student explained that sending an email to university staff was a formal channel although they felt that the email communication was slower than using the communication apps:

*“I used to send emails to the university staff, which is a formal channel for communication with them. Although this method of communication is slower, they cannot memorize my face or voice...haha...” (Student O)*

In response to this phenomenon, Technician A suggested students should set up their university email account on their iPod Touch to facilitate communication, and this had been introduced to the students with instructions in the user guide of the iPod Touch by the university. Technician A’s suggestion showed that, actually, the iPod Touch also supported the students communicating with others, especially university staff, through email.

As mentioned earlier, learning in context and collaboration are particularly important and associated with constructivism. The above data indicates that, during the clinical practicum, the nursing students not only learned in context but also learned through collaboration. Through the mobile device, the nursing students actively participated and collaborated with others and built their own knowledge during the clinical practicum. This is evidence that the nursing students used the mobile device as a constructivist learning tool.

#### *4.3.2.2 A Situated and Experiential Learning Tool*

Situated learning is one of the criteria of the interaction learning (LS) intersection from the FRAME model (Koole, 2009). For situated learning, the importance of context and interaction in the process of knowledge construction was emphasised (Mattar, 2018). The situated learning context must contain other people

who are experienced at solving similar problems and the learners may have learned from experienced practitioners for a holistic set of actions (Maudsley & Strivens, 2000). Besides, interaction between the learner and other learners or educators in a sociocultural context is also important in situated learning, such as the more experienced members in the group teaching the less experienced (Hansman, 2001). Student M reported that they have learned from their Clinical Tutors and supplemented this through use of the mobile device:

*“It was a good idea to use mobile learning that could facilitate our learning on the ward. I think that the demonstration by the Clinical Tutors and the return demonstration by the students was more important. However, occasionally, the Clinical Tutors were too busy on the ward and I could only review the nursing care skills by watching the demonstration videos.” (Student M)*

Clinical Tutor B also agreed that learning from context is important for the nursing students and the mobile device could also enhance situated learning:

*“Students should take full advantage of the realistic elements of the practicum first, and look up further information through the mobile device after work when necessary.” (Clinical Tutor B)*

The response from the participating students indicated that the students used the mobile device as a situated and experiential learning tool. As experiential learning is constructing knowledge and meaning from real-life experience, experiential learning is ‘situated’ in the relevant context of the learners’ own future careers (Yardley,

Teunissen & Dornan, 2012) which is in the same condition as the clinical practicum. During the situated and experiential learning process, learners with self-directed learning characteristics would try to construct personal understandings of the world (Zepke & Leach, 2002). It was also found that situated and experiential learning occurred through self-directed learning activities among the nursing students during the clinical practicum:

*“Sometimes I wanted to read, but books weren’t always available on the ward. Or, sometimes I wanted to read a drug guide, but there was just one on the ward, and I couldn’t borrow it, so then I would take out the gadget.” (Student G)*

*“Instant access to the references could avoid disturbing the nurses with questions. I could find out the answers by myself.” (Student P)*

Besides the timely information accessibility and knowledge portability, the mobile device also supported situated and experiential learning through the university-provided app. The students appreciated that they could review the clinical skills by watching the video clips through the Nursing Video App, which they reported could shorten the study time and they could choose the specific skills as and when they wanted to review them:

*“Most of the clinical skills were taught in year one and I forget some steps if I do not always practise the skills. I could choose the specific skills for revision if necessary.” (Student O)*

*“These clips are great for revising and refreshing our knowledge, but they have only been available at a later stage. It would have been better to have them earlier.” (Student G)*

Through the above self-directed learning activities and sharing with other students as mentioned in the previous section, the interaction learning (LS) intersection of the FRAME model was verified.

#### *4.3.2.3 A Reflective Learning Tool*

According to Seaman & Rheingold (2013), learners cannot learn from experience unless they reflect. Learners have to recapture their experience, think about it, mull over it and evaluate it, which are all central to experiential learning (Boud, Keogh, & Walker, 1985) and, therefore, reflection is increasingly described as an essential attribute of a competent healthcare professional, including nurses (Mann, Gordon & Macleod, 2009). Both participating Coordinators and Clinical Tutor B agreed that the mobile device could enhance students’ post-duty reflective learning:

*“Nursing is a practice profession. You do not expect the nurse to be browsing the iPod Touch while delivering nursing care at the same time. Instead, the students can use the device to search for information and verify what they learned on the ward after they have left the hospital.” (Coordinator A)*

*“Unless there are things that cannot be taught on the spot, the value of a clinical practicum lies in the opportunities to see and practice*

*the thing...The point of having a practicum is so that you can see it, touch it and do it in person. Mobile learning can be an additional step. For instance, there may be discrepancies between theory and practice. Then, it will be highly meaningful to have a search on the Internet to find out why...It will be useful to go to the Internet to find out about something one doesn't really understand.” (Clinical Tutor B)*

According to the response from the students, students primarily used both the iPod Touch and their own smartphone during meal times or waiting time, while travelling, in the university library or on the street before or after duty. The nursing students used the Mobile Assessment App for preparation and revision before and after their clinical practicum in different specialties:

*“I relied on the Mobile Assessment App to find out what I was supposed to know. I would then go to look for those things and enhance my understanding.” (Student C)*

*“I used the app to review what I learned from each specialty. Then I could pay attention to the items that I still did not encounter or search for more information on the items with which I was not familiar.” (Student M)*

Furthermore, the students marked down their queries on the device and could search for information any time when they were off duty:

*“Some steps of the nursing care procedures may be different between the ward and that we learned in the nursing laboratory. I can use my mobile device to ask and share with my classmates in this case.” (Student G)*

Student G’s response indicated that collaboration with other students during reflective practice was essential among the nursing students. In fact, collaborative reflection is important for a nurse to prepare for participation in an inter-professional team in a hospital (Clark, 2006).

Aside from experiential learning, as reflection involves the willingness and ability to think, consult and undertake further enquiry (Eraut, 1995), reflective practice also ties into the discussion of critical thinking (Maudsley & Strivens, 2000), which will be discussed in section 4.4.2. Although the nursing students have applied the mobile device as a reflective learning tool, the issue of reflective learning or critical thinking was not obviously indicated in the FRAME model.

#### *4.3.2.4 An Assessment Tool*

Assessment is part of learning as, through the self-evaluation in the grading process, learners reviewed the assessment topics and the criteria on which they would be assessed (Zepke & Leach, 2002). On the other hand, the design and the actual practice of the assessment are important, and the role of the university staff and Clinical Tutors were important in this regard. The participating students perceived the university-provided device as an assessment tool. Cohort A students revealed that they used the iPod Touch mainly for asking the Clinical Tutors to rate their performance



through the Mobile Assessment App when on the ward. In Cohort B students, except for student M and student N, they only brought the iPod Touch to the hospital for the purpose of assessment.

However, students' comments on the design of the Mobile Assessment App suggested that the app had certain issues as an assessment system. They commented that the wording was not always clear, especially when the items only stated the nursing diagnosis:

*“Some items were easy to understand, for example, bathing. Both Clinical Tutors and I were able to understand how I performed on this item and the skill on which I had to be assessed. But some items only provided the nursing diagnosis. I would have to explain in detail to the Clinical Tutor before a mark could be given to me. The wordings perhaps confused the tutors and they weren't sure about what the headings meant.” (Student E)*

This reflected that it was not easy for Clinical Tutors to understand how to assess the students' performance for some items, even though the Clinical Tutors had attended the Clinical Tutors' training session provided by the university. Further explanation and standardise the assessment criteria among Clinical Tutors of the assessment items by the university staff is necessary.

Improvement on the grading system, with a score from 0 to 4, was needed as suggested by the students. They were concerned about the different marking standards among different Clinical Tutors, and thought it was unfair:

*“It is unclear to everyone what ‘0 to 4’ stands for despite the given description.” (Student F)*

*“I have been asked by two Clinical Tutors how to distinguish between grade 2 and 3 on the Mobile Assessment App.” (Student K)*

As a result, a few students worried that the Mobile Assessment App was not a very fair system and the scores would tend to be lower due to the unclear items and marking standard from the Clinical Tutors’ perspective. In addition, according to student H, some Clinical Tutors would give their login password to the student to enter the marks, which made her feel that the system was unfair. Two of the students pointed out that the app showed only the marks but could not clearly reflect students’ performance and perhaps the assessment was not sufficiently accurate. They suggested providing some space for the Clinical Tutors’ comments and remarks. Technician A was also aware of this problem and he blamed some Clinical Tutors for giving students access to their passwords:

*“The worst cases are Clinical Tutors who have given students their password, which is really not a good idea.” (Technician A)*

Actually, the mobile device was suggested to act as a practical assessment tool, to be used in areas such as exams and tests, rating scales, and surveys (Woodill, 2011). According to Lehman (2003), clinical mentors or instructors in universities can use mobile devices to keep records of student assignments, to search checklists for students conducting physical assessments on patients, and to document students’

progress on-the-spot. Nevertheless, the above information indicates that the design of the applications, including the design of the Mobile Assessment App, is important in mobile learning. Even in the assessment process through the mobile device, the roles of teaching and supporting staff from the university are crucial, which was not highlighted in the FRAME model.

#### **4.4 Learning Participants**

The learning participants of the current study are the nursing students. According to the learner (L) aspect of the FRAME model, it takes into account an individual's cognitive abilities, memory, prior knowledge, emotions and possible motivations. It describes how learners use what they already know and how they encode, store and transfer information (Koole, 2009). However, some criteria were difficult to assess or measure, such as cognitive abilities and memory. Therefore, the required individual characteristics of the mobile learner as perceived from the participants of this study are analysed and discussed in this section.

##### **4.4.1 Learning Attitude**

More than half of the Cohort A students and nearly all of the Cohort B students pointed out that a successful mobile learner should be proactive in learning and have self-discipline or self-control. A few of them also mentioned that being responsible was another important individual characteristic:

*“Yes, self-control (is another requirement) because a mobile device is too convenient. Many apps are educational, but many others are*

*for games. Addiction is common. You need to balance and manage your time well.” (Student F)*

*“A student with a self-discipline characteristic would keep learning by using the mobile device. As we needed to upload the practicum records and assessment results to the university server before the due date, being responsible was also important.” (Student P)*

Likewise, the characteristics of being flexible and curiosity or interest in new things were also essential for the students using mobile learning, as these characteristics motivated learners to learn, which is vital in constructive learning. Mattar (2018) pointed out that a constructivist learner should be self-motivated, self-directed, interactive and collaborative participants in their learning experiences. Among these characteristics, being proactive in learning is a common belief of different constructivists (Kanuka & Anderson, 1999).

Similar points of view were collected from Clinical Tutors. Being able to use one’s own initiative, being proactive and preparing in advance for what the students were expected to learn were important individual characteristics from the Clinical Tutors’ perspective. However, Clinical Tutor A found that most of the nursing students were not able to achieve her expectations with regard to these characteristics:

*“Usually, it is me taking the initiative to ask them if they want a set of notes. They are often too shy to ask...It is a common thing, not only the students of this university but also other institutes’ students. They discover too late the device features they are expected to learn.*

*They only find out a few days before their practicum comes to an end, when they need to present the iPod Touch [for clinical practicum logbook] to their tutors” (Clinical Tutor A)*

She further explained the importance of advance preparation by the students:

*“Students should have informed the Clinical Tutors early enough about what they need to learn and what the university’s requirements are. They should not wait until the last days to present the iPod Touch to their Clinical Tutors. When informed in advance, the Clinical Tutor can teach them the related topics and show them the relevant cases.” (Clinical Tutor A)*

Actually, advance preparation is being responsible in learning. Kolb (1984) also identified that the active learner should take responsibility for their own learning, focus on the process and experience and then create knowledge. In short, being a successful mobile learner, he or she should be proactive in learning, especially being a constructivist learner.

#### **4.4.2 Critical Thinking**

Critical thinking is the ability to analyse and evaluate information (Duron, Limbach & Waugh, 2006). Learners with critical thinking are able to select learning activities or up-to-date information that is most relevant to their background at the moment of their choosing and access the electronic resources by following their own time schedule (Woodill, 2011). According to the students’ feedback, critical thinking

is a fundamental requirement of a mobile learner. This is because the students have to analyse the reliability of the information from the Internet:

*“Some of the information from the Internet was not reliable. All of us can provide information on the Internet. If the student does not read more information from the textbook, he or she may get an incorrect answer.” (Student O)*

*“Yes, we could search for a lot of information from the Internet but we didn’t know whether the information was accurate or not! Sometimes I would doubt the information from the Internet but sometimes the instant information could help me to answer the Clinical Tutor’s question.” (Student N)*

From the Coordinators’ perspective, their concern was information-overload in learning for the students. Coordinator B described that:

*“It is just too convenient to search for information from the Internet and they [students] may find themselves information-overloaded.” (Coordinator B)*

Therefore, critical thinking is essential for mobile learners to eliminate excessive information. The response of the participating students also reflected that they used much of the time to verify the information reliability:

*“Searching for information on the Internet can save time but I still*

*have to read more books to make sure of its reliability. It took more time than just searching for the information in my textbooks.”*

*(Student E)*

In section 4.3.2.3, it is reported that the nursing students used the mobile device as a reflective learning tool. Due to the reason that critical thinking is crucial in reflective practice, which helps students to think, consult and undertake further enquiry (Maudsley & Strivens, 2000), the participating nursing students applied critical thinking during their use of the mobile device. As discussed in section 4.3.2.3, critical thinking was not indicated in the FRAME model even though, as described by the participating nursing students, critical thinking was a fundamental characteristic for mobile learners.

#### **4.4.3 Emotion**

It was known that emotion is associated with online learning (O'Regan, 2003), as emotions can motivate the learner's behaviour to act (Barbalet, 1998) and are seen as instrumental in influencing learners' choices in response to certain stimulations (LeDoux, 1999; Lerner & Keltner, 2000). The choice of using the mobile device was also influenced by emotion during the clinical practicum.

First of all, the learner's feeling about technology obviously affects the emotion of the learner. The term "technophile" means a person who regards technology positively, is enthusiastic to new forms of technology and is not afraid of new technologies (Tenner, 2002). The terms "technophilia" and "technophobia" express personal orientations towards technology (Campion, 1989) in which technophilia is

positive and shows enthusiasm toward technology while technophobia is the opposite. The participating students suggested that being a mobile learner, the learner should have an interest in using new devices, be ready to carry a mobile device anywhere and not be afraid of information technology. Based on these conditions, being familiar with the operation of the gadget and apps and being able to tell which apps were suitable were also essential for a mobile learner:

*“There are different kinds of mobile devices. Being familiar with different operating systems and mobile devices is necessary for mobile learning. Otherwise, the student will neither be willing to use any mobile device nor carry the device with them.” (Student H)*

*“Choosing appropriate apps can help us to find the answer quickly. You need to know how to find the best apps for you to solve the problem. Being familiar with the operating system of the device allows me to find the apps and use the device effectively.” (Student G)*

Besides not being afraid of information technology, basic knowledge on using the mobile device was also important for a mobile learner, such as knowledge on data backup for the mobile device and the Chinese character coding input method:

*“How can a student use mobile learning if he or she was reluctant to use a mobile device? Without basic knowledge on using the mobile device, the student might give up using the mobile device easily...oh! Knowledge on the Chinese character coding input method was important too as it could shorten the writing time and facilitate*



*communication with others.” (Student L)*

The Technicians emphasised that students should not be technophobic. They should also be willing to use new technology and be willing to take the mobile device with them. Similarly, both Coordinators also mentioned that students should make the mobile device as their learning buddy or learning partner:

*“Unless the clinical learning is structured and under the guidance of a mentor [from the university], I don’t think the student will make iPod Touch as their buddy during the clinical practicum.”*  
*(Coordinator B)*

She explained that as a mobile learner, students should be able to play with the apps and the program of the mobile device. In this respect, this idea was consistent with the HoD. The HoD also highlighted that, for the nursing students, becoming familiar with the purposes of having the iPod Touch and the apps of the device were important. Otherwise, the students would not make use of the mobile device for the learning purposes during their clinical practicum.

Ronit’s (2011) study revealed that technophilia leads to the adoption and usage of technology in the long run. Therefore, being a technophile is an essential characteristic of a mobile learner to enhance the students’ continued use of mobile learning.

Moreover, the feeling of perceiving the mobile device as a tool for assignments affected its use for other learning needs for a few of the students. Student H claimed

that he was reluctant to use the iPod Touch:

*“There was the feeling that the gadget was for assignments, so, sometimes I was reluctant to use it.” (Student H)*

He related the function of the iPod Touch to the assessment of the clinical practicum, which made him reluctant to use the device.

Worrying about losing the mobile device was another factor affecting the students’ emotion regarding the use of the mobile device. Three of the Cohort B students pointed out that due to the small size of the iPod Touch, in the past four years, they always worried that they would lose the device or it might be out of order and they would not be able to provide it to the Clinical Tutors for the mark entry. Student K said:

*“I have had this worry [losing the iPod Touch] since I got the device in year one. It made me nervous and, therefore, I only brought the device to the ward for the purpose of mark entry.”*  
*(Student K)*

Besides, several conflicts in using mobile learning were also identified among Cohort B students. First, the size of the mobile device made the students worry about losing the device and also the small screen was not good for reading. However, students were reluctant to use a bigger device due to its inconvenience:

*“It was a conflict on the size of the iPod Touch. It was portable and*

*easy to carry with its pocket size. On the other hand, the words were small with such a small screen. However, if a bigger device was used, for example, the iPad, it would facilitate reading but would be inconvenient for taking it to the hospital and for storage [the iPad]. It was a very difficult decision: if I could only choose one of them...I would say that I preferred the iPod Touch to the iPad as it was easy to carry. For me, convenience was the priority for using mobile device on the ward, otherwise, I might choose the iPad...haha..."*

*(Student I)*

Another conflict concerned the use of mobile learning against the importance of on-site demonstration. Students appraised the concept of using mobile learning during the clinical practicum period. However, six of the participating students said that the demonstrations by the Clinical Tutors were more important during their clinical practicum period. They pointed out that the students should not only rely on the use of mobile learning during the clinical practicum:

*"Demonstration by the Clinical Tutor and return demonstration by the nursing students are more important in clinical learning."*

*(Student N)*

*"The clinical practicum provided us the chance to taste the real situation in the hospital. Mobile learning should be used as a complement to the onsite demonstration."* *(Student O)*

Meanwhile, the paperless nature of the Mobile Assessment App against the

convenience of the paper logbook was another conflict. Student J preferred to use the paper logbook, however, she admitted that going paperless was a trend nowadays:

*“The use of paper records was more convenient for both the students and the Clinical Tutors but I trust that paperless records would be a trend in the future. It was good for us to be well prepared for the trend. I didn’t like the paperless records but I had no choice in the matter.” (Student J)*

The above data reflected that the conflicts over the use of the mobile device influenced the nursing students to use it. Together with the feeling of the device being an assignment tool and worrying about losing the device, all of these factors affected the students’ emotions as well. As emotions play a critical role in the learning process, O’Regan (2003) suggested that the role of emotion must be addressed in the theory and practice of teaching and learning. In the FRAME model, emotion is one of the criteria for the learner (L) aspect (Koole, 2009), which also matched with the participating students in the current study.

#### **4.5 Learning Environment**

Many factors can influence the quality of learning (Hinchliff, 1999). Among these factors, the environment in which learning takes place is one of the major factors (Hand, 2006). In the current study, the learning environment is the clinical environment. A high quality and cost effective clinical education experience could facilitate student learning in the clinical environment (Dunn & Burnett, 1995; Chan, 2001; 2003). Thus, to facilitate clinical learning, the clinical learning environment

cannot be ignored. The clinical learning environment is the interactive network of forces within the clinical setting which influences the nursing students' clinical learning outcomes (Dunn & Burnett, 1995). All that surrounds the nursing student including the clinical setting, the staff, the patient, the clinical tutor and the nurse educator, are components of the clinical environment (Papp, Markkanen & Bonsdorff, 2003). The learning environmental factors that affected students using mobile learning are also essential and are discussed in the following sections.

#### **4.5.1 Technical Support**

Institutional support, such as technical support, are needed for mobile learning (Cheon et al., 2012). Considering the results of the current study, technical support on the software is important. Students were reminded regularly to check whether there was any information announced by the clinical practicum Course Coordinator through the Online Learning Environment (OLE). However, only three of the students tried to use the iPod Touch or their own smartphone to access the OLE and all three students had negative comments on using mobile devices to access the OLE:

*“I had tried to use my smartphone to access OLE, however, it has to be set up and downloaded, which was inconvenient.” (Student H)*

*“Because I had the habit of browsing (OLE) on my PC at home as it was easier...It's not an application. I mean, the OLE is not an application. It's easier to open webpages on a PC than on a phone mainly because of the size (of the screen). The size fits better.” (Student F)*

Although there was a link provided at the OLE to facilitate students to set up and access the mobile site of OLE (light version) which was designed for the use of a mobile device, more than half of the participating students were not aware of it. Two of the Cohort A students who knew about the mobile site of OLE but one of them had never used it and the other felt that it was still inconvenient with regard to its setup. Technician A also admitted that even though there is a mobile site of the OLE, the mobile version does not have a full version featuring all its resources, which is something his department should work on to enhance students' learning.

*“There is a mobile site of the OLE, but the mobile site isn't a full version featuring everything. Some features are only accessible via the app when improvements have been made, and we should work on that.” (Technician A)*

Aside from the university website, insufficient university-provided application is another important issue. Students preferred more information provision and tailor-made free apps developed by the university could better support the students to use mobile learning. Improvement on the current university provided apps was also needed:

*“Only two apps were provided by the university which was not enough. The university could develop more apps, for example, medical abbreviations or group the teaching notes into an app.” (Student K)*

*“The current apps could be used by the IOS only. The university should also develop the apps for the Android operating system.”*

*(Student N)*

Both Technicians expected that more apps and e-books would be developed by the university to enhance students' learning. Furthermore, both Coordinators and Clinical Tutors also hoped that, through providing more apps, it could promote not only the students to use mobile learning but also encourage the university staff to use the mobile device to enhance teaching and learning. Some suggestions on future development of mobile learning for the nursing students which are similar to the students' ideas are as follows:

*“[The Technician] should revise the programme. Incorporate more functions or apps. [The students and university staff] should fully utilise the software and functions of the device to enhance learning and teaching experience. More apps about enhancing the clinical learning, not just information giving or record purposes [can be provided by the university]. For example, apps in learning medical terminology, games about simulated clinical environment.”*

*(Coordinator A)*

*“We can include the function of a note-pad, a space in which the [Clinical] Tutor or the student can put down a question, jot notes, or make a remark about the teaching and learning progress. This can serve as a good reference at the end of a course programme. If the space is left empty, that can also reflect students' passive learning*

*attitude.” (Clinical Tutor A)*

Actually, technical support is one of the barriers to mobile learning (Mehdipour & Zerehkafi, 2013). The above information indicates that appropriate design of the website for mobile access and technical support affected the nursing students' use of mobile learning. Technical support from the university is obviously important, however, this issue was not indicated in the FRAME model.

#### **4.5.2 Everyday Digital Culture**

In the social (S) aspect of the FRAME model, Koole (2009) stated that an individual must follow the rules of cooperation where the interaction takes place. Meanwhile, the rules of cooperation are determined by the culture of the interaction taking place or a learner's culture (Koole, 2009). Simply speaking, culture is one of the issues affecting the social aspect of the FRAME model. The practice of each individual's use of technology is one of the factors affecting the use of mobile learning among nursing students during the clinical practicum.

The HoD pointed out that students' decision regarding whether or not to use mobile learning could be due to peer pressure. He explained that if most of the nursing students' friends mainly used their mobile device for learning or communication, then the other students would follow suit and vice versa. Therefore, he expected more students would use mobile learning when the mobile device become popular. Student P's response was similar to the HoD. Student P explained that if an individual was easily affected by others, his or her preference with regard to the use of mobile learning would also be easily affected:



*“If a group of students takes out the iPod Touch to use, then I would follow suit and use it more often. However, few students used it, preferring the apps on their mobile phones, so the iPod Touch got ignored. It was basically a bandwagon effect.” (Student P)*

Few students also pointed out and explained the importance of the everyday digital culture:

*“It’s become an everyday habit! People use the Whatsapp [application] to contact others once they wake up. They make phone calls less. They do so when there is an urgent matter only.” (Student A)*

*“I think it is the culture among us to use apps for communication. We have different shift duties during the clinical practicum. If you make a phone call, you may wake up or disturb your friend on his or her sleeping day after a night shift.” (Student I)*

Besides, at the time of the current study, the participating nursing students were not keen on using the mobile device for watching videos. The habit of the nursing students regarding the watching of nursing video clips reflected the students’ digital culture at that time. Only four of the participating students used their iPod Touch to access the Nursing Video App or OLE and watch the nursing care video clips. Other students mainly watched the video clips at home using their personal computer (PC) or notebook as the video clips can only be watched with an Internet connection and cannot be downloaded to the device:

*“It was because I had the habit of browsing that on my PC at home.  
That was easier than using the iPod Touch.” (Student L)*

Actually, the use of the mobile device was not only affected by the everyday digital culture of the nursing students but was also affected by the everyday digital culture of the Clinical Tutors and university staff. Five of the students reflected that Clinical Tutors who were more advanced in age were not too keen on using the mobile device and many of them did not prefer to use the mobile device for mark entry. The students claimed that as the Clinical Tutors were not familiar with the device and software, the students were uncomfortable when the Clinical Tutors complained about the Mobile Assessment App to them:

*“The Clinical Tutors needed a lot of time to investigate how to use  
the Mobile Assessment App...This might affect my grading as well.”  
(Student J)*

As a result, the nursing students received different kind of complaint from the Clinical Tutors on the Mobile Assessment App:

*“Your university is the only one which making trouble on the  
assessment and students’ practicum record.” (Student K)*

*“I have encountered a Clinical Tutor complaining to me that the  
Mobile Assessment App caused her to have a headache!” (Student  
H)*

Due to the received complaints concerning the use of the assessment app from the Clinical Tutors, fear of further complaints prevented students from using their mobile device on the ward:

*“One of my Clinical Tutors complained about the assessment app in front of me...after that, except for the mark entry, I did not take my mobile device out in front of her again.” (Student K)*

Coordinator A revealed that even the academic staff were not using the iPod Touch for other purposes aside from using the Mobile Assessment App. Coordinator B also reflected that:

*“The culture [of using mobile learning] is not well established yet among students and [academic] staff.” (Coordinator B)*

As mentioned by Spencer-Oatey & Franklin (2012), behaviours and interpretations of behaviour were affected by culture because culture is the set of attitudes, beliefs and values shared among a group of people and communicated from generation to generation (Matsumoto, 1996). The above response from the nursing students and complaints received from the Clinical Tutors indicate that the digital culture was not well established among the participants of the current study at that time. The everyday digital culture also affected the use of the mobile device among the nursing students on the ward and the university staff also had to pay attention to the design of the applications to match with the digital culture of the involved parties in mobile learning.

### 4.5.3 Teacher-learner Relationship in Chinese Culture

In Chinese culture, maintaining harmonious relationships and avoiding conflict is important (Chinese Culture Connection, 1987; Wang, Wang, Ruona & Rojewski, 2005). Moreover, showing respect for social status and reputation in society is essential to keep the harmonious relationships among individuals in Chinese culture (Liu, 2003). Therefore, the nursing students felt that it was embarrassing to teach the Clinical Tutors to use the mobile device or the Mobile Assessment App. Student O said:

*“I did not want to embarrass the clinical tutor by teaching her how to use the iPod Touch. I was afraid that the Clinical Tutor might have a bad feeling or misunderstand and think that I was challenging her capability.” (Student O)*

As all of the nursing staff, including the Clinical Tutors, were busy on the ward, the students needed to inform or remind their Clinical Tutors to enter the marks for them, which also caused the nursing students to feel embarrassed:

*“Since the Clinical Tutors had so many things of their own to take care of, we understood that they couldn’t be tapping on the gadget while they were busy. We would tell them about this thing well ahead of time. Otherwise, they wouldn’t be able to help at the last minute even if they wanted to. However, the Clinical Tutor might think that I was ordering and pushing her to do so.” (Student A)*

Besides, as the students may not have the same duty pattern as their Clinical Tutor, they had to leave the iPod Touch with the Clinical Tutors to rate their performance. The students received the iPod Touch after they had changed their practicum to another ward. As a result, they did not want to trouble the Clinical Tutors and could not ask the Clinical Tutor to rate again even if they found any missing items or problems on the mark entry after they got the device back. Student J stated that:

*“I did not want to trouble the Clinical Tutor again. A few of my classmates also encountered the same problem but none of them went to the ward nor asked the Clinical Tutor for the mark entry again. I guessed that the Clinical Tutor should be willing to help us but none of us would do the request again.” (Student J)*

To show their respect to the teaching staff of the university, the nursing students preferred to use their computer at home or university library to send an email as they were worried in case of any typos in the email:

*“It is more respectful to send an email for formal communication with the teaching staff of the university.” (Student O)*

*“I was afraid that it might create an impression of carelessness to the teaching staff if there was a typo in the email. Therefore, I only sent an email to the university staff through the computer at home.” (Student M)*

One of the interesting points mentioned by the students was that if the Clinical Tutor was nice and friendly to the students, students preferred to ask or learn from the Clinical Tutor directly. Student D's response reflected that the nursing students felt more comfortable and willing to communicate with their Clinical Tutor when there was a harmonious relationship between them:

*“If the mentor was friendly, it would be much easier to consult him or her than to search for information on the device.” (Student D)*

The above data indicate that the nursing students tried to maintain the harmonious relationships between the Clinical Tutors and the teaching staff of the university. Achieving harmonious relationships emphasised social hierarchy and stability. In addition, teaching is teacher-centred in Chinese culture rather than learner-centred. Learners are required to obey senior learners as well as teachers in Chinese culture (Pierson, 1996). Therefore, the nursing students did not challenge and preferred to show their respect to the Clinical Tutors and teaching staff of the university. This indicated that the culture of the teacher-learner relationship also affected the use of mobile learning among the nursing students.

#### **4.5.4 Working and Staff Culture of the Hospital Ward**

From the perspectives of situated learning, people learn as they participate and become closely involved with a culture or community of learning (Hansman, 2001) along with interacting with the community and learning to understand its cultural values and rules (Lave and Wenger, 1991, Fenwick, 2000). Hence, the working and staff culture of the hospital ward also affected the behaviour of the nursing students.

The working environment of the government hospital wards in Hong Kong is very busy. The heavy workload on the ward hindered the nursing students in their use of the mobile device while on duty

*“The workload already made me very busy and I do not have the time to use the iPod Touch on the ward.” (Student C)*

*“I seldom used the mobile device on the ward. As you know, I was busy with the routine nursing cares on the ward.” (Student H)*

The HoD and the Coordinators also pointed out that the heavy workload on the ward already made the nursing students busy while on duty. The nursing students would not have time to use the mobile device. Coordinator A reflected on feedback from one of her students:

*“[The student said] Why do I bother to put the iPod Touch in my pocket when I don't even have time to take a break?” (Coordinator A)*

Coordinator B also believed that students were occupied by routine nursing care while on duty. As a result, students would only use the iPod Touch after they came off duty:

*“In fact, students are very busy on each clinical day and often they can only access the iPod Touch after their shift of work. And since it's after work, iPod Touch will not be the only access to online*

*learning.” (Coordinator B)*

Clinical Tutor B echoed the views from the Coordinators stating that:

*“Time is a crucial factor. In a tight schedule [of routine nursing care], students can hardly get the time to take out their device or click on anything.” (Clinical Tutor B)*

Besides the heavy workload on the ward, fear of misunderstanding by the ward staff or patients was also a main reason why students did not always use the mobile device on the ward. The nursing students worried that the ward staff or patients might misunderstand they were not serious or not concentrating during the clinical practicum. Student D, during the interview, revealed that:

*“I only used the iPod (Touch) during my meal time unless it was necessary or there was no rough paper available on the ward. I am afraid that the clinical staff or patients might misunderstand that I am playing games on the device...although I really always play games on the device but only at home...haha...and the routine nursing care already made me busy on the ward.” (Student D)*

Otherwise, a few of them used the device quickly even after the staff allowed them to use it:

*“You would have to indicate yourself but how could you explain to every one of them you were not playing but searching for*



*information? I would not go around explaining to people one by one.” (Student J)*

*“The staff might wonder did you already complete the routine nursing care or not? How come you have time to use the mobile device? I didn’t want the clinical staff misunderstanding and thinking that I was a lazy student.” (Student K)*

The students’ fear of being misunderstood was further confirmed from the response of both participating Clinical Tutors. According to Clinical Tutor B, many ward staff did not recommend the nursing students to get the phone or the iPod Touch out when they were on duty. Both Clinical Tutors admitted that it would give a bad impression to the patients and cause misunderstanding from the ward staff:

*“It gives a bad impression to the patients to see someone holding a mobile phone, unless they somehow have a clear idea that it is a student doing mobile learning.” (Clinical Tutor B)*

*“There is no label on the device stating its educational function. At a glance, it does make people think that it is used for playing a video game or doing other fun things.” (Clinical Tutor A)*

To avoid misunderstanding, Clinical Tutor A suggested the nursing students should only use their mobile device when they were working with their Clinical Tutors:

*“Unless they are holding it right next to the Clinical Tutor, other*

*people won't have a clue what they are doing with it. Unfortunately, it is quite possible for there to be some misunderstanding regarding this...It is a rather different matter if the student approaches a teacher with the device. People will then understand it is used for learning purposes." (Clinical Tutor A)*

Another important issue on the ward culture is that both Clinical Tutors and nursing students expressed that the learning culture of the hospital ward is learning from a real clinical situation, which was also mentioned in section 4.4.3. From the view of clinical staff and nursing students, the real clinical situated learning was more important than using the mobile device as there were some variations from the real clinical situation when compared with the nursing care video clips:

*"For example, the real patient always struggles during Ryle's tube insertion or other nursing procedures, which was not shown in the video clips and the video clips therefore did not teach you how to solve the problem." (Student J)*

Both Clinical Tutors also disclosed that clinical learning from the real situation is more important:

*"If we put it numerically, we may say the lectures make up 40% of their learning process, the iPod Touch 15 to 20%, and the practicum definitely makes up the rest." (Clinical Tutor A)*

*"If the usefulness of the clinical practicum comes first, then mobile*

*learning on the iPod Touch is bound to play a secondary role...It should not be the main occasion. After all, what is the point of having a clinical practicum when things can be learnt on the iPod Touch?" (Clinical Tutor B)*

Furthermore, although the Clinical Tutors agreed with using mobile learning, they emphasised that the interaction and communication with the patients was the most important thing for students' learning. The use of the mobile device should only be as a supplementary role. Clinical Tutor B further explained:

*"Nursing is different from other programmes in that there is much more than book knowledge. Interaction and communication with patients are crucial things that cannot be put down in words. For instance, what do we mean by 'a patient having pain'? We have to judge the degree of pain by touching the patient to check whether the muscle is all cramped, whether he or she can walk, move or even yell at you. None of these are found in the text. Therefore, the theories are one thing, the variation of patients' response in real life are another. That is, hands-on training cannot be replaced...But there are things that can only be done with our own hands."*  
*(Clinical Tutor B)*

Another commonly mentioned issue on the hospital ward is the concern about infection control. Half of the participating Cohort B students expressed their concerns on the issue of infection control when using their mobile device on the ward. Students claimed that as the hospital environment was full of bacteria, they did not want to use

their own smartphone on the ward even if the ward staff allowed them to use the device. Two of them used an alcohol pad to disinfect the iPod Touch after the mark entry or used a tissue paper to avoid the device having direct contact with any equipment of the ward. For the same reason, a few of them bought an iPod Touch cover for infection control purposes and if they felt that it was too dirty, they changed the cover of the device:

*“We had a uniform to protect ourselves but not the device. I didn’t want to transmit or get any bacteria from the hospital to my home. I must wash my hands and disinfect the device when I am leaving the ward.” (Student N)*

Similar to the response of the students, Clinical Tutor B also expressed her concerns on the issue of infection control. She claimed that it depended on the personal hygiene of the nursing students:

*“From the standpoint of infection control, it is highly unhygienic to take an item in and out of the pocket all the time in our working environment, unless the student washes his or her hands properly every now and then.” (Clinical Tutor B)*

Infection control is important to prevent infectious diseases and encourage cost effectiveness (Jarvis, 2001). Healthcare-associated infections, which means infections acquired while in healthcare settings and with a lack of evidence that the infection was present or incubating at the time of entry into the healthcare setting (Horan, Andrus & Dudeck, 2008), are the most common complication occurring in

hospitalised patients (Sydnor & Perl, 2011). Infection control among the ward staff was important and, therefore, could not be ignored, even when using the mobile device.

From the above experiences of the different stakeholders on the use of mobile learning during clinical practicum, the core elements and factors affecting the use of mobile learning as a clinical learning platform were identified. The FRAME model and the future design of the mobile learning situations for clinical learning can also be enriched which will be discussed in the following section.

#### **4.6 The Application of the FRAME Model in Facilitating Clinical Learning**

From the FRAME model, mobile learning results from the integration of the device (D), learner (L) and social (S) aspects (Koole, 2006; 2009). The above sections indicate that the FRAME model supported the use of mobile learning for the nursing students while they underwent the clinical practicum. However, the FRAME model was insufficient to reflect the important role of university staff, critical and reflective thinking of the learning participants, that is nursing students in the current study, and the learning environmental issues, especially the cultural issue, during the clinical practicum which are discussed in this section.

##### **4.6.1 The FRAME Model Supported the Use of Mobile Learning during the Clinical Practicum**

From the experience of all stakeholders, the three aspects and the intersections of

the FRAME model influenced the use of mobile learning among the nursing students.

Firstly, the physical characteristics of the mobile device, such as the size, weight and duration of the battery power, are important factors that affected the nursing students' impression of mobile learning. From the students' comments on the hardware features of the mobile device, they linked the physical characteristics of the mobile device with their impression of mobile learning. The students emphasised the portability and mobility of the mobile device in mobile learning. Although most of the students were satisfied with the iPod Touch, they preferred to have their own choice of mobile device or use their own smartphone for mobile learning. However, from the perspective of Technicians, a unique mobile device facilitated the development of applications and management of technical issues. Moreover, as the characteristics of the mobile device have a significant impact upon usability (Koole, 2009), the device (D) aspect is an important factor in mobile learning. Koole (2009) also pointed out that the role of mobile technology is highlighted in the FRAME model, therefore, the mobile device is an active component with an equal weighting to learning and social processes.

Secondly, the learning participants, that is the nursing students in the current study, with an active learning attitude, good self-control, who are responsible, flexible, and exhibit curiosity or interest in new things, were better suited to mobile learning. This is because these characteristics motivated learners to learn, especially in constructivist learning. Being a technophile is also essential for a mobile learner because the students' emotions would also be affected and, as a result, affect their use of mobile learning. Besides, critical thinking is a fundamental requirement of a mobile learner, as described by the students. Therefore, the learner (L) aspect of the FRAME

model is applicable in the local context for the nursing students.

Thirdly, the learning environment is an important element that affected whether the nursing students used the mobile device. Even with sufficient technical support, it is impossible for the nursing students to use the mobile device if the clinical environment does not allow them to do so. The environment was not only created by the information context as suggested in the FRAME model, but also the ward staff, the culture of the ward staff and digital practice. All that surrounds the nursing student including the clinical setting, the staff, the patient, the clinical tutor and the nurse educator, are components of the clinical environment (Papp, Markkanen & Bonsdorff, 2003). However, according to the FRAME model, Koole (2009) states that the mobile learning experiences occurred within a context of information in which the learners consume and create information with the mobile device as a mediator. The complicated learning environment was ignored in the FRAME model.

Actually, the learning environment is very important for a learner as its component creates the culture within the environment. Moreover, learning is viewed as culturally situated meaning-making inside and outside of educational institutions and media use in everyday life has achieved cultural significance (Pachler, Bachmair & Cook, 2010). Strandell-Laine, Stolt, Leino-Kilpi and Saarikoski (2015) also pointed out that due to the culture of the hospital ward, the nursing students always being discouraged on the use of smartphone or mobile device due to the negative staff or patient attitudes and hospital policies. Therefore, the learning environment could not be ignored. In the social (S) aspect of the FRAME model, Koole (2009) suggested conversation and cooperation, and social interaction as the criteria of this aspect. She explained that learners must follow the rules of cooperation to communicate with

others in the processes of social interaction and cooperation (Koole, 2009; Koole & Ally, 2006). Through these processes, the learners able to acquire knowledge, exchange information, and sustain cultural practices. However, it is unclear on how the cultural issue affected the learners' behaviour from the Venn diagram. Supplementary information on the learning environment is needed to indicate the importance of the cultural issue.

Koole (2009) stated that the device usability (DL) and social technology (DS) intersections of the FRAME model referred to the affordances of mobile technology. From the comments of the nursing students on the affordances of the mobile device mirrored both the device usability (DL) and social technology (DS) intersections. The portability, information availability, psychological comfort and satisfaction are the criteria of the device usability (DL) intersection (Koole, 2006; 2009; Koole & Ally, 2006). The nursing students clearly reflected that they are satisfied on the use of mobile learning. However, their comments on the university-provided iPod Touch, the Mobile Assessment App, and the device functionality indicated that the device usability influence both impression and the use of mobile learning as suggested in the criteria of the device usability (DL) intersection.

Among the social technology (DS) intersection, mobile learners have to exchange information and documents within and across systems to enhance their interaction (Koole, 2006; 2009). The developer suggested device networking, system connectivity and collaboration tools as the criteria (Koole, 2006; 2009) because this intersection described how mobile device enables information exchange and collaboration. The participating nursing students reported their difficulties in information connectivity due to the lack of WiFi in the hospital which affected the



information accessibility and communication with others by the university-provided iPod Touch. As an alternative, the nursing students mainly used their own smartphone for the communication purpose as it is easier to connect with the Internet to search for information and sharing with others. This reinforced the request of using their self-purchased smartphone or mobile device for mobile learning as mentioned before.

The interaction learning (LS) intersection reflects a production of learning depends on the social constructivism philosophy (Koole, 2009). Therefore, she suggests interaction, situated cognition and learning communities as the criteria of this intersection (Koole, 2006; 2009; Koole & Ally, 2006). Since the university staff design on the use of mobile learning during clinical practicum, situated and experiential learning was expected. Although most the university staff did not expect the nursing students use the university-provided mobile device to interact with others, the nursing students used their smartphone to achieve this purpose instead. The multiple functions of the mobile device also enhance the nursing students' learning in context. The nursing students are happy to share updated clinical information with classmates which indicated that they have interaction with not only the ward staff but also other learners. Also, self-directed learning from the nursing students was indicated which is essential during the situated and experiential learning process (Zepke & Leach, 2002). Moreover, the situated learning context must contain other people who are experienced at solving similar problems and the learners may have learned from experienced practitioners for a holistic set of actions (Maudsley & Strivens, 2000). This designated that the nursing students have to negotiate, understand, interpret and integrate the information from the experienced people to the unique cultures and environment which echoed with Koole's (2009) explanation on the interaction learning (LS) intersection, which indicates different types of

interaction facilitated between learners and other components of the social environment.

Finally, as the FRAME model defines an ideal mobile learning situation as a process resulting from the convergence of the device (D), learner (L) and the social (S) aspects (Koole, 2006; Koole & Ally, 2006), the use of mobile learning in the local clinical practicum context is achieved this “ideal” mobile learning situation. Twelve of the students suggested that using mobile learning during the clinical practicum could be continued and expected that using mobile learning would be a trend and would be adopted by other institutions. Once it became a common practice, other students would follow the trend and use mobile devices for learning:

*“I think it (using mobile learning) was a good approach and can be continued.” (Student A)*

*“I believe it (using mobile learning) can become popular. In this digital world, other universities may, in the future, advocate the use of the mobile device. So, this can be continued but it needs to be improved.” (Student C)*

Also, both Clinical Tutors agreed with the necessity of using the mobile device for the clinical practicum record and using mobile learning would be a trend in the future.

Clinical Tutor A appreciated that:

*“We need to move forward. It wouldn't do to stick to the old-fashioned practice of signing on a little notebook. The new*

*device is undoubtedly a good thing, but there are still some details to attend to.” (Clinical Tutor A)*

Although most of the nursing students appreciated the use of mobile learning, the current mobile learning situation for the nursing student is not “ideal” as described by the FRAME model. The above Clinical Tutor A’s comment reflected that further elements and factors are needed to supplement the FRAME model.

From the above discussion, the researcher found that the FRAME model supported the use of mobile learning during the clinical practicum. However, the learning environment is an important element in the mobile learning process as it involved different factors, especially the cultural factor, affecting the use of mobile learning. This element must be clearly shown in the mobile learning model to indicate its importance.

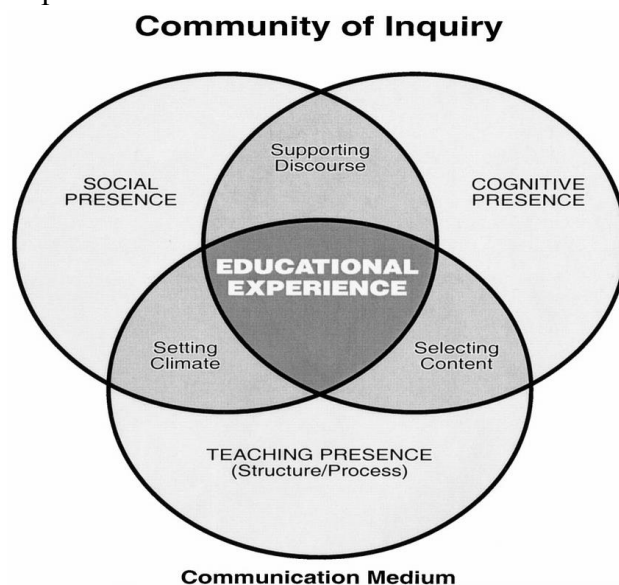
#### **4.6.2 Supplemented by The Community of Inquiry (CoI) Framework**

As mentioned in section 2.5, Kenny et al (2009a; 2009b) applied the FRAME model to evaluate the success of the integration of mobile learning into a nursing programme. Although they (2009a; 2009b) found that the FRAME model was proved as useful in their analysis of mobile learning in the clinical learning context, they (2009b) suggested to apply the Community of Inquiry (CoI) theoretical framework on mobile learning to get a more fruitful results in the future study.

The CoI, as indicated in Figure 5, identifies the crucial prerequisites elements for a successful higher educational experience (Garrison, Anderson & Archer, 2000; 2010)

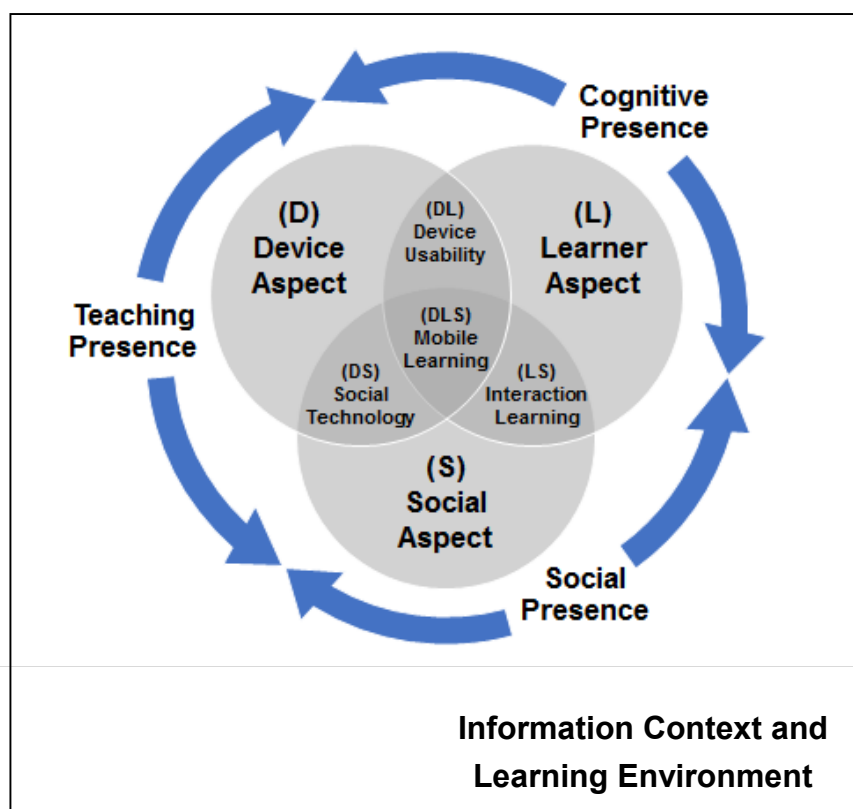
for studying the online learning experience. The framework represents a process of creating a deep and meaningful learning experience, especially the collaborative-constructivist learning, through the development of three interdependent elements, included teaching, social and cognitive presence (Garrison et al., 2000; 2010). In which, the teaching presence is the design, facilitation, and direction of cognitive and social processes which may be performed by anyone participant in a Community of Inquiry (Garrison et al., 2000; 2010). This indicated that the teaching presence is the central organizing element (Cleveland-Innes & Campbell, 2012). For the cognitive presence, it is the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse (Garrison et al., 2000) and, therefore, the cognitive presence is closely related to critical thinking (Garrison, 2011). While the social presence described as the ability to project one's self and establish personal and purposeful relationships with others (Garrison, 2007).

Figure 5 The Community of Inquiry (CoI) framework: elements of an educational experience



The intersections of the teaching, cognitive and social presence are the functions, named as selecting content, supporting discourse, and setting climate, identified by the developers. These three functions are used as indicators of each element and represent how the instructor creates the three presences of the model (Garrison et al., 2000; Orcutt, 2016). In other words, the three functions occur when the three elements are coexist and interaction with each other elements. Therefore, the coexisting of these three elements is essential. If these three elements inserted into the FRAME model, together with point out the learning environment into the context (as indicated in Figure 6), the use of mobile learning as a platform for clinical learning would be completed.

Figure 6 FRAME model supplemented by the CoI



As the teaching presence of the CoI is able to indicate the important role of the university staff as mentioned in previous sections. The university staff, included the HoD, practicum Course Coordinators and the technical support staff are responsible for the design of mobile learning and providing technical support to the nursing students during the process of mobile learning. From the nursing students comments on the Mobile Assessment App and the request on more university-provided apps, the role of the university staff should be indicated in the mobile learning model. In the meantime, as mentioned in previous section, the peer-to-peer communication via the mobile device among the nursing students was existed. It also reflected the concept of the teaching presence in which the learners' peers could also be the instructor and echoed with the social technology (DS) intersection of the FRAME model.

For the cognitive presence, it emphasis the reflecting think and critical thinking which was also important and reflected from the participating nursing students' responses as reported in section 4.3.2.3 and section 4.4.2. As the learner critical thinking is a required characteristics of a mobile learner and reflective thinking is also a required element in clinical learning (Freshwater et al., 2008), the cognitive presence should also indicate in the mobile learning model.

Finally, the social presence is echoed with the social (S) aspect of the FRAME model as well as the interaction learning (LS) intersection. As in situated learning, knowledge and learning looked as a relationship between an individual with each other and the interaction of the environment, studying the relationship between learner and its environment is important when exploring the learning process (Gee, 2008). Therefore, adding the social presence into the above suggested model indicated the importance of the learning environment as well as the relationship between the

learners and its environment.

## **5. CONCLUSION**

This chapter concludes the study results, implications and limitations. Recommendations for future study are also presented.

### **5.1 Summary of the Study**

From the findings of the current study, different elements and factors were identified as affecting the use of mobile learning among the nursing students. Most of these factors matched with the FRAME model while a few of them were missing or neglected. According to these results, recommendations for sustainable clinical learning with mobile devices are provided in the following sections.

#### **5.1.1 The Core Elements and Factors Affecting the Use of Mobile Learning as a Clinical Learning Platform**

The core elements composing mobile learning during the clinical practicum include the affordance of the mobile device, the learning participants and the learning environment. Among these core elements, different factors are involved in affecting the use of the mobile device on the ward.

Firstly, as the affordances of the mobile device are the interactions between the users and the mobile device, the tool, that is the mobile device in mobile learning, prompts, guides, or restrains the users in their use of it, which depends on their previous experiences (Salomon, 1990). Therefore, the mobile device is the most



important factor affecting the use of mobile learning, especially with regard to its physical characteristics and usefulness. The results of the current study showed that the nursing students' satisfaction was easily influenced by the physical characteristics and the usefulness of the mobile device. Not only the nursing students, but also Clinical Tutors and Coordinators agreed that a small and lightweight mobile device facilitates one-handed use and portability of the mobile device. A mobile device with a big memory capacity, durable battery power, clear and sharp screen, user-friendly design, and, easy control and stable operating system are other favourable characteristics for an effective mobile device for mobile learning. Nowadays, due to the falling price and increase of choice on mobile devices, many people have acquired mobile device as the basic need rather than luxury gadget (Mather & Cummings, 2015; Nair & Bhaskaran, 2014), therefore, the request on using their own mobile device, especially smartphone is increased.

With regard to usefulness, a mobile device with multiple functions, including functions for taking notes, calculation, audio recording, image capturing and information storage, is preferred to enhance clinical learning. As convenience in searching for information or answers by the students themselves is important in situated and experiential learning, information connectivity and information accessibility of the mobile device are other important factors affecting the use of the mobile device for clinical learning. Besides, through information connectivity, the students can share information and enhance communication among the learners, which is also an important element in clinical learning. Therefore, information connectivity and information accessibility of the mobile device are important factors to enhance clinical learning.

To attain an ideal mobile device, the learners have their own choice of mobile device or can use their own smartphone for clinical learning is preferred. Although it may not be favourable for the development of Apps from the Technicians' perspective, the problems regarding the old battery of the mobile device and longer processing time due to the older operating system could be solved and thus promote the use of the mobile device.

Secondly, the nursing students are another core element affecting the use of mobile learning as a clinical learning platform. Nursing students who are proactive and self-directed in learning, with self-discipline, who are good in self-control and responsible are important factors that positively affect the use of the mobile device for clinical learning. Being flexible, curious and interested in new things also motivates learners to learn via the mobile device, which is vital in constructivist learning (Kolb, 1984) as well as in clinical learning. To prevent information overload in mobile learning, critical thinking is also regarded as a fundamental requirement of a mobile learner according to the nursing students' and Coordinators' descriptions.

In addition to the learning attitude and the ability to think critically, emotion of the nursing students is another factor. It is not surprising that a technophile learner is keen on using the mobile device. However, if the students perceived the mobile device as an assessment tool, are worrying about the device not working, or that they might lose it, the students would be reluctant to use it. Moreover, there are a few conflicts in using mobile learning, such as the size of the mobile device, use of mobile learning against on-site demonstration and going paperless in mobile learning against the convenience of the paper logbook. These conflicts also cause hesitation about the use of mobile learning during the clinical practicum.

Finally, the learning environment, that is the clinical learning environment, also involved many factors affecting the nursing students' use of mobile learning on the ward. Among these factors, sufficient technical support from the university is important, as the provision and design of the Apps from the university affects the usability of the mobile device in clinical learning.

Other factors of the clinical learning environment are related to the cultural issues including the everyday digital culture, teacher-learner relationship in Chinese culture and the working and staff culture of the hospital ward. The nursing students are concerned about the harmonious teacher-learner relationship and the impression they give to their Clinical Tutors or university staff. If the students, the Clinical Tutors and the university staff are familiar with the operation of the mobile device and ready to use mobile learning on the ward, more students would be keen on using the mobile device on the ward, because embarrassment or conflicts regarding the use of the mobile device between the Clinical Tutors and the nursing students could be avoided. As a result, the harmonious teacher-learner relationship could also be maintained.

Moreover, the heavy workloads on the hospital ward, the concerns of infection control and being misunderstood by the clinical staff and patients also affected the use of mobile learning on the ward. If the ward is busy, the nursing students do not tend to use the mobile device in order to prevent them being misunderstood by the clinical staff and patients. Finally, the learning culture of the hospital ward also constrains the use of mobile learning. If the Clinical Tutors and the nursing students perceived that learning from the real clinical situation was more important, the use of mobile learning as a clinical learning platform would be minimised.

To conclude, although the participants, included the nursing students, the university staff and Clinical Tutors, of the current study agreed that the use of mobile learning is a trend and could be continued, many factors affect the use of mobile learning as a clinical learning platform. All of these factors are mainly related to the affordance of the mobile device, the learning participants and the learning environment.

### **5.1.2 The Applicability of the FRAME Model on the Use of Mobile Learning in the Local Clinical Practicum Context**

From the core elements affecting the use of mobile learning as a clinical learning platform, it is obvious that the affordance of the mobile device, the learning participants and the learning environment are important elements in mobile learning in the local clinical practicum context. These elements could be reflected from the device (D), the learner (L) and the social (S) aspects of the FRAME model. The participants' critiques and utilisation of the mobile device also verified the device usability (DL), the social technology (DS) and the interaction learning (LS) intersections of the FRAME model. Although the FRAME model is applicable in facilitating clinical learning and indicated most of the elements and factors affecting the use of mobile learning, the integration of the CoI together with the FRAME model could indicate a more complete picture on the use of mobile learning in the local clinical practicum context.

Owing to the important role of the university staff and Clinical Tutors in the

design of mobile learning and in clinical learning, the teaching presence of the CoI cannot be neglected in mobile learning in the local clinical practicum context. Cognitive presence, which signifies the learner's sustained reflective and critical thinking, is essential under the situated and experiential learning practice in the local clinical practicum context. In addition to the social presence, the social relationship of the learner with other learners, clinical staff and the university staff can be indicated.

In addition, due to the heavy workload and the learning culture on the local hospital ward, the learning environment should not be ignored. Therefore, apart from the information context as mentioned in the FRAME model, the learning environment should also be highlighted in the mobile learning model to indicate the factors of the learning environment on the use of mobile learning during the clinical practicum.

### **5.1.3 Recommendations for the Application of the FRAME Model in Facilitating Clinical Learning in the Local Clinical Practicum Context**

To sustain mobile learning for clinical learning in Hong Kong, the core elements and factors verified for the local mobile learning model should be considered.

Firstly, allow the nursing students to choose the mobile device or use their own smartphone for mobile learning. Then, the nursing students could choose their own device according to their preferences on the physical characteristics and functions of the mobile device, especially on its information connectivity and accessibility. Moreover, smartphone is commonly used as the device for mobile learning (Wu et al, 2011; Hwang & Wu, 2014). As the students must be familiar with the operation of

their own smartphone, they should know how to save the practicum and assessment records. As a result, the permission to use their own smartphone could boost the learners' emotions regarding using mobile learning and they would not perceive the device as an assessment tool only. The affordance of the mobile device would also be enhanced through the improvement in the device usability (DL) and social technology (DS) intersections of the FRAME model.

Secondly, to support the above recommendation, technical support on providing more applications for both the Android and IOS operating systems is needed. These applications should assist the nursing students to search for medical and nursing care information, and facilitating the communication among learners, clinical tutors and university staff could enhance situated and experiential learning during the clinical practicum and reflects the interaction learning (LS) intersection of the FRAME model as well as the teaching presence of the CoI. Apart from the provision of applications, the students also have to be proactive and self-directed in learning. More training and emphasis on critical and reflective thinking not only enriches situated and experiential learning but also signifies the cognitive presence of the CoI.

Thirdly, the balance between the use of mobile learning and learning from the real clinical situation must be emphasised to sustain the harmonious relationship as well as the use of mobile learning on the ward. Thus, the social presence of the CoI could be denoted.

As the above recommendations involved different people involved in clinical learning and complex factors, the learning environment could also be reflected upon.

## **5.2 Implications of the Study**

To implement the above recommendations, different stakeholders have to be involved in all stages of using mobile learning to facilitate clinical learning in the local clinical practicum context for the nursing students.

At the planning stage of using mobile learning, the university staff have to collect opinions on the use of mobile learning and the clinical learning needs from the nursing students and clinical tutors. The university staff could integrate the collected opinions with the clinical practicum course intended learning outcomes into the design of the university-provided applications to fit with different clinical learning needs. In the meantime, the university-provided applications should be designed for both the Android and IOS operating systems so that the students could choose their own mobile device or smartphone that they are familiar with for mobile learning.

During the implementation stage, the university staff have to start the use of the mobile device from the classroom learning on the theoretical courses to clinical learning during the clinical practicum. The student would then be familiar with the mobile device and treat the device as their learning buddy or partner which enlightening the use of mobile learning as a clinical learning platform during the clinical practicum.

For the nursing students, the roles and responsibilities of the nursing students during the clinical practicum should be introduced to them before the clinical practicum embarked. Specifically, the importance of being proactive and self-directed in situated and experiential learning during the clinical practicum should be

emphasised. Also, training on critical thinking and how to reflect the clinical learning experiences should be provided in the pre-practicum training. Furthermore, communication skills should also be taught and the nursing students should be regularly reminded on the importance of communication with the staff and patients on the ward to enhance interaction learning and prevent misunderstanding during the clinical practicum.

For the clinical tutors, the importance of being a role model and facilitator in the situated and experiential learning should be reinforced in the clinical tutor training. Moreover, explanation on the concepts of mobile learning in facilitating clinical learning and introduction on the mobile device and university-provided applications are also necessary in the clinical tutor training so as enriching the use of mobile learning during the clinical practicum.

In addition, clear guidelines on the use of mobile learning on the ward and the provided technical support from the university must be clear to both of the clinical tutors and nursing students to reduce controversy between the nursing students and clinical staff or patients.

To sustain the use of mobile learning, the evaluation on the use of mobile learning should be conducted regularly to review the experience of using mobile learning from the nursing students and clinical tutors. From the collected comments, the university staff could update the university-provided applications as well as design more applications to facilitate clinical learning and fit with different needs.



### **5.3 Strengths and Limitations of the Study**

There are strengths and limitations on the dual role of the researcher. For the strengths, the researcher, as one of the clinical practicum course coordinators for around ten years, has in-depth understanding on the purposes and contents of the university-provided applications and the implementation procedures of using mobile learning for the students. This information assisted the researcher to understand the comments which were provided by the participants.

Besides, the important rapport, trust and confidence could be obtained from her colleagues and participated students in sharing their experience on the use of mobile learning which enabled the researcher to collect detailed information from different stakeholders.

On the other hand, as the researcher was also one of the teaching staff of the participating students, power tension may have existed although preventive measures were taken during the interviews and data analysis as mentioned in the ethical considerations (section 3.7.4). The nursing students may have told the researcher only what they thought the researcher wanted to hear.

Another limitation of this study was the generalizability of case study. The university involved in the current study is the only one university that provides a mobile device to each nursing student for mobile learning. This is an unique situation on using the same mobile device for clinical learning among all of the participants.

Moreover, there was only one researcher to conduct all of the individual

interviews and the data analysis. Researcher bias may exist, although member checking for the participants to give feedback on their data was carried out so as to minimise any researcher bias. Besides, as the interviews were conducted after all of the clinical practica had been completed, the participating nursing students may not have remembered all of the issues related to the use of mobile learning during their clinical practica in previous years.

Furthermore, the data was collected in 2013 and 2014, and the mobile device is not commonly used nowadays. However, if the environmental factors still exist, the results of the current study are still useful and applicable to new mobile devices for clinical learning.

#### **5.4 Recommendations for Future Studies**

A mobile learning model, the integration of the CoI and the FRAME model, in facilitating clinical learning for the local clinical practicum context was suggested from the results of the current study. An empirical study on the proposed model is needed to investigate the relationship between the teaching, cognitive and social presence of the CoI, and different aspects of the FRAME model to further validate on the suggested model in future.

Besides, due to the rapid development of mobile device technology, further investigation on the proposed mobile learning model in the local clinical learning context could be conducted on an up-to-date mobile device to examine the applicability of the proposed model.

Moreover, a longitudinal study on the use of mobile learning among the nursing students is needed to explore any difference on the experience of using mobile learning, such as any difference on the core elements and factors affecting the use of mobile learning and the practice of using the mobile device in facilitating clinical learning during the clinical practicum. It is because, after prolonged engagement in mobile learning, the nursing students would be familiar with the ward and mobile learning culture which deepened their experience on the use of mobile learning. Besides, the long-term contact with the nursing students would also allow the researcher building trust with them (Creswell, 2013).

Further investigation on the effectiveness of using mobile learning in facilitating clinical learning, such as the course results of the clinical practicum courses and comments on the performance of the nursing students from the clinical staff, is also essential to provide evidence for the support on further development of mobile learning from the educational policy makers and the university administrators.

## REFERENCES

- Al-Fahad, F. N. (2009). Students' attitudes and perceptions towards the effectiveness of mobile learning in King Saud University, Saudi Arabia. *Online Submission*, 8(2).
- AlHaqwi, A. I., van der Molen, H. T., Schmidt, H. G., & Magzoub, M. E. (2010). Determinants of effective clinical learning: a student and teacher perspective in Saudi Arabia. *Education for Health*, 23(2), 369.
- Ally, M. (2009). *Mobile learning: Transforming the delivery of education and training*. Edmonton: Athabasca University Press.
- Altmann, T. K., & Brady, D. (2005). PDAs bring information competence to the point-of-care. *International Journal of Nursing Education Scholarship*, 2, 1 – 10.
- Andrews, T., Smyth, R., Tynan, B., Berriman, A., Vale, D., & Cladine, R. (2011). Mobile technologies and rich media: expanding tertiary education opportunities in developing countries. In A. G. Abdel-Wahab, & A. A. El-Masry (Eds.), *Mobile Information Communication Technologies Adoption in Developing Countries: Effects and Implications* (pp. 103 – 116). New York: Information Science Reference.
- Apple Inc. (2009). *iPod touch user guide: For iPhone OS 3.1 Software*. Retrieved from [https://manuals.info.apple.com/MANUALS/1000/MA1196/en\\_US/iPod\\_touch\\_3.1\\_User\\_Guide.pdf](https://manuals.info.apple.com/MANUALS/1000/MA1196/en_US/iPod_touch_3.1_User_Guide.pdf)
- Apple Inc. (2010). *iPod touch user guide: For iOS 4.1 Software*. Retrieved from [https://manuals.info.apple.com/MANUALS/1000/MA1553/en\\_US/ iPod\\_touch\\_](https://manuals.info.apple.com/MANUALS/1000/MA1553/en_US/iPod_touch_)

iOS4.1\_User\_Guide.pdf

Apple Inc. (2015). *Identifying iPod models*. Retrieved from <https://support.apple.com/en-us/HT1353>

Association of Registered Nurses of Newfoundland and Labrador. (2014). Professionalism and the registered nurse. Retrieved from [https://www.arnnl.ca/sites/default/files/documents/ID\\_Professionalism\\_and\\_the\\_Registered\\_Nurse\\_0.pdf?cv=1](https://www.arnnl.ca/sites/default/files/documents/ID_Professionalism_and_the_Registered_Nurse_0.pdf?cv=1)

Barbalet, J. (1998). *Emotion, social theory and social structure*. Cambridge: Cambridge University Press.

Barker, A., Krull, G., & Mallinson, B. (2005). A proposed theoretical model for m-learning adoption in developing countries. In *Proceedings of mLearn 2005: The 4<sup>th</sup> World Conference on mLearning*. Cape Town, South Africa. Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.102.3956&rep=rep1&type=pdf>

Baxter, P., & Jack, S. (2008). Qualitative case study methodology: Study design and implementation for novice researchers. *The Qualitative Report*, 13(4), 544 – 559. Retrieved April, 5, 2014, from <http://www.nova.edu/ssss/QR/QR13-4/baxter.pdf>

Boud, D., Keogh, R., & Walker, D. (Eds.). (1985). *Reflection: Turning experience into learning*. New York: Kogan Page.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, 3(2), 77 – 101.

- Braun, V., & Clarke, V. (2013). *Successful qualitative research: A practical guide for beginners*. Los Angeles: Sage.
- British Educational Research Association (BERA). (2011). *Ethical guidelines for educational research*. Retrieved from <https://www.bera.ac.uk/wp-content/uploads/2014/02/BERA-Ethical-Guidelines-2011.pdf>
- Briz-Ponce, L., Juanes-Méndez, J.A., García-Peñalvo, F.J., & Pereira, A. (2016) Effects of mobile learning in medical education: A counterfactual evaluation. *Journal of Medical System*, 40, 136. doi.:10.1007/s10916-016-0487-4
- Burnard, P. (1989). Experiential learning and andragogy—negotiated learning in nurse education: a critical appraisal. *Nurse Education Today*, 9(5), 300 – 306.
- Cantatore, F., Crane, L. H., & Wilmoth, D. (2016). Defining clinical education: Parallels in practice. *Australian Journal of Clinical Education*, 1, 1 – 8.
- Campion, M. G. (1989). Technophilia and technophobia. *Australasian Journal of Educational Technology*, 5(1), 23 – 36
- Carpenter, D. R. (2007). Triangulation as a qualitative research strategy. In H. J. S. Speziale, & D. R. Carpenter (Eds.), *Qualitative research in nursing: Advancing the humanistic imperative*. (pp. 379 – 391). Philadelphia: Lippincott Williams & Wilkins.
- Chambliss, D. F. (1996). *Beyond caring: Hospitals, nurses and the social organization of ethics*. Chicago: The University of Chicago Press.
- Chan, D. S. K. (2001). Combining qualitative and quantitative methods in assessing

- hospital learning environments. *International Journal of Nursing Studies*, 38(4), 447 – 459.
- Chan, D. S. K. (2003). Validation of the clinical learning environment inventory. *Western Journal of Nursing Research*, 25(5), 519 – 532.
- Chan, L., Bridges, S. M., Doherty, I., Ng, M., Jin, J., Sharma, N., Chan, N., & Lai, H. Y. (2015). A qualitative study on how health professional students and their PBL facilitators perceive the use of mobile devices during PBL. *Interdisciplinary Journal of Problem-Based Learning*, 9(1), 12.
- Chan, S. (1996). The development of nursing education in Hong Kong. *Proceedings of the first China-Hong Kong nursing education conference*. Hong Kong: The Hong Kong Polytechnic University.
- Chan, S., & Wong, F. (1999). Development of basic nursing education in China and Hong Kong. *Journal of Advanced Nursing*, 29(6), 1300 – 1307.
- Charm, C. Y. C., & Hwang, G. J. (2017). A review of mobile learning practices in health-related disciplines. In *International Conference on Open and Innovative Education 2017 (ICOIE 2017)* (p. 448 – 459). Hong Kong: The Open University of Hong Kong.
- Chen, W., Tan, N. Y. L., Looi, C. K., Zhang, B., & Seow, P. S. K. (2008). Handheld computers as cognitive tools: Technology-enhanced environmental learning. *Research and Practice in Technology Enhanced Learning*, 3(03), 231 – 252.
- Cheng, C., Cheung, R., & Wan, C. (2010). E-learning in higher education: A case study in Hong Kong. *Proceedings of 2010 IEEE International Conference on*

*Advanced Management Science*. Retrieved from [https://www.researchgate.net/publication/241172014\\_E-learning\\_in\\_higher\\_education\\_-\\_A\\_case\\_study\\_in\\_Hong\\_Kong?cv=1](https://www.researchgate.net/publication/241172014_E-learning_in_higher_education_-_A_case_study_in_Hong_Kong?cv=1)

Cheon, J., Lee, S., Crooks, S. M., & Song, J. (2012). An investigation of mobile learning readiness in higher education based on the theory of planned behavior. *Computers & education, 59*(3), 1054 – 1064.

Cheraghi, M. A., Salsali, M., & Ahmadi, F. (2008). Factors influencing the clinical preparation of BS nursing student interns in Iran. *International Journal of Nursing Practice, 14*, 26 – 33.

Chinese Culture Connection. (1987). Chinese values and the search for culture-free dimensions of culture. *Journal of Cross-cultural Psychology, 18*(2), 143 – 164.

Clark, P. (2006). What would a theory of interprofessional education look like? Some suggestions for developing a theoretical framework for teamwork training. *Journal of Interprofessional Care, 20*, 577 – 589.

Clarke, P., Keing, C., Lam, P., & McNaught, C. (2008). Using SMSs to engage students in language learning. In *EdMedia+ Innovate Learning* (pp. 6132 – 6141). Association for the Advancement of Computing in Education (AACE).

Clay, C. A. (2011). Exploring the use of mobile technologies for the acquisition of clinical skills. *Nurse Education Today, 31*(6), 582 – 586.

Cleveland-Innes, M., & Campbell, P. (2012). Emotional presence, learning, and the online learning environment. *The International Review of Research in Open and Distributed Learning, 13*(4), 269 – 292.



- Cobcroft, R. S. (2006). *Literature review into mobile learning in the university context*. Doctoral thesis, Queensland University of Technology, Brisbane, Australia. Retrieved from <http://eprints.qut.edu.au/4805/1/4805.pdf>
- Cohen, L., Manion, L., & Morrison, K. (2007). *Research methods in education* (6th ed.). London: Routledge.
- College of Nursing Hong Kong. (1992). *Position paper on the future direction of nursing education in Hong Kong*. Hong Kong: College of Nursing Hong Kong.
- Crescente, M. L., & Lee, D. (2011). Critical issues of m-learning: Design models, adoption processes, and future trends. *Journal of the Chinese Institute of Industrial Engineers*, 28(2), 111 – 123.
- Creswell, J. W. (2003). *Research design: Qualitative, quantitative, and mixed methods/approaches*. Thousand Oaks: Sage.
- Creswell, J. W. (2013). *Qualitative inquiry & research design: Choosing among five approaches* (3rd ed.). Los Angeles: Sage Publications.
- Daniel, A. (2010). *M-learning in nursing education*. Retrieved from <http://www.soyouwanna.com/mlearning-nursing-education-34853.html>
- Dearnley, C., Haigh J., & Fairhall, J. (2008). Using mobile technologies for assessment and learning in practice settings: A case study. *Nurse Education in Practice*, 8, 197 – 204.
- Dearnley, C., Taylor, J., Hennessy, S., Parks, M., Coates, C., Haigh, J.,...Dransfield, M. (2009). Using mobile technologies for assessment and learning in practice

settings: Outcomes of five case studies. *International Journal on E-learning*, 8(2), 193 – 207.

Denzin, N. K., & Lincoln, Y. S. (2011). *The sage handbook of qualitative research* (4th ed.). Thousand Oaks: Sage.

Dewey, J. (1897). *The significance of the problem of knowledge*. Chicago: University of Chicago Press.

Doyle, G. J., Garrett, B. and Currie, L. M. (2014). Integrating mobile devices into nursing curricula: Opportunities for implementation using Rogers' diffusion of innovation model. *Nurse Education Today*, 34(5), 775 – 782.

Driscoll, M. P. (1993). *Psychology of learning for instruction*. Boston: Allyn & Bacon.

Ducut, E., & Fontelo, P. (2008). Mobile devices in health education: Current use and practice. *Journal of Computing in Higher Education*, 20, 59 – 68.

Dunn, S. V. & Burnett, P. (1995). The development of a clinical learning environment scale. *Journal of Advanced Nursing*, 22, 1166 – 1173.

Duron, R., Limbach, B., & Waugh, W. (2006). Critical thinking framework for any discipline. *International Journal of Teaching and Learning in Higher Education*, 17(2), 160 – 166.

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

Elliot, M. (2002a) The clinical environment: A source of stress for undergraduate

- nurses. *Australian Journal of Nursing*, 20(1), 34 – 38.
- Elliot, M. (2002b). Clinical education: A challenging component of undergraduate nursing education. *Contemporary Nurse* 12(1), 69 – 77.
- Eraut, M. (1995). Outcomes and professional knowledge. In J. Burke (Ed.), *Outcomes, Learning and the Curriculum: Implications for NVQs, GNVQs and Other Qualifications* (pp. 260 – 272). London: Falmer Press.
- Farrell, M. J., & Rose, L. (2008). Use of mobile handheld computers in clinical nursing education. *Journal of Nursing Education*, 47, 13 – 19.
- Fenwick, T. (2000). Expanding conceptions of experiential learning: A review of the five contemporary perspectives on cognition. *Adult Education Quarterly*, 50(4), 248 – 272.
- Freshwater, D., Taylor, Beverley J., Sherwood, Gwen, & Sigma Theta Tau International. (2008). *International textbook of reflective practice in nursing*. Oxford ; Malden, MA: Blackwell Pub.
- Garrett, B. M., & Jackson, C. (2006). A mobile clinical e-portfolio for nursing and medical students, using wireless personal digital assistants (PDAs). *Nurse Education in Practice*, 6(6), 339 – 346.
- Garrison, D. R. (2007). Online community of inquiry review: Social, cognitive, and teaching presence issues. *Journal of Asynchronous Learning Networks*, 11(1), 61 – 72.
- Garrison, D. R. (2011). *E-learning in the 21st century: A framework for research and*

*practice*. Retrieved from [https://www.researchgate.net/publication/287556984\\_E-Learning\\_in\\_the\\_21st\\_century\\_A\\_framework\\_for\\_research\\_and\\_practice\\_Second\\_edition](https://www.researchgate.net/publication/287556984_E-Learning_in_the_21st_century_A_framework_for_research_and_practice_Second_edition)

Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. *Internet and Higher Education*, 2(2-3), 87 – 105.

Garrison, D. R., Anderson, T., & Archer, W. (2010). The first decade of the community of inquiry framework: A retrospective. *Internet and Higher Education*, 13(2010), 5 – 9.

Gee, J. P. (2008). A sociocultural perspective on opportunity to learn. *Assessment, Equity, and Opportunity to Learn*, 76 – 108.

George, L. E., Davidson, L. J., Serapiglia, C. P., Barla, S., & Thotakura, A. (2010). Technology in nursing education: A study of PDA use by students. *Journal of Professional Nursing*, 26(6), 371 – 376.

Georgiev, T., Georgieva, E. and Smrikarov, A. (2004). M-Learning: A New Stage of e-Learning. In *International Conference on Computer Systems and Technologies 2004*. Rousse, Bulgaria. Retrieved from <http://ecet.ecs.ru.acad.bg/cst04/Docs/sIV/428.pdf>

Gikas, J., & Grant, M. M. (2013). Mobile computing devices in higher education: Student perspectives on learning with cellphones, smartphones & social media. *Internet and Higher Education*, 19(2013), 18 – 26.

Glendon, K., & Ulrich, D. L. (1997). Unfolding cases: An experiential learning model.

*Nurse Educator*, 22(4), 15 – 18.

Goldmark, J. (1923). *Nursing and nursing education in the United States: Report of the committee for the study of nursing education*. New York: The Macmillan Company.

Goldsworthy, S., Lawrence, N., & Goodman, W. (2006). The use of personal digital assistants at the point of care in an undergraduate nursing program. *CIN: Computers, Informatics, Nursing*, 24(3), 138 – 143.

Hammond, L., Austin, K., Orcutt, S., & Rosso, J. (2001). *How people learn: Introduction to learning theory* (Doctoral dissertation, Masters thesis, Stanford University). Retrieved from <http://www.stanford.edu/class/ed269/hplintrochapter.pdf>.

Hand, H. (2006). Promoting effective teaching and learning in the clinical setting. *Nursing Standard*, 20(39), 55 – 63.

Hanewald, R., & Ng, W. (2011). The digital revolution in education: Digital citizenship and multi-literacy of mobile technology. In *Mobile technologies and handheld devices for ubiquitous learning: Research and pedagogy* (pp. 1 – 14). IGI Global.

Hansman, C. A. (2001). Context-based adult learning. *New Directions for Adult and Continuing Education*, 2001(89), 43 – 52.

Hinchliff, S. (1999). *The Practitioner as Teacher* (2<sup>nd</sup> ed.). London: Scutari Press.

Hitchcock, G., & Hughes, D. (1995). *Research and the teacher: A qualitative*

*introduction to school-based research*. London: Routledge.

Holloway, I., & Wheeler, S. (1996). *Qualitative research for nurses*. Oxford: Blackwell Science.

Hong Kong Hospital Authority Working Group on Nursing Education. (1992). *Report of the Working Group on Nursing Education, Part I*. Hong Kong: Hong Kong Hospital Authority Working Group on Nursing Education.

Horan, T. C., Andrus, M., & Dudeck, M. A. (2008). CDC/NHSN surveillance definition of health care-associated infection and criteria for specific types of infections in the acute care setting. *American Journal of Infection Control*, 36, 309 – 332.

Hudson, K., & Buell, V. (2011). Empowering a safer practice: PDAs are integral tools for nursing and health care. *Journal of Nursing Management*, 19, 400 – 406.

Hwang, G. J., & Tsai, C. C. (2011). Research trends in mobile and ubiquitous learning: A review of publications in selected journals from 2001 to 2010. *British Journal of Educational Technology*, 42(4), E65 – E70. doi:10.1111/j.1467-8535.2011.01183.x

Hwang, G. J., & Wu, P. H. (2014). Applications, impacts and trends of mobile technology-enhanced learning: a review of 2008 – 2012 publications in selected SSCI journals. *Int. J. Mobile Learning and Organisation*, 8(2), 83 – 95.

Jacob, S. M., & Issac, B. (2008). The mobile devices and its mobile learning usage analysis. In *Proceedings of the International MultiConference of Engineers and Computer Scientists, I*. Hong Kong. Retrieved from <https://arxiv.org/ftp/arxiv/>

papers/1410/1410.4375.pdf

Jarvis, P. (1992). Reflective practice and nursing. *Nurse Education Today*, 12(3), 174 – 181.

Jarvis, W. R. (2001). Infection control and changing health-care delivery systems. *Emerging Infectious Diseases*, 7(2), 170 – 173.

Johansson, P. E., Petersson, G. I., & Nilsson, G. C. (2013). Nursing students' experience of using a personal digital assistant (PDA) in clinical practice: An intervention study, *Nurse Education Today*, 33(10), 1246 – 1251.

Johansson, P., Petersson, G., Saveman, B. I. & Nilsson, G. (2014). Using advanced mobile devices innursing practice: The views of nurses and nursing students. *Health Informatics Journal*, 20(3), 220 – 231.

Johnson, D. W., & Johnson, R. T. (1996). Cooperation and the use of technology. In D. H. Jonassen (Ed.). *Handbook of research for educational communications and technology* (pp. 1017 – 1044). New York: Simon and Schuster Macmillan.

Johnson, J. L. (2013). A dialectical examination of nursing art. In W. K. Cody (Ed.), *Philosophical and Theoretical Perspectives for Advanced Nursing Practice* (pp. 171 – 186). Burlington, MA: Jones and Bartlett Learning.

Johnston, J. M., Leung, G. M., Tin, K. Y. K., Ho, L. M., Lam, W., & Fielding, R. (2004). Evaluation of a handheld clinical decision support tool for evidence-based learning and practice in medical undergraduates. *Medical Education*, 38(6), 628 – 637.

- Kanuka, H., & Anderson, T. (1999). Using constructivism in technology-mediated learning: Constructing order out of the chaos in the literature. *Radical Pedagogy*, 1(2). Retrieved from [http://radicalpedagogy.icaap.org/content/issue1\\_2/02kanuka1\\_2.html](http://radicalpedagogy.icaap.org/content/issue1_2/02kanuka1_2.html)
- Karnieli-Miller, O., Strier, R., & Pessach, L. (2009). Power relations in qualitative research. *Qualitative Health Research*, 19(2), 279 – 289.
- Keegan, D. (2002). *The future of learning: From eLearning to mLearning*. Hagen: Ericsson.
- Keegan, D. (2005). The incorporation of mobile learning into mainstream education and training. In *Proceedings of mLearn 2005: The 4<sup>th</sup> World Conference on mLearning*. Cape Town, South Africa. Retrieved from <http://www.iadisportal.org/digital-library/the-incorporation-of-mobile-learning-in-to-mainstream-education-and-training>
- Kenney, J. W. (2013). Theory-based advanced nursing practice. In W. K. Cody (Ed.), *Philosophical and Theoretical Perspectives for Advanced Nursing Practice* (pp. 333 – 352). Burlington, MA: Jones and Bartlett Learning.
- Kenny, R. F., Park, C., Van Neste-Kenny, J. M. C., Burton, P. A., & Meiers, J. (2009a). Using mobile learning to enhance the quality of nursing practice education. In M. Ally (Ed.), *Mobile Learning: Transforming the Delivery of Education and Training* (pp. 75 – 98). Edmonton: Athabasca University Press.
- Kenny, R. F., Van Neste-Kenny, J. M. C., Park, C. L., Burton, P. A., & Meiers, J. (2009b). Mobile learning in nursing practice education: Applying Koole's



FRAME model. *Journal of Distance Education*, 23(3), 75 – 96.

King, M. G. (1987). *Conflicting interests: Professionalization and apprenticeship in nursing education. A case study of the Peter Bent Brigham Hospital*. Unpublished doctoral dissertation, Boston University.

Kirk, L. M. (2007). Professionalism in medicine: Definitions and considerations for teaching. *Proceedings (Baylor University Medical Center)*, 20(1), 13 – 16. Retrieved from, <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1769526/>

Kismihok, G. (2007). *The role of mobile learning in european education: Mobile learning report 2007, China*. Budapest: Corvinno Technology Transfer Center Ltd.

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. New Jewsy: Prentice Hall.

Koole, M. L. (2006). *The framework for the rational analysis of mobile education (FRAME) model: An evaluation of mobile devices for distance education*. Unpublished master's thesis, Athabasca University, Alberta. Retrieved from [http://auspace.athabascau.ca/bitstream/2149/543/1/aaa\\_FINAL\\_VERSION\\_mkoo le\\_thesis\\_edited\\_May9\\_2006.pdf](http://auspace.athabascau.ca/bitstream/2149/543/1/aaa_FINAL_VERSION_mkoo le_thesis_edited_May9_2006.pdf)

Koole, M. L. (2009). A model for framing mobile learning. In M. Ally (Ed.), *Mobile Learning: Transforming the Delivery of Education and Training* (pp. 75 – 98). Edmonton: Athabasca University Press.

Koole, M. L., & Ally, M. (2006). Framework for the Rational Analysis of Mobile Education (FRAME) Model: Revising the ABCs of Educational Practices. In

*International Conference on Networking, International Conference on Systems and International Conference on Mobile Communications and Learning Technologies* (p.216). Retrieved from <http://hdl.handle.net/2149/612>

Korucu, A. T., & Alkan, A. (2011). Differences between m-learning (mobile learning) and e-learning, basic terminology and usage of m-learning in education. *Procedia - Social and Behavioral Sciences*, 15(0), 1925 – 1930. doi: <http://dx.doi.org/10.1016/j.sbspro.2011.04.029>

Kukulka-Hulme, A., & Taxler, J. (2007). Designing for mobile and wireless learning. In H. Beetham, & R. Sharpe (Eds.), *Rethinking Pedagogy for a Digital Age: Designing and Delivering e-Learning* (pp. 180 – 192). London: Routledge.

Kumar, L. S., Jamatia, B., Aggarwal, A. K., & 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*, 2. Retrieved from <http://www.eurodl.org/?article=447>

Lai, C., & Wu, C. (2016). Promoting nursing students' clinical learning through a mobile e-portfolio. *Computers, Informatics, Nursing*, 34(11), 535 – 543.

Lai, C. Y., Wu, C. C. & Chen, S. M. (2006). A mobile learning environment to support the clinical nursing practicum. In T. Reeves & S. Yamashita (Eds.), *Proceedings of E-Learn 2006--World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education* (pp. 695 – 700). Honolulu, Hawaii, U.S.A.: Association for the Advancement of Computing in Education (AACE). Retrieved from <https://www.learntechlib.org/primary/p/23772/>.

- Lai, C. Y., & Yen, Y. C. (2018). Using mobile devices to support cognitive apprenticeship in clinical nursing practice: A case study. *Interactive Technology and Smart Education, 15*(4), 348 – 362.
- Laouris, Y., & Eteokleous, N. (2005). We need an educationally relevant definition of mobile learning. *Proceedings of mLearn 2005*. Retrieved March 31, 2014, from <http://www.mlearn.org.za/papers-full.html>.
- Lave, J. (1988). *Cognition in practice: Mind, Mathematics, and culture in everyday life*. Cambridge: Cambridge University Press.
- Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. New York: Cambridge University Press.
- Lea, S., & Callaghan, DL. (2011). Enhancing health and social care placement learning through mobile technology. *Educational technology & Society, 14*(1), 135 – 145.
- Lee, N., Chae, S., Kim, H., Lee, J., Min, J. H., & Park, D. (2016). Mobile-based video learning outcomes in clinical nursing skill education: A randomized controlled trial. *Computers, Informatics, Nursing, 34*(1), 8 – 16.
- LeDoux, J. (1999). *The emotional brain: The mysterious underpinnings of emotional life*. London: Phoenix.
- Legard, R., Keegan, J., & Ward, K. (2003). In-depth interviews. In J. Ritchie & J. Lewis (Eds.), *Qualitative research practice: A guide for social science students and researchers*. (pp. 138 – 169). London: Sage.

- Lehman, K. (2003). Clinical nursing instructors' use of handheld computers for student recordkeeping. *Journal of Nursing Education, 42*(10), 41 – 42.
- Lerner, J., & Keltner, D. (2000). Beyond valence: Toward a model of emotion-specific influences on judgment and choice. *Cognition and Emotion, 14*(4), 473 – 503.
- Leung, G. M, Johnston, J. M., Tin, K.Y. K., Wong, I. O. L., Ho, L., Lam, W. W. T., & Lam, T. (2003). Randomised controlled trial of clinical decision support tools to improve learning of evidence based medicine in medical students. *British Medicine Journal, 327*(7423), 1090.
- Liaschenko, J., & Peter, E. (2004). Nursing ethics and conceptualizations of nursing: Profession, practice and work. *Journal of Advanced Nursing 46*(5), 488 – 495.
- Lincoln, Y. S. & Guba, E. (1985). *Naturalistic inquiry*. CA: Sage.
- Littlewood, S., Ypinazar, V., Margolis, S. A., Scherpbier, A., Spencer, J. & Dornan, T. (2005). Early practical experience and the social responsiveness of clinical education: Systematic review. *British Medical Journal, 331*(7513), 387 – 391.
- Liu, S. (2003). Cultures within culture: Unity and diversity of two generations of employees in state-owned enterprises. *Human Relations, 56*, 387 – 417.
- Liu, Y., Li, H., & Carlsson, C. (2010). Factors driving the adoption of m-learning: an empirical study. *Computers & Education, 55*(3), 1211–1219.
- Long, T., & Johnson, M. (2000). Rigour, reliability and validity in qualitative research. *Clinical Effectiveness in Nursing, 4*, 30 – 37.
- Mann, K., Gordon, J., & Macleod, A. (2009). Reflection and reflective practice in

- health professions education: A systematic review. *Advances in Health Sciences Education, 14*(4), 595 – 621.
- Mather, C., & Cummings, E. (2015). Empowering learners: Using a triad model to promote eHealth literacy and transform learning at point of care. *Knowledge Management & E-Learning, 7*(4), 629 – 645.
- Matsumoto, D. (1996). *Culture and psychology*. CA: Brooks/Cole Pub.
- Mattar, J. (2018). Constructivism and connectivism in education technology: Active, situated, authentic, experiential, and anchored learning. *Revista Iberoamericana de Educación a Distancia, 21*(2), 201 – 217.
- Maudsley, G., & Strivens, J. (2000). Promoting professional knowledge, experiential learning and critical thinking for medical students. *Medical Education, 34*, 535 – 544.
- McBrien, B. (2006). Clinical teaching and support for learners in the practice environment. *British Journal of Nursing, 15*(12), 672 – 677.
- Mehdipour, Y., & Zerehkafi, H. (2013). Mobile learning for education: Benefits and challenges. *International Journal of computational Engineering Research, 3*(6), 93 – 101.
- Melosh, B. (1982). *“The physician’s hand”: Work culture and conflict in American nursing*. Philadelphia: Temple University Press.
- Melrose, S., Park, C., & Perry, B. (2015). *Creative clinical teaching in the health Professions*. Retrieved from <http://epub-fhd.athabascau.ca/clinical-teaching/>

- Messinger, J. (2011). *M-learning: An exploration of the attitudes and perceptions of high school students versus teachers regarding the current and future use of mobile devices for learning*. Retrieved from <http://gradworks.umi.com/34/87/3487951.html>
- Mete, S., & Sari, H. Y. (2008). Nursing students' expectations from tutors in PBL and effects of tutors' behaviour on nursing students. *Nurse Education Today*, 28(4), 434 – 442.
- Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook* (2nd ed.). Thousand Oaks: Sage.
- Moore, M. (1993). Three types of interaction. In K. Harry, M. John, & D. Keegan (Eds.). *Distance education: new perspectives*. London: Routledge.
- Motiwalla, L. (2007). Mobile learning: A framework and evaluation. *Journal of Computer and Education*, 49, 581 – 596.
- Murray, E., Gruppen, L., Catton, P., Hays, R., & Woolliscroft, J. O. (2000). The accountability of clinical education: Its definition and assessment. *Medical Education*, 34, 871 – 879.
- Nair, P., & Bhaskaran, H. (2014). The emerging interface of healthcare system and mobile communication technologies. *Health and Technology*, 4(4), 337–343.
- Naismith, L., Lonsdale, P., Vavoula, G., & Sharples, M. (2004). *Report 11: Literature review in mobile technologies and learning*. Bristol: Futurelab. Retrieved from <https://www.nfer.ac.uk/publications/futl15/futl15.pdf>

- Napthine, R. (1996). Clinical education: A system under a pressure. *Australian Nursing Journal*, 3(9), 20 – 24.
- Narins, B., & Gale, T. (2013). *The Gale encyclopedia of nursing and allied health* (3rd ed.). Detroit: Gale Cengage Learning.
- Newman, K., & Howse, E. (2007). The impact of a PDA-assisted documentation tutorial on nurses' students attitudes. *Computer Informatics Nursing*, 25(2), 76 – 83.
- O'Connor, S., & Andrews, T. (2015). Mobile technology and its use in clinical nursing education: A literature review. *Journal of Nursing Education*, 54(3), 137–144.
- O'Malley, C., Vavoula, G., Glew, J., Taylor, J., Sharples, M., Lefrere, P.,...Waycott, J. (2005). *Guidelines for learning/teaching/tutoring in a mobile environment*. Retrieved from: <https://hal.archives-ouvertes.fr/hal-00696244/document>
- O'Regan, K. (2003). Emotion and e-learning. *Journal of Asynchronous Learning Networks*, 7(3), 78 – 92.
- Orcutt, J. M. (2016). *Teaching Presence and Intellectual Climate in a Structured Online Learning Environment*. Retrieved from: [https://nsuworks.nova.edu/cgi/viewcontent.cgi?referer=https://scholar.google.com.hk/&httpsredir=1&article=1975&context=gscis\\_etd/](https://nsuworks.nova.edu/cgi/viewcontent.cgi?referer=https://scholar.google.com.hk/&httpsredir=1&article=1975&context=gscis_etd/)
- Pachler, N., Bachmair, B., & Cook, J. (2010). *Mobile learning: Structures, agency, practices*. London: Springer.

- Papp, I., Markkanen, M. & Von Bonsdorff, M. (2003) Clinical environment as a learning environment: student nurses' perceptions concerning clinical learning experiences. *Nurse Education Today*, 23, 262 – 268.
- Patton, M. Q. (2002). *Qualitative research & evaluation methods* (3rd ed.). Thousand Oaks: Sage Publications.
- Pierson, H. (1996). Learner culture and learner autonomy in the Hong Kong Chinese context. In R. Pemberton, E. Li & W. Or. (Eds.), *Taking Control: Autonomy in Language Learning* (pp. 49 –58). Hong Kong: Hong Kong University Press.
- Polit, D. F., & Beck, C. T. (2012). *Nursing research: Generating and assessing evidence for nursing practice* (9th ed.). Philadelphia: Wolter Kluwer and Lippincott Williams & Wilkins.
- Pollara, P. & Broussard, K. K. (2011). Student perceptions of mobile learning: A review of current research. In M. Koehler & P. Mishra (Eds.), *Proceedings of SITE 2011: Society for Information Technology & Teacher Education International Conference* (pp. 1643 – 1650). Nashville, Tennessee, U.S.A.: Association for the Advancement of Computing in Education (AACE). Retrieved from <https://www.learntechlib.org/primary/p/36533/>.
- Portney, L. G., & Watkins, M. P. (2014). *Foundations of clinical research: Applications to practice* (Pearson new international ed.). London: Person Prentice Hall Health.
- Power, R. (2013). Targeting FRAME: A new tool for mLearning design. In proceeding of 12<sup>th</sup> World Conference on Mobile and Contextual Learning, Doha,



Qatar. Retrieved from <http://www.qscience.com/doi/pdfplus/10.5339/qproc.2013.mlearn.34>

Prieto, J. C. S., Migueláñez, S. O., & García-Peñalvo, F. J. (2014). Understanding mobile learning: Devices, pedagogical implications and research lines. *Teoría de la Educación. Educación y Cultura en la Sociedad de la Información*, 15(1), 20 – 42. Retrieved from <https://www.redalyc.org/pdf/2010/201030471003.pdf>

Pu, Y., Wu, T., Chiu, P., & Huang, Y. (2016). The design and implementation of authentic learning with mobile technology in vocational nursing practice course. *British Journal of Educational Technology*, 47(3), 494 – 509.

Punch, K. F. (2009). *Introduction to research methods in education*. Los Angeles: Sage Publications.

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

Quinn, C. N. (2012). *The mobile academy: mLearning for higher education*. CA: Jossey-Bass.

Quinn, F. (2000b). *The principles and practice of nurse education* (4th ed.). Cheltenham: Stanley Thornes.

Raudaskoski, S. (2003). The Affordances of mobile applications. *Cost Action*, 269, 1 – 15. Retrieved from [https://www.researchgate.net/profile/Sanna\\_Raudaskoski/publication/312384558\\_THE\\_AFFORDANCES\\_OF\\_MOBILE\\_APPLICATIONS/links/587cec8e08ae9a860ff0de26/THE-AFFORDANCES-OF-MOBILE-APPLICATIONS.pdf](https://www.researchgate.net/profile/Sanna_Raudaskoski/publication/312384558_THE_AFFORDANCES_OF_MOBILE_APPLICATIONS/links/587cec8e08ae9a860ff0de26/THE-AFFORDANCES-OF-MOBILE-APPLICATIONS.pdf)

- Robinson A.L., Andrews-Hall S. & Fassett M. (2007). Living on the edge: Issues that undermine the capacity of residential aged care providers to support student nurses on clinical placement. *Australian Health Review*, 31(3), 368 – 378.
- Ronit, P. (2011). Technophilia: A new model for technology adoption. In *UK Academy for Information Systems Conference Proceedings 2011*. 41. Retrieved from <https://aisel.aisnet.org/cgi/viewcontent.cgi?article=1040&context=ukais2011>
- Rothstein, J. M. (2002). “Clinical education” vs clinical education. *Physical Therapy*, 82(2), 126 – 127.
- Rutty, J.E. (1998). The nature of philosophy of science, theory and knowledge relating to nursing and professionalism. *Journal of Advanced Nursing* 28, 243 – 250.
- Salomon, G. (1990). Cognitive effects with and of computer technology. *Communication Research*, 17(1), 26 – 44.
- Schunk, D. H. (1991). Self-efficacy and academic motivation. *Educational psychologist*, 26(3-4), 207 – 231.
- Seaman, J., & Rheingold, A. (2013). Circle talks as situated experiential learning: Context, identity, and knowledgeability in “learning from reflection”. *Journal of Experiential Education*, 36(2), 155 – 174.
- Sharples, L. (2005). A holistic approach of technology in teaching. New York: McGraw Hill Book Co. Inc. Sharples, M., Arnedillo-Sanchez, I., Milrad, M., & Vavoula, G. (2009). Mobile learning: Small devices, big issues. In N. Balachef, S.

- Ludvigsen, T. DeJong, A. Lazonder, S. Barnes. (Eds.), *Technology-enhanced Learning: Principles and Products* (pp. 233 – 250). Dordrecht: Springer.
- Shih, E., & Mills, D. (2007). Setting the new standard with mobile computing in online learning. *International Review of Research in Open and Distance Learning*, 8(2), 1 – 6.
- Sit, J. W. H., Chung, J. W. Y., Chow, M. C. M., Wong, T. K. S. (2005). Experiences of online learning: Students' perspective. *Nurse Education Today*, 25(2), 140 – 147.
- Spencer-Oatey, H., & Franklin, P. (2012). What is culture? A compilation of quotations. *GlobalPAD Core Concepts*, 1 – 22. Retrieved from [https://warwick.ac.uk/fac/soc/al/globalpad/openhouse/interculturalskills\\_old/globalpad\\_-\\_what\\_is\\_culture.pdf](https://warwick.ac.uk/fac/soc/al/globalpad/openhouse/interculturalskills_old/globalpad_-_what_is_culture.pdf)
- Speziale, H. J. S. (2007). Designing data generation and management strategies. In H. J. S. Speziale, & D. R. Carpfenter (Eds.), *Qualitative research in nursing: Advancing the humanistic imperative*. (pp. 35 – 55). Philadelphia: Lippincott Williams & Wilkins.
- Stake, R. E. (1995). *The art of case study research*. Thousand Oaks: Sage.
- Strandell-Laine, C., Stolt, M., Leino-Kilpi, H., & Saarikoski, M. (2015). Use of mobile devices in nursing student–nurse teacher cooperation during the clinical practicum: An integrative review. *Nurse Education Today*, 35(3), 493 – 499.
- Sydnor, E. R., & Perl, T. M. (2011). Hospital epidemiology and infection control in acute-care settings. *Clinical microbiology reviews*, 24(1), 141 – 173.

- Tan, Q., & El-Bendary, N. (2013). Location-based learning with mobile devices. In A. Tsinakos & M. Ally (Eds.), *Global Mobile Learning Implementations and Trends*. (pp. 169 – 186). Beijing: China Central Radio & TV University Press.
- Tanner, C. A. (2006). Thinking like a nurse: A research-based model of clinical judgment in nursing. *Journal of Nursing Education*, 45(6), 204 – 211.
- Tappen, R. M. (2011). *Advanced nursing research: From theory to practice*. Sudbury: Jones & Bartlett Learning.
- Tenner, E. (2002). Confessions of a Technophile. *Raritan*, 22(1), 135.
- Thede, L. Q., & Sewell, J. P. (2010). *Informatics and nursing: Competencies & applications*. Wolters Kluwer Health/Lippincott Williams & Wilkins.
- Thorell-Ekstrand, I. & Björvell, H. (1995). Nursing students' experience of care planning activities in clinical education. *Nursing Education Today*, 15, 196 – 203.
- Traxler, J. (2009). Current state of mobile learning. In M. Ally (Ed.), *Mobile learning: Transforming the delivery of education and training* (pp. 9 – 24). Edmonton: Athabasca University Press.
- Traxler, J. (2010). Distance education and mobile learning: Catching up, taking stock. *Distance Education*, 31(2), 129 – 138.
- Tuckett, A. G. (2005). Applying thematic analysis theory to practice: A researcher's experience. *Contemporary Nurse*, 19, 75 – 87. doi: 10.5172/conu.19.1-2.75
- Uden, L., & Beaumont, C. (2006). Why problem-based learning. In *Technology and problem-based learning* (pp. 44 – 64). IGI Global.

- United Nations Educational, Scientific and Cultural Organization [UNESCO]. (2013). *Policy guidelines for mobile learning*. Retrieved from <http://unesdoc.unesco.org/images/0021/002196/219641e.pdf>
- Venkatesh, B., Nargundkar, R., Sayed, F. K., & Shahaida, P. (2006). Assessing Indian students' perceptions towards m-learning: Some initial conclusion. *International Journal of Mobile Marketing*, 1(2), 75 – 79.
- Vishwanath, A. (2016). Mobile device affordance: Explicating how smartphones influence the outcome of phishing attacks. *Computers in Human Behavior*, 63(2016), 198 – 207.
- Von Glasersfeld, E. (1989). *Knowing without Metaphysics: Aspects of the Radical Constructivist Position*. Retrieved from <https://eric.ed.gov/?id=ED304344>
- Vygotsky, L. (1978). Interaction between learning and development. *Readings on the development of children*, 23(3), 34 – 41.
- Waltz, C. F., Strickland, O. L., & Lenz, E. R. (2010). *Measurement in nursing and health research*. New York: Springer Publishing Company.
- Wang, D., Xiang, Z., & Fesenmaier, D. R. (2014). Adapting to the mobile world: A model of smartphone use. *Annals of Tourism Research*, 48, 11 – 26.
- Wang, J., Wang, G. G., Ruona, W. E. A., & Rojewski, J. W. (2005). Confucian values and the implications for international HRD. *Human Resource Development International*, 8(3), 311 – 326.
- Wexler, S., Schlenker, B., Brown, J., Metcalf, D., Quinn, C., Thor, E.,...Wagner, E.

- (2007). *360° Research Report on Mobile Learning: What it is, why it matters, and how to incorporate it into your learning strategy*. Santa Rosa, CA: eLearning Guild.
- Williams, B. (2001). The theoretical links between problem-based learning and self-directed learning for continuing professional nursing education. *Teaching in Higher Education*, 6(1), 85 – 98. doi: 10.1080/13562510020029626
- Winters, N. (2006). What is mobile learning? In M. Sharples, (Ed.). *Big issues in mobile learning: Report of a workshop by the Kaleidoscope Network of Excellence Mobile Learning Initiative* (pp. 5 – 9). Retrieved from <https://telearn.archives-ouvertes.fr/hal-00190254>
- Wong, K. F. (2013). A study of the universities of the third age in Hong Kong: An evaluation of elder academy model for the life long learning of older people. Doctoral dissertation, Lingnan University, Hong Kong. Retrieved from [http://dx.doi.org/10.14793/soc\\_etd.31](http://dx.doi.org/10.14793/soc_etd.31)
- Woodill, G. (2011). *The mobile learning edge: Tools and technologies for developing your teams*. New York: The McGraw-Hill Companies.
- Wu, P., Hwang, G., Tsai, C., Chen, Y., & Huang, Y. (2011). A pilot study on conducting mobile learning activities for clinical nursing courses based on the repertory grid approach. *Nurse Education Today*, 31(8), E8 – E15.
- Wu, C. C., & Lai, C. Y. (2009). Wireless handhelds to support clinical nursing practicum. *Educational Technology & Society*, 12, 190 – 204.
- Yardley, S., Teunissen, P. W., & Dornan, T. (2012). Experiential learning:

Transforming theory into practice. *Medical Teacher*, 34(2), 161 – 164.

Yılmaz, K. (2013). Comparison of quantitative and qualitative research traditions: Epistemological, theoretical, and methodological differences. *European Journal of Education*, 48(2), 311 – 325.

Yin, R. K. (2014). *Case study research: Design and methods* (5th ed.). Los Angeles: Sage.

Young, M. F. (1993). Instructional design for situated learning. *Educational Technology Research and Development*, 41(1), 43 – 58.

Zepke, N., & Leach, L. (2002). Contextualised meaning making: One way of rethinking experiential learning and self-directed learning? *Studies in Continuing Education*, 24(2), 205 – 217. doi: 10.1080/0158037022000020992

## **Appendix 1: Semi-structured Interview Guide for the Nursing Students**

1. What is your opinion on the use of mobile learning among nursing students during the clinical practicum period? (e.g. advantage/ disadvantage/ recommendation)
2. Tell me what kinds of supporting infrastructure/features (e.g. software/hardware/ design/Apps) of the mobile device did you use?
3. Where and how did you make use of the iPod Touch or other mobile device during the clinical practicum period?
4. What did you use the iPod Touch for during the clinical practicum period?
5. Are you satisfied with the current infrastructure of the iPod Touch? Why?
6. What makes a person a successful mobile learner? What else did you need to use the iPod Touch to learn?
7. Did you use the mobile device to communicate with your classmates/university staff? If yes, why and where did you use the mobile device for communication?
8. What kind of supporting system did you use for the communication (e.g. email/ OLE/Apps)?



9. How did the mobile device facilitate you to communicate or collaborate with other individuals or the university?
  
10. Did any factors affect your use of the mobile device during the clinical practicum period?
  
11. Is there anything else about mobile learning/use of the mobile device among nursing students you would like to tell me?

## **Appendix 2: Semi-structured Interview Guide for the Practicum Course**

### **Coordinators (Coordinators) & Clinical Tutors**

1. What is your opinion on the use of mobile learning among nursing students during the clinical practicum period? (e.g. advantage/ disadvantage/ recommendation)
2. Tell me what kinds of supporting infrastructure/ features (e.g. software/hardware/ design/Apps) of the mobile device would be useful for the students during the clinical practicum period?
3. Where and how should the students to make use of the iPod Touch or other mobile device during the clinical practicum period?
4. Did the students use the iPod Touch during the clinical practicum? If so, why and where did they use it?
5. Are you satisfied with the current infrastructure of the iPod Touch? Why?
6. What makes a person a successful mobile learner? What else do you suggest a mobile learner needs to use the iPod Touch for learning?
7. Did the students use the mobile device to communicate with you/ other teaching staff? If so, why and where did they use the mobile device for communication?

8. What kind of supporting system did the students use for the communication (e.g. email/ OLE/ Apps)?
  
9. How could the mobile device facilitate the students to communicate or collaborate with other individuals or the university?
  
10. Were there any factors that may affect the students' use of the mobile device during the clinical practicum period?
  
11. Is there anything else about mobile learning/use of the mobile device among nursing students you would like to tell me?

**Appendix 3: Semi-structured Interview Guide for the Head of Division of  
Nursing and Health Studies (HoD)**

1. What is your opinion on the use of mobile learning among nursing students during the clinical practicum period? (e.g. advantage/disadvantage/recommendation)
2. When and why did you have the idea to introduce the use of mobile learning among nursing students during the clinical practicum?
3. Tell me what kinds of supporting infrastructure/features (e.g. software/ hardware/design/Apps) of the mobile device would be useful for the students during the clinical practicum period?
4. Where and how did you expect the students to make use of the iPod Touch or other mobile device during the clinical practicum period?
5. Are you satisfied with the current infrastructure of the iPod Touch? Why?
6. What makes a person a successful mobile learner? What else do you suggest a mobile learner needs to use the iPod Touch?
7. Did you expect the students to use the mobile device to communicate with you/ other teaching staff? If yes, in what circumstances and where can they use the mobile device for communication?

8. What kind of supporting system did you expect the students to use for the communication (e.g. email/ OLE/ Apps)?
  
9. How could the mobile device facilitate the students to communicate or collaborate with other individuals or the university?
  
10. Were there or did you expect any factors that could affect the students' use of the mobile device during the clinical practicum period?
  
11. Is there anything else about mobile learning/use of the mobile device among nursing students you would like to tell me?

**Appendix 4: Semi-structured Interview Guide for the Technical Support Staff  
(Technicians)**

1. What is your opinion on the use of mobile learning among nursing students during the clinical practicum period? (e.g. advantage/disadvantage/recommendation)
2. Tell me what kinds of supporting infrastructure/features (e.g. software/hardware/design/Apps) of the mobile device would be useful for the students during the clinical practicum period?
3. Usually, what kind of technical problem did students encounter?
4. Where and how should the students make use of the iPod Touch or other mobile device during the clinical practicum period?
5. Are you satisfied with the current infrastructures of the iPod Touch? Why?
6. What makes a person a successful mobile learner? What else do you suggest a mobile learner needs to use the iPod Touch?
7. Did the students use the mobile device to communicate with you/other technical support staff? If yes, why and where did they use the mobile device for communication?

8. What kind of supporting system did you expect the students to use for the communication (e.g. email/OLE/Apps)?
  
9. How could the mobile device facilitate the students to communicate or collaborate with other individuals or the university?
  
10. Were there or did you expect any factors that could affect the students' use of the mobile device during the clinical practicum period?
  
11. Is there anything else about mobile learning/use of the mobile device among nursing students you would like to tell me?

## Appendix 5: Letter of Access

22<sup>nd</sup> September, 2013

Ms. Charm Yee Chong

Dear Ms. Charm,

Thank you for your letter of 25 August 2013 seeking approval from us in conducting a research project entitled “A Mobile Learning Model for Clinical Learning in Hong Kong: A Case Study” which involves interviewing the students of the Bachelor of Nursing with Honours in General Health Care programme, honorary clinical tutors and university staff.

I write to confirm that we have no objection to your proposed research project to be conducted in the university. You must also obtain written consent from each participating student and staff prior to conducting the interview.

I would suggest using the interview room at the \_\_\_\_\_ for your interview. Please contact Ms. \_\_\_\_\_, the Senior Laboratory Technician, in regard to arrange the interview room.

If you need further information, please feel free to contact me at \_\_\_\_\_.

Wishing you every success in your study.

Yours sincerely,

Head, Division of Nursing & Health Studies



## Appendix 6: Sample Transcript

Interview 6 (23<sup>rd</sup> December 2013)

Participant 6: Mr. W [W]

Interviewer: Caroline Charm [C]

Line		Transcript	Memos
1 2 3 4 5	C:	Thank you for taking part in this research. I want to start by asking this question: From the perspective of a nursing student, what is your opinion on the use of mobile learning during clinical practicum period?	Q1
6 7 8 9 10 11	W:	I think it is a good way to learn. Most people have a smartphone, which is a mobile device in itself. Using it to learn is bringing learning to everyday life, as it gives them more options for their learning and thus more flexibility.	His answer is in general. Not specific to nursing students.
12	C:	I see. What do you mean by more options?	
13 14 15	W:	You can do it anytime and anywhere. For example, you can take out the phone and start reading. Learning is made convenient.	
16 17 18	C:	For nursing students, what is your opinion on the use of mobile learning especially during your practicum?	I try to get his answer more specific to nursing students.
19	W:	You mean the iPod Touch or...	
20 21	C:	Not necessarily. It can be your smartphone or iPod Touch.	
22 23 24 25 26 27 28 29	W:	Utilizing mobile learning during practicum? Let me think... You said that it is meant for our studies. I cannot think of anything to do with our studies that can be bad. It is just a matter of using a tool that is a mobile device. Having tools is not the most important. As a student, I think that anything for studying is good. I'd always wondered if we could make	He thought of this for about 5 seconds.  He provided some

30		everything, including the mobile assessment	suggestion here.
31		system, textbooks, and notes, electronic.	
32			
33	C:	Then, what kind of supporting	Q2
34		infrastructures/ features of the mobile device	
35		did you use during the last four years of	
36		practicum?	
37	W:	Mostly for entering the scores of clinical	
38		training for the assessor.	
39	C:	For mark entry of the mobile assessment	
40		system?	
41	W:	Yes. I also used it to download dictionaries to	
42		look up difficult words as well as to play	
43		music and games.	
44	C:	You said that it was used for mark entry and	
45		looking up words. Do you mean a regular	
46		English dictionary or a dictionary of medical	
47		terms?	
48	W:	In fact, both.	
49	C:	I see.	
50	W:	I used it for looking up words that I did not	
51		know when I read English books.	
52		Sometimes, I used it to look up special	
53		medical terms that I came across during my	
54		practicum.	
55	C:	What you just mentioned is that these things,	
56		such as playing music, searching word	
57		meanings, and mark entry, were all done with	
58		the iPod Touch?	
59	W:	You mean the functions?	
60	C:	Yes.	
61	W:	Sometimes, I also used these functions on my	
62		PC at home.	
63	C:	I see. So, you are saying that you also used	
64		other mobile devices apart from the iPod	
65		Touch?	
66	W:	Yes, mobile devices. Does my PC count as a	He suddenly confused
67		mobile device?	that PC as mobile device.

68	C:	Is the PC stationed at home and not taken out	
69		to the streets?	
70	W:	That's right. It is a PC not mobile device.	
71	C:	Did you do the things you mentioned, such as	
72		using the dictionary and playing music and	
73		games, with a portable device you take with	
74		you, such as a smartphone?	
75	W:	No, not at the initial stage.	
76	C:	When was that?	
77	W:	The initial stage was when I did not have a	He started to use
78		smartphone, from Year 1 to Year 3. I only	smartphone in year 4.
79		had a smartphone when I was in the middle	
80		of Year 4.	
81	C:	I see.	
82	W:	I also used the smartphone for purposes other	Advantage of phone than
83		than those mentioned, say, entertainment and	iPod
84		mark entry. The phone is handier than the	
85		iPod Touch for these functions.	
86			
87	C:	I see.	
88	W:	Yes. I only needed to bring one phone for all	
89		of those functions.	
90	C:	That means you have been doing things, such	
91		as using the dictionary and playing music, on	
92		the smartphone since you had it.	
93	W:	Yes. The use of the iPod Touch became less	
94		frequent.	
95	C:	I see. Does that mean you also observed that	
96		you used the iPod Touch more often from	
97		Year 1 to Year 3 when you did not have a	
98		smartphone?	
99	W:	Yes.	
100	C:	You said you used the iPod Touch for mark	
101		entry and dictionary. The dictionary is a	
102		learning tool. Did you use the iPod Touch to	
103		search for other educational functions apart	
104		from the dictionary as far as your study is	
105		concerned?	

106	W:	Uhm, yes. For example, anatomy. Some apps	
107		with illustrations for a clearer explanation	
108		can be downloaded. For example, you can	
109		have a 360-degree panoramic view of each	
110		part. It's convenient. I used it for reading	
111		books, too.	
112	C:	What kind of books?	
113	W:	Downloaded notes and novels.	
114	C:	Books for entertainment?	
115	W:	Course texts, too.	Course materials
116	C:	What kind of course texts? Textbooks or	
117		notes?	
118	W:	Both.	
119	C:	Did you use it to obtain some online	
120		textbooks?	
121	W:	Yes, such as e-books.	
122	C:	The main functions for learning include the	Q2 (continue)
123		dictionary and other apps, such as reading	
124		books and notes. Is that all? Did you also use	
125		the iPod Touch for other learning purposes?	
126			
127	W:	I remember that I used it while reviewing. I	
128		liked to use the iPod Touch for audio	
129		recording. I would record myself discussing	
130		the points I considered important to listen to	
131		later. Reading a book while travelling is	
132		difficult so I would listen to the recording for	
133		revision on the road.	
134	C:	Is that all?	
135	W:	Yes.	
136	C:	You used the iPod for music and games. You	
137		also used it for audio recording for learning.	
138		Is there anything else?	
139	W:	That's about it.	
140	C:	You said you used the iPod Touch less often	Why iPod Touch used
141		since you had your smartphone. Why is that?	less often than
142			smartphone?
143	W:	First, I can make phone calls with a	

144		smartphone. Most people have a phone with	
145		them. If the phone can do what an iPod	
146		Touch does, the former will replace the latter.	
147		It is better to carry one device than two.	
148		Second, the hardware design of a smartphone	
149		is more up to date than that of iPod Touch,	
150		and the functions, including sharper images	
151		and faster running of apps, are more	
152		advanced. A smartphone can do all other	
153		things that an iPod Touch can do except for	
154		the mark entry for clinical practicum. I used	
155		an Android phone, so it did not have the mark	
156		entry function.	
157	C:	I see. You mentioned that you found the	Summarising
158		smartphone handier than the iPod Touch and	
159		that you always had it with you.	
160	W:	Yes.	
161	C:	Many of its functions can replace those of the	
162		iPod Touch, right?	
163	W:	Yes.	
164	C:	You mentioned the functions. What	Q2 (continue)
165		functions or features do you think a mobile	
166		device should have or may be helpful to your	
167		clinical practicum? It does not have to be an	
168		iPod Touch. What do you expect from its	
169		hardware and software?	
170	W:	What do I expect? I think it has to be easy to	
171		carry.	
172	C:	Right.	
173	W:	For example, it is good if you can put a phone	
174		in your pocket. Moreover, it has to be light in	
175		your pocket. If it is too heavy, no one will	
176		carry it around. We also need to work	
177		overnight during the practicum, sometimes	
178		for a long period of time, so the battery is also	
179		crucial. It has to be durable. The screen has to	
180		be clearer.	
181	C:	Clearer?	

182	W:	Yes. If I want to read a book, then having a	
183		large screen will be ideal. Otherwise, I have	
184		to read close to the screen. As I said, it has to	
185		be really fast.	
186	C:	I see. It has to be fast enough.	
187	W:	Yes, the processor has to be fast.	
188	C:	So, only the system of the hardware needs to	
189		be fast.	
190	W:	That's right. The system of the software can	
191		be updated. The hardware of the iPod Touch	
192		I used before could not support the updated	
193		software so some apps could not be updated	
194		and used.	
195	C:	Is there anything else?	
196	W:	That's about it.	
197	C:	Where do you usually use the mobile device?	Q3
198			
199	W:	Where?	
200	C:	Yes.	
201	W:	While I'm commuting or waiting for	
202		someone.	
203	C:	I see.	
204	W:	And just before I sleep.	
205	C:	I see.	
206	W:	Mainly on such occasions.	
207	C:	Do you mean before you fall asleep at night?	
208	W:	Yes.	
209	C:	Do you use the iPod Touch or smartphone	
210		when you are in the hospital?	
211	W:	Yes, I do.	
212	C:	What do you usually use the phone for in the	Q3 (continue)
213		hospital?	
214	W:	Do you mean while I am on duty?	
215	C:	Yes.	
216	W:	Mainly for jotting down words that I'm not	
217		familiar with and for looking them up when I	
218		have time or trying to look up some pill	
219		names that I'm not familiar with.	

220	C:	So that means you use the mobile device	
221		mainly for mark entry as well as for looking	
222		up words and pill names in the hospital. Are	
223		there any other functions that can be used in	
224		the hospital?	
225	W:	No, not really.	
226	C:	Suppose you are not in the hospital. You said	Q4
227		you used the apps on the mobile device to	
228		play music and games. Do you also use the	
229		device for functions that you just mentioned,	
230		such as looking up pill names?	
231	W:	Yes, mostly while I'm revising.	
232	C:	When do you usually review?	
233	W:	When do I review more often?	
234	C:	When do you do that especially?	
235	W:	Uhm, mostly before exams.	
236	C:	I see. Especially before exams.	
237	W:	Yes.	He laughs for few seconds.
238	C:	You mean you use it more often before	
239		exams?	
240	W:	Yes.	
241	C:	Right.	
242	W:	I use it more when I need to review more as	
243		the exams approach.	
244	C:	I see. As far as the iPod Touch given by the	Q5
245		faculty is concerned, were you happy with it	
246		as a tool for assessment?	
247	W:	I would say yes and no.	
248	C:	Why?	
249	W:	The good thing about it is that it's quite small	
250		and easy to carry to the wards for assessment.	
251		The downside is its lack of clarity.	
252			
253	C:	Was it insufficiently clear?	
254	W:	For instance, it is unclear to everyone what	He refer to the Mobile Assessment App.
255		"0 to 4" stands for despite the given	
256		description.	

257	C:	You're saying that it was unclear when a 0 or	
258		1 mark should be given despite the	
259		description.	
260	W:	Yes. That's one of the problems. The second	
261		problem is that well-experienced assessors	
262		may not be used to the new system. They are	
263		more used to logbooks and checking the right	
264		boxes than swiping on a mobile phone.	
265	C:	You're saying some assessors are not used to	
266		the mobile devices.	
267	W:	That's right.	
268	C:	Can you say a bit more about the use of the	
269		iPod Touch for assessment? What are the	
270		comments of the mentors on this?	
271	W:	Some assessors find clicking on the words	Comments from mentor
272		difficult, and they ask me to help.	
273	C:	So they cannot click on the words?	
274	W:	Yes, and they often click on the wrong ones.	
275		They ask for my help when they're	
276		frustrated.	
277	C:	I see. Anything else?	
278	W:	That's about it.	
279	C:	You said that its advantage is its small size. Is	Q5 (continue)
280		there anything else? Anything that made you	
281		feel happy with it?	
282	W:	The design of the apps is organized. The apps	He refer to the Mobile
283		are in different pages. For example, if I want	Assessment App again
284		to find the assessment criteria of a particular	
285		department, such as the Emergency Room, I	
286		can easily find them from the apps for	
287		reference.	
288	C:	So do you think the items for assessment are	
289		good for reference?	
290	W:	Yes.	
291	C:	What exactly is the reference about?	
292	W:	For my self-learning. For instance, during the	
293		clinical practicum, I found that my	
294		performance assessment in the ER had an	



295		item for assessing the needs of patients.	
296		When I learned that, I paid more attention to	
297		this task and asked my patients related	
298		questions. I had a better chance of meeting	
299		the requirements.	
300	C:	I see. Anything else?	
301	W:	No, that's it.	
302	C:	Were you happy with the iPod Touch for	Q5 (continue)
303		learning purposes? Or do you have any	
304		opinions on that?	
305	W:	Uhm, I was not completely satisfied with it,	He hesitated for a while
306		and I seldom used it because both the	
307		hardware and the software were somewhat	
308		outdated.	
309	C:	You mean the hardware and the software of	
310		the iPod Touch were old?	
311	W:	Yes.	
312	C:	I see. Was it because the hardware was	
313		unable to support new operating systems so	
314		you were unable to update the device with	
315		new apps?	
316	W:	Yes. The apps were the same old ones.	
317	C:	I see. Do you mean it affects the use of the	
318		iPod Touch for learning purposes?	
319	W:	Yes, that's right. If I can do everything with	Suggested for using
320		my smartphone, then I will not need to bring	smartphone
321		another device with me.	
322	C:	What does a nursing student require if he/she	Q6
323		wants to achieve mobile learning?	
324	W:	Requirements?	
325	C:	Yes. Requirements of a student to use	
326		mobile learning.	
327	W:	I think the person has to be flexible.	
328	C:	Can you elaborate on that?	
329	W:	For instance, in the past, people would stay at	
330		home so they could review quietly. However,	
331		this is not absolutely necessary. I can do the	
332		same thing with an iPod Touch or	

333		smartphone. It also depends on whether the	
334		person is flexible or creative enough to think	
335		of that. Another requirement is to be	
336		fashionable.	
337	C:	Can you elaborate on that? What do you	
338		mean fashionable?	
339	W:	When you walk on the streets, you find many	
340		people using their smartphones for all sorts	
341		of things that they like to do, such as games,	
346		music, reading, or work. Using a smartphone	
342		has become a trend.	
343	C:	Can we say that mobile learning is a trend?	
344	W:	Uhm, yes. Mobile learning and entertainment	
345		are both trends.	
346	C:	You mentioned that the willingness and	
347		readiness to carry a mobile device anywhere	
348		are prerequisites for the mobile learning of	
349		students, didn't you?	
350	W:	Yes.	
351	C:	Are there any other requirements?	Q6 (continue)
352	W:	Another is self-control.	
353	C:	I see. Why do you think self-control is	
354		another requirement?	
355	W:	Yes, self-control because a mobile device is	
356		too convenient. Many apps are educational,	
357		but many others are for games. Addiction is	
358		common. You need to balance and manage	
359		your time well.	
360	C:	Regarding the use of a mobile device, from	
361		your experience of having only iPod Touch	
362		in the first three years, what difficulty did	Q10
363		you have in using only the iPod Touch for	
364		assisting your learning?	
365	W:	Did I have any difficulty? Uhm...	
366	C:	Did you have any trouble in terms of using it	
367		or carrying it around?	
368	W:	Actually, it was easy to carry around.	He refer back to the
369		However, the battery ran out quickly, and	device

370		that is its main problem. Another limitation	
371		in using it for learning is that couldn't update	
372		the apps.	
373	C:	You said that you bought a smartphone when	
374		you were in Year 4, but the operating system	
375		of the phone was different from that of the	
376		iPod Touch. Did that have anything to do	
377		with you giving up the iPod Touch?	
378	W:	You mean the operating system?	
379	C:	Yes.	
380	W:	I think such connection is absent.	
381	C:	I see. So no connection at all.	
382	W:	I like trying new things. I also think the two	
383		systems are both good in different ways. You	
384		get used to either one before long.	
385	C:	You said you like trying new things. Do you	Refer back to Q6
386		think your willingness to try new things is	
387		one of the requirements for the mobile	
388		learning of a student?	
389	W:	Yes. If you are conservative, you will have	
390		little interest in this world. Then, you will	
391		have less chance to encounter or learn new	
392		things.	
393	C:	You mentioned interest. Does that mean	
394		curiosity?	
395	W:	Yes.	
396	C:	Let's sum up what you said. If a nurse wants	Summarize for Q6
397		to engage in mobile learning, he/she needs to	
398		be flexible and have self-control, interest in	
399		new things, and curiosity. Anything else you	
400		want to add?	
401	W:	That's about it.	
402	C:	Let us move on to another area. Apart from	Q7
403		making phone calls, did you use the mobile	
404		devices to communicate with others?	
405	W:	Yes.	
406	C:	How did you use these mobile devices for	Q8
407		communicating with others? What software	

408		or function did you use?	
409	W:	I guess you're referring to WhatsApp, Line,	He tried to recall very seriously
410		and email. Do I also use FaceTime?.....Yes, I	
411		think I used that before but only occasionally.	
412			
413	C:	FaceTime means...	
414	W:	Video calling. I used it before but rarely.	
415	C:	You used it before nonetheless?	
416	W:	Yes.	
417	C:	Socializing software includes WhatsApp and	
418		Line.	
419	W:	SMS, too.	
420	C:	SMS was also used?	
421	W:	Yes, I still used it because some of my friends	
422		did not have smartphones yet.	
423	C:	You mentioned email, FaceTime, and video	Q8 (continue)
424		calling. Were there any other communication	
425		channels?	
426	W:	Does Bluetooth count as a communication	
427		tool? Does sending a song to someone count?	
428			
429	C:	Yes, of course. Have you used Bluetooth to	
430		send a song to someone?	
431	W:	Yes, something like that.	
432	C:	Then do you think Bluetooth is a required	Clarify for the device feature
433		tool for a mobile device?	
434	W:	Not necessarily Bluetooth, but a mobile	
435		device must have "a transmitting tool".	
436	C:	What do you mean by having "a transmitting	
437		tool"?	
438	W:	A tool for sending files, music, or videos.	
439	C:	Music and videos?	
440	W:	Yes. Of course, you can do that with	
441		WhatsApp and Line, but it can only be done	
442		when a network exists. Instead, bluetooth can	
443		be used without a network. It works	
444		differently.	
445	C:	I see. You mentioned email, FaceTime, SMS,	

446		Line, and WhatsApp, but did you use a	
447		mobile device for browsing the OLE, that is,	
448		the Online Learning Environment when you	
449		were having clinical practicum and outside	
450		the university?	
451	W:	You mean browsing on the iPod Touch?	
452	C:	Yes. Or a smartphone.	
453	W:	Oh, yes.	
454	C:	Did you do that often?	Q11
455	W:	No, not frequently.	
456	C:	Why?	
457	W:	Because I had the habit of browsing on my	
458		PC at home because it was easier.	
459	C:	How?	
460	W:	It's not an application. I mean, the OLE is not	
461		an application. It's easier to open webpages	
462		on a PC than on a phone mainly because of	
463		the size. The size fits better.	
464	C:	That means you browse the OLE at home	Q11(continue)
465		with a PC because it is easier. Did you do that	
466		often?	
467	W:	Yes.	
468	C:	You said that you used the media on a mobile	
469		device to communicate with your friends.	
470		What purposes and contents are commonly	Q7 (continue)
471		involved in that kind of communication with	
472		a mobile device?	
473	W:	It can be just for a casual chat or a specific	
474		purpose, such as arranging a gathering,	
475		exchanging and sharing information, or	
476		sending photos to others.	
477	C:	So the common purposes of communication	Q9
478		through a mobile device are to have casual	
479		chats, arrange gatherings, and share	
480		information. Do you mean sharing news?	
481	W:	Yes and notifying the other person about	
482		some important information that he/she may	
483		also find valuable.	

484	C:	You mentioned sending photos. Apart from	
485		photos, did you send your friends other	
486		things?	
487	W:	Mainly photos. I also sent songs and videos	
488		but not as often as I sent photos.	
489	C:	Did you ever communicate with your	Q7 (continue)
490		teachers at the university through a mobile	
491		device?	
492	W:	No.	
493	C:	Why not?	
494	W:	Uhm, why?	
495	C:	You never did it before? Never contacted a	
496		teacher using a mobile device? Why?	
497	W:	Because you need their phone numbers to get	
498		in touch with them or you need to email	
499		them.	
500	C:	Did you ever use a mobile device to send	Related to Q8
501		email to your teachers?	
502	W:	Seldom.	
503	C:	Was it because you would wait until you got	
504		home to send email?	
505	W:	Yes. Typing is also easier with a PC.	
506	C:	Apart from teachers, did you use the mobile	Q9 (continue)
507		device to get in touch with friends in other	
508		ways? Why did you use the built-in functions	
509		of a mobile device to get in touch with your	
510		friends?	
511	W:	Getting in touch with friends can be done	He looks happy with
512		either by using the applications in a mobile	when talking about
513		device or by making phone calls. You can	getting in touch with
514		also make a personal call. For matters that	friends.
515		can wait, such as casual chat, using an instant	
516		message is much easier than making a phone	
517		call. You do not need to worry about calling	
518		someone while he/she is busy. The message	
519		can be read whenever he/she is available.	
520			
521	C:	You said that you mostly used alternative	

522		methods for non-urgent matters.	
523	W:	I would make phone calls for urgent matters.	
524	C:	I see. Does it mean that the alternative	
525		methods are not for urgent purposes?	
526	W:	Yes.	
527	C:	Because the other party may not be	
528		available?	
529	W:	Yes. The other party can reply when he/she	
530		has the time. The alternative methods are also	
531		for other matters that are not urgent but	
532		important.	
533	C:	Can you give an example? What are	Clarify for non-urgent
534		non-urgent matters but important?	matters
535	W:	An example is sharing tips. We exchanged	
536		information when we knew which hospital	
537		we were placed at or when we found good	
538		tips for interviews, which would be coming	
539		up in a few weeks. Those were not urgent	
540		matters, but they were important. Sending	
541		messages enables the sharing of this kind of	
542		information, which can be retrieved anytime	
543		afterward.	
544	C:	Good. Let us go back to the time of the	
545		practicum. Did the same thing happen? Can	
546		you give real examples of that during the	
547		practicum?	
548	W:	None that I can think of during the practicum.	
549			
550	C:	You mentioned arranging gathering with	
551		friends during the practicum, didn't you?	
552	W:	I did not install WhatsApp or Line on my	
553		iPod Touch.	
554	C:	Was it because you were unable to install	
555		them technically?	
556	W:	Yes. It was prohibited.	
557	C:	Would you use the phone to get in touch with	Q8 (continue)
558		your classmates or share information with	
559		them during your practicum?	

560	W:	Yes, but I did that more often after the	
561		practicum.	
562	C:	Do you think that a mobile device, such as a	Q9 (continue)
563		phone or an iPod Touch, can help facilitate	
564		your communication with others or the	
565		school?	
566	W:	Yes, I think so. It depends on how you use it.	
567			
568	C:	Can you expound on how to use it?	
569	W:	A double-edged sword can save and kill.	
570	C:	I see.	
571	W:	Getting in touch with someone is easy with	
572		the advancement in technology. In the past,	
573		you had to send a letter to send a message and	
574		then make a phone call later. Today, you only	
575		have to click a button to get in touch with	
576		someone.	
577	C:	Do you actually do that?	
578	W:	I do. I can find many different friends and	
579		have many different WhatsApp groups.	
580		Getting in touch with others is convenient. It	
581		brings people closer. However, those who do	
582		not use the phone this way but only indulge	
583		in the virtual world on their own end up	
584		isolated and distanced from others.	
585	C:	That means it depends on the user. It depends	
586		on how students make use of their mobile	
587		device.	
588	W:	Yes.	
589	C:	Going back to the practicum, what factors	Q10
590		have affected your use or disuse of a mobile	
591		device, such as an iPod Touch or a mobile	
592		phone?	
593	W:	I did not dare use them in front of a senior	
594		staff member.	
595	C:	Why?	
596	W:	It would give them the impression that you	
597		use the device only to play.	



598	C:	I see.	
599 600 601 602	W:	Yes. They would assume that you were playing when you hold the device. So I seldom take the device out to avoid any misunderstanding.	
603	C:	I see.	
604	W:	I also avoid taking it out in front of patients.	
605	C:	Why?	
606 607 608 609 610	W:	For the same reason. Nevertheless, I do not need to use it in front of them. For instance, I am in Psychiatry so I want to communicate more with my patients than with other people through my mobile device.	
611 612 613 614 615	C:	You mentioned that you refrained from using the device mainly to avoid misunderstanding. Were there any other factors that made you use the device, such as for better communication?	Q10 (continue)
616	W:	In front of people?	
617	C:	Yes.	
618	W:	Let me think...Actually, rarely.	
619	C:	Except for the mark entry function?	
620 621 622 623 624 625 626 627 628	W:	Yes. It can be used in the presence of an open-minded staff. They are usually impressed by the device. Perhaps they also know that the university gave it to us. They are usually curious to find out how the device works and asks us to demonstrate the functions. So it would be better in front of them, but we seldom came across this kind of staff.	He refer to the Clinical Tutor
629 630 631 632 633	C:	In other words, the staff in the wards think that the device is mainly for entertainment when used in the hospital. Can we say that they cannot associate it with the function for learning?	
634	W:	Yes, more or less.	
635	C:	Were there any factors that led you to use or	Q10 (continue)

636		not use the mobile device outside the	
637		hospital?	
638	W:	The availability of Wi-Fi is one.	
639	C:	Why is that?	
640	W:	An available Wi-Fi means having less battery	
641		and data consumption. Put simply, it helps	
642		save money, which is an incentive for me to	
643		use the device. Moreover, it depends on	
644		whether I have friends around me.	
645	C:	Why?	
646	W:	I think it would be better to chat with friends	
647		during gatherings than use my phone.	
648	C:	I see. You think chatting is a better way to	
649		communicate when you are with your	
650		friends?	
651	W:	Yes. That's what I believe.	
652	C:	Good. Finally, do you have other opinions	Q11
653		about mobile learning?	
654	W:	We have the mark entry function, but it is not	
655		perfect, as not everyone uses the same	
656		operating system. For instance, it cannot be	
657		used on my smartphone so its compatibility	
658		is limited.	
659	C:	The function of mark entry is restricted to the	
660		iPod Touch because of a problem with the	
661		operating system, but other activities or	
662		communication can be performed using your	
663		smartphone.	
664	W:	Yes.	
665	C:	Is there anything else other than the mark	
666		entry system, electronic notes, and	
667		compatibility with more than one operating	
668		system at the same time?	
669	W:	Umm... That's about it.	
670	C:	Let's go back to the assessment. You	Mobile Assessment App
671		mentioned that the iPod touch, as an	
672		assessment tool, has many items.	
673	W:	Many? You mean issues?	

674	C:	Yes. Those that you mentioned.	
675	W:	Do you mean the 0-to-4 scale?	
676	C:	Yes. The grading.	
677	W:	That is slightly unclear.	
678	C:	So only the grading is slightly unclear. Some	
679		mentors have ideas that....	
680	W:	They have different ideas.	
681	C:	Right. Did everyone find it differently and	
682		had a problem with the touch screen	
683		operation?	
684	W:	Yes. Using the touch screen is difficult.	
685	C:	Is that all?	
686	W:	Yes.	
687	C:	Do you have other suggestions regarding the	
688		assessment system? Do you have other	
689		thoughts apart from the grading system?	
690	W:	Probably not. Guidelines exist, but they can	
691		be clarified to the mentors.	
692	C:	What do you mean by clarified?	
693	W:	The difference between 0 and 4 should be	
694		clarified to them.	
695	C:	Do you mean more information about the	
696		scoring system should be given to the	
697		mentors?	
698	W:	That's right.	
699	C:	Aside from that, was enough technical	
700		support given to the students?	
701	W:	You mean...	
702	C:	Was enough technical support for the mark	
703		entry system or anything else that has to do	
704		with your studies in the iPod Touch given to	
705		the students?	
706	W:	Being able to download more related apps	
707		would be nice.	
708	C:	I see.	
709	W:	I have not heard of such kind of support. We	
710		found many apps on our own. However, we	
711		cannot download apps if they have fees. It	

712		would be nice if the school could support us	
713		in this regard.	
714	C:	Apart from the mark entry application, did	Nursing Video App
715		you know that we also offer video apps?	
716	W:	Yes, I have seen those.	
717	C:	Right. You have seen them, but did you	
718		download them?	
719	W:	Yes, I did, but it would be more relevant for	
720		me to prepare the skills examination only.	
721		Haha....	
722	C:	Do you have other comments on mobile	Q11 (continue)
723		learning?	
724	W:	I guess that the same problem may inevitably	He think and presented
725		occur in a few years. The mobile device can	seriously.
726		easily be outdated, which happens to most	
727		electronic devices. Most students have their	
728		own smartphones, and thus the school may	
729		consider integrating the functions they want	
730		with the existing smartphones of the students	
731		to increase their use and avoid the problem of	
732		being outdated at the same time.	
733			
734	C:	However, smartphones can become outdated,	
735		too.	
736	W:	True. However, the students themselves can	
737		update them.	
738	C:	I see. So you recommend students to	
739		download the function on the iPod Touch or	
740		other mobile device of their own choice on	
741		their own.	
742	W:	Yes	
743	C:	The functions can still be used even when the	
744		phones are replaced.	
745	W:	Yes. I have observed that most students or	
746		young people have their own smartphones.	
747		So persuading them to carry one more device	
748		will be difficult	
749	C:	Do you have other comments?	Q11 (continue)

750	W:	If, unfortunately, a student does not have a	
751		smartphone, we can think of an alternative,	
752		such as giving him/her some funds as	
753		subsidy.	
754	C:	I see. Do you have anything else to add?	
755	W:	No, that's about it.	
756	C:	Thank you.	

## **Appendix 7: Information Sheet**

### **A mobile learning model for clinical learning in Hong Kong: A Case Study**

You are invited to participate in a study supervised by Dr. Jocelyn Wishart and conducted by myself Ms. Charm Yee Chong. I am the doctoral candidate of the School of Education in the University of Bristol.

The purpose of this study is to explore a sustainable mobile learning model for clinical learning in Hong Kong. You are invited to participate in the interview. The interview will be audio recorded and it will last for 45 minutes to one hour.

You have every right to withdraw from the study at any time and without penalty of any kind. All of the information will be kept confidentially in a locked cabinet or personal computer which can be accessed by the researcher only.

If you would like to have more information about this study, please feel free to contact me at .

Thank you for your interest in participating in this study.

Doctoral candidate

---

Charm Yee Chong

## Appendix 8: Consent Form

I, \_\_\_\_\_, agree to participate in the interview for the study of “A mobile learning model for clinical learning in Hong Kong: A Case Study”. I have been informed about this study by the researcher, Miss Charm Yee Chong.

I understand that the one-hour interview will be recorded by a recorder and all of the information will be kept confidentially in a locked cabinet or personal computer which can be accessed by the researcher only. I also realize that all of the collected information will be used for study purpose only. I understand that this study is a EdD project and the study results will be published but my personal information will be kept confidentially. There is no harm will come to me and I am voluntary participating in the study and I have the right to refuse or withdraw from the study at any time.

Interviewee signature: \_\_\_\_\_

Researcher signature: \_\_\_\_\_

Date: \_\_\_\_\_

## Appendix 9: Approval of Using the FRAME model

寄件者: Marguerite Koole < >  
寄件日期: 2014年4月9日星期三 0:36  
收件者: CHARM Yee Chong  
主旨: Re: Request for the use of the FRAME model  
附件: DLS\_fig\_venn.ai; venn\_diagram.ai; DLS\_fig\_venn.pdf

Hi Caroline,

I would be delighted to give you permission to use the FRAME model. I understand that you may wish to make modifications. So long as you indicate the original source, that's fine. That's the way research works.

I have just attached some diagrams that you are welcome to use.

I would love to see some of your publications when they come out.

Cheers,  
Marguerite

*Marguerite Koole, PhD  
Instructional Media Analyst  
Centre for Distance Education  
Athabasca University*