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**The Impact on the Learning of Nursing Students in a Health Technology Integrated  
Clinical Learning Environment**

*a Case Study*

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**The Impact on the Learning of Nursing Students in a Health Technology  
Integrated Clinical Learning Environment: a Case Study**

by

Lai Chun Lam

A dissertation submitted to the University of Bristol in accordance  
with the requirements of the Degree of Doctorate of Education in the Faculty of Social  
Sciences and Law, School of Education (Hong Kong)

Words Count: 43679

August 2022

## **Abstract**

This study explores the perception of nursing students using health technology during clinical training and examines the impact of health technology related to the Clinical Learning Environment (CLE). As there is an increasing demand for quality care from patients and the challenges posed by a high turnover rate of nurses, nurses struggle to work and adapt in this changeable setting. This study aims to develop an insight into an understanding of the CLE. It includes the perceptions of nursing students regarding health technology and the impact on their learning as nursing students. It uses a case study methodology, using a survey of the Clinical Learning Environment, Supervision and Nurse Teacher Scale (CLES+T) and interviews with nursing students, graduated nurses and academic university mentors. The study utilises the theoretical work of Kolb's learning process, behaviourism and constructionism learning theories, and a facilitation/supervision model. Findings suggest that nursing students lack practice opportunities. Further, additional factors relate to issues of leaderships, ward atmosphere, supervisory relationships, learning opportunities, and nurse teachers interwoven in a health technology integrated setting. Nursing students specifically reflected on their concerns about health technology dependency and how this potentially limits their critical thinking skills. Further still, limitations to access password integrated health technology restricted students' learning, their practice opportunities rely on a good supervisory relationship and a positive ward atmosphere. To some extent, students indicated that the managerial staff could shape the CLE and affect their learning opportunities regarding their supervision and mentoring. This study contributes to the emerging knowledge about the impact of health technology on the learning of nursing students in the clinical setting during training. It provides an understanding of the challenges posed by both health care providers and educational institutions who should coordinate more measures to facilitate students' learning in the health technology integrated CLE. This study helps to address the issues related to health technology in clinical settings and its impact on the practice of nurses including academic staff which, in turn, affect students' learning.

## **Acknowledgement**

My thanks go out to all those participants who have helped me complete this dissertation with whom this project would not have been possible. I cannot express enough thanks to my supervisor, Dr. Navin Kikabhai, for his continued support and encouragement: He has given excellent conversations, support and the perceptive comments that kept me on-track with juggling this dissertation as well as other life commitments. I would also like to extend my gratitude to my second supervising tutor: Dr. Ioanna Bakopoulou for their valuable feedback.

The completion of this project could not have been accomplished without the support of my ex-working professional colleagues and supervisor: Dr. Wong Ka Fai and Caroline Charm who provided support to my project processes all along. It was difficult moving to a new country whilst completing this study, and I want to express my gratitude to my professional colleagues for their continued support. Special thanks to Dr. Andy Chong and Dr. Mavis Tong who shared their data analysis skills with me. I would also like to give my thanks to Professor Lee Kok Long who give me an opportunity to work in nursing education and for motivating me during this study.

I would like to express my special thanks of gratitude to my husband's family. His sister Teresa, thank you for allowing me time away from you to research and write. You also deserve a huge thank you for caring, and watching over my children: Rebecca and James.

Finally, to my caring, loving, and supportive husband, Chris: my deepest gratitude. Your encouragement when times got rough is much appreciated and duly noted. It was a great comfort and relief to know that you were willing to provide management of our household activities while I completed my work. I gave my heartfelt thanks for your patience and understanding whilst doing this study.

## 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. Except where indicated by specific reference in the text, the work is the candidates 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.

Signed: \_\_\_\_\_



Date: 30/08/2022

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## **Chapter 1: Introduction**

This chapter introduces this study, which explores the perception of nursing students using health technology (HT) during clinical training to better understand the impact of HT related to the clinical learning environment (CLE). This chapter introduces the background to this study and the technology and its impact within the healthcare sector, as well as the study's theoretical framework, key aim and objectives and research questions. This is followed by a brief insight into the positionality of the researcher, drawing upon my own experiences and sharing how I became increasingly interested in nursing education. This chapter concludes with an outline of the proceeding chapters.

### **1.1 Background of the Study**

Nursing education refers to give theoretical and clinical training to nursing students and prepare them to provide high quality care to patients competently. It likes an umbrella to cover subject knowledge related to nursing, nursing skills training and nursing clinical training in various public or private settings (Boore et al, 2012). Nursing education has different levels including pre-registered nurse's education program and post-registered nurses' education program. In this study, it focuses to the pre-registered nurse education, specifically, considers their skills training and nursing practice in clinical settings. Within these skills training and practices, nurses supervisors and nurse teachers bear the important role to guide the nursing students to learn the relevant theoretical knowledge and apply those relevant knowledge into skills training and practices in various settings. Nursing education and training<sup>1</sup> is derived from different philosophies and models of learning, including humanism, developmental theory, condition of learning, andragogy, social learning theory, experiential learning, cognitive theory and behaviorism. All these philosophies and models will shape the teaching and learning to the nursing students (Boore et al., 2012). Nursing

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<sup>1</sup> Traditionally, education has been understood as learning a body of knowledge, usually within the classroom. This learning has tended to be theoretically orientated. With respect to training, this has traditionally been understood as a requirement of specific skills that an individual is expected to be competent at. These competences are also governed by an external regulatory body. Nursing education is about the approaches to equip the next generation of nurses to be competent to provide high quality care to patients. However, it is important to note that in some instances nursing education has been used as an umbrella term to cover subject knowledge and nursing skills training [refer to the work of Boore et al., (2012) as an example].

education and training can be achieved not only from traditional hospital-based training schools but also from higher education institutions or colleges (Goldmark, 1923; Mak, 2003; Hall & Ritchie, 2009; Nursing Council of Hong Kong, 2020). Healthcare reforms require professional nurses to change in the healthcare system. Focusing on safety, quality and competence in delivering healthcare to patients places considerable responsibility on nurses who are qualified to assume this role (Alvernia University, 2020).

In the early 1990s, a series of reports on human error and health quality initiated from the Institute of Medicine (IOM) emphasised the urgency of system change to improve patient healthcare (Linda et al., 2000; National Academies of Sciences, 2011). At present, the healthcare system is affected by an increasing ageing population and the shortage of nurses. On the basis of these changes, a technology-integrated healthcare system and nursing training has been initiated and advocated for the past 20 years (Levett-Joners et al., 2009a & 2009b; Hospital Authority Head Office, 2016). Understanding health technology (HT) is important and Lehoux (2006) summarises that HT not only includes all instruments and devices for diagnostic or therapeutic services but also includes the systems and procedures to support and organise hospital works. HT can be integrated in different health settings and is not a stand-alone device, but one component of larger health care delivery systems.

Technology integrated into health and medical care allows nurses to enhance the quality of patient care (Barnard & Locsin, 2007). In general, advances in technology and new devices have improved the quality of both patient care and healthcare professionals (Huston, 2017).

## **1.2 Technology in Health Care System**

Technology in patient care: with regard to the effect on patients, HTs cover aspects of monitoring, treatment, health education and setting appointments. According to the electronic Health Record (eHR) Office (2014), the system of eHR aims to help patients reduce duplicated investigations, facilitate more effective treatment and reduce errors from physician to patient by enabling efficient and quality-assured clinical practice. Since 2000, the eHR allows data sharing among public hospitals. Since 2016, the eHR furthers the collaboration with private health sectors that have been able to store and retrieve patient data (HA Convention, 2016). In addition, more software technologies are integrated into health-care services, such as mobile applications to facilitate booking patient appointments in specialist outpatient clinics. A Phone Enquiry System has also been implemented to enhance

communication between patients and carers, facilitate sending questions about Specialist Out-Patient Clinic services and cancel or reschedule patient appointments (Hospital Authority Head Office, 2016).

Technology in nursing education: Nursing education covers various nursing knowledge and skills training to enhance a nurse to be competent (Gopee, 2008). As technology is developed and used in nursing education and health-care provisions, relevant studies have been carried out to enhance the knowledge and skills training improvement in curricula and the quality of nurses in clinical settings (Hall & Ritchie, 2009; Berragan, 2013; Watkins et al., 2012; Piscotty et al., 2015). For example, more information technologies are integrated into nursing programmes by providing virtual reality experiences to students to enhance their understanding and cultural awareness. However, this has been argued to have depersonalized nursing care. Nursing staff risk ignoring the feelings of patients while using this technology. In turn, this can also challenge values, beliefs and raise ethical issues (Hall & Ritchie, 2009; Hyysalo, 2010). Nursing educational providers have applied simulation activities, using virtual reality and online teaching and learning resources to nursing programmes. These educational institutions integrate technologies such as different devices of cardiac and electronic blood pressure monitors or bladder scans to familiarise students with basic equipment used in a clinical setting. Other technologies that are becoming increasingly common in nurse educational programs include virtual reality education to create scenarios that enable students to participate in decision-making on care procedures; simulation systems and problem-based cases for students to complete nursing tasks and online resources such as e-mentoring and e-books to facilitate the search of evidence-based information during training (Conole et al., 2008; Kelley, 2015; Damewood, 2016). Nursing students carry out their practice in different clinical settings. The Clinical Learning Environment (CLE) is important for students to achieve desired learning outcomes (Levett-Jones et al., 2018). Theoretical learning in educational institutions and practical skills development in clinical settings during training is a core requirement in nursing education. Students develop their knowledge through the use of physical materials, professional collaboration and engagement in a shared clinical culture. Thus, they learn problem-solving skills in various situations (Levett-Jones et al., 2018). The changing clinical settings, due to the integration of technology, require nurses to adapt, but they need to be supported with using online resources to enhance their clinical learning. Some literature on HT and clinical practice of nursing is carried out from the perspective of nurses (Greenfield, 2007; Singh, 2016; Kahouei et al.,

2013), but as yet, the clinical setting with integrated technologies among nursing students, in terms of their learning, has not been explored.

Technology in hospitals: In addressing the healthcare system, the Hospital Authority Head Office (HAHO), the body that organises and monitors the health system in Hong Kong (HK), instituted measures to improve the medical care system in 2000. Necessary measures are highlighted to improve quality assurance and establish a culture of safety, develop safe service protocols, revamp clinical practice and leverage modern technology and new treatment options. Since then, public hospitals have integrated information technologies to improve health services efficiency and ensure medical safety. Healthcare technology has also been developed in Hong Kong. The Inpatient Medication Entry (IPMOE), Clinical Management System (CMS), 2D barcode system and Electronic Patient Record (ePR) can modernise and improve the way clinical and health professionals deliver patient care across the hospital trust (Hospital Authority Head Office, 2009, 2013, & 2016). Furthermore, advance patient information transfer equipment has also been introduced, such as iPads installed with CMS functions, usage of intranet to allow effective patient information tracing in other departments and widened mobile technology functions for faster communication among nursing staff and physicians (Hospital Authority Head Office, 2001 & 2016). All of these are computerised tools for medication administration and documentation. First, CMS can be conveniently used for healthcare information data transfer and storage as paperless documentation is advocated in clinical settings. Second, the design of a 2D barcode system can reduce errors in patient identification. Third, the use of a point-of-care system enables improved efficiency in nursing care, and the IPMOE serves as a computerised tool for medication administration and documentation (Hospital Authority Head Office, 2013).

These tools aim to improve drug administration safety and information transfer. Aligned with the development of the above measures, since 2007, a culture of safety is also being developed in the HK healthcare system. Quality assurance has focused on and audited the medical practice, including those of nursing and other healthcare professionals (Hospital Authority Head Office, 2008 & 2016). In this culture of safety, teamwork is another strategy initiated and promoted to enhance patients care quality. The HAHO (2010) aims to encourage staff, from executives to frontliners, to report incidents and prevent their recurrence through knowledge sharing on the basis of a non-blame response.

HT such as computer usage has increased with task performance and patient communication enhancement. However, HT's functions to improve the quality of patient services are questioned (Cornell et al., 2010a, 2010b). For instance, time spent on computers is found approximately 50% - 60% of a nurse's time at work and managing such tasks is dependent on the nurses' experience. The time spent to implement nursing procedures may be shortened with HT support, however, the time for communicating with patients and the workload of nurses were not improved. It is because new activities have been assigned to nurses to fill the time gap. HAHO also reported that misidentification cases had increased from 5 in 2008 to 10 in 2009, with incident rates of 1-5 cases per year in HK (Hospital Authority Head Office, 2014, 2019a). Medication errors steadily increased from 72 cases in 2010 to 96 in 2013. This finding may be related to the increased reporting to HAHO as facilitated by the near-miss system, which reports potential medication incidents that are ultimately avoided by the staff (Hospital Authority Head Office, 2014, 2019a). In implementing IPMOE, the incident rate remains within 55-80 cases yearly. IPMOE was piloted in 15 public hospitals in 2013 and then initiated in other institutions. Seven hospitals are still waiting to implement IPMOE in 2023, after resolving technical problems (Hospital Authority Head Office, 2019b, 2020).

In brief, these adaptations initiated the global transformation of healthcare from a paper-based system to a more technological-based system. Advanced medical technologies and re-engineering are continuously advocated to all public healthcare providers worldwide (Institute of Medicine, 2011). Thus, a technological environment briefly arises in a contemporary clinical setting to a certain extent, in which nursing student practices differ from the traditional healthcare environment. Flott and Linden (2016) also report that studies on HT from the perspective of nursing students are insufficient. Thus, a growing body of information on HT, emerging technologies and the CLE from the perspective of nursing students is important. On the basis of this background, the context of present study is set within Hong Kong, however, the academic literature used draws upon a range of international contexts.

### **1.3 Theoretical Framework**

Various learning theories have been applied to nursing students. In this study, David Kolb's experiential learning theory (1984) is used to explore the effect of HT in CLEs on nursing students' learning. Kolb asserts that:

*Learning is the process whereby knowledge is created through the transformation of experience. (Kolb, 1984, p.21)*

Kolb emphasises the importance of learning to build knowledge in four stages. First, learners can develop their concrete experience based on observation and reflection. Then the formation of concepts can begin after review and reflection of such experience. Finally, learners can conclude the knowledge from the experience and generalise the learning in practice (Kolb, 1984).

This study uses a clinical facilitation model. Facilitation/supervision is important to enhance student learning in a clinical training, and the application of a relevant model by the educational provider and hospitals is crucial (Franklin, 2013; Mckellar & Graham, 2017). Thus, the effectiveness of mentorship and preceptorship are evaluated from the perspective of nursing students who learn in a technology-rich environment. The perspectives of mentors, preceptors or other similar supervisors in the clinical setting during students' practical training are also included (Gopee, 2011).

Another utilised model is mentoring (Gopee, 2008), a concept and practice that can be used to facilitate the learning of professionals. Mentoring has been applied to the nursing profession since the 1980s (Gopee, 2008). The term "mentor" has also been used interchangeably with clinical instructor, clinical teacher, clinical supervisor, nurse teacher, and preceptor. Whichever term is used, there is general consensus that this involves an experienced individual who guides a novice (Gopee, 2008, 2011). The present study explores the impact on the learning of nursing students when mentoring is used in the HT-integrated clinical environment.

The Clinical Learning Environment, Supervision and Nurse Teacher (CLES+T) scale, an instrument developed by Saarikoski et al. (2008), is used to assess the satisfaction of nursing students regarding the CLEs during clinical training. This instrument has five dimensions with a total of 34 factors that relate to the supervisory relationship, leadership, premise of nursing care, pedagogical atmosphere and nurse teacher (Saarikoski et al., 2008). In the present study, CLES+T is used to evaluate how the factors influence the satisfaction of nursing students in clinical environments that integrate and use HT to provide patient care.

These theories and models give a framework to guide the researcher to examine complicated issues. They not only help to focus the implementation of instruments but also help to describe and explain the data through analysis to address the aim of this study (Nachmias & Frankfort-Nachmias, 1996).

#### **1.4 Aim and Objectives**

A literature search reveals that no notable study has focused on the learning of nursing students in a HT-integrated clinical environment. The present study explores this area, and therefore its aim is

- To examine the perception and experiences on the impact of health technology to the learning of nursing students in clinical learning environment

The objectives are to

- Explore nursing students' perceptions on HT in clinical settings;
- Understand the influencing factors of CLES+T: the supervision, ward environment with respect to opportunities for learning and practice, the relationship between the nurse and leadership and the impacts on nursing students in HT-integrated CLE and
- Explore the nursing students' learning in relation to Kolb's learning model in HT-integrated CLE

The methodological approach adopts a case study paradigm that utilises a questionnaire and interviews.

#### **1.5 Research Questions**

The research questions are

- What are the perceptions of nursing students regarding HT in the CLE?
- What is the impact of the learning of nursing students in the HT-integrated CLE?
- Why, and in what way, does the HT-integrated CLE affect the learning of nursing students?



## **1.6 Researcher's Background**

Of significance to this study is my own professional position. I have been a registered nurse for over 20 years and have been working as an academic lecturer for six years. My role, in part, involves being responsible for mentoring nursing students in clinical settings. Over this period, I have become increasingly interested in HT and in particular how students adapt to the changing demands of health services. Over this time, I have become acutely aware that junior students worry about their practice in wards. They are also usually concerned with their transportation to obtain placement districts and duty roster; they also desire to practise with real patients and obtain feedback from all available means. Students routinely comment that the clinical training was not their expected experience given the many concerns about the medication administration in reality. They became more familiar with IPMOE after exposure to the device but tend to feel less confident and competent in its usage. They have similar feelings towards intravenous infusion and CMS. I have reflected on the importance of “hands-on” practice for student learning in clinical settings. Apart from IPMOE, students have tended to report that they have struggled with understanding new devices or with applying other electronic devices relevant to patient care in wards. They routinely made comments about being unfamiliar with those devices if no introduction or demonstration was provided. I also recall more positive comments from several students about not being afraid of using the devices but being rather concerned with model variations, which may have different settings in practice. What was interesting, in reflection, was that students did not raise awareness of monitoring devices and were uncertain if the reading generated was correct, but they showed more active in participation and observation. I found that students hoped to gain opportunities to learn more through practice with nurses or observation. On a number of occasions, I knew that some nurses would refuse students' observation while others expressed feelings of pressure on incorrect knowledge and thus advised students to learn under my supervision. I often realised that opportunities for practice and exploration are more essential for students. Over my working experience, I have become increasingly interested in student's experience in the CLE, and in particular with respect to HT.

## **1.7 Chapter Outline**

This thesis comprises six chapters. Chapter 2 reviews the concept of nursing education in practice, ideas and themes from studies related to CLE and concepts of learning and the

models that shape the nursing students' learning. It further discuss clinical facilitation/supervision models, including mentorship and preceptorship, and the concept and relevant studies on HT development in nursing. The chapter also recognises that the concepts, models, and philosophies are interwoven and interdependent. Chapter 3 presents the research design and methodology. It discusses the use of a case study approach that uses both questionnaire and interviews. The sampling method, setting, data collection, analysis measures and ethical issues of this study are discussed. Chapter 4 summarises the findings from the data gathered from using both the questionnaire and interviews. Chapter 5 presents a discussion and analysis of the findings in conjunction with academic literature. Finally, Chapter 6 concludes the thesis and summarises key themes, ideas, findings and limitations. Possible future research opportunities and concluding comments are also provided.

## **Chapter 2: Literature Review**

### **2.1 Introduction**

This chapter will review and probe previous literature related to this research study. With the aim to investigate the issue of nursing clinical training, this study reviews the relevant context of nursing curriculum, nursing clinical training phenomenon, and HT in nursing to enrich researchers' understanding of their importance to this study. This chapter discusses about the indispensable of clinical training in nursing education, then it continues by linking the importance of clinical training with nursing knowledge construction. Next, a detailed concept of CLE is introduced. Previous studies related to CLE of nursing including various instruments are reviewed and explored, and CLE's determining elements to nursing students' learning during clinical training are analyzed. Studies on HT in nursing are surveyed as well. Subsequently, Kolb's experiential learning theory and other critical learning theories, including behaviorism, constructivism and situated learning theory, are discussed from the perspective of influencing nursing learning. Finally, the chapter evaluates the shape of facilitating/supervision models to students learning in clinical training.

### **2.2 Comprehension of Nursing Education**

Nursing education typically involves students achieving professional and practical competencies, skills and knowledge to become what Hall and Ritchie (2009) characterise as reflective, competent practitioners. Accordingly, nurse education involves undertaking a mixture of theoretical knowledge and completing practical experience through placement (Hall & Ritchie, 2009). For Gopee (2015), nursing is a profession comprising of skill-or-competency-based activities, which are acquired through repeated practice within a clinical environment.

Nurse education worldwide, including HK, starts through an apprenticeship system and is provided from hospital-based schools (Mak, 2003; Valiga, 2012; Scott et al., 2013). Nursing apprentices learn through working in real clinical settings. By observing senior apprentices and professionals, then repeating the steps of caring for patients, students' knowledge of nursing tasks enriches with time (Scott et al., 2013). In this process, learning is a step to cope with the actions and behaviours of others. Subsequently, students need medical knowledge and work in clinical settings, but must complete a few courses of 3-6 months in between the programme. Registered nurses in HK have learnt relevant program in higher education

institutions since 1990. Thus, their knowledge has been enriched through work-based learning. Knowledge learnt through observation and practice with actual patients and reflection of procedures are the main learning modes (Mak, 2003).

Nursing has historically been regarded as a vocation and as a profession in many countries (Scott et al., 2013). In view of enacting the law, nurses should maintain a professional image and competence in implementing patient care (Bastable, 2014). Nursing is a caring, enabling, knowledge-based, and competence-assessed profession, which is dynamic in meeting the changing health needs of society (Nurse Council of Hong Kong, 2012). Similar to those in Australia, the United Kingdom, the United States and Canada, nursing students in HK are required to have clinical training and then pass the clinical assessment for registration (Nurse Council of Hong Kong, 2017a; Ahpra, 2019).

Typically, in HK, theory and practical skills enrichment is expected of a nursing programme, including total teaching and learning of 2650 hours for a general health registered nurse and 2630 hours for a mental health registered nurse. Half of the contact hours of a nursing programme comprise practical skills teaching and learning in clinical settings with supervision, an approach that is close to that in the UK (The Open University, 2020). Given that half of the whole nursing programme is completed in practice, students' learning can be enhanced with an effective environment (Craig & Smith, 2015). The Nurse Council of Hong Kong (NCHK), a statutory body monitoring the quality of nursing education in HK, requires students to complete theoretical courses with over 1250 and 1230 contact hours for general and mental registered nurses, respectively. In addition, they need to have on-site placement experience with 1400 contact hours for both streams (Nurse Council of Hong Kong, 2017a).

By teaching and learning-focused practice, students can gain knowledge and skills in performing tasks. Students can learn by example or by exploring experiences and committing these to memory (Gopee, 2011; Boore et al., 2012). However, the curriculum has limited coverage of technological knowledge. Nkosi et al. (2011) argue for the inclusion of information technology, which can allow students to feel more confident with using computerised devices. For instance, the HK nursing curriculum only has 20 contact hours for technology learning, which is mainly teaching of information technology (Nurse Council of Hong Kong, 2017b). Under Cap. 165 in HK laws, nursing students need to have 70% or higher total hours of clinical education, but only 20 minimal hours for information

technology teaching and learning.

Jokelainen et al. (2011) also emphasise the importance of using technology and suggest that not providing relevant knowledge to students leads to a gap during their clinical training. Both students and mentors may not understand how to apply relevant knowledge to operate the technological devices. The nursing curriculum may also show an inadequate coverage of HT education. This issue is reinforced as

*... Student mentoring included facilitation of achievement of professional competence and professional growth of the students. Reflective learning and critical thinking are crucial for students to learn to be able to develop new thinking and practices in clinical nursing when working as professional nurses in the future. However, it was surprising to note that the influence and use of technology in nursing practice was not considered in mentoring of students. However, the growth of technology is increasing in health care, for example, in the use of electronic documentation. (Jokelainen et al., 2011, pp.2854-2867)*

Regarding the support for classroom teaching and clinical mentoring, various skills should be developed to enhance the learning of nursing students either in classroom or clinical settings (Gopee, 2015). An overloaded curriculum in teaching nursing theory, demonstrating skills, establishing critical thinking and exploring nursing research knowledge occupy most of the time of educators, and their support for students remains insufficient (Valiga, 2012). Self-directed learning skills are promoted in nursing education, rather than the traditional teaching approaches such as lectures and slide presentations. However, this concept is neither fully mastered by educators nor inspires students. In addition, nursing education cannot escape from technological evolution. Reforms to install models of instruction such as open-source learning, mobile applications, online learning, cloud computing and a myriad of other technological advances are incorporated with health equipment and devices are broached in teaching. Virtual reality education is currently a popular topic in nursing (McCallum et al. 2011; KIDD et al., 2012; Foronda et al., 2014; Ulrich et al., 2014), resulting in the urgent installations of relevant devices in campuses and integration into the curriculum. Moreover, nurse educators are not immune to assimilating this mode of teaching (Valiga, 2012). The time constraint and various roles of nurse educators influence their support for students (Landers, 2000; Johansson et al., 2010; Cherry and Jacob, 2015; Lee et al., 2018). However, limited information is available on educators' efforts to support students in clinical settings,

especially in HT-rich environments. Jokelainen et al. (2011) make this point suggesting that inadequate technological education and training of both teachers and students may result in incompetent practice during clinical training. This study will examine this aspect from the perspective of students and how this issue affects their learning in clinical setting.

### **2.3 Valuable Nursing Knowledge of Clinical Training**

Benner (1984) suggests that clinical competence is closely linked to the accumulation of experience through several steps or participation in clinical settings, apart from the theoretical concept in nursing educational institutions. Benner (1984) reports five stages of competence: novice, advanced beginner, competent, proficient and expert. Nursing students must pass through all these stages to gain expertise. Initially, nursing students are novices and need to cultivate their knowledge. Novice nursing students do not gain any such experiences and are taught context-free rules to guide their actions with respect to different attributes. On this basis, nursing students' knowledge is acquired from theories and applied to actual clinical settings through hands-on practice.

Boore et al. (2012) state that nursing practice is based on acquired knowledge. Furthermore, the philosophy of nursing is defined as knowledge in considering people, environment, care, and health. Several ideas, such as cultural context, can also shape the nature of nursing and concept of care. Levett-Jones et al. (2018) state that students can apply their knowledge gained from academic pursuits to actual practice; they should learn to make positive critical judgments and decision-making regarding patients' health and well-being for clinical placement. An ongoing cycle of learning is thus summarised: clinical placement experience, knowledge gained at university applied to clinical practice, the need for new knowledge identified during clinical placement experience, knowledge gaps motivating the pursuit of knowledge and a return to clinical placement experience.

#### **2.3.1 Nursing Clinical Training Learning**

Clinical training (clinical practicum/placement) is a period for nursing students where they work in clinical settings and practise the nursing skills and language by executing the academic theory gained in class. Students can also learn what professional nurses value; how they communicate, behave, feel and think and how these attributes influence patient care. Students can understand the nursing culture and environment and thus learn how to adapt, work and learn in this context (Levett-Jones et al., 2018). Students are expected to equip

themselves to become knowledgeable and competent to provide nursing care to patients by learning in clinical placements. Nursing educators set objectives and assessment tools for skills development, which are essential requirements to pass the programme, following guidelines and resources such as online learning (Gopee, 2015). In terms of competencies, nurses can apply their accumulated knowledge to perform safe and effective patient care (Benner, 1984).

During clinical training, learning is applied with work-based theory, which is conceptualised for students to enrich their knowledge by doing and memorising repeated steps or tasks, thereby becoming familiar with the care procedures. Evaluations of nursing procedures are common to assess whether the students are competent (Aston and Hallam, 2011). In this case, professional mentoring and supervision can guide students in the clinical settings.

Stabler-Haas (2012) emphasises the importance of theoretical and practice-based educational programmes for nursing students, who need to complete various courses such as clinical training within their curriculum. Clinical training is a prerequisite and is coordinated by educational institutions and approved by health care providers (Hall & Ritchie, 2009; Hospital Authority Head Office, 2020). Nurse educators not only conduct teaching but also collaborate with healthcare providers for placements, which are not guaranteed or insufficient due to increasing demands for nursing study (Dragon, 2009). Therefore, the opportunity to complete a clinical placement is a valuable period to enrich nursing students' practical knowledge (Papp et al., 2003).

Hall and Ritchie (2009) comment that nurses can generate knowledge by questioning and evaluating practices rather than repeating the tasks or procedures because that is the common method. Nursing students and nurses carry out patient care using a gold standard, 'Nursing Process', which was developed in the 1960s. This tool can enhance the quality of patient care and student knowledge development. To address a specific nursing diagnosis, the tool implements a four-stage problem-solving cycle: assessment, planning, implementation and evaluation (Gardner, 2003).

Crombie et al. (2013) conclude that clinical placement can impact on students' knowledge retention. Clarke and Copeland (2003) argue that practice provides students with personal and professional competences. Students are also enabled to deal with critical situations and

provide better care to patients. Clarke and Copeland (2003) assume that a work-based learning approach has the capacity to bring tangible benefits to the organisation, patients and practitioners alike if all the contextual factors that affect professional development are well managed.

The literature reviewed shows that novices who are allowed to observe someone perform the skills or procedures can enhance their learning (Wulf et al., 2010; Levet-Jones et al., 2018). Observation is an opportunity to promote learning by memorising and conceptualising how to perform tasks after reprocessing the experience (Wulf et al., 2010). Levett-Jones et al. (2018) determine the learning process of nursing students. Starting from the clinical placement, students may experience incomplete knowledge and are self-motivated to enrich and fill this knowledge gap. Students gain a comprehensive knowledge base to support critical thinking and clinical decision making in expert practice, which can be employed in their next clinical placement, to continue the learning cycle.

Placement design is a critical component of the nursing programme to ensure students gain an effective clinical experience. Educational institutions also need to coordinate with health providers and plan to address the objectives of scheduled placements. Appropriate clinical training schedules and rosters should be provided to students and resource and academic staff support should be sufficient for students (Papp et al., 2003). Placement has two modes, namely, block and distributed. Block mode is a full-time placement for a period of weeks at any time in the programme. Distributed placement demands students to practise and study concurrently, and several may be combined in a placement period. Some studies find that shorter placement periods cannot motivate students as team members in a clinical setting, while other state that interacting with unsupportive staff rather than the placement duration is the main adverse effect on student learning (Levett-Johns et al., 2008; Birks et al., 2017). Given that students spend half of their practice in clinical settings, the following sections review the context of CLE.

### **2.3.2 Concept of CLE in Nursing**

Flott and Linden (2016) define a CLE for patient care, where nursing students can learn about care and the overarching concept of their professional practice. CLE can be of varying types of hospitals, hospices, care home, community centres, public and private clinics and simulation laboratories, in which students simulate patient care. In recent years, a new model



of clinical setting called Dedicated Education Units (DEU) has been developed in Australia for students to practise and learn. Many studies have shown evidence that the DEUs promote higher satisfaction in learning (Moscato et al., 2007; Craig and Smith, 2015). CLE encompasses staff, equipment, clinical setting, patients, clinical mentors and nursing teachers. CLE is complex to control because of the interactions among different people with different backgrounds and knowledge of the physical environment. Students need to overcome various external challenges and choose priorities. Within this context, much of the evidence emphasises the important role of nursing teachers and clinical mentors or supervisors, who are ultimately responsible for student learning in clinical practice. Thus, an effective CLE can facilitate the enrichment of students' knowledge during clinical practice (Craig and Smith, 2015).

Concerned about the clinical setting, Bisholt et al. (2014) discuss that students have varying experiences when placed in different clinical settings. Achieving positive learning in non-acute clinical settings, such as a nursing home and psychiatric units, prove difficult. Students also comment that they gain few learning opportunities in documentation and limited feedback from supervisors. Hospital settings are suggested to provide more meaningful learning situations in complex contexts for nursing students' learning. Another study shows that students felt less satisfied in private hospitals (Nepal et al., 2016). Pitkänen et al. (2018) state that clinical settings share similar ideas in their health system reform under the influence of the Bologna Process and European Union (EU) directive. Nursing students concluded that supervisors have a critical effect on student learning. Husebø et al. (2018) summarise that a supportive learning environment for students is essential.

### **2.3.3 Effective Clinical Learning Environment**

Gopee (2015) highlight that an effective and suitable learning environment for students is achieved through continuous evaluation by all team members that are involved in clinical practice. An effective CLE should be flexible and provide learning opportunities to students, supply knowledgeable mentors, provide sufficient time for mentor and student interaction, cultivate willingness to contribute to the teaching process and have adequate teaching-staff-student ratio. According to Jonassen and Land (2000), the learning environment is shaped by individual, social and cultural aspects that interweave and interact every day. Learning is affected by the environment with the influence of cultural and material/physical resources.

Social interactions with any person in the environment or activities are other major factors that influence learners.

Craig and Smith (2015) list several points that can contribute to the development of an effective clinical environment. Students can receive orientations, various learning pathways, resources, access to information technology, participation of all involved staff in the teaching, understanding of their learning needs, educational audits, and continuous performance environment. Craig and Smith (2015) suggest that students need to access suitable resources, which can help them develop an understanding of how theory relates to practice. Qualified personnel to teach students are also considered part of an effective learning environment.

Papp et al. (2003) summarise the themes of an effective CLE. In their learning, students expect to be welcomed and appreciated as team members, gain adequate practice opportunities and receive enthusiastic mentoring by clinical staff and adequate support from nurse teachers and clinical mentors or supervisors. A good quality of clinical practice includes good mentoring, which enhances the quality of patient care in a clinical setting. Although students can learn from poor placements, the gains are better in an effective clinical environment.

Flott and Linden (2016) review the important elements influencing a learning environment from past CLE evaluation tools, including staff-student relationships, involvement, culture or atmosphere, reflective or feedback mechanism, facilitation from qualified staff, learning opportunities and effect of leadership. An effective CLE allows students to gain learning outcomes. They develop skills, knowledge and behaviours necessary for practice; consolidate their confidence and cultivate learning or working satisfaction.

Gopee (2011) explains that a practice environment or activities allow students to enrich their professional skills or competencies-based activities. Work-based learning is another approach to enrich knowledge. Gopee (2011) adds that the factors of a good CLE include a culture to share knowledge, awareness of student learning and provision of constructive comments to students. However, some scholars have reflected on the influence of HT development in the healthcare system and nursing education; thus, the effect of technology on the CLE still requires consideration (Flott and Linden, 2016; Gopee, 2015).

### **2.3.4 Studies on clinical learning environment in nursing**

In the literature reviewed, different research designs help generate important findings to enrich the context of CLE. Regarding the student perceptions or experiences of CLE, various studies are conducted through interviews, site observations, investigations and reviews (Jessee, 2016; Mikkonen et al., 2016; Walker et al., 2016). Using an interpretivist paradigm allows for understanding of the interrelation between what people think and how they act in their social world (Robson, 2011). Reviewed studies summarise the feedback of nursing students toward CLE during clinical placement, including feelings of being unwelcome, anxiety, stress, and helplessness (Jessee, 2016; Mikkonen et al., 2016; Walker et al., 2016). Different conclusions are reported regarding these experiences. Peyrovi et al. (2005) reveal that having feelings of stress during the first placement is typical and can be overcome by gaining more experience. Hosoda (2006) states positively that such anxiety experienced by nursing students not only allows them to gain valuable information in a clinical setting but also improves their socialisation skills by performing their tasks. Butterworth et al. (2011) comment that the communication skills and experiences of instructors can serve as an essential support to students to relieve stress in clinical settings. Other strategies such as resilience are also reviewed by Moscaritolo (2009) and Thomas et al. (2012).

Literature has also investigated the reason behind the stressful experiences of students and their effects on their learning during clinical training. Positive interpersonal relationships are vital in clinical placements, in which supervisory relations are an important factor affecting nursing students' learning within CLE (Nolan, 1998; Löfmark and Wikblad, 2001; Carlson et al., 2003; Levett-Jones et al., 2009; Warne, 2010; Williamson et al., 2011; Serçekus and Baskale, 2016; Rafati et al., 2017; Arpanantikul and Pratoomwan, 2017; Lee et al., 2018). Common factors contribute to the quality of the relationship between supervisors and students, including supervisors' busy work schedules, ward climate or atmosphere, organisational culture, different duty rosters, lack of guidelines, mentoring experience of supervisors and poor feedback mechanisms. In some studies (Löfmark and Wikblad, 2001; Carlson et al., 2003; Levett-Jones et al., 2009b; Yousefy et al., 2015), students report that they did not obtain sufficient supervision despite available opportunities for practice. In this context, many students often struggle to carry out routine tasks for practice. Others report that they had observations rather than hands-on practice and they received insufficient comments on their performance. Thus, they did not gain practical knowledge. In such cases, opportunities for practice are lost. Students also report the unsupportive atmosphere

originating from hierarchical relationships among professionals inside the clinical setting, potentially discouraging nurses' close supervision and leading to negative attitudes towards students during clinical training. Students' desires to learn are also found to decline (Dunn and Handfort, 1997; Carlson et al., 2003; Papp et al., 2003; Williamson et al., 2011; Crombie et al., 2013; O'Mara et al., 2014; Cooper et al., 2015). Lee et al. (2018) identify similar findings, adding that students' practice must be governed by organisational policy.

Another factor influencing the students' satisfaction and learning in the CLE is the discrepancy between the school laboratory setting from reality (Davis, 1990; Papathanasiou et al., 2014; Bigdeli et al., 2015; Foolchand and Maritz, 2020) and the application of theoretical knowledge to real patients during placement (Landers, 2000). Finding discrepancies between lectures and practice, students report feeling disappointed about miscommunication with instructors. They feel embarrassed and helpless, not only for the failure to respond to questions from instructors in the presence of others but also in being ignored by staff for participation in nursing activities (Nolan, 1998; Carlson et al., 2003; Houghton et al., 2013; Yousefy et al., 2015; Serçekus and Baskale, 2016). Suggestions to have better coordination and collaboration of the clinical training arrangement are encouraged between educational institutions and health providers. Relevant human and material resources are also required to support students (Khishigdelger, 2016).

#### **2.3.4.1 Evaluation tools on CLE**

Various instruments have been used to evaluate the satisfaction of nursing students in their CLE to reflect on the quality of the CLE and the structure of the curriculum (Gopee, 2015). For example, the CLE scale was developed as early as 1990 and focused on professional and cultural change in the clinical context (Dunn and Hansford, 1997). Ten years later, the CLE Inventory (CLEI) was developed and highlighted the difference between ideal class learning and real clinical learning (Chan, 2002a and 2002b). Saarikoski and Leino-Kilpi (2002) considered the cultural impact in the clinical context and the interaction among staff, leaders and students in developing the CLE and Supervision scale (CLES). Given that nursing teachers have played an important role since 2000, Saarikoski et al. (2008) revised the CLES by adding this factor to develop a new tool: CLES and Nurse Teacher scale (CLES+T). D'Souza et al. (2015) modified the CLES+T to be the Modified CLE, Supervision and Nurse Teacher scale (modified CLES + T) to add four more factors: hierarchy, patient relationships, clinical nurse commitment and staff-student relationships.

Other instruments have been developed from different perspectives to examine the effectiveness and support of CLE. Hosoda (2006) developed the CLE and Diagnostic Inventory (CLEDI), which investigates the relationship of CLE and the metacognition of instructors. In 2009, the Student Evaluation of Clinical Education Environment (SECEE) was developed by Sand-Jeckin (2009). Based on the framework of cognition apprenticeship theory, CLES and Student Nurse Appraisal of Placement, SECEE investigates CLE with modified indicators, including the issues of student and faculty ratio, asking questions of both faculty and staff, interaction with clients, clinical rotation time and faculty and nursing staff support. Chuan and Barnett (2012) established the CLE instrument, investigating the perceptions of nursing students, staff and tutors. Mansutti et al. (2017) report the lack of information about the sampling of the tool development, such as the CLE scale (Dunn and Hansford, 1997) and SECEE (Sand-Jecklin, 2009). Poor to fair quality is also found regarding the content validity, internal consistency and reliability on the CLEI, CLEDI and CLE instrument. With their quality problems and factors that are not customisable based on the needs of other researchers, these tools are rarely used in further research, including the present study. CLES+T is considered a well-established tool with over 10 translations, and its validation and reliability have been assessed across 10 countries (Mansutti et al., 2017). CLES+T gains accumulating evidence on instrument validity and in comparing data, with emphasis on its good quality internal consistency. In summary, the complexity of clinical contexts is increasing while there is debate about the quality of instruments which review CLE. In the items of the CLES+T, factors are critical elements that affect nursing students' learning as highlighted in the literature but have no relevant information on the HT-integrated CLE. However, the effect of CLE on nursing students must be assessed over time (Jessee, 2016; Flott and Linden, 2016).

Based on the literature review, the tool CLES+T developed by Saarikoski is a well-known instrument to examine CLE. Among the different tools, CLES+T has better validity and reliability. Most importantly, its five dimensions, namely, supervision, atmosphere of clinical setting, nurse teacher, opportunities for learning and practice and leadership, with 34 factors, have been previously used to discuss the experiences of nursing students with training in different clinical settings (Saarikoski et al., 2008). These five dimensions still dominate in contemporary clinical settings and are thus also used in the present study to examine the factors influencing the satisfaction of nursing students on the HT-rich clinical settings. The

following section further explains the influence of the five dimensions and their significance to the learning of nursing students in clinical training. In this study, CLES+T instrument is used in the HK context. Given that the development of mentorship is emphasised in nursing education globally, understanding the more updated situation in the HK clinical setting is helpful to comprehensively evaluate the impact of HT on CLE.

### **2.3.5 Factors Influencing CLE**

Numerous factors influence CLE. Based on various evaluation tools and findings from interviews, previous studies commonly categorise the following dominating factors: supervision, atmosphere of clinical setting, nurse teacher, opportunity for learning and practice and leadership. These are crucially interrelated in a clinical context (Gopee, 2015).

With respect to leadership style, Dunn and Hansford (1997) emphasise the important role of nurse managers as a major factor influencing all aspects of clinical units. Nurse managers who pay attention to students positively contribute to their learning. However, the effect of nurse managers can be shaped by the level of hierarchy and routine in wards, both of which can affect the learning culture. Skaalvik et al. (2011) comment that ward managers (WMs) value students as resources helping in CLE, possibly due to the influence of the reform of the healthcare system. In contemporary healthcare settings, nurse managers encounter pressures in developing safety awareness (Finkelman, 2012). However, Jokelainen et al. (2011) suggest that enough resources and support from the managerial level should be provided to enhance students' opportunities during mentoring.

The second influence was the nurse teacher, who plays an important role in supporting students in CLE (Arkan et al., 2018). Saarikoski et al. (2008) suggest that nurse teachers can be a crucial and independent factor. Warne et al. (2010) comment that nurse teachers possess institutional expertise in nursing and act as mentors to provide students with support in practice and theory improvement in the CLE. However, mentorship has been discussed as more important than nurse teachers in terms of supervision (Andrews and Wallis, 1999). Two studies briefly state that nurse teachers encountered problems of access and were limited in participating in risky procedures (Fetter, 2009a & 2009b). Landers (2000) comment that a nurse teacher needs to keep updated knowledge on current practice to enhance the theory–practice gap for students during placement. Fernández et al. (2015) focuses on security and identified password security as one area that needed to be secured by health professionals.

These studies help to explore further details on the effect of mentoring to nurse teachers in the HT-integrated CLE.

A third factor focuses on ward atmosphere. Saarikoski and Leino-Kilpi (2002) and Saarikoski et al. (2008) state that a positive ward atmosphere should include a non-hierarchical structure with the best teamwork and good communication. The terms ‘atmosphere’, ‘culture’ and ‘climate’ have been used in a social or organisational context to elaborate on the attitudes of staff who shape students’ learning (O, Mara et al., 2014; Cooper et al., 2015; Sabatino et al., 2015; Yousefy et al., 2015; Arkan et al., 2018). Sullivan (2013) state that culture can affect the efficiency of communication. Culture is also a common source of job dissatisfaction and a determinant of organisational effectiveness. Papp et al. (2003) find that a positive atmosphere is important for students to achieve their learning objectives, apart from the good cooperation and support from nurses in clinical settings and the mentors or nurse teachers from educational institutions. Hodaso (2006) state that a good atmosphere and cultural and organisational factors can affect the learning experience of nursing students. However, a high-quality patient safety environment was advocated after the HK healthcare system reform, and one of the measures to achieve this goal is through health-IT integration in clinical settings (Institute of Medicine, 2011). Flott and Linden (2015) find that organisational culture can affect the behaviour of leaders and staff toward nursing students’ learning. Sand-Jecklin (2009) and Chuan and Barnett (2012) mention that policies can also affect organisational culture, such as by not allowing students to participate and rather to allow only observation procedures. Ogier (1989) states that learning was demotivated under a strained atmosphere. Chang and Daly (2016) emphasise that a learning culture in a hospital originated from positive organisational culture, whereas a negative environment not only hindered the development of learning but also affected the relationship and accomplishment of work among nursing staff. A learning environment could support and nurture new graduates, new staff and undergraduate students. The necessity of technological usage in the healthcare setting is a trend that poses opportunities and challenges to nursing professionals. Technological knowledge could be achieved in many forms and relates not only to hands-on competency but also to knowledge of organisational policy, current research and change evidence (Keating, 2015; Chang & Daly, 2016). Corresponding information on its impact on students’ learning in the HT-integrated CLE remains unclear.

The fourth factor is supervision. Löfmark and Wikblad (2001), Levett-Jones (2009b),

Sabatino et al. (2015), O'Mara et al. (2014), Sundler et al. (2014) and Salamonson et al. (2015) emphasise the importance of good relationships with nursing staff in influencing student learning. They state that respectful and welcoming nurses can motivate student confidence. This attitude also encourages and affects the opportunities for student learning. Doyle et al. (2017) conclude that the most important factor affecting students' learning satisfaction was supervisors' availability to provide help during their clinical training. However, the lack of a nursing workforce globally places a risk of lacking supervisory staff, potentially undermining the effectiveness of the learning of nursing students (Jokelainen et al., 2011). Another aim of using HT in the system reform is to reduce human error due to various reasons, including shortages of nurses (Institute of Medicine, 2011). The impact on nursing students who learnt in HT-integrated CLE remains unknown.

The fifth and final factor is opportunities for learning and practice. Löfmark and Wikblad (2001) find that nursing students may feel uncertainty in clinical experience when they had fewer practical opportunities and were only allowed to observe. Peyrovi et al. (2005) comment that opportunities for learning are better when students were actively involved in patient care. Carlson et al. (2003) show that the importance of personal interactions can affect the learning opportunities of nursing students. Houghton et al. (2013) state that the inadequate number of staff, limited supervision time and staff being occupied in non-nursing tasks influence students' learning opportunities.

Bransford et al. (2000) state that knowledge can be enriched through experience transfer in clinical training. Students complete tasks and then a function of the similarity of transfer and learning experiences can be accumulated. The knowledge transfer from school to other non-school settings can be enhanced by the full understanding of the functions of the environment. However, these environments change rapidly (Mansutti et al., 2017), and thus, exploring ways to help students develop strategies to adapt to the complex clinical context is essential. As the majority of hands-on nursing procedures, such as measuring blood pressure and glucose levels and recording information, have dramatically evolved from human-powered to computer-controlled, students are expected to actively engage in these clinical practices. At present, these procedures have been replaced by technology. Traditionally learning through repeated practices and guidance by clinical staff may be insufficient in this context (Arpanantikul and Pratoomwan, 2017; Chang and Daly, 2016). Henderson et al. (2012) conclude that CLE is an effective and safe environment for student practices, but the



challenges due to innovative changes to traditional practices are not considered. Alongside nursing students' learning shaped by captioned stakeholders and pertinent to the impact of the atmosphere inside the CLE, the force of HT integration clearly needs investigation to fill this research gap.

#### **2.4 HT integrated in CLE**

This study investigates the students' perception of HT-integrated CLE. The background of HT in nursing is reviewed to provide a clear picture of this study.

Gail et al. (2008) describe various types of technology and technical devices for nursing in clinical settings. These technologies can be categorised into simple and complex. The most influencing factor of HT development is the use of health informatics and communication systems in daily nursing practices (Bhattacharya and Ramachandran, 2015). Technology benefits are evidenced by saving time, standardising the terms and format for easy communication, giving fast access to provide accurate patient care and reducing healthcare errors (Barnard & Locsin, 2007). HT allows nurses to enhance the quality of patient care (Glandon et al., 2014; Bhattacharya and Ramachandran, 2015). However, Munyisia et al. (2010) indicate that HT cannot reduce the time spent on documentary work by nurses. Lopez and Fahey (2018) note that nurses make errors and have increased workloads while managing the HT.

One paper concluded that nursing students gained knowledge of handling technical equipment with supervision by staff or sharing knowledge with classmates. Students could become more confident with more opportunities to practise technical tasks, including advanced ones. Students could ask more questions to an assigned supervisor and become confident enough to share their new knowledge with other nurses who may not be familiar with the equipment (Löfmark and Wikblad, 2001). By contrast, Arpanantikul and Pratoomwan (2017) indicate that nursing students feel stressed when using new technical machinery in the clinical environment because they lack opportunities to practise.

In brief, previous studies reveal the factors influencing student learning. However, the issue of machinery or technical equipment usage of nursing students is mainly neglected. Factors leading to inadequate opportunities for practising the usage of machinery or technical equipment were also not reported. Again, no scientific approach verified any factors affecting

the usage of machinery or technical equipment of nursing students. In research, providing convincing evidence could explain the relationship of student learning to machinery or technical equipment issues by including more variables. The present study explores the effect of HT usage to other environmental factors such as supervisors, clinical nurses and managers in the clinical setting.

The literature is mainly concentrated on the experience and perceptions on HT usage of nurses rather than nursing students (Stevenson and Nilsson, 2012; Estrada and Dunn, 2012; McCartney, 2016; Holden et al., 2016; Lopez and Fahey, 2018). The views of nursing students are focused on the technology to improve teaching and learning in higher education institutions, such as improvement of curriculum or teaching strategies (e.g., Conole et al., 2008; Kowitlawakul et al., 2015; Tubaishat et al., 2016; George et al., 2017) and clinical placement support (Ryan et al, 2017; Jeong, 2017). Nkosi et al. (2011) identify the importance of computer literacy to nurses. However, access to and use of computer or information technology systems have been limited to nursing students. They emphasise the importance of curriculum adjustment and support from healthcare providers to enrich nursing students' computer skills and competence in using information technology systems. Hansbrough et al. (2020) find that nurse students experienced limitations in learning when accessing electronic health information with passwords of other nurse staff. Therefore, additional details about the impact of learning in an HT-integrated CLE should be explored.

#### **2.4.1 HT integrated in CLE in HK**

The studies on HT in HK for nursing are likewise rare. Studies investigate technologies involving medication errors of pharmacists (Samaranayake et al., 2012), a template-based electronic medical record system from doctors' perspectives (Ting et al., 2011), a clinical information system for staff of nursing homes (Oi et al., 2014) and information literacy and academic writing skills of part-time post-registration nursing students (Tarrant et al., 2007). The literature on HT only concerns the opinions of nurses or other professionals and focuses on curricular enhancement of nursing education. Three studies on CLE have been conducted in HK. For example, Yung (1997) examines the CLE of nursing students in HK and investigate the relationship between ethical decision-making and the perceptions of CLE. A comparison showed that students with degrees presented lower ethical decision-making than those with hospital-based certificates. The possible reason was the limited clinical experience of degree-holders compared with that of hospital-based students. However, the small sample

size of six participants could not reflect the general views of nursing students. Chan and Ip (2004 and 2007) apply an instrument CLEI developed in Australia to HK students in two studies and emphasise a significant difference between actual and ideal CLE. The results also highlight the paramount importance of supportive factors to secure the required teaching and learning of students during placement. Most importantly, these factors may be changed by the transformation of the healthcare system in HK. Despite such evidence, the effect of the dramatic transformation of HT on nursing students' learning in HK is still largely ignored.

#### **2.4.2 Effect of HT on Nursing**

At present, HT development cannot be removed from the healthcare system. Noting the changes in nursing practice, relevant concerns to patient care values are discussed (Huston, 2013; Cipriano, 2011).

The application of technology in organisations has been noted earlier by Weber (1958), who feared that its use may affect the freedom of human decisions. Weber also emphasises the control of bureaucracy in an organisation and says that society may be full of 'Specialists without spirit, sensualists without heart' (1958, pp.181–182). Nursing is a profession that traditionally implements cares autonomously, while contemporary nursing care is integrated with technologies.

The effects of HT on nurses' professional development provoke similar concerns, despite the previous contents in Section 1.2 of Chapter 1. Benner (1984) discusses the art of nursing practices in a complex situation. Nurses must focus on human needs and caring, despite the science and technological application of their profession. Benner and Wrubel (1989) also draw attention to HT that may shape the quality of nursing care for patients, as follows:

*... the devaluation of nursing care and other caring practices. In a highly technical society that values autonomy, individualism, and competitiveness, caring practices have always been fragile, but this societal blindness causes those who value technological advances to overlook the ways these advances are rendered dangerous and unfeasible without a context of skillful, compassionate care. (Benner and Wrubel, 1989, p.xv)*

Benner and Wrubel (1989) discuss the traditional nursing care that emphasises knowledge in various specialities and the empathic mindset to understand patient needs. Given that

healthcare service is a human-dependent task, including the handling of simple equipment can allow nurses to better understand and constrain attention to patients to avoid problems of considering cases as an endless list of separate variables and problems.

Polifko (2010) states that nurses must be knowledgeable in the use of technologies, such as eHRs, to facilitate information access and promote the health of patients and families. Locsin (2001) discusses the effect of technology on nursing, including the change of language in daily practices, such as in using electronic charting and modern nursing environments with different machines or technologies. He also emphasises that depersonalisation in nursing causes lack of caring, trust and humility, thereby affecting the relationship between nurses and patients. The emphasis on competence in technological nursing rather than practice in turn affects the wellbeing of patients (Smedley, 2005; Locsin, 2017). Ball (2011) further reported that nursing care in the clinical context is no longer a manual process because of its integration with HT. In healthcare settings, nurses use technologies every day. Gail et al. (2008) remind us that technology can place risks on nurses who are focused on the data generated from monitoring devices and so miss signs that would be picked up through in-person monitoring. Samaras (2012) reinforces the need to improve health information technology to minimise errors and risks to patients. Nurses depend on technology to implement routine care in a more accurate, safe and time-saving manner. However, nurses must not entirely depend on the technologies, especially in emergencies, due to the possibility of equipment malfunction or breakdown, during which they would need to revert to traditional practice to complete their tasks manually. Overall, technological dependence and practice have been developed among nurses, and they need to understand how to use and may even be involved in the repair, design and monitoring various types of technologies (Benner and Wulner, 1989; Ball, 2011; Barnard and Locsin, 2007; Glandon et al., 2014; Quail, 2015; Browne & Cook, 2011).

However, several barriers to using HT remain. In practice, nurse awareness of using online information resources could be used to address daily healthcare or patient inquiries, irregular HT skills supervision from healthcare providers and incapacity to evaluate the accuracy and integrity of information (Locsin, 2001; Cherry and Jacob, 2015). Barnard and Locsin (2007) comment that nurses are at times viewed as technicians rather than carers in the clinical environment. Contemporary incidents related to technical machinery handling and ignorance of critical thinking in using HT for care procedures or decision-making on patient are

likewise recorded (Evans, 2009; Hospital Authority Head Office, 2017). From a management perspective, the ideas from nurses should be incorporated in the purchasing decision of new HT. Relevant support for their adaptation to HT use must be addressed (Dunphy et al., 2001; Huston, 2017; Weberg et al., 2019). From the perspective of nursing education, Garvey et al. (2014) comment that information technology allows student learning in various environments through open access. However, these technologies are limited to social platforms such as Facebook and only facilitate the e-learning of students. From the perspective of healthcare, students have limited access to HT, especially health informatics, and require passwords from professional nurses to access the informatics system. Notably, these results were only from the perspectives of healthcare providers (Fetter, 2009a).

#### **2.4.3 Brief Summary on CLE and HT in Nursing Literature**

In brief, regardless of the available information on psychometric factors or other environmental factors affecting nursing students' learning in CLE, limited research has focused on the impact of technology on the practice of nursing students. Serçekus and Baskale (2016) only mention educational technologies rather than resources in clinical environments. Carlson et al. (2003) and Rafati et al. (2017) do not mention information on the characteristics of equipment and of the physical environment, respectively. The items of those evaluation instruments generate analogous findings, several of which are not explained. For instance, no underlying reasons are provided for the few learning opportunities in documentation and limited feedback from supervisors. Third, the characteristics of the setting or the physical environment are not described. Several participants comment that different settings may shape their chances of learning, even though their studies were carried out in the same region and influenced by standardised national policies. Notably, most of the studies have been conducted in European regions (e.g., Warne et al., 2010; Bisholt et al., 2014; Nepal et al., 2016).

Craig and Smith (2015) mention that a clinical placement involves half of the learning hours of a nursing student and their learning could be enhanced with an effective clinical environment. Guidelines, adequate resources, available information technology access and staff support in clinical environments are the main criteria to enhance student learning in clinical training (Fig. 1). Given that HT was a part of the resources and that technology is prevailing in usage in contemporary clinical settings, this aspect of information in the literature is lacking, even though resources, machinery devices and technology were

recorded. The present study helps to fill the gap under the qualitative method.

**Fig. 1 Elements to enhance effective CLE**



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(Source: Craig & Smith, 2015)

A technological environment, to a certain extent, arises in contemporary clinical settings. Nursing student practice in this new clinical environment differs from that of the traditional clinical environment (Locsin, 2001; Fetter, 2009a and 2009b). Studies on HT only focus on the opinions of nurses and emphasise the curricular enhancement to nursing development. Ball (2011) point out a challenge between the teaching setting and work experience that shows a difference between ‘ideal’ and ‘reality’ nursing. Thus, nursing informatics technology education and training in educational institutions and clinical settings must be balanced.

Cherry and Jacob (2015) comment that technological resource support in a clinical setting is important to the learning of nursing students. Findings related to the students’ use of such resources in quantity and quality are unsatisfactory, but many studies reported that, compared with no support, these resources help nursing students in clinical learning. Therefore, technology should be continued to develop and support the knowledge of nursing students during placement. Flott and Linden (2016) also find a dearth of information on HT and CLE from the perspective of nursing students.

In summary, any research approach has either limitations or contributions to fill the information gap of CLE. However, relevant information remains lacking in terms of

technology, physical resources or environment, machinery and equipment used by nursing students in the clinical context. Hence, this aspect should be investigated to provide a clear picture of the CLE in nursing students' learning in a contemporary healthcare system.

## **2.5 Understanding Learning in Nursing**

Nurse learning has undergone various changes. Nurses start their education through apprenticeship mechanisms, which tended to emphasise the transfer of learning. However, the rising dominance and academic direction of higher education institutions serves as the force to change nurse learning. By contrast, technology has directed various industries, including nursing, since the 1990s. Thus, nurse educators need to know how to use computers and online software to deliver teaching in school while nurses need to know how to operate machinery equipment and information technologies in clinical settings (Jarvis et al., 1998).

Gopee (2011) summarises three definitions of learning in nursing: (i) a reflective response to changes in behaviour, attitudes and physical aspects; (ii) occurring daily in life experiences and not education-driven and (iii) a psychomotor skill rendering a person capable to perform tasks. Based on Gopee's definition, nurses need to assume lifelong learning and build knowledge in their careers. Nursing is not only theoretical-driven but also depends on the enrichment of nursing knowledge through practice. With a focus on practising activities in nursing learning, the next section elaborates relevant theories, philosophies and models to enable the understanding of how nursing students accumulate their knowledge in real clinical settings.

### **2.5.1 Kolb's Experiential Learning in Nursing**

Many learning theories are available to guide learners to acquire knowledge in systematic approaches, one of which is experiential learning theory. Experiential learning refers to learning by doing. One main representative scholar is Kolb, who defines learning as a cycle involving the interaction between thought and actions, influenced by repeated practical experiences and reflection (Kolb, 1984). It emphasises learning through experience construction. Kolb shows how learning takes place through constructionism and defends the learning process that involves experience accumulation.

Kolb's experiential learning theory has been criticised as insufficiently comprehensive to

explain how human learning is constructed. It also does not involve adequate consideration of factors in the areas of social, personal and political aspects of the learning environment (Vince, 1998; Morris, 2020). Scholars also suggest further improvement to his ideas and even his model. For example, Gibbs (1988) emphasises the reflective analyses to individual issues and attention to the feelings of learners in certain cases based on Kolb's theory. Johns (2004) also suggests questioning administered by others to review the issues during reflection.

Kolb's theory has been a framework in many studies on education management despite some criticism (Raschick et al. 1998; Poore et al. 2014; Ha and Verishagen, 2015; Urquidi-Martín, 2019). It provides a foundation linkage between theory and practice. In Kolb's learning theory, the basis of the learning cycle comprises four steps. First, the student learns concrete existing knowledge on a specific activity. Second, the student develops concepts by real-life reflective observation. Third, abstract concepts can be filtered and summarised through adding new ideas. Fourth, the student responds to the actions and makes a decision. Thus, a new experience is created through repeating the experience application. Kolb states that effective learning is dependent on the completion of all four stages because the experience concept could not be constructed if it is interrupted. Kolb also discusses that acquiring experience was shaped by various factors, including interaction between the person and their environment. He also links up the potential effect of technological development on education (Kolb, 1984).

Based on Kolb's idea, reflection is a crucial step in which concepts are developed and shape student learning. Given that the nature of nursing requires repeated practice, learners build their knowledge through a practice-based discipline. In other words, a practice-based discipline of nursing depends on the support of reflective mechanisms and is vital to enhance critical thinking skills. Knowledge could be enriched by feedback from peers, clinical staff, educators and clinical mentors or supervisors. Supervision is suggested as a crucial strategy to enhance the effectiveness of reflective practice (Bottomley & Prymachuk, 2018). However, the reflective practice must be supplemented with adequate time (Gopee, 2011). The review of Kolb's learning theory shows its obvious use by nurses and students in daily care as new practice and equipment were continuously innovated.

A nursing programme focuses half of students' learning hours in real setting practices, and scholars and researchers emphasise the importance of real learning experience to nurse



education. The healthcare system is changing with using more HT in clinical settings; relevant HT products and demonstrations are also introduced in nursing education.

In this study, the pseudonymous Wu-Zee University is selected as the case study. It has initiated and advocated nursing learning with the integration of advanced technologies in the school setting, but how its investment in curriculum could contribute to the learning of nursing students is unclear. Most importantly, HT usage has become a part of students' medication assessment. Students encounter new environments with more technology usage during clinical training in reality, but their responses or actions and feelings to the knowledge construction in an HT-integrated clinical environment during clinical training are unknown.

### **2.5.2 Behaviourism and Constructivism in Practical Learning**

Many learning theories guide nursing programme planning in the classroom and clinical education and training. The two main theories are behaviourism and constructivism. A review of these two theories allows for the understanding of how they shape nursing students' learning in reality.

Behaviourism focuses on the learner to undergo learning with instructions given in a situation. Students can learn with the stimulation of environmental events, such as changes in patient condition. This theory involves changing observable behaviour, in which communication, including formal and informal feedback, is the medium to transfer the experience of one person to another. From the ideas of behaviourist learning theory, the achievement of learning goals heavily depends on the students' intrinsic value. Allowing or rejecting participation in events holds traumatic sway over students' learning motivation (Wignes, 2006; Bottomley and Prymachuk, 2018). Gopee (2011) recognises that behaviourist learning theory can be applied in the health profession, focusing on a positive appreciation of the learners when they can competently complete the task. Wignes (2006) sums up behaviourist learning theory on the effects of education. Students' competence and standardised practices become the foundations to nursing education while mentors and facilitators need to set learning outcomes, become setters and modify student behaviours. Local hospitals commonly provide student orientation programmes before the beginning of each clinical training. During the first clinical training, nursing teachers or mentors provide briefing guidelines and learning goals to students before they move to the nursing setting. Students become used to learning by mirroring the role model behaviour in clinical settings.

Initially, simple nursing tasks such as blood pressure monitoring and wound dressing skills are introduced to students. Given this initial start, students are expected to demonstrate these skills under the instruction of nurse teachers or mentors. Usually, a debriefing session is carried out to allow students to reflect on their learning and clarify any misconceptions. When students obtain seniority and gain more clinical experience, they learn by observing nursing staff implementing daily practice. Students are assigned a supervisor from the clinical setting, and feedback is given to enhance student understanding and make improvements, thereby preparing a competent graduate.

Constructivism is closely correlated to cognitive theory, and it affects the learning and knowledge that students construct by knowing, discovering and making interpretations (Wignes, 2006). Memory retention could be enhanced when repeating the experience such that a single activity can enrich knowledge construction. Again, the influence of this constructivist theory was advocating opportunities and accumulating learning with repeated critical thinking and problem-solving skills. In constructivist theory, mentors and facilitators are the role models distributing information and continuously prompting student learning (Wignes, 2006). In reality, the role of mentor and facilitator is important to facilitate learning, emphasising nursing students' active engagement as a characteristic of constructivism. Learners could also accumulate new knowledge based on their previous experience as a foundation, and their active participation is required (Gopee, 2011). The implementation of constructivism fails when learners are isolated from participation, observation and discussion. Communication and feedback are also important in knowledge construction (Jarvis et al., 1998).

Briefing, guidelines and direct communication are common tools for transferring knowledge among nurses, nurse teachers and students (Gopee, 2011). Within this context, behaviourism theory is applied in daily practice by nurses and students to enrich their knowledge. At the same time, clinical placement could provide feedback opportunities through facilitation or supervision. For nurse supervisors or peer support, the development of constructive feedback methods is essential as part of clinical supervision (Gopee, 2011). Reflection is a major component of development and learning, and nurses could help make sense of experiences through reflection (Bulman and Schutz, 2013; Tarrant, 2017). The constructivist approach could assist nursing students to build their competence and enable them to handle complex situations in the hospital through analysis, implementation and evaluation. Nurse teachers and

the clinical supervisor are also responsible for enhancing their own skills by constructing knowledge based on past experience and sharing the same languages and norms with students (Jarvis et al., 1998; Wignes, 2006). This type of learning strategy could provide learners with experience-based opportunities to practise skills with appropriate decision making, similar to those experienced by nursing students in real clinical settings.

These theories focus on learner participation in activities, feedback provision and repeated reflection. The literature reviewed in Sections 2.1–2.6 shows that student learning could be shaped by the behaviours of different stakeholders in the clinical setting and students raise their concerns on aspects for improvement. Wignes (2006) reinforces that various learning approaches are needed in nursing education, and students' knowledge can be affected by changes in environmental factors and other theories, such as situated learning theory. Given that HT is integrated into clinical settings, such environmental changes have not been counted comprehensively, especially from the view of nursing students. Echoing this concern, Wignes (2006) suggests that students learn by cooperating with others (i.e., including patients) and determining the difference in culture in various settings. Therefore, the effect of situated learning theory on students' learning is important.

### **2.5.3 Situated Learning Theory in Nursing Learning**

Nursing students' learning is inspired by situated learning theory (Lave & Wenger, 1991). Students could acquire knowledge by participating in social–cultural community practices (Lave & Wenger, 1991) that serve as an approach to around authentic activities. This theory focuses on learning and doing concurrently rather than separating or prioritising tasks. Daily, this high-ranking process requires reflection, interpretation and critical thinking. The importance of situated learning theory in nursing is as follows:

*... Placements are complex social contexts and students have to succeed in joining and being accepted by the community of practice. Part of this process, and a crucial aspect of students' learning, is the capacity to learn from established members of the community. (Cope et al., 2000, p.852)*

Lave and Wenger (1991) emphasise the community adaptation of practices to underpin student learning. This adaptation is not focused on the competence of a single skill but is rather related to interactions with the staff in a social context. Student learning, including practical skills, cannot be excluded because students interact with others in clinical settings.

Under situated learning theory, the knowledge learnt in school may be difficult to apply at work (Leberman & Doyle, 2006). Theory–practice gaps also commonly arise due to stimulus from environmental factors, including nursing teachers (Cope et al., 2000; Landers, 2000). The clinical environment is ever-changing in health systems, but information on the processes or activities for student learning related to the influence of HT-integrated CLE has not been explored in detail.

#### **2.5.4 Clinical Facilitation / Supervision Model**

Nursing learning is closely related to apprenticeship. Apprentices could acquire knowledge through observation and practice while working in a clinical setting (Nolan, 2007; Prak et al., 2020). Experienced nurses share their experience with junior nurses. Knowledge is built by sharing, on-site observation and repeat practices and tasks to improve the nursing care procedures.

However, university education has developed since the 19th century and replaced the apprenticeship-style education from hospital-based programmes. Nursing school programmes commonly teach theories in classrooms for several months and then set practices in clinical settings (Gopee, 2011), such that students received and confirmed theoretical knowledge through teacher demonstrations. Self-practice is requested before training in clinical settings. The purpose of clinical placements and supervision is to promote the development of healthcare students' professional skills, on which high-quality CLEs and supervision have significant influence (Levett-Jones et al., 2018). Educational institutions can either use block or distributed modes to plan the students' clinical training, with the former having a longer training period than the latter. Regardless of which mode is applied, the effect on student learning could differ (Walker et al., 2016; Birks et al., 2017). The people supervising students in clinical training also varied, such as mentors, preceptors, clinical nurse educators and academic staff (also called nurse teachers or academic mentors) (Gopee, 2015). Good clinical facilitation could increase opportunities for practice and enhance student learning and is thus considered a key component for student success (Henderson and Tyler 2011; Mckellar et al., 2018).

Various supportive models are used in nurse education. The models are chosen depending on their programme context, training arrangement and coordination of educational institutions

and healthcare providers. The clinical facilitation model (CFM), also called clinical supervision model, is assigned to support the learning of nursing students. In this study, the term ‘facilitating’ model is used to standardise the content of the present study. Various types of supervising roles are appeared in clinical facilitating models (Fig. 2).

**Fig. 2** **Clinical Facilitating/Supervision Models**

<b>Model</b>	<b>Components of model</b>
1. Preceptor	1:1 model wherein a registered nurse is assigned to a student
2. Facilitation/ Supervision	A registered nurse is assigned to students in 1:6 or 1:8 model, and a facilitator can be either employed from hospitals or educational institutions.
3. Facilitation/ Preceptor	Combination of preceptor and facilitation/supervision model, in which a student is assigned to a registered nurse for precepting while a facilitator supervises a group of students in a ratio of 1:8
4. Dedicated Education Unit	A combined model of the preceptor and facilitator model. One more role is of a nurse educator who communicates with both hospitals and universities.
5. Mentor	A combined model of the preceptor and facilitator model. One more role is of a nurse educator who communicates with both hospitals and universities.

(Sources: Franklin, 2013; Mckellar & Graham, 2017)

Traditionally, the terms named in clinical mentor, preceptor, clinical supervisor and clinical nurse educators (also called facilitators) are interchangeably assigned to facilitate student learning. Regardless of the term used, one clear function is to supervise the students to learn in the clinical environment and create practice opportunities for enhancement (Landers, 2000). Their relationship must be built on trust but in varying durations. Again, this relation depends on the requirement and design of the clinical training plan (Franklin, 2013; Gopee, 2011 and 2015; Craig & Smith, 2015; Levett-Jones et al., 2018).

Facilitating models for supporting students differ among countries (Mckellar & Graham, 2017). Based on the review by McKellar and Graham (2017), interchanging models are used by different countries. Within their healthcare educational system, various models and levels of supervision were used to address the need for specific professional education and support students’ competent needs. Their study provided evidence that clinical facilitators can

provide better support to students who feel more confident to ask and have more opportunities to practise. In reality, many studies reflect various facilitation model implementations in their countries (Harvey and Uren, 2019; Franklin, 2013; Santucci, 2004). Jokelainen et al. (2011) indicated that both mentorship and preceptorship are dominated in clinical training. Their findings also show that mentorship and preceptorship are required for more systematic implementation in clinical environments to support students during clinical training to avoid any attrition rate. Löfmark et al. (2012) identify that students highly value the supervision from teachers and preceptors, both of whom could facilitate students achieving their learning outcomes.

Mentorship is one popular facilitating model used to support students in clinical settings (Saarikoski et al., 2007). The concept of mentoring is that an experienced person acts as a mentor to guide an inexperienced person, also known as a mentee. Andrews and Wallis (1999) indicate that mentoring is vital to students during placement. In nursing, clinical experienced staff in the background are assigned to mentor students. Their relationship ideally lasts for one year. They have regular meetings with students, but the function of the relationship depends on the human resource availability. This approach includes several types: one-to-one, group, peer and E-mentoring. In nursing education, the first three types are commonly executed in clinical settings (Gopee, 2011 & 2015; Craig & Smith, 2015).

Academic staff who conduct mentoring may be referred to by different terms such as academic mentors and nursing teachers (Craig & Smith, 2015). Gopee (2015) comments that learning and further opportunities in performing caring procedures for real patients are important to students, and they value the relationship with nurse teachers, especially in their first training. Poor mentoring from academic staff fails to provide opportunities to students to practise patient care. They are unable to link theory to practise because of poor nursing knowledge and mentoring skills due to less experience (Landers, 2000). Since the 1990s, access to information technology has challenged nursing teachers. Scholars have become aware that the effect of technology cannot be ignored (Gopee, 2015). As nursing teachers adapt to a technologically based environment in school, they also need to be capable of operating the technologies and machinery equipment in clinical settings (Finkelman, 2012).

Preceptorship is another model. Hall and Richiet (2009) defined preceptorship as an experienced nurse providing guidance to newly graduated nurses in clinical settings. This

model is similar to the mentoring model, in which a preceptor supervises a preceptee in a 1:1 ratio in practice. However, the preceptor needs to bear part of the clinical duty. This facilitating model has been used and discussed in contemporary healthcare systems globally (Löfmark et al., 2012; Kristofferzon et al., 2013; Broadbent et al., 2014; Mckellar & Graham, 2017). If properly applied, preceptorship training could help bridge the gap between theory and practice, given the extremely different real hospital settings and the lectures taught in school laboratory sessions. Improper preceptorship training is one of the main issues faced by nursing students during work-based learning. Unfulfilled roles and time occupied by clinical work are mainly criticised by students during placement (Franklin, 2013; Ward & McComb, 2018). Thus, inadequate interactions between preceptor or supervisors and students reduces the effectiveness of mentoring (Andrews and Wallis, 1999).

Good supervision through the preceptorship model involves multiple factors. The experience of clinical preceptors or supervisors may affect the correct knowledge delivery to students in clinical settings. Several nurses are therefore not willing to assume this role because they do not feel competent enough (Henderson & Tyler, 2011), while others do teach but are highly occupied by clinical workload. In this model, the inadequate time of clinical nurse educators available for teaching also requires managerial support (Hall-Lord et al., 2013; Gopee, 2011). Broadbent et al. (2014) indicate that clinical nurses feel confusion in their roles and lack time to carry out supervisory tasks.

One more developing model is the DEU. It has been developed since 2003 (Moscato et al. 2007; Whittle et al., 2008). The DEU is a partnership among administrators, clinical staff, students and educators, where they are delegated to an assigned unit with providing a holistic clinical environment to support students' clinical learning. However, human resources and cost are barriers to its success and sustainability (Moscato et al., 2007; Sims and Cook, 2013; Eskilsson et al, 2015).

An updated clinical facilitating model has been recently developed by the Australian Health Organization (Mckellar & Graham, 2017). Nurses are assigned as clinical mentors to provide comprehensive supervision, teaching and coordinating tasks for practice. They do not need to share clinical work. Hospitals may cooperate with educational providers to recruit clinical nurses to supervise students within the clinical training period or assign nurses from clinical settings to assume this role for a short period, such as one week. Nurse educators may also be

shared between hospitals and educational providers to act in this role and to provide supervision to students for a long period (Mckellar et al., 2018).

Regardless of nurses' education by apprenticeship or a higher education academic programme, nursing students continue gaining their practical knowledge under the influence of captioned theories, philosophies and models in any clinical setting. However, the shortage of nurses and innovations from the healthcare system reform bring different changes to the physical environment, organisational culture and staff behaviour modification. The effect of the HT integrated CLE on nursing students' learning remains unknown, especially how they can learn with the application of these theories, philosophies and models.

Goope (2011) warns of risks to eroding specialists' skills because of environmental factors, such as medical devices and social value. As such, the present study uses the above literature, theory or models as guidance to analyse the clinical training experience and CLE of nursing students in Wu-Zee University.

Alongside the models, influencing factors have shaped the CLE. Not all practice settings could provide student nurses with a positive learning environment. CLE is a multidimensional entity with a complex social context. Among the factors that were previously investigated, the effect of technology is the main concern in recent papers. However, information related to the perception on the effect of HT on the student learning in clinical settings remains limited.

## **2.6 Summary**

In summary, having reviewed the literature, the key themes cover four main areas, these are: comprehension of nursing education, nursing knowledge of clinical training, HT integrated in CLE, and understanding learning in nursing. In the second key area, five sub-themes are identified, these are: nursing clinical training learning, concept of CLE in nursing, effectiveness of clinical learning environment, studies on clinical learning environment, and factors influencing CLE. In the fourth sub-theme, a further theme was identified relating to the evaluation tools on CLE. With respect to the third key area, two sub-themes were identified, these are: HT-integrated in CLE in Hong Kong, and the effect of HT on nursing. With respect to the fourth key area, four sub-themes were identified, these are: Kolb's Experiential Learning in nursing, Behaviourism and Constructivism in practical learning,



Situated Learning Theory in nursing learning, and Clinical Facilitation and Supervision model.

In terms of their relation to the research questions of this study, this literature review and the identified gaps provide an opportunity to examine the perceptions, the impact, why and in what ways nursing students experience HT-integrated CLE.

## Chapter 3: Methodology

### 3.1 Introduction

This chapter begins by explaining the adopted a case study research design. It then describes and analyses the study methodology and design. The adoption of a case study method is justified, given its mixed approaches to address the research questions with rationales. Setting and sampling are described and conducted in line with the purpose of this study. Preparation work of the CLES+T instrument is managed, and the related data collection process is conducted with underlying rationales. Data analysis for this questionnaire approach is described and explained. Subsequently, another approach of arranging interviews with participants of different backgrounds is conducted with grounded, thematic reflective analysis used to generate the themes. Relevant documentary preparation including voluntary consent, information sheets and interview schedules (refer to: Appendix A, B, and C) for both methodology approaches are elaborated. Last, the trustfulness and credibility of the collected data and ethical consideration are also discussed (Creswell, 2014).

### 3.2 Research Design

A good research design helps address research questions with evidence (Yin, 2009). Here, a descriptive case study design is adopted. Hancock and Algozzine (2006) stated:

*... they are intensive analyzes and descriptions of a single unit or system bounded by space and time. (Hancock and Algozzine, 2006, p.11)*

Case study is categorised as a flexible design and investigates a situation, individual, group, organisation or any factor that the researcher wishes s to explore (Robson, 2011). Robson (2011) summarises the concept of case study and defined this as

*... a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real life context using multiple sources of evidence. (Robson, 2011, p.136)*

In investigating a research issue, a case study can be single, multiple, or integrated as part of a large mixed-method research. Multiple-case study facilitates the investigation of more complex contexts and research questions. This design can also strengthen and support the findings. However, this approach is criticised for being expensive and time-consuming (Yin, 2003). By contrast, single case study allows for wholeness and simplicity. This design

focuses on a single representative population or organisation where cases are clearly distinguishable from other variables (Ragin & Becker, 1992; Yin, 2003). Yin (2003) indicates that single case study enables researchers to investigate a representative case of the field in a more comprehensive and detailed manner. It allows researchers to get richer information by conducting case analysis, case analysis between units or cross-case analysis among units in a chosen representative case.

Yin (2009) comments that case study is commonly used in social science disciplines, such as public health, but can also be used in various situations, including education and nursing. Case study is the preferred method when ‘how’ or ‘why’ questions are posed in contemporary events within a real-life context. The researcher cannot exert much control on the situation (Yin, 2009). Case study is also fit for research questions requiring an extensive and in-depth description of social phenomenon and allows researchers to retain the holistic and meaningful characteristics of real-life events. Again, the data from case study depends on multiple sources of evidence that need to enhance the trustfulness of the findings (Yin, 2009).

Hancock and Algozzine (2006) discuss the characteristics of a case study. First, this method addresses a phenomenon such as event, situation, programme or activity. Second, the studied phenomenon is not manipulated and kept in a natural context with restrictions of space and time. Third, a case study needs a rich descriptive narrative, and sources of information are collected from key persons. Swanborn (2000) suggests that case study research fits to investigate people undergoing changes in a social context and presents several advantages:

*... to explain on the level of the individual explicitly and in detail the causes of the individual's behavior. (Swanborn, 2000, p.79)*

According to Robson's definition, case study could investigate one nursing educational institution as a chosen organisation (Robson, 2011). The present study was limited to investigating a group of students of Wu-Zee University, which served as a single case. Applying the research context, student learning in an HT-integrated CLE was investigated and the study period is controlled to within their clinical training. The sources of information were mainly traced from highly practised and experienced nursing students through questionnaire survey and interview. Year-five students were recruited for the questionnaire-based survey. Then, year-four and five students were invited for interviews, serving as cases in terms of experience of two subunits. Academic mentors and graduate nurses were also

invited for interviews to enrich the understanding of the study context. Their contributions served as another two subunits.

Case study designs vary and aim to fit the disciplinary perspective. The designs can be categorised into intrinsic, instrumental and collective (Stake, 1995). Case study designs can also be grouped into three other types: exploratory, explanatory and descriptive (Hancock and Algozzine, 2006). The present study used the instrumental and descriptive research design. Instrumental design pays attention to a particular phenomenon by combining more information to enhance the understanding of this phenomenon. Descriptive design enables the description of a phenomenon in a complete picture within its circumstances, in which researchers can implement interviews, data collection, observations and focus group meetings to achieve further information (Hancock and Algozzine, 2017).

These design methods allowed a deeper investigation of the effect on the learning of nursing students in HT-integrated CLE from the perspectives of different stakeholders, such as nursing students, academic mentors and nurses. Interviews were also used to investigate the effect on the learning of nursing students in HT-integrated CLE to understand the experiences and perceptions of learning in an HT-integrated setting from the view of nursing students.

### **3.3 Mixed Methods Inquiry in Case Study**

This study initially explores the perceptions of HT-integrated CLE in terms of the learning of nursing students and then examines the effect of common dominant factors: supervision relationship, ward atmosphere, opportunities for learning and practice, nurse teacher and leadership for student learning in HT-integrated CLE. Given that this study involves human interactions within CLE, traditional research designs are also adopted. Mixed methods of social research methods are used as discursive tools for the phenomena in this study, as discussed below.

The design of pragmatic paradigms enriches the information. This study combines quantitative and qualitative paradigms, which have typical features in data collection that allow for a comprehensive understanding of the research problems (Gray, 2009; Robson, 2011). Mixed-method designs have five purposes: triangulation, complementarity, development, initiation and expansion. Thus, the validity of information is enhanced by

counteracting variance attributes, such as methods, data sources and inquiry components. Inquirer biases can be avoided, enriching the breadth and depth of inquiry results (Greene et al., 1989; Creswell, 2014).

First, the quantitative approach describes the prevalence and the relationship among variables, relying on numerical data and avoiding researcher bias to alter the results. A validated instrument is used to measure different variables, and the data are analysed by executing statistical procedures (Creswell, 2008). The benefits of the quantitative approach include greater flexibility to recruit participants that can complete a questionnaire-based survey. Analysing the patterns of data allows for research understanding (Flick, 2014). In the present study, a questionnaire is used to discuss the satisfaction on influencing factors that affect students' learning during clinical training. The factors are supervision, ward atmosphere, opportunities for learning and practice, leadership and nurse teachers.

Second, a qualitative approach provides case information, describes a complex context and shares personal experiences of specific situations. Contextual and setting factors may be identified as related to the phenomenon of interest (Johnson & Onwuegbuzie, 2004). In the present study, nursing students, academic mentors and graduated nurses are interviewed individually. Various dimensions are discussed to not only complement the content regarding the effect on learning of nursing students in HT-integrated CLE but also to determine which variables affect the learning of nursing students in such a context.

This study uses a semi-structured interview, which allows a flexible framework for the interviewee to express their ideas and enables interviewers to adjust their questioning technique but with the same meaning (Robson, 2011).

Hancock and Algozzine (2006) also stated that

*... Interviews may be structured, semi-structured, or unstructured. Semi-structured interviews are particularly well-suited for the case research. Using this approach, researchers ask predetermined but flexibly worded questions, the answers to which provide tentative answers to the researchers' questions. In addition to posing predetermined questions, researchers using semi-structured interview ask follow-up questions designed to probe more deeply issues of interest to interviewees. In this manner, semi-structured interviews invite interviewees to express themselves openly and freely and to*

*define the world from their own perspectives, not solely from the perspective of the researcher.* (Hancock & Algozzine, 2006, p.40)

Individual face-to-face interviews are conducted to directly collect the data, avoid biased responses and provide consistent responses (Robson, 2011). Interviewees can also feel comfortable expressing their ideas. Audiotape is used to record the responses and to facilitate repeated listening to avoid missing data. In HK, Cantonese is the main language of communication of nursing students, and both Cantonese and English were experienced during interviews.

Both methods were used to carry out pilot tests to examine the sampling and data collection procedures, improving data collection techniques and ensuring that participants reliably understood the questionnaire items (Creswell, 2008).

Yin (2009) discussed that mixed-methods disciplines have been recently integrated into case studies, allowing researchers to address more difficult questions. Applying these designs in the current study allows the researcher to determine the concepts of the issues of nursing students. The weakness of each approach can be overcome and the findings can be validated through convergence and corroboration (Johnson & Onwuegbuzie, 2004).

### **3.4 Quantitative Approach**

The aim was to examine the perception and experiences on the impact of HT to the learning of nursing students in a CLE. In the present study, a questionnaire-based survey was used to investigate the learning satisfaction of students by evaluating the factors of CLES+T to address the first and second research objectives.

#### **3.4.1 Clinical Learning Environment, Supervision and Nurse Teacher**

The current study adopts the CLES+T developed by Saarikoski et al. (2008). The questionnaire-based survey is in English and facilitates an understanding of nursing students who have standardised language qualifications. The questionnaire-based survey is scored using a five-point Likert scale, with 1 = strongly disagree to 5 = strongly agree. A bipolar scaling method is used, measuring either positive or negative responses to a statement to determine a respondent's opinion or attitude towards a given subject (Ary et al., 2019). Based on the literature reviews (Saarikoski et al., 2002; Saarikoski et al., 2008; Mansutti et

al., 2017), the domains of CLES+T are closely linked to CLE and to nursing students' learning satisfaction. The CLES+T scale has 34 items categorised into the following five domains:

- 1: 'Pedagogical atmosphere on the ward' that concerns the psychosocial climate and opportunities for supervising and facilitating student learning;
- 2: 'Leadership style of the WM' that determines whether the WM is democratic and supports the staff to teach nursing students;
- 3: 'Premises of nursing on the ward' that concerns the quality of the nursing care. Students can learn from the performance of nurses who provide care to patients. Opportunities for observation and participation in nursing activities are also provided to students;
- 4: 'Supervisory relationship' that concerns the 1:1 relationship between the ward preceptor and the student (Saarikoski et al., 2002; Saarikoski et al., 2008) and
- 5: 'Role of the nurse teacher' that evaluates the teacher's pedagogical and social role in clinical practice.

The reliability of the instrument is estimated using Cronbach's alpha coefficients. Reliability coefficients of the other sub-dimensions of CLES+T scale range from 0.96 to the marginal 0.77 (Saarikoski et al., 2008). The original CLES and CLES+T scales have been validated, using 416 respondents (Saarikoski et al., 2002) and 549 respondents, respectively. The total explanation percentage of the five sub-dimensions' model is 67% (Saarikoski et al., 2008).

Questionnaires can provide numeric descriptions of trends, attitudes, or ideas of samples from participating populations (Creswell, 2014). Nursing students are invited to write their basic demographic information, including gender, years of experience, ward nature, HT devices available and used in the clinical setting, number of supervisors and approval and access rights for academic mentors to use the HT devices. This information assists with understanding the characteristics of the HT-integrated CLE, providing information to analyse the trend or patterns among these elements to the CLES+T items.

### **3.4.2 Setting of the study**

This study was carried out in a private educational institution which provides one-fourth of the total annual nursing students' graduate in HK. This institution was authorised and implemented in the same curriculum criteria set by the NCHK. Thus, recruiting the

participants from their pool of nursing students is appropriate. These nursing students also bear the same opportunities as those from other educational organisations to practise in public hospitals. Given their experiences with the same situations in public hospitals, this sample therefore presents suitable candidates to represent the ideas of nursing students in HK.

Regarding the curriculum, the chosen institution is a brand-marked organisation using teaching technology by staff and learning for students. The faculty of nursing has integrated technological teaching resources such as a simulation centre, a virtual reality centre and online learning materials. A simulated machinery system for teaching medication administration is also installed in the laboratory.

The clinical training arrangement in Wu-Zee University had four periods, each starting after the theoretical classes of the academic year. The first placement was assigned to clinics, where most students learnt wound dressing and simple vital sign monitoring for approximately one week. The second placement had an academic mentor to guide 6-8 students in the general medical and surgical wards, and it commonly lasted for six weeks. General-stream students also needed to complete one assessment of either wound dressing or medication administration, then were subsequently assigned to a placement alone. A clinical supervisor from the ward was assigned to each student, although this practice depended on the human resource available in the clinical setting. In between, students needed to finish their assessment of either wound dressing or medication administration and passed the final assessments of Total Patient Nursing Care.

By contrast, mental health stream students did not have academic mentors. Staff accompanied them by email or phone during the placement period, and this practice lasted until the end of the nursing programme. In the wards, each student was assigned a member of clinical staff as their supervisor. Mental health stream students might encounter new clinical supervisors when they had placements in other settings. Similar to general health stream students, mental health stream students needed to complete all assessments and were examined by the clinical supervisor.

Both streams of students needed to complete an iPad evaluation system with their assigned academic mentor or clinical supervisor after each placement.



### **3.4.3 Sampling for Survey**

Purposive sampling was used to distribute the questionnaires. Thus, researchers do not need to spend resources on sampling and benefit from sharing the same characteristics of participants. This sampling technique is commonly used in narrative-based research and invites individuals who have experience with the phenomenon being investigated (Cronin et al., 2015). From the quantitative perspective, purposive sampling allows researchers to use a cross-section of the population (Gray, 2009). Purposive sampling has several types, including homogeneous sampling, which is selected in the current study. This sampling method allows for the concentration on one specific group of the population that has a specific background. With the aim to further understand the HT effect on student learning in clinical settings, nursing students with clinical experience can prove helpful. Their high exposure to the clinical setting can provide sharing of more experiences in the case.

Nursing students of Wu-Zee University attend clinical training each academic year, so students have different clinical placement experiences according to their academic year experience. In this case study, fifth-year students were chosen because they have more experienced more clinical settings and gained the most practical experience. A total of 258 participants were invited from fifth-year students who had completed the full-time undergraduate nursing programme. Their previous clinical experience could prove more fruitful to the study compared with other academic-year students.

### **3.4.4 Data Collection**

The data collection was held in a general office from 5 May 2020 to 12 May 2020. As students arrived in the office to hand over their registration documents, they were invited to fill out a set of questionnaire surveys. Six chart boards were used to assist in filling out the questionnaire surveys, with several briefing points stuck on each chart board. The information sheet and contact details of the researcher were attached to the questionnaires. All returned questionnaires were placed into a designated collection box, which was retrieved and checked for the number of returned questionnaires twice a day. Given the protective measures for the COVID-19 pandemic implemented for students coming back to the institution, the data collection lasted five days. Feedback on the procedure was also obtained from the staff representative. No complaints or inquiries from students were given as feedback from the office staff or through other means of contact to the researcher. The deadline for returning the questionnaires was extended to 30 May 2020, although no more

were returned to the staff representative or researcher from 12 May 2020.

Relevant permission was obtained from the educational institution and course leaders. Pilot tests were carried out on a group of different cohort students with clinical experience. Pilots allow researchers to review the feasibility of the study and improve any process flaws (Robson, 2011). The tests also provide an opportunity to evaluate the suitability of data collection methods and hints for any refinement of the survey.

Nursing students who completed the nursing programme and handed over their license registration application forms were thus recruited for this study. A list of eligible students for the license registration procedure was obtained from the registration committee leader. Relevant coordination was arranged with registration committee members with prior research experience.

### **3.4.5 Data Analysis**

From 258 final-year students, 254 returned their questionnaires. The exclusion of blank and incomplete forms removed 38 responses from the analysis. All collected data were processed through IBM SPSS 26. Data of the demographics and clinical settings with the HT-integrated CLE information were calculated by descriptive statistics. The percentage of collected data was calculated and the relationship among variables was compared.

### **3.5 Qualitative Approach**

Objectives 2 and 3 are achieved by interviews which helped to explore the dominating factors and their impact on learning of students in the HT-integrated CLE, thereby facilitating understanding of the perceptions of students on the HT-integrated CLE.

#### **3.5.1 Setting of Qualitative Approach**

As noted by Merriam (1998), using a case study design under qualitative approaches, enabled the researcher to situate the analysis within the chosen conceptual and theoretical framework. The qualitative approach and framework can shape the data collection and analysis and can reveal how all the parts work together to form a whole. It is assumed that meaning is embedded in people's experiences and that this meaning is mediated through the investigator's own perceptions (Merriam, 1998).

Merriam (1998) defines the setting of the qualitative approach as

*... the investigator in qualitative research spends a substantial amount of time in the natural setting of the study, often in intense contact with participants. (Merriam,1998, p.8)*

Given Merriam's (1998) insight I recall that I spent a approximately six months interviewing participants, at times, in their natural setting. Karlan and Appel (2018) comment that an inappropriate setting leads to time wastage. In Wu-Zee University, a pool of 1500 undergraduate nursing students is taken as a sample population. Students with clinical experience are qualified for recruitment, especially those with more practical experience in clinical settings, and are targeted to explore their nursing experience in depth. Hence, year-five students who have just finished all their clinical training are targeted as potential candidates. The last page of the questionnaire included an invitation statement for an interview. Students were asked to write their contact numbers or email addresses to allow the researcher to set the contact them to arrange an interview.

### **3.5.2 Sampling for Interview**

Two year-five and six year-four nursing students were successfully invited, and two academic mentors and two graduated nurses agreed to join this study. The purposive sampling technique was again used based on the population characteristics. Sample selection depended on the researcher to satisfy the needs of the study (Robson, 2011).

Students who had not received any experience in clinical placement would be unsuitable for the study. Therefore, the year-five nursing students were recruited for interview after completing the survey. These students had been supervised by academic mentors from their educational institution and healthcare providers in different approaches.

However, recruitment of interviewees was not smooth. Several measures were applied to recruit the student participants. Initially, this was through the questionnaire which was from a pool of 258 respondents. Ten participants left their contact details on the questionnaire. Each was contacted via email, however, three of the provided email addresses were not valid. Five potential candidates left their phone numbers as well and were contacted through WhatsApp. The emails generated no response while only two students responded through WhatsApp, but one replied that they had no spare time to attend the interview. Only one male student was

successfully contacted and he agreed to have the interview. Another measure involved recruiting during a promotion of a volunteer activity. In this instance, the researcher inquired about the interviewee's background and invited her to the interview. The researcher asked the interviewees to help promote the interview recruitment through their peer networks. One more measure involved inviting academic colleagues to share the promotional statements of this study to WhatsApp groups of students they have previously mentored.

Two academic staff were purposively recruited in Wu-Zee University. The researcher had cooperated with both mentors before and directly invited them via email to participate in this research. Academic mentor Ren (A1) has been a nurse for over 30 years and has supervisory experience of over 20 years in public and private hospitals and nursing schools, respectively. She was registered after finishing nursing school and had worked in a nursing office for a few years. She also taught nursing programmes in a nursing school, a private hospital and a university. Academic mentor Amy (A2) has been a nurse for 20 years in a public hospital and has supervised students for over 10 years. She was registered after university programmes.

Two nurses who had graduated for one year from Wu-Zee University were invited to participate the study. Recruitment was carried out through WhatsApp promotion through colleagues. Nurses Chan and Jackie are male and female, respectively, both working in public hospitals.

Flick (2014) comments that the candidates for interview must reach 32 or until the data are saturated, which is an indicator to stop inviting participants. The data were summarised and analysed for matching ideas and saturation among the three groups of participants.

### **3.5.3 Interview Schedule**

Interview questions are developed as a guide (Appendix A–C) to collect information on the perceptions of nursing students on HT-integrated CLE. First, demographic data are collected to further understand the background and characteristics of their setting. Questions are set based on the literature gaps related to the definition and perceptions on HT-integrated CLE, experience of nursing students' learning in HT-integrated CLE, and reasons leading to such impacts. Interview schedules include questions about their relationship of supervision, atmosphere, opportunities of learning and practice, nurse teachers and leadership in the HT-integrated CLE.

### **3.5.4 Data Collection of Interview**

Two pilot interviews were carried out with one academic staff and one student. The questions used as interview guides could be clarified to ensure that they are understandable and reasonable to interviewees (Thomas, 2009). Each interview was carried out in a silent venue that candidates preferred. The interviews took approximately one hour.

#### **3.5.4.1 Students**

Students were interviewed in quiet places, either in cafes or at Wu-Zee University, depending on their preference. Each interview covered the following information: a) their demographic background; b) stream of programme; c) academic year; d) placement in public or private hospital; e) nature of ward; f) HT available in setting; g) types of HT being used in setting; h) orientation done by which person; i) experience on supervised usage of HT; j) experience on being refused to use HT; k) ratings on the effectiveness of clinical supervisor, clinical staff, WM and academic mentor and l) access rights of using HT by academic mentors.

The interviewees were asked about their learning experiences in their clinical training in the clinical settings. The students were invited to share their perceptions of HT and the effects on their learning during clinical training. The CLE influencing factors of clinical supervisor, academic staff, leadership style of WM, atmosphere of learning and premise of nursing care to their learning were discussed. The effects of HT on these CLE influencing factors were shared.

#### **3.5.4.2 Academic Mentor**

Both mentors were not immune to the local health reform and witnessed the change from paper-based to digital nursing procedures. Ren and Amy were interviewed separately for approximately one hour each. Both were asked the same questions based on the interview schedule (refer to Appendix A) used by students. Several points were explored to probe for deeper information and verify the data provided by students.

#### **3.5.4.3 Graduate Nurse**

Both nurses were interviewed in their working environments as per their requested. Each interview lasted for approximately one hour. Both were asked questions based on the interview schedule (refer to Appendix C) used with the students.

### **3.5.5 Data Analysis**

Data analysis was conducted through using a thematic analysis (TA) approach (Braun and Clarke, 2021). It can be used in various qualitative studies as a constructionist method to examine the various lived experiences of a group of a population within society (Byrne, 2021). This approach is a flexible method to address detailed but complex qualitative data. It has guidelines and steps to prepare the interview questions that aid in collecting common ideas from all participants' transcripts and making them into themes (Braun and Clarke, 2006; The University of Auckland, 2019). Given that this study aims to explore the perception of students on HT-integrated CLE and mainly depends on the experience expression of various groups of participants through survey and interview, it has produced vigorous data. TA generates rich descriptive and interpretative information through analytic narrative production; its inductively developed analysis helps to generate themes in similar patterns with semantic and latent meanings (Braun and Clarke, 2021). TA also offers theoretical flexibility (Braun and Clarke, 2021) such that a researcher could apply various theories and models in research. In this study, Kolb's experiential learning model, the clinical facilitation/supervision model and the three learning theories of behaviourism, constructivism and situated learning were used to apprise the details of students' learning experience on an HT-integrated CLE.

The guidelines and steps of data collection and theme-making of the TA have six phases: familiarisation of the dataset, coding, generating initial themes, developing and reviewing themes, naming themes and writing up (Braun & Clarke, 2006). The interview data were subjected to analysis using the researcher's familiarity with the process and expression of each interviewee. The recorded interviews were listened to and converted into transcripts. Repeated listening and counter-checking ensured the verbatim transcription, without elaboration, omission, changes, adjustments or rephrasing. After confirmation of the transcript notes, a final transcript check ensured accurate transcription. Verbatim responses were matched to each question asked during the interviews and recorded systematically. Responses to each question were grouped according to each group of interviewees. Then, alike wordings of transcripts were highlighted in the same colour and interpreted for meaning. Interesting wordings of transcripts were highlighted in different colours. Similar ideas were extracted and coded, then compiled into an individual coded label. Coded data

were counter-checked to the original audiotape and transcripts. The coded data were further analysed and categorised in the same descriptive ideas. The coded data among students, graduate nurses and academic mentors were compared and reviewed. Finally, findings with common ideas were themed and checked against the research questions. Relevant themes and sub-themes were analysed, to enrich the information on students' learning in an HT-integrated CLE. The researcher has rearranged the named themes in varied layouts to make the contents a story with concise and understandable information on HT-integrated CLE for readers.

### **3.6 Ethical Consideration**

Thomas (2009) states that the ethical principles of research aim to balance the rights of researchers and participants. Possible conflicting interests of involved parties or stakeholders are also considered. The researcher needs to avoid any risks and inconveniences resulting from this study. Relevant ethical issues are assured according to the guidelines of the British Educational Research Association (BERA, 2018).

#### **3.6.1 Power relations**

This study is carried out in a workplace setting, and thus the sample comprises the researchers' students. The impact of power imbalance due to relationships with the nursing students must be addressed. The rights of participants are clearly explained to reduce the pressure on their academic interests and promote the accuracy of data collected by providing an information sheet during the interview (Creswell, 2014). The research study is scheduled at favourable times to reduce the physical burden on students during their clinical training or study time. During the COVID-19 pandemic, students have no need to return to school, and thus data collection was scheduled on the date of their license registration document collection.

#### **3.6.2 Informed consent**

To control and minimise harm to involved parties, the researcher obtained voluntary consent from participants who agreed to the study and completed and returned the survey form. A tailor-made consent form was also developed for the interview. An information sheet describing the background of the study is given to participants for reference regarding the consent forms, which are collected directly (Appendix D). The sheet also lists the rights of participants and the responsibility of the researcher.

Participation in the study is completely voluntary and can be withdrawn at any time. Refusal to participate or withdrawal of their consent does not result in any penalty or loss of benefits. Access approval was granted from Wu-Zee University and the University of Bristol before data collection. The CLES+T instrument is also approved for use in this study by the original author, as per the response email dated June 19, 2019 (Appendix E–G).

### **3.6.3 Confidentiality and Anonymity**

The researcher has considered the confidentiality of participants and the collected data. Anonymity of individuals in this study is addressed by using pseudonyms. All collected paper data are kept in a locked cabinet and a security password was assigned to any digital records on the computer. Data can be accessed by the researcher only. Participants' identities are recorded anonymously. The provided information is not to be disclosed to health organisations and irrelevant persons. All information is confidential.

### **3.7 Content Validation / Trustworthiness**

Yin (2009) states that evidence enhancement of the case study can follow three principles: using multiple data sources, creating a case study database and maintaining a chain of evidence. Yin (2009) commented that the design quality of empirical social research is based on trustworthiness, credibility, confirmability and dependability of data. These four areas can also be applied to the case study.

#### **3.7.1 Valid Data of Survey**

Creswell (2008) stated that findings are more valid when the reliability score of the instrument is high. The validity and reliability scores of the instrument has been previously calculated by the original author and undergone test and retest processes that prove their stability over time (Gustafsson et al., 2015).

#### **3.7.2 Data Generated from Interview**

Findings from the interview reveal that, more attention is paid to trustworthiness which covers credibility, confirmability, transferability and dependability of data. Credibility can address problems of trustworthiness of the findings. Confirmability can ensure neutrality of research. Transferability focuses on generalisation or applicability of findings. Dependability can enable data consistency (Ary et al., 2019).



Gray (2009) defines credibility as a process to ensure the findings are trustworthy, valid and reliable. The findings of each case can gain convergence evidence by replicating the data from one study to another. Information from multiple sources can also serve as evidence to construct validity. Problems with credibility are avoided through sampling, a bias precaution such as using prompts and probing techniques and following interview guides. Lincoln and Guba (1985) state that credible findings can be achieved through prolonged engagement, observation and triangulation. Prolonged engagement can enable scoping while persistent observation can determine details. Erlandson et al. (1993) state:

*... Prolong engagement a foundation for credibility the researcher to learn the culture of an organization or other social setting over an extended time period that tempers distortions introduced by particular events or by the newness of researcher and respondents...Prolong engagement also serves to build trust and develop a rapport with the respondents...Persistent observation helps the researcher sort out relevancies from irrelevancies and determine when the atypical case is important. (Erlandson et al., 1993, pp.133-134, 137)*

In the present study, prolonged engagement could be understood to commence when data collections began and when data collections were completed. In this instance, this took 12 months. In a broader sense, prolonged engagement could be understood considering my own curiosity about how nurse experiences HTs in CLEs. In this instance, this occurred when I first began teaching in the university sector, some ten years ago (refer to Chapter One, 1.6). Each interviewee is also given sufficient time to express their ideas, while prompts and probing techniques are used to clarify unclear points. Reflection after each interview also allows for self-observation and focus on the questions. Again, this measure can guide the researcher to maintain the topic is on track during data collection (Gray, 2009).

Triangulation is used to compare the findings from two or more different methods of data collection or sources. The convergence can be determined to develop or corroborate an overall interpretation, an important step to ensure the comprehensiveness of findings (Mays and Pope, 2006). Two methods and four sources of data triangulation enhance the quality of the study. Two methods of data collection allow the researcher to relate the findings from one to another, such as the results of survey linked to the underlying reason from the interview. The data involving students with different academic experiences, academic mentors and graduate nurses can be used to cross-check the other information. Erlandson et al. (1993)

provide the definition:

*... Triangulation. By this method, the researcher seeks out several different types of sources that can provide insights about the same events or relationships. (Erlandson et al., 1993, p.115)*

Yin (2009) suggests:

*... With data triangulation, the potential problems of construct validity also can be addressed because the multiple sources of evidence essentially provide multiple measures of the same phenomenon. Not surprisingly, one analysis of case study methods found that those case studies using multiple sources of evidence were rated more highly, in terms of their overall quality, than those that relied on only single sources of information. (Yin, 2009, p.117)*

Lincoln and Guba (1985) stated that data triangulation from different methods and replication from different persons can enable the reliability of data. Hence, dependability (internal consistency) of data can be enhanced. In this study, various views from students, academic mentors and graduate nurses provide comprehensive information and explanation of the phenomenon to enhance dependability.

Merriam (1988 and 1998) suggest techniques to enhance dependability, two of which the researcher has applied. The first is the explanation of researcher's assumptions and theory behind the study and the measures to arrive the data collection. The second is the usage of data triangulation methods.

Another criteria to enhance trustfulness of case study is transferability which is subjected to the issue of external validity (Lincoln & Guba, 1985). Merriam states:

*... In qualitative research, a single case or small nonrandom sample is selected precisely because the researcher wishes to understand the particular in depth, not to find out what is generally true of the many. (Merriam, 1998, p.208)*

In this case, year-five, year-four, graduate nurses and academic mentors serve four subunits to strengthen the details of the HT-integrated CLE phenomenon. Subunits may be incorporated into a single case study. Yin (2009) states:

*... The subunits can often add significant opportunities for extensive analysis, enhancing the insights into the single case. (Yin, 2009, p.53)*

Lincoln and Guba (1985) define confirmability as being similar to objectivity. The findings are determined by respondents rather than by research biases or personal preferences. They suggest using methods that by their character render the study beyond contamination by human foibles. They reinforce the importance of keeping raw material such as audiotape records and survey results, data analysis records such as themes and literature and process notes such as ethical documents, reflexive notes and instrument information. Ary et al. (2019) summarise techniques to ensure the confirmability. In this study, triangulation of methods and group of interviewees, peer review and reflexivity are all used.

### **3.8 Summary**

This case study uses several sources of information. First, year-five students are recruited to complete the questionnaire-based survey to investigate the satisfaction of HT-integrated CLE and the effectiveness of supervision of nursing students. Second, year-four and year-five students are used to express their experience in the HT-integrated CLE to better understand their underlying ideas and experiences of the clinical setting situation. It helps to give a detailed explanation of the findings generated from the questionnaire-based survey of the nursing students. Third, the information is cross-checked by inviting academic mentors and graduate nurses to participate in interviews. These steps not only enrich the information missed but also provide counter-checks of the information sources from students. Relevant arguments on design and methodology application are explained and procedures of implementation of data collection are comprehensively described. Ethical issues on subjects and data validity and trustfulness are also addressed.

## **Chapter 4: Findings**

### **4.1 Introduction**

This chapter is divided into two sections. First, the findings from the survey are discussed. Second, the themes are developed from the perceptions and experiences of two final-year nursing students, six nursing students in fourth year, two academic mentors and two graduated nurses. The nursing students are studying in Wu-Zee University, and the graduated nurses had attended the same university. The academic mentors also work in the same university. This chapter involves the findings of the survey and interviews. They are intertwined in design to enrich the information on the learning of nursing students in the clinical setting during training.

### **4.2. Participant's Clinical Training Background**

A group of 258 eligible final-year nursing students were invited to participate in this research. A total of 254 returned their questionnaires, this is a return rate of 98.45%. A total of 40 (15.50%) responses were pieces returned as partially incomplete, and they were excluded from data analysis. A total of 211 (81.78%) students returned the questionnaire, in which 209 (99.05%) had a placement in public hospitals while 2 (0.95%) had a placement in private hospitals. Among the respondents, 52 (24.64%) are male and 159 are female. Regarding the academic stream, 145 (68.72%) were in the general health stream while 66 (31.28%) were in the mental health stream. The last clinical settings for their ward placements are as follows: 59 (27.96%) surgical, 51 (24.17%) medical, 23 (10.9%) mental health acute and 20 (9.48%) mental health rehabilitation. Eight students either did not comment or recorded 'unknown' in the terms of their setting (Appendix H).

#### **4.2.1 Ward as a good learning environment**

Based on the questionnaire data, the general health stream students perceived a higher mean score (3.43) than did those of the mental health stream students (3.15) to the wards as a good learning environment. When rating their experience in wards as a good learning environment, the general health stream students again recorded a higher percentage than the mental health stream students, with 77 (53.10%) and 5 (3.45%) ticking 'Agree to certain extent' and 'Fully Agree', respectively (Appendix I).

### 4.3 Perception of Health Technology

The pattern between the two streams of students in the current clinical setting is different. This pattern could be understood by knowing more details about their settings for clinical training. In the present study, two students were uncertain if the electronic equipment is HT, but most of the students mentioned that the equipment integrated with electronic and computerised functions could be categorised as HT. Two student examples were:

*“... All electronic equipment used in wards are classified as health technology...”* (Ting (S5): Interview, 2020, Lines:7)

*“I think there will be getting more devices in electronic because there are more and more patients. And it is impossible that all procedure is completed manually because the medical staff is not enough, and more and more patients...”* (Fiona (S4): Interview, 2020, Lines:991-992)

Similar ideas were generated from the graduated nurses and academic mentors. One graduated nurse and one academic mentor said:

*‘That it integrates the modern technology. I will define it as the health technology. The reason is that it is included a computer program or involved electronic technology ...’* (Chan (G1): Interview, 2020, Lines:51-52)

*‘It is a big trend. The steps of development in recording and IPMOE cannot go back. As there undergoes electronic process, there are many aspects relying on them ...’* (Amy (A2): Interview, 2020, Lines: 42-43)

#### 4.3.1 Category and Supply of the HT

Students commonly described the electronic equipment, such as vital sign monitors, used in wards as examples and categorise them as ‘basic’ or ‘non-basic’ in the interviews. One student said:

*‘It (bladder scan) was not advance, it was basic...I thought they (IPMOE, blood glucose monitor, ePAF, infusion pump, and some monitoring devices) were basic inside the wards, you would use them daily or the nurses used always. All of them were basic... enough (in wards).’* (Maggie (S4): Interview, 2020, Lines:134, 141, 152)

A similar idea from one graduated nurse was:

*‘... I think it included (blood pressure monitor devices) ... I use VE scan ... IPMOE ... CMS ... I think it can be divided into basic and non-basic ... It is enough in my ward’* (Chan (G1): Interview, 2020,

Lines:32, 40, 46)

Respondents also mention equipment such as CMS and IPMOE needing passwords to access.

One student said:

*'Teacher let me use IPMOE first time, it needed login in whole process ... then I knew the system for drug distribution was under CMS.'*  
(Cecilia (S4): Interview, 2020, Lines:147-148, 189-190)

All students remembered resources, including HT, that are sufficient during clinical training, although each ward had varying equipment. One student said:

*'So it may relate to resources supply, resources is more distributed to big hospitals, they can trial some new technology. But district hospitals may not have many resources to try new technology. Leading hospitals may be well developed, so district hospitals started to follow the pace of the development ... I think the electronic equipment was adequate in wards.'* (Cecilia (S4): Interview, 2020, Lines:72-80)

Resources are regarded as important factors affecting the supply of electronic equipment are also raised by the academic mentors and graduated nurses. One graduated nurse and one academic mentor stated:

*'First, whether there could buy this equipment with supplying a sum of capital in a department or not. Though you had (resources), whether you could control ward manager of a ward to consider that's necessary or not. It was mainly influenced by these two factors.'*  
(Chan (A1): Interview, 2020, Lines:72-73)

*'There was difference in the same clinical training in the same year. If there were more health technologies available to use, more new health technologies were available to use, such as in a busy environment, so more chance was available to explore those machines for students. In contrast, the setting such as convalescent, rehabilitation, in a non-busy setting, several infusion pumps were available only and other health technologies were not available in ward, then there was fewer chance for practice indeed.'* (Ren (A1): Interview, 2020, Lines:219-223)

#### **4.3.2 Benefits and Risks of HT**

All respondents agreed that HT presents a range of benefits. Concerning their ideas on advantages and disadvantages of HT in practice, students summarised specific characteristics of HT in the wards. Seven students used terms such as 'time saving', 'easy', 'accuracy' and

‘systematic’ to describe the daily nursing practices using HT. Two of these students said:

*‘... It could facilitate data collection, in more systematic, and made it (document) easier to see the words clearly.’* (Angela (S4): Interview, 2020, Lines:29-30)

*‘... I believed that the development of the equipment was more and more advanced, to reduce the staff working time ...’* (Fiona (S4): Interview, 2020, Lines:993)

Similar ideas generated from graduated staff and academic mentor are as follows:

*‘... the system could help a working environment to run smoother...nurse could work faster, and it's more accuracy...’* (Interview: Chan (G1), 2020, Lines:28, 718-719)

*‘... There were many benefits to health care system. It was because HT could facilitate our health assessment easier...Also it could be recorded...It was convenient and accuracy was high...’* (Amy (A2): Interview, 2020, Lines:43-44)

Students also commented on the disadvantages of using HT in the wards, mainly in relation to the ‘function’ and ‘interface’ of the electronic equipment. Three students and one graduated nurse shared these comments:

*‘BP (blood pressure monitor) equipment is easily out of charging. Once the power is charged, it could also switch off suddenly.’* (Maggie (S4): Interview, 2020, Lines:174)

*‘I had asked about this machine to the clinical mentor. But it's really hard, because there was many setting inside the system. Then Miss (clinical mentor) explained to me ...’* (Ting (S5): Interview, 2020, Lines:314-315)

*‘Indeed, it was Okay for simple equipment but it was IPMOE, it had too many functions. For some functions, I was not familiar to operate, then I would like to explore it.’* (Sharon (S4): Interview, 2020, Lines:420-421)

*‘Because of the high utilisation rate of machine in the ward and not using them properly, so parts of machine are detached easily. For example, the disposable SpO2 sensor was lost. If you maintain it well, it can help me working better. It's just one of the problems. It needs to be well maintained ... They will search substitutes, some well-functioning one. I don't think it is an effective measure ... It should be*

*convenient for us, but it is not in reality because there are many troublesome processes. It is useless.* (Jackie (G2): Interview, 2020, Lines:76-78, 86, 736)

#### **4.3.3 Dependence on using HT**

Apart from the nurses, students also shared relevant experiences on ‘dependence on using HT’. Two students remembered:

*‘It (damaged equipment) was put aside, sometimes it could function again and sometimes not, but staff still used it occasionally.’* (Maggie (S4): Interview, 2020, Lines:173, 177-182)

*‘... So couldn’t rely on the equipment completely...I thought the nurse also was dependent to the equipment...not clarified the problem (reading abnormal) really...not asking about the situation, just informed to the doctor directly ...’* (Sharon (S4): Interview, 2020, Lines: 603-604, 701-702, 708-709)

For the consequences of depending on using HT for nursing, two students pointed out:

*‘No confidence (in blood pressure monitoring)! I had used advanced machine (equipment) during studying time, and I hadn’t used this (manual) method, all is done by machine ...’* (Fiona (S4): Interview, 2020, Lines:1008, 1012-1013)

*‘Ah! I would not touch, I would approach closer to the patient, I would look what it was. This was to observe that equipment, but might not touch it.’* (Sharon (S4): Interview, 2020, Lines:62-63)

Several students mentioned that nursing maintains reliance on HT. However, the possibility of errors lead to the emphasis that technology should be considered as merely an ‘assistant’. One student said:

*‘I think it is convenient for health staff to do assessment. Well, it may be a bit dangerous ... we will rely too much on the technology ... There may be an error. It is just a machine ... It acts assistant in function ...’* (Maggie (S4): Interview, 2020, Lines:17, 19-20, 30)

#### **4.3.4 ‘User-friendly’ HT for future development**

Respondents expected that the equipment changes continuously, but suggested that developers created ‘user-friendly’ equipment in the future. Two students expressed that:

*‘... Its development should be kept on going, going, going ... I think*



*that it will be more in number and more complex...technology should be user friendly indeed.*’ (Ting(S5): Interview, 2020, Lines:29, 786-787)

*‘... computer will develop very fast. And so that clinical setting has developed at the same pace. It’s easy to get started with as well as those who are accustomed to using computers. And it is expected to use easily.’* (Maggie (S4): Interview, 2020, Lines:1146-1147).

#### **4.3.5 Curriculum in HT**

Students recounted insufficient teaching regarding the HT and expected to have more demonstrations in laboratory sessions from nurse teachers. Two students commented:

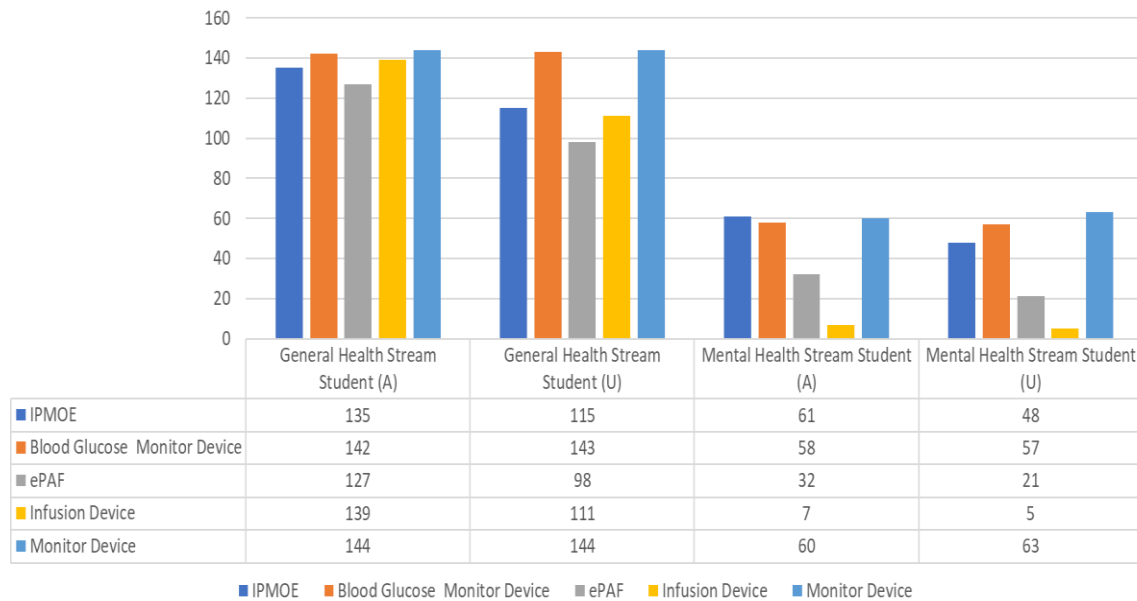
*‘I have seen it in school but the mode (learning) was depending ourselves exploration, just like a lab (laboratory session) mode, placed a machine there, you explored it by yourself and touched.’* (Sharon (S4): Interview, 2020, Lines:104-105)

*‘I had an assignment on the CMS, that meant I searched CMS online, but students didn’t know if they didn’t choose CMS, they would not search ... I felt there was no difference from the taught to no teaching. I thought it’s not useful. Although I could answer staff about its history but it was really not practical.’* (Sally (S4): Interview, 2020, Lines:615-617, 649-650)

#### **4.4 Availability and Use of HT in Wards**

Table 1 showed the ‘availability and use’ of the electronic equipment of both streams. In general wards, most students indicated that the common equipment includes monitoring devices (99.3%), blood glucose monitoring device (97.9%), Infusion pump (95.9%), ePAF (87.6%) and IPMOE (93.1%). By contrast, more electronic equipment was available in the wards of the mental health stream students, except for the infusion pump (10.6%) and ePAF (48.5%) that had low availability. For the IPMOE, 48 (72.7%) of mental health stream students and 115 (79.3%) of the general health stream students recorded its usage. Students from both streams experienced specific cases during their clinical training.

**Table 1 Available and Used HT in Wards**



Remark: ‘A’=Availability and ‘U’=Used

For the mental health students who had not seen equipment such as IPMOE, the service nature and product not being introduced were the main points. Two students added:

*‘... Mental health nursing is difficult to have close integration with health technology. There may be number or data generated from technology, for example, vital sign and IV droplet. For hourly recording in numerical data, technology may help you more. However, mental health is not involved numbers. You are sad or not, you are happy or not, that needs a person to assess.’ (Mathew (S5): Interview, 2020, Lines:1081-1084)*

*‘... For a mental health ward, there is difficult to see many equipment ... At that period, IPMOE has been just introduced to hospitals ... School, school did not got (IPMOE), hard copy was used in school. I had not used this system (IPMOE) in school. Is there any now?’ (Sally (S4): Interview, 2020, Lines:32, 871, 941)*

In using electronic equipment in clinical settings, barriers such as the restriction and printed versions from hospitals are noted. Two students stated:

*‘Yes! I had been some ward. You were not allowed to touch IPMOE absolutely.’ (Sharon (S4): Interview, 2020, Lines:353)*

*‘I heard that not allowing to use IPMOE (ordered by APN), even though knowing that student had an examination, the student could see the printed drug prescription only.’ (Fiona (S4): Interview, 2020, Lines:915)*

## 4.5 Orientation in Wards

This part of the information presented the findings of any effects on student learning during clinical training. Both streams of students were mainly orientated by APN (81 students, 55.9%) and ward nurses (80 students, 55.2%) for the general health students while 40 students (60.6%) by APN and 31 students (46.97%) by ward nurses for the mental health students. Appendix I shows the results.

### 4.5.1 Nursing Care: 'DO and Don't DO'

All students had an orientation session provided by the hospital. The nurse or clinical supervisor orientated students on the physical ward settings, materials storage areas, and routines. Students made an interesting point related to the guidelines of learning in the ward, where they carried out several nursing tasks. Three students stated:

*'In an acute ward (mental health), I was not allowed to use blood glucose monitor device. I had asked for carrying out the task, I had requested it, and mentioned that I had learnt the device in school. Nurses always told me to wait for the supervision of my mentor (clinical supervisor), however, the schedule of duty roster between the clinical supervisor and I was not matched at all.'* (Sally (S4): Interview, 2020, Lines:288-289)

*'One patient was just admitted during our orientation. We asked whether we could conduct an assessment to the patient. A nurse said "you don't need", just like we did not need to dispense medication to patient, but she said that we could observe.'* (Maggie (S4): Interview, 2020, Lines:374-375)

*'Commonly they did not let you do some procedures regarded as high risk by them. We seemed to carry out the tasks such as BP and temperature, which are done by HCA (healthcare assistance). Sometimes, I heard that H'stix is not allowed, just allowed change diaper.'* (Fiona (S4): Interview, 2020, Lines:889-890)

Students were also required to undergo audits or assessments at times. Two students shared their experiences:

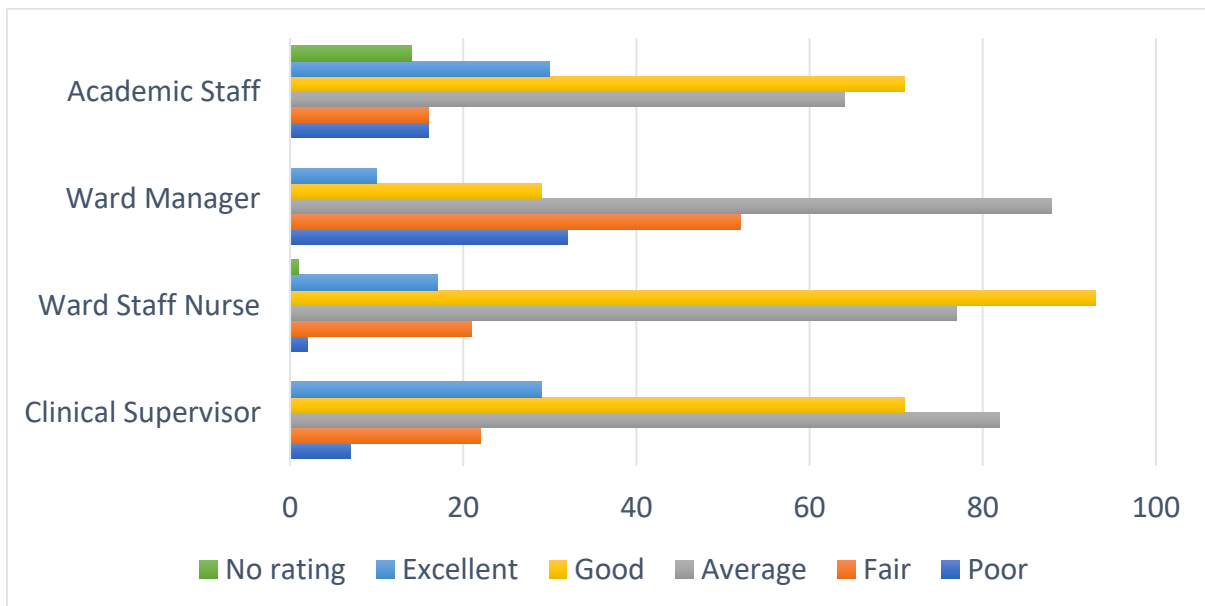
*'... It was because I had been other ward, they would let you carry out the task after having an assessment to you and they considered you were OK. But that ward would not allow you to conduct the task even though you were supervised.'* (Sharon (S4): Interview, 2020, Lines: 493-495)

*‘... it was quite busier in my last clinical training ward. There were many items to be audited such as Hsti’x and Rytes (Nasogastric tube). The ward was also a Stroke ward, so staff requested us to have GCS (Glasgow Coma Scale) audit on the orientation briefing date ...’*  
 (Cecilia (S4): Interview, 2020, Lines: 764-768)

#### 4.6 Effectiveness of Staff Support

Students interacted with other nursing staff after their orientation. Table 2 shows that the clinical supervisor, ward nurse staff, and academic mentors obtained positive ratings from students such as ‘good’ 71 (33.68%), 93 (44.08%), and 71 (33.65%). By contrast, WMs obtained negative ratings from students, with ‘good’ 29 (13.74%) only.

**Table 2 Effectiveness of staff support (n=211)**



##### 4.6.1 Using HT under Nurse Supervision

With the aim to cover further information on the relationship between supervision and using HT, students were asked to rate the supervising frequency in using HT.

**Table 3 How many times have you used HT under nurse supervision?**

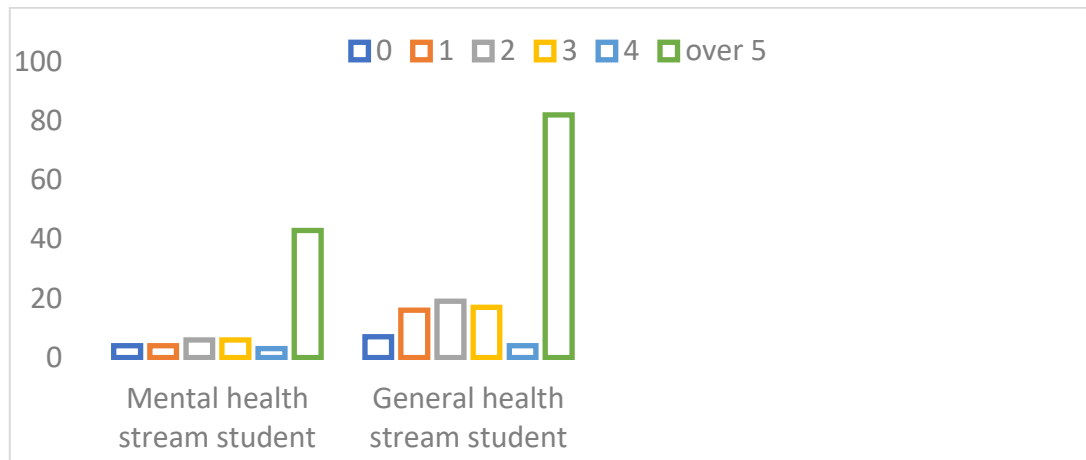


Table 3 showed that among students from mental and general health streams, 43 (65.15%) and 82 (56.55%) respectively rated ‘Over 5’ times in using HT under supervision while 4 (6.06%) and 7 (4.83%) generally did not receive any such supervision.

#### **4.6.2 Supervisory Relationship**

Among the students, 193 (91.5%) agreed that they were assigned to a clinical supervisor. However, only 60 (29.9%) students rated having a good relationship while 47 (22.3%) rated having a poor relationship with their supervisors. For the contact hours of students with their individual supervisors, 67 (31.8%) stated ‘no unscheduled private supervision’ and 59 (28%) students had ‘once or twice during a course’. Appendix J presented the findings, indicating that over half of the students had no regular supervision relationship with their supervisors.

According to the comments of Question 9a of the survey, eight students noted that they felt lost and disorientated in the environment. They did not know whom to ask questions related to knowledge or issues encountered in the wards. Four students commented that they carried out daily tasks while five students comment that they learnt less. One student made no comment.

Appendix K showed that among the students, the highest percentage of 93 (44.1%), selected ‘agree to some extent’ and 17 (8.1%) indicated ‘Fully agree’ on the statement ‘My supervisor showed a positive attitude towards supervision’. Nearly half of the student commented ‘disagree’ and ‘neutral’. For feedback, less than half of students chose positive ratings, with

only 73 (34.6%) selecting ‘agree to some extent’ and 19 (9%) selecting ‘Fully agree’. A similar result was observed for the next statement about satisfaction with supervision received.

#### **4.6.2.1 Clinical Supervisor Role in Students’ Clinical Training**

Appendixes K and J showed negative findings on students’ supervision status. Students presented the reason, which was the varying relationships (‘Good’ and ‘Poor’) with supervisors, which could change with time in several wards. Four students expressed:

##### **‘Good relationship’**

One student said:

*‘She concentrated on the teaching of students, she presented contents clearly and liked to hold my hand to guide me.’ (Fiona (S4): Interview, 2020, Lines:328-329)*

##### **‘Relationship changed’**

One example was described as:

*‘It was okay at the beginning, but it’s not really good at the end. Because she might think that I might have done something wrong, I started to get nervous, and the more I did it, the more nervous I became, and she felt that I didn’t need to become like that. Then she started not to care about me ... once when I went to the obstetrics department, I had good relationship with the supervisor. She leaded us all the way during visiting delivery room ...’ (Maggie (S4): Interview, 2020, Lines:489, 493-494, 671)*

##### **‘Poor relationship’**

Two students verbalised:

*‘Our relationship was fair. In reality, he (Supervisor) was away from ward for two weeks and I’d always made mistakes during his holiday, so they (nurses) thought that I was so poor (in performance), I became less confident to answer his simple questions ... I’m talking about the relationship. If sir thinks I’m Okay. His friends (other colleagues) would consider me Okay too. They would talk to me more and teach me more. You did not always work with your mentor at the same time. So if you worked with his friend (colleagues), we were relaxed and I felt easier asking them question.’ (Mathew (S5): Interview, 2020, Lines:408-410, 418-420)*

*'Most of the ward had assigned mentor (clinical supervisor), but some mentors just had their title, but they did not care about us ...'* (Maggie (S4): Interview, 2020, Lines:629)

#### **4.6.2.2 Learning from Clinical Supervisor**

Six out of eight students complained of insufficient supervision during their clinical training, which echoing the findings of the survey. Respondents verbalized that supervisory relationship seriously influenced their learning during clinical training. Roster and staff attitudes were expressed by students:

##### **'Unmatched Roster'**

Two students reported:

*'Yes, sometimes our roster not matched. I even heard of a classmate who did not see him/her (the clinical supervisor) ...'* (Ting (S5): Interview, 2020, Lines:116)

*'... the mentor assigned to me, but she is on maternity leave! Therefore, I have never seen a mentor.'* (Sharon (S4): Interview, 2020, Lines:210-212)

##### **'Poor attitude of the clinical supervisor'**

Two students said:

*'She had told me that I have some weaknesses, and she can make me to have a reflection, but she didn't suggest a solution to me. ... At that day, she scolded me. There is a classmate watching at me, she really scolded me in front of the classmate. But there is one more problem, she stared to this student and said "I will not care about you because you are not my mentee." and then she looked at me again and said "you must need to know, do you understand or not" ... you walk around the ward, there are many things to be explored and learnt. I'm normal if I did not know. The clinical supervisor did not teach me or told to me, I felt disappointed and sad. Should I know all knowledge before starting my placement, but I am a student, I am still learning at present.'* (Sally (S4): Interview, 2020, Lines:392, 478-479, 514-516)

*'... at the beginning, she taught me very well, she referred me to an APN at the end ... didn't explain reason ...'* (Maggie (S4): Interview, 2020, Lines:522, 530-531)

#### **4.6.2.3 Supported by Clinical Mentor from Nurse Service Department**

Apart from the clinical supervisor from the ward, six out of eight students stated that they

were assigned a clinical mentor from Nurse Service Department (NSD). Clinical mentors were mainly responsible to supervise the students for clinical matters, and the students highly valued them. One student said:

*'I felt I have better relationship with the clinical mentor from NSD. It is because I didn't always get in touch with the clinical supervisor actually.'* (Cecilia (S4): Interview, 2020, Lines:564-565)

A clinical mentor was a nurse who regularly guided the students to learn in the wards. As nurses carried out procedures, the clinical mentor taught the students how the task was done and to operate the equipment, including advanced systems such as IPMOE. Several students expressed ideas concerning the 'questioning' and 'able to practise'. Two students explained:

*'In contrast, the clinical mentor acted like teacher who was close to you, she guided you daily. But she has other students, so she could guide you one to two days weekly, each day would spend few hours to teach you, for instance, you can ask any questions happening in the ward, you wanted to practise AOM, try to practise a specific function button (IPMOE), she can access (the IPMOE) and let you see and try ...'* (Fiona (S4): Interview, 2020, Lines: 225-228)

*'... I could ask more to do...she would tell me which parts were good and which part was not good....'* (Sharon (S4): Interview, 2020, Lines:235-237)

#### **4.6.3 Role of Ward Nurses during Clinical Training**

When students could not meet their supervisors, they might rely more on the ward nurses. Typically, a senior student might be assigned to be responsible for a cubicle in a ward, thereby increasing the interaction between students and ward nurses. 'Helpful' and 'Helpless' were recorded in both the survey and interviews. Several students mentioned that they had 'helpful', 'nice' and 'friendly' relationships with ward nurses. One student verbalised:

*'They (ward nurse) are so friendly, it is a good experience there.'* (Ting: (S5): Interview, 2020, Lines:106)

Other students used 'helpless' and 'busy' in comments on their relationship with ward nurses. One student said:

*'It depended who they were, not all of them will help ... they were busy with settling the cases handover, a lot of work for handover.'* (Sharon (S4): Interview, 2020, Lines:288, 321)



#### 4.6.3.1 Learning from Ward Nurses

Students shared different points of view on their real experience. Several respondents commented that not all nurses wanted to teach students because of being busy and teaching being outside their duty. Students revealed the following:

##### **‘Busy ward nurses’**

Two students shared:

*‘We were not the relationship like a teacher and a student. It just helped them a bit. Of course, there was individual nurse who will to care students, but they were really busy always, so our communication was not so much. I believed that I communicated with them during meal time commonly, but it’s the same when back to the clinical setting.’* (Fiona (S4): Interview, 2020, Lines:230-232)

*‘... the ward was quite busy as well, so I had a lot of routine work to do. On the other hand, the staff was very busy. In fact, didn’t have a chance for learning.’* (Cecilia (S4): Interview, 2020, Lines:281-283)

##### **‘Not their duty’**

Two students elaborated:

*‘... but I had met some staff who were not willing to teach, and I could understand. I didn’t think that I felt unhappy. Regarding learning, I had some ideas, their behaviour was normal. They didn’t have responsibility to teach us, they had their own duty, it was Okay to me.’* (Cecilia (S4): Interview, 2020, Lines:307-310)

*‘I guessed they (nurses) were worried a bit and the nurses were not volunteer to teach students, they were mainly serving patient, so it was understandable to me that they did not pay attention to students.’* (Angel (S4): Interview, 2020, Lines:769-771)

#### 4.6.4 Leadership style of ward manager

Among the students, the highest number of 96 (45.5%) and 22 (10.4%) respectively ticked ‘Agree to some extent and ‘Fully agree’ on the statement ‘The WM regarded the staff on her/his ward as a key resource’. Meanwhile, the lowest number 68 (32.2%) and 9 (4.3%) students respectively selected ‘Agree to some extent and ‘Fully agree’ on the statement ‘Feedback from the WM could easily be considered’. Appendix L showed the results, indicating that WM might be more concerned about their staff rather than the nursing

students. This finding also explained the lower percentage of feedback from WM to students.

#### **4.6.4.1 WM Role in Clinical Training**

Several students expressed that the WM acted as a leader. Various students from the survey and interviews expressed that the WM concentrated only on their roster duty, and thus had no interaction with them. Students voiced out the following.

##### **‘Ward manager doing administrative work only’**

Two students said:

*‘... the ward managers, they were responsible more administrative workload under my observation.’* (Fiona (S4): Interview, 2020, Lines:786)

*‘... There were no restrictions on the use of equipment ... I thought he had achieved the leader role.’* (Maggie (S4): Interview, 2020, Lines:416-419, 432)

##### **‘No interaction between ward manager and students’**

Three students shared:

*‘It seemed that I hadn’t talked with her again after I talked with her on the orientation day ... She didn’t communicate with us too much, not follow our progress ....’* (Maggie (S4): Interview, 2020, Lines:396, 406)

*‘Regarding to recent manager, basically she didn’t come out (of the office).’* (Cecilia (S4): Interview, 2020, Lines:908)

*‘In fact, both the ward manager and APN didn’t pay too much attention to us. The ward manager might not stay in the ward, even though they stayed at ward but most of them just were in the office. They just did paperwork. The APN of the Geri (Geriatric) ward did not pay attention to us ...’* (Angel (S4): Interview, 2020, Lines:708-710)

##### **‘Different managing style of ward managers’**

With respect to the different managing styles of the WMs, one student described this as being ‘authoritarian’ (Interview: Ting (S5), 2020, Line: 457). By contrast, other students described their WM as being supportive, expressive and encouraging problem-solving.

#### 4.6.4.2 Effect of learning from Ward Manager:

Students shared their experiences on learning when encountering different management styles of WMs. One student said:

*'She is a pragmatic manager...I can learn from her...Yes, she welcome student to use equipment, there are no restrictions.'* (Ting (S5): Interview, 2020, Lines:377, 388-389, 395)

By contrast, other WMs ignored the learning needs of students. Two students said:

*'A classmate, a TUNs (temporary undergraduate nursing student who works part time in the ward) too, told me "You (nurse) should not teach TUNs. TUNs should do tasks. You can teach her if she finishes all her tasks"... Such manager ordered the nurses that not to teach TUNs always ... I had hard feeling, I wondered that how we can understand something if no learning!'* (Ting (S5): Interview, 2020, Lines:493-494, 496-49, 499)

*'... the health technologies or computers in ward, (ward manager) really did not pay attention to the learning progress of students, she really did not ask about this.'* (Fiona (S4): Interview, 2020, Lines:835-836)

#### **'Ward manager Influences ward atmosphere'**

Students commented that the leadership style of WMs affected the ward atmosphere. Two students and one graduated nurse noted:

*'I considered the ward culture lead me not able to learn ... the example just mentioned, the nurse was not my mentor, she was willing teaching me but not willing helping me to sign the form ... because the nurse was 'jun' (junior). It meant there was severe hierarchy idea in the ward.'* (Sally (S4): Interview, 2020, Lines: 678, 695, 707)

*'At least, I was not going to be so scared ... if manager was easy-going...you were courageous enough to ask more ... I had encountered the style of authoritarian ward manager before. I was so surprised, I wanted to leave immediately. I avoided encountering her. I really did not want to let her know what I am doing. Because such guy, such leader, you had to follow their steps. I thought it (tense atmosphere) created a lot of pressure ... I'm worried to be blamed ...'* (Ting (S5): Interview, 2020, Lines:437-438, 458, 462-463, 468)

*'This means that she/he was very harsh, control with iron hand. It would make tense atmosphere in a ward. One reason was that staff*

*scared WM coming out and bothered (staff), really scared this issue...It's just like that. If some managers concerned that whether students making mistakes or not, and this leads nurse would prohibit students from doing certain things ...' (Chan (G1): Interview, 2020, Lines: 310-312, 344-345)*

#### **4.7 Pedagogical Atmosphere**

The most students agreed with the statement 'The ward can be regarded as a good learning environment'; 98 (46.4%) and 7 (3.3%) students ticked 'Agree to some extent' and 'Fully Agree', respectively. The second-highest score was for the statement 'The staffs were easy approach', for which 97 (47%) ticked for 'Agree to some extent' and 16 (7.6%) for 'Fully Agree'.

The lowest ratings were for the statement 'During staff meeting (e.g. before shifts) I felt comfortable taking part in the discussion', for which 45 (21.3%) students ticked 'Agree to some extent' and 7 (3.3%) 'Fully Agree'. Another low-scoring statement was 'The staff were generally interested in student supervision', for which 70 (33.2%) students ticked "Agree to some extent" and 5 (2.4%) for "Fully Agree". Appendix M shows the results.

Both scores reflected that student experience difficulties in interacting with the nursing staff and learning in clinical settings. This finding echoed the information on ward nurses mentioned in Section 4.6.3. Students claimed they felt lost and confused in the ward, and did not know who to ask or approach among the busy staff.

##### **4.7.1 Practice opportunities and questioning reduced under tense atmosphere**

According to the transcripts from interviewees, two points related to the supply of equipment and managerial style could shape the pedagogical atmosphere and affected student learning.

##### **'Inadequate supply of equipment'**

Eight students and other cases from academic mentors and graduate nurses agreed that the wards had sufficient equipment, except in certain situations. Apart from damaged equipment, inadequate supply of equipment could affect pedagogical atmosphere and lead to fewer learning opportunities. One example was described by Fiona, who commented:

*'In a busy setting, I was not sure (nurse hurry the task) to ask staff that 'let me help you' because there was not enough equipment and*

*they were really busy. In contrast, more equipment for students could reduce the workload of staff, then the ward atmosphere would not be tense and students felt more confident to ask that 'Equipment is still available there, let me help measuring in this cubicle ...'* (Fiona (S4): Interview, 2020, Lines:214-216)

### **'Pressure from managerial staff'**

All students associated the learning effect to the tense atmosphere caused by managerial level. One student quoted:

*'... then I read them one by one, but he said incorrect and then blamed me ... He take me around and not to the main points ... So I guessed the atmosphere (poor atmosphere) was developed from top to bottom.'* (Mathew (S5): Interview, 2020, Lines:544-546)

Staff were also affected by management. Three students referred to the culture of the setting, and the tense feelings with respect to asking questions. They specifically expressed:

*'It depended on whether the ward man (manager) connived this culture (one nurse hating all students).'* (Interview: Sally (S4), 2020, Lines:790)

*'The atmosphere was harmonious and I would be bold enough to ask questions. The atmosphere was not fusion. I should ask which nurse ... A medical ward, its atmosphere was not harmonious, so I asked a nurse who would be more familiar with me. I would not be bold enough to ask other nurses ... the ward manager is easily to scold staff for minor issues ... I would be more careful if I talked to WM.'* (Maggie (S4): Interview, 2020, Lines: 445-446, 450-451)

*'In the perspective of culture only, I thought that the culture in the ward was not good. You were so busy, if you were busy doing your own tasks. Even if it was impossible that nurses and nurses communicated with each other too. I believed nursing needed communication really because nursing was actually a team work in my view ... Busy was a result of the hierarchy effect of authority ... ah, you didn't even want someone to keep chasing you. Hence it all affected my study ... I thought the opportunity was less.'* (Cecilia (S4): Interview, 2020, Lines: 448-451)

Similar expressions are noted by two academic mentors:

*'... Of course there was (the manager who was so nervous that lead to the atmosphere in the ward being tense as well). The manager was the head of the ward. If she thought that safe was all, so the most important thing was safety. If she thought that there should not*

*happen in ward, she might make the subordinates not to involve too much (students' learning in the ward).'* (Ren (A1): Interview, 2020, Lines:857-858)

*'Definitely had (I believed the ward culture was related to the leadership style of the ward manager) ... If manager welcomed students' learning, then staff would welcome them. They (nurses) would not be unfriendly and did not refuse to keep some tasks to us. We could be freely to do any tasks.'* (Amy (A2): Interview, 2020, Lines:475, 479-480)

The two graduated nurses had the same experiences about the tense atmosphere and said:

*'... I think it is a culture of a ward, and I am welcomed in the ward. Because I know that there are some wards where student is not allowed doing anything, they just acted as a "drip stand" (they only stood around).'*' (Jackie (G2): Interview, 2020, Lines:463-464)

*'This is very important. The current culture of nursing industry is that students come to practise but to be runner (assistant), it is real ... I was a student and had an internship, I had met other students for internships in the same ward. They only did the tasks, learnt nothing, which is they regarded them as a runner (assistant), but I actually think that it is not fair to students ... There is no one to teach them. ... No one has ever talked to me about this, but this is a norm, I can only say ... I have experienced it myself, I have seen it personally.'* (Chan (G1): Interview, 2020, Lines: 691-692, 696-703, 707, 711)

#### **4.8 Academic Mentor (Nurse Teacher)**

Based on the survey, three areas related to the academic mentor are explored. First, the nurse teacher enables the integration of theory and practice. Among the students, the highest number of 102 (48.3%) selected 'Agree to some extent' and 16 (7.6%) selected 'Fully agree' on the subheading 'Nurse teacher as enabling the integration of theory and practice'. Lower scores were recorded regarding the subheading on the cooperation between nurses and academic mentors and their relationships with students. Only 57 (27%) chose 'Agree to some extent' and 9 (4.3%) chosen 'Fully agree' on the statement 'In our common meetings I felt that we are colleagues'. Appendix N shows the results, which indicated that students felt they were not colleagues in a ward during clinical training. An academic mentor echoed a similar experience as being a "guest", and said:

*'You have placement there, you just like a guest ... I felt I was not a colleague of HA. I was not a colleague of a private hospital too. I was not their colleagues; my main duty was practice (mentoring).'*' (Ren

(A1): Interview, 2020, Lines: 543, 807-808)

#### **4.8.1 Academic Mentor Role in Clinical Training**

The general health students mentioned that they did not see their academic mentor. In addition, their first training lasted six weeks while the AOM assessment lasted two days.

##### **‘Not meet often’**

Two students stated:

*‘Because the first time I had placement and I didn’t know anything, so a mentor was assigned from school, but there is no more afterward (after the first training of the general health stream).’ (Sharon (S4): Interview, 2020, Lines:735)*

*‘... I won’t see the academic mentor anymore (after the first training of the general health stream) ...Yeah. In addition to the period of exam (AOM exam) ...’ (Fiona (S4): Interview, 2020, Lines:606, 610)*

Meanwhile, the mental health students stated that their academic mentor visited them 1-2 times during each clinical training, but most saw them once a year during their clinical training journey. One student said:

*‘That is, academic mentor visits us every time, but the number of visits is determined by the academic mentor. So I hadn’t seen him (academic mentor) during my first clinical placement (mental health stream). Because academic mentor didn’t visit us frequently, only two times ... then I also hadn’t seen him during my second placement. After that ... I saw a Sir (academic mentor), and I saw him once in year- three ... Visiting frequency was really not very much.’ (Sally (S4): Interview, 2020, Lines:1109-1110, 1114-1115)*

#### **4.8.2 Learning effect from academic mentor**

Two themes concern the learning effect from academic mentors. Students commented that having an academic mentor was helpful for sharing and guiding during their first training.

##### **‘Sharing and Guiding’**

Two students stated:

*‘Academic mentor will share her experience to us. And that was our first internship ... should pay attention to some basic knowledge such as the etiquette. For we haven’t experienced so much, so she told us about that ...’ (Fiona (S4): Interview, 2020, Lines: 593-594, 651-652)*

*'... she (academic mentor in the first clinical training) briefed us what we have to do before entering the ward, what is the responsible routine of this group student today, what is the routine of that student. If we encountered questions, we could ask her questions. After the practice in ward on the same day, she liked to have a debriefing to us for half an hour.'* (Maggie (S4): Interview, 2020, Lines: 944-948)

### **'Limited in some situation'**

However, the role of the academic mentor was only helpful in situations such as AOM assessment after the clinical training. The mental health students commented that their academic mentor was 'not very useful'. Regarding the teaching of HT, students shared that their main concern was the 'password'<sup>2</sup>. Three students and two academic mentors said:

*'Yes, not able to use, she (academic mentor) cannot use (IPMOE). Even though "Miss" (academic mentor) requested and wrote it down to use IPMOE, she did not get password, she needed to ask for password from nurse to access.'* (Ting (S5): Interview, 2020, Lines: 732)

*'I had (experience of no password to access), so many times (this experience). Since you did not get a password, you should not use their machine (IPMOE).'* (Ren (A1): Interview, 2020, Lines: 572)

*'...it must not be convenient because we (academic mentor) were not their staff, no authorized, not granted a password or code to us and log in their system...'* (Amy (A2): Interview, 2020, Lines: 85-86)

*'If I had AOM exam only, the teacher taught a lot (IPMOE). The teacher is really good at teaching step by step. But I think it is limited to IPMOE. So she may not have time to teach other technology.'* (Cecilia (S4): Interview, 2020, Lines: 682-685)

*'... they were not very useful. During the internship, it's best to spend more time in the ward. If an academic mentor came to the ward, we had to leave the ward for a few hours. We might miss some important learning opportunities in the ward...Never have (experienced technology teaching). They would not take the initiative to teach us how to use the equipment.'* (Angel (S4): Interview, 2020, Lines: 1079-1082, 1096)

### **4.8.3 Access Rights of Academic Mentor during Student's Clinical Training**

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<sup>2</sup> A password is used to access the computerised system. This usually is given to nursing staff. On occasion academic staff do have access via a password, but this only gives information about medication delivery.



Among the students, 117 (55.5%) claimed that their academic mentors were allowed to use HT without passwords, while 22 (10.4%) stated that the academic mentors were not allowed such usage. Table 4 shows the results.

For HT with passwords, 80 (37.9%) students stated that their academic mentors were granted access while 54 (26.6%) students claimed that their mentors were not given such access. Excluding the mental health stream, 11 (5.21%) general health stream students neither selected any choice nor provided clear reasons in the comment item.

For the mental health stream students, according to the mentoring design from Wu-Zee University, 66 did not have regular academic mentors within each placement period.

**Table 4**

**Academic mentor was granted access approval to use HT without password-integrated**

	Number of students	Percent
Not Approval	22	10.4
Approval	117	55.5
Other	6	2.8
No need in mental stream	66	31.3
	N=211	100.0

**Academic mentor was granted access approval to use HT with password-integrated**

	Number of students	Percent
Not Approval	54	25.6
Approval	80	37.9
Other	11	5.2
No need in mental stream	66	31.3
	N=211	100.0

One reason for not allowing the use of HT without password integration by the academic mentor might relate to ward resources. One academic mentor explained:

*'I remembered that there lacked an equipment in an acute ward, then*

*we finished the work with using another type equipment ... ECG machine again, the ECG cable and electrode were damaged, they could not connect well to patient. Nurses expected that we helped to complete the ECG. Finally, my student borrowed a cable from another ward and finished the ECG.* (Amy (A2): Interview, 2020, Lines: 206-207, 211-213)

Interview statements recorded that mentors and students were not restricted in using the equipment without passwords. One student recalled:

*'... She told us about the routines we can do daily ... She (WM) did not restrict us to use the equipment, we can use ... mainly carried out the routine in surgical or medical ward.'* (Maggie (S4): Interview, 2020, Lines: 360, 416-417)

#### **'No password for academic mentor'**

Numerous respondents responded that academic mentors have no passwords, apart from representative academic mentors. Three students claimed:

*'... When I had my AOM assessment, my academic mentor had her own password and account to access the IPMOE for me.'* (Fiona (S4): Interview, 2020, Lines: 674-675)

*'... Because academic staff was not granted a password from the hospital ...'* (Ting (S5): Interview, 2020, Lines: 732)

*'... IPMOE needed ward staff account (password) but academic staff did not get it.'* (Cecilia (S4): Interview, 2020, Lines: 691-692)

#### **4.9 Access Rights Effect on Students' Learning**

The access rights not only limited the mentoring of academic mentors but also affected student learning during clinical training. Ting made this point:

*'...it was impossible for teacher to mentor (the practice of AOM) the students even they come to hospital ... Willing, willing, they rest assured to let academic mentor access the system (IPMOE). But it had one more step, it was to need inviting a ward nurse to observe.'* (Ting (S5): Interview, 2020, Lines:733, 737)

Apart from influencing academic mentors, passwords also affected nursing staff in teaching students.

#### **'Nursing staff are nervous about their password'**

Relevant studies were conducted as HT continues to develop. All students observed that nurses were concerned about their passwords. Two students shared:

*'They are all rigorous. That is, when she went to anywhere, she must log out, she will not share their password to anyone. So if I am an admitted patient, I feel safer.'* (Sally (S4): Interview, 2020, Lines: 1262, 1266-1267)

*'All knows that every student is not allowed, so I am not allowed too ... He borrowed my (password), he is so nervous, he tells me "You remember to sign out in advance before switching off system" ...'* (Mathew (S5): Interview, 2020, Lines: 968, 976-977)

One academic mentor also concluded:

*'Of course password could affect student learning.'* (Ren (A1): Interview, 2020, Lines: 802)

All students reflected that the nurses could provide the access rights for students' learning on one condition: 'Trust'. They made the following statements:

#### **'Trust is a condition'**

Two students verbalized:

*'... I need to ask her (clinical supervisor) each time, that means before each practice of AOM, I will ask her whether I can help in medication distribution or not, I can practise if she says "ok". Then she logs in her password for me, whether she stays with me or not ... she always asks a colleague to observe me when she has leave ... I don't think they (nurses) did not concern their password seriously. They (nurses) really trust us (students), we will not use their password for other purpose.'* (Maggie (S4): Interview, 2020, Lines: 538-540, 549, 845-847)

*'Nurses would be careful with their password. It was a trust to academic mentor when nurse login a system with their password, the nurses should accompany with you (academic mentor) but they would walk around sometimes, and the access right was for academic mentor rather than for students. They would not leave students along to access a password needed system.'* (Amy (A2): Interview, 2020, Lines: 856-857)

#### **4.10 Refusal of Password-integrated HT Access**

Many systems needed passwords to access clinical settings. Thus this study is interested

exploring how passwords of nursing staff affected student learning.

#### 4.10.1 Reason to refuse students using password-integrated HT

The results in Table 5 indicated that the reason of “Time constraints of staff” gained the highest percentage of answers at 68 (32.22%). A total of 42 (19.9%) students ticked “Your supervisor not on duty” and 33 (16.64%) students ticked the ‘Staff worry about liability’. These were the main barriers for students to access the technologies in clinical settings.

**Table 5.**

#### **Being refused to password-integrated HT**

	No. of student	Percent
Being refused	101	47.9
No refused	110	52.1
Total	211	100.0

#### **Reason to refuse student using password-integrated HT**

<b>*Type of reason</b>	<b>No. of student</b>
Time constraint of staff	68 (32.2%)
Your supervisor not on duty	42 (19.9%)
Not allowed by ward manager	21 (10.0%)
Either student or academic mentor no assigned password for access	27 (12.8%)
Staff worry about liability	33 (15.6%)
Staff advise to learn after graduation because of complexity	10 (4.7%)

\*Respondents can choose more than one reason

To elaborate on the reasons generated from the survey, interviewees expressed ideas that support these findings.

### **‘Time constraints of staff’**

Password-integrated HT such as IPMOE and CMS needed staff passwords, but students were not given access and they needed to ask for supervision from nursing staff. Again, students’ choices reflected a real situation that staff time was a scarce resource. Issues of ‘busy ward nurses’ that were previously discussed in Section 4.6.3.1 were repeated. The numerical data echoed the findings on the effect from nursing staff to student learning. Two more students reinforced that:

*‘... they are busy with settling the cases handover, a lot of work for handover ... ward nurses may not guide all the time ... may just ask you to observe the steps nearby ... I really understand the reason for the ward staff not giving password to students. That is to say, they are already busy in one hand, they may not have time to watch you doing it, I really understand, but is there any ways (to solve) ...’* (Sharon (S4): Interview, 2020, Lines:370-371, 426-427)

*‘... It is because the students are free at that moment, but the nurses such as my supervisor who may be busy in her paperwork, so she did not have time (to entertain me) even I have questions. And I cannot ask as well during my working. So there is accumulated many questions.’* (Angel (S4): Interview, 2020, Lines:793-796)

### **Clinical supervisor is ‘Away from ward’**

The below statements expression showed the reason behind the supervisors not being on duty. Other factors included leave and multiple roles of the clinical supervisor that could influence the supervision of students. Four students shared:

*‘Yes, sometimes our duty not matched. I even heard of a classmate who did not see him/her (the clinical supervisor).’* (Ting (S5): Interview, 2020, Lines:116)

*‘... the mentor assigned to me, but she was on maternity leave, so I had never seen a mentor. On the last day, I had evaluation, I ask an APN for help in hurry ...’* (Sharon (S4): Interview, 2020, Lines:210-212)

*‘In reality, she (the clinical supervisor) was away from ward for two weeks and I’d always made mistakes ...’* (Mathew (S5): Interview, 2020, Lines:284)

*‘... Suddenly she received an order from another ward, a patient was diagnosed with a Stroke. She needed to care the case who was not admitted to her Stroke ward ... Honestly, she hadn’t taught me any actually ...’* (Cecilia (S4): Interview, 2020, Lines:520-522)

### **‘Staff Worries about Liability’**

Students indicated that nurses concerned with their own liability link this with using password-integrated equipment. Liability led nurses to feel concerned about students making mistakes and therefore only allowed them to observe. Two students verbalized:

*‘In fact, I think that it is the accountability system in HK, that is, a code means that what you have done. That is if assuming that she gives the code (password) to student, if I made mistake, the nurse bear all the responsibility. Because I access the system with using the nurses’ code ...’* (Sharon (S4): Interview, 2020, Lines:403-404)

*‘It’s because nurses concerned that we did not know how to use (IPMOE) and worried about the consequence (liability). So there was no solution and it’s understandable to have observation only.’* (Angel (S4): Interview, 2020, Lines:296-297)

Similar expressions on the liability issue were given by graduated nurses and academic mentors. They stated:

*‘Before graduating, I thought a password was for personal, because you could access a lot of personal confidential data firstly. Second, responsibility problem, because you login with your code, then your name was on record to the information of HA (Hospital Authority HK)..So before, I thought it was important.’* (Chan (G1): Interview, 2020, Lines: 556-557)

*‘... Liability problem, because the password accessed allowed others to see more involving the privacy data.’* (Amy (A2): Interview, 2020, Lines:863-864)

### **4.11 Nursing Care during Clinical Training**

Among the students, 106 (50.2%) and 12 (5.7%) rated ‘Documentation of nursing was clear’ the highest with ‘Agree’ and ‘Fully agree’, respectively. The second-highest of 98 (46.4%) for ‘agree’ and 13 (6.2%) for ‘Fully agree’ were given to ‘Patients received individual nursing care’. The item ‘There were no problems in information flow related to patient care’ followed, with 90 (42.7%) and 3 (1.4%) of ‘Agree’ and ‘Fully agree’, respectively. The lowest score is for ‘The ward nursing philosophy was clearly defined’, with 86 (40.8%) students choosing ‘Agree’ and 4 (1.9%) choosing ‘Fully agree’. Appendix O shows the results.

Students reflected that the main nursing care they provided patients comprised basic routine tasks and that patient documentation was enough for their routine needs. Patient history was not deeply reviewed for enriching personal knowledge, mainly due to the need to access CMS with a staff password. The patient information collection and reviewed was incomplete in several situations such as AOM assessment. Relevant themes were made as follows:

### **‘Routine’**

One student said:

*‘... because the briefing of wards mainly told us about the routine always ...’* (Fiona (S4): Interview, 2020, Lines: 173)

### **‘Information incomplete for students’ learning’**

Two students said:

*‘... you needed to depend on the computer for their (patients) details about previous admission history. ... Commonly, you got the trust from a nurse, then you could read patients’ history slowly (in computer).’* (Fiona (S4): Interview, 2020, Lines: 510-513)

*‘... but regarding to learning, it is not good, there do not have an account (password), we cannot see old information. If I have an account, it can further to facilitate my learning.’* (Cecilia (S4): Interview, 2020, Lines: 1192-1194)

Students felt concerned and helpless regarding the usage of password-integrated electronic systems in hospitals. Two students conveyed:

*‘Yes! Yes! They printed out a form and then I could read back...I also felt worry, because I regretted that I hadn’t conducted much admission assessment (ePAF) to patient. One reason was that I hadn’t conducted a whole case in complete ...’* (Ting (S5): Interview, 2020, Lines:694, 698-699)

*‘... the only way was reading the nursing kardex (nursing document) only ... It’s not enough, for instance lab (laboratory) result might not be available ... I felt helpless not being able to answer the patients’ questions sometimes, not able to answer them. Education was not good. I mean to educate the patient.’* (Sally (S4): Interview, 2020, Lines:1570, 1574, 1583-1584)

## 4.12 Mentoring and Student Learning

Concerning the mentoring in HT-integrated CLE, several ideas could be explored from the view of an academic mentor, such as mentors' role and function, mentee, characteristics of mentoring design, the relationship between HT and mentoring and student learning.

### Function of Mentoring

Ren said:

*'I thought that role is important ... You acted as teacher, you could tell them what you know. If they did not get any mentor, they would lose direction, and not know what they were doing.'* (Ren (A1): Interview, 2020, Lines:3, 5-6)

### Who Can Mentor?

Ren added:

*'Indeed, mentoring person can be various in a clinical setting ... I think they are all termed as mentor... Yes, they are divided into academic or clinical ... The person provided from hospital mainly is nurse, the nurse from clinical. And nurse come from CND (Central Nurse Division).'* (Ren (A1): Interview, 2020, Lines:14, 19, 24, 52)

### Difference in Mentoring Design between School and University

Ren described:

*'Nurse education in nursing school is one type of apprenticeship in the past.'* (Interview: Ren (A1), 2020, Lines:478)

*'Actually, most nursing school would assign teacher to visit students in ward that mean each teacher would be responsible a group of students. Then the teacher planned the schedule for students' assessment or supervision in ward ... It is different in university. Two different modes, the period of programmes is different and outcome was various too.'* (Ren (A1): Interview, 2020, Lines:412-430)

Given that nursing required three years in nursing school, Ren stated that the programme duration between school and university differs, which causing different student roles.

### Different Student Roles



Ren explained:

*'In my opinion, student nurse in nursing school was a student but also acted as staff. They bear more responsibility because they were paid. In contrast, students are students only nowadays; they bear less responsibility because teachers have taken their responsibility. If they are not paid as well as not a TUNs, they just need to act well the role of students. But it's not the same traditionally, they were staff role.'* (Ren (A1): Interview, 2020, Lines: 225-229)

The difference in students' roles led to diverse learning. Ren added:

*'TUNs can learn more than a nursing student, because they are staff and give more allowance to let them do.'* (Ren (A1): Interview, 2020, Lines:490-496)

*'Indeed, students could explore more in the past but it was risky for them because they lacked of supervision. Contrary, you were just a student only now and you needed to learn actively. If you did not participate actively, you couldn't learn anymore even though there was a procedure available for practice there.'* (Ren (A1): Interview, 2020, Lines:233-235)

Although the programme duration was not the same, contact hours for relevant requirements of theory and clinical training needed to be fulfilled according to NCHK requirements.

### **Differences in Mentoring Duration**

Ren elaborated:

*'... Each institution has various design, it can be six weeks, four weeks, two weeks. It is accepted as you fulfill the curriculum requirement of NCHK ... It is an orientation if you stay in a ward for two weeks. If you are orientated and understand to a ward, then your time of clinical training afterward will be distributed in four weeks or six weeks, it will be more even. Therefore, I don't think it's a problem of the length of clinical training duration.'* (Ren (A1): Interview, 2020, Lines:254-255, 265-272)

However, two weeks clinical training might affect student learning. One student said:

*'... My idea about their concept was that we did not need to know too much because we just stayed two weeks only, so they seemed not actively to answer our questions. And we could not apply the learnt knowledge to the ward even though we learnt.'* (Fiona (S4): Interview, 2020, Lines:254-256)

## **Impossible to Have 1:1 Supervision**

Ren explained:

*“It was not able to be one to one. All of them mainly were cubicle nurse. Regarding to human resource, it’s not able to have one to one. When they teaching, they could arrange the ratio what they liked, for example one nurse to one student; one nurse supervised two students, or one nurse to eight students ... It’s depended on the situation, they could be one mentor to three students. Sometimes, they would not follow this ratio, they even neglected their assigned mentoring duty.”*  
(Ren (A1): Interview, 2020, Lines:66-68, 87)

Ren added one more reason:

*‘It’s because ward nurses have two roles. They were nurse and their main role was not mentor. Although students were assigned to them, but they had not taken the role in full time, not concentrated. According to the human resource problem, they couldn’t give solution to this phenomenon.’* (Ren (A1): Interview, 2020, Lines: 91-93)

Students mentioned that both clinical supervisors and ward nurses were busy and could provide close supervision to students. However, if HT was intended to assist nurses, then students also needed to learn using such equipment.

## **Is Mentoring Affected by HT?**

Ren explained that HT development does not affect her personal mentoring:

*‘Nurses in clinical environment were still busy in both periods ... Health technology wouldn’t impact on mentoring even though there were more health technologies used in hospitals. Different health technologies development was available in different phases of the healthcare system ...’* (Ren (A1): Interview, 2020, Lines: 190-191)

However, the access rights of HT might place barriers to her mentoring:

*‘You asked for the help from staff to switch on the machine with using their password, then both staff and you (the academic mentor) supervised the student to distribute the drug ... Yes, the situation was quite common. You didn’t have a password, so you shouldn’t use their machine.’* (Ren (A1): Interview, 2020, Lines: 566-574)

Given that nursing staff could not sufficiently support enough to students' supervision, hospitals had arranged measures to enhance the placement support for students.

### **Representative Mentor (Honorable) with Assigned Password**

Ren provided information in response to the access rights issue and said:

*'Some hospitals provided password (to the academic mentor)... Assigned password is just for IPMOE, not able to access data entry system, a system named CMS (Computer Management System), the password for data entry system is not provided at all.'* (Ren (A1): Interview, 2020, Lines: 554, 794-795)

Not all nurse teachers were granted a password in all hospitals. Thus they still encountered problems during mentoring.

### **Encountering HT Problems during Mentoring**

Ren quoted busy schedule as an example:

*'Ah! It really depended on the ward situation. If the environment (ward) was too busy, staff was occupied by the works, you cannot request; but if the environment (ward) was not too busy, I could use after request, I had booked ... But AOM, hospital at the beginning not allowed, not allowed to use IPMOE to dispense drug, otherwise you had set the time, and had already requested from staff and ward manager, it is ok.'* (Ren (A1): Interview, 2020, Lines: 495-496 and L:500-502)

Another reason was related to students' ability, Ren added:

*'It's because busy, busy. Student acted during nursing care slowly, it is true students acted quite slowly, as well as environment is busy, how can afford more time to let you (student) dispense the drug slowly.'* (Ren (A1): Interview, 2020, Lines: 512-516)

### **Adaptation of Nurses to HT**

Though problems occurred in mentoring, Ren recommended that all of the nurses, including students and teachers, needed to adapt HT. She emphasised:

*'The trend of health technology in the future, would be more and more as I said. Students need to equip themselves. They need to have desire to learn and are not afraid of it.'* (Ren (A1): Interview, 2020, Lines:1071-1072)

Similar ideas were echoed by students. Fiona verbalized:

*'... but you need to learn how to use the new one (a new model of equipment).'* (Fiona (S4): Interview, 2020, Lines:1010)

Nurse teachers learnt together with students. Ren said:

*'We learn in school, in ward. We should keep learning in different environment and situation and you will get the knowledge ... We learn with students ... We get ready to learn when we encounter new technologies ... You keep learning, it is not too hard actually.'* (Ren (A1): Interview, 2020, Lines: 202-215)

Apart from the technologies, other factors were explored influencing the students' learning. Ren reinforced the factors of opportunities and safety.

### **Opportunity**

*'The most influencing factor to their learning is that whether there is any opportunity for students to provide nursing care or not ... Yes la! It means that they have opportunity to perform nursing care. If they lack of it, they cannot learn anymore even if they desire to learn ... The reason they lack of it because no one is available to supervise them ... Maybe you ask nurse staff to supervise but whether they have time or not ... They would express this problem during reflection session or feedback collection.'* (Ren (A1): Interview, 2020, Lines: 98 & 102 & 106-107 &111)

### **Safety Culture in Hospital**

*'... I thought this culture was related to patient safety. For student, they didn't want student to get any injury. For patient, they didn't want patient to get any incidents. Hence they didn't allow students to learn through practice in reality ... If this situation happens and it gets back to hospital policy, students would attempt less to practise if hospital policy was set for prevent incidents to patients ...'* (Ren (A1): Interview, 2020, Lines: 360-379)

*'Regarding to any writing of policy, private hospitals would be more because the preference of patient in private hospitals would not like students to touch them. However, the relationship between nurses and students would weigh more important in public hospitals ... This allows to communicate better between them. Then their trust to you will increase. Safety culture is just like the atmosphere which covers*

*the culture. But safety culture is relied on individual mindset. As both of your share each other mindsets, more understanding the ideas of each other, then you would know more about specific student who is a reliable person.* ' (Ren (A1): Interview, 2020, Lines: 380-394)

Students complained that the teachers from Wu-Zee University did not effectively support them. Ren elaborated on the role of a resource person and clinical mentor from NSD:

*'... Regard to the role of resource person (another role of a teacher), it really depended on the nurse teacher whose visiting frequency. They didn't have any consistency. But if school set a time schedule, they had to visit students with set frequency in one week or one month. The implementation was more systematic.'* (Ren (A1): Interview, 2020, Lines: 520-524)"

*'Yes, there was nurse assigned from Nurse Service Department (NSD) to provide supervision to students in a ward from 9am to 5pm for one week. The nurse was not from the training ward of the student. The nurse would ask ward nurse to keep some procedures for their students and keep supervision to the student.'* (Ren (A1): Interview, 2020, Lines: 530-536)

Ren discussed continuously that the roles of academic mentors, NSD nurses, and ward clinical supervisors could not be compared:

*'They couldn't be compared (academic mentor, NSD nurse and ward clinical supervisor). Nurse might not supervise (students) closely, it was difficult to measure how much they have taught. They would teach student if they had encountered some students. For academic mentor, they had close supervision for six weeks during first clinical training. For clinical instructor from hospital, they set specific time to visit individual student for specific procedures. All of them had their specific role.'* (Ren (A1): Interview, 2020, Lines: 542-552)

#### **4.13 Summary**

The survey results presented the numerical data on the clinical settings from the perspective of respondents. The common pattern of practices or experiences of nursing students during clinical training were reflected. The quantified data about HT used in clinical settings are also shown. Feedback on satisfaction with the clinical training of nursing students was reviewed. The effectiveness in terms of support from clinical supervisors, ward nurses, WMs, and academic mentors were rated. Given that their roles influence the learning of nursing students during clinical training, this chapter summarised the contents from interviewees to illustrate

further information on student learning in the contemporary clinical settings.

## **Chapter 5: Analysis and Discussion**

### **5.1 Introduction**

This chapter presents an analysis and discussion of the findings in conjunction with the academic literature. It has five parts that address the research questions. First, student perception on HT, the effect of physical characteristics in HT-integrated CLE, including HT in contemporary ward settings, on student learning are discussed. Second, the supervisory relationships, their characteristics in contemporary CLE and their effects on student learning are analysed. Third, this section discusses the pedagogical atmosphere and its effect on the learning of nursing students. Fourth, student learning opportunities are discussed based on their experiences. Fifth, student learning is discussed by applying Kolb's learning process. Afterwards, the impact of the current CLE on students mentoring in Wu-Zee University is considered and discussed.

### **5.2 Student Perceptions on HT**

In this section, the perception on HT is discussed in terms of a good learning environment, characteristics of HT settings, practice opportunities in HT-integrated settings, effects of HT learning that link to HT-dependence, nursing adaptation in HT-integrated settings and access rights to use HT.

#### **5.2.1 Learning Environment**

As was found, general health stream students give higher scores for their wards as good learning environments compared with the mental health stream students. Mathew gave a specific reason:

*'... Mental health nursing was difficult to have close relationship with health technology. There might be number or data generated from technology, for example, vital sign and IV droplet. For hourly recording in numerical data, technology might help you more. However, mental health was not involved numbers. You were sad or not, you were happy or not, that needed a person to assess.'* (Mathew (S5): Interview, 2020, Lines:1081-1084)

The clinical settings and practical experiences show that a traditional clinical placement for the mental health stream students was insufficient to provide a real-life experience of nursing care to patients with mental health difficulties (Patterson et al., 2016). Bisholt et al. (2014)

also found that different settings affect student satisfaction, which is less likely in a psychiatric unit, as was similarly found in this study. The reason was related to fewer learning situations in the psychiatric units than in the general wards.

The findings also identified that supervision was an important factor to satisfy student learning. However, the mental health stream students were not supervised by academic mentors while the assigned clinical supervisors were unavailable due to various reasons during clinical training to the mental health stream and general health stream students. Foolchand and Maritz (2020) found that limited resources were an essential factor challenging the mentoring and learning of students, their findings presented the limitation in clinical setting, including having adequate staff with clear roles and competencies, sufficient equipment and satisfactory learning resources and opportunities for students. Their paper echoed the present finding of this study that students expected to be mentored by their supervisor at the same schedule roster and with sufficient practice opportunities. The present study added information about the HT-integrated CLE. HT did not reduce the nursing workload, so nurses were not able to provide enough supervision to students.

### **5.2.2 Characteristics of HT Settings**

This study provided ideas from the perspectives of students regarding the characteristics of HT in a clinical setting. All respondents agree that the electronic and computerised equipment operated for data storage and transfer can be categorised as HT. However, mental health stream students expressed a low effect of HT on their learning, possibly due to the type of nursing care they provide that focused on behaviour and drug management (Overton et al., 1977). Fiona explained:

*'I think the reason is that we didn't have chances to use the computer (CMS), in contrast, staff told us information about patients and give us some printed document to see, it's Okay. So I think the impact is not big in the perspective of using computer (CMS).'* (Fiona (S4): Interview, 2020, Lines:470-472)

HT in the present study could be divided into two types: basic and non-basic electronic equipment, machine, devices or systems. Basic HT includes vital signs monitoring devices, such as a blood pressure monitors, an ECG machines and a bladder scan. The non-basic HT includes IPMOE, CMS and ventilators. HT could also be categorised into password-integrated and non-password-integrated based on student descriptions and usage. These



categorisations provided an understanding of student perspectives of HT. However, the findings showed that students commonly use the basic electronic equipment because they focused on routine duty during the entire clinical training and other environmental factors (Benner and Wrubel, 1989; Conole et al. 2008; Browne & Cook, 2011; Kelley, 2015; Damewood, 2016). Regarding the availability and usage of HT in wards, eight respondents agreed on their sufficient equipment. Cecilia, one of the students, made a comparison between types of hospitals said:

*'So it may relate to resources supply, resources is more distributed to big hospitals, they can trial some new technology. But district hospitals may not have many resources to try new technology. Leading hospitals may be well developed, so district hospitals started to follow the pace of the development ... I think the electronic equipment was adequate in wards.'* (Cecilia (S4): Interview, 2020, Lines: 72-80)

However, attention was paid to the damaged equipment that the staff still used and the inadequate supplement for non-functioning equipment. In addition, the equipment models and devices differed according to the services provided in each ward. The models could also change continuously. Jackie said:

*'Because of the high utilisation rate of machine in the ward and not using them properly, so parts of machine are detached easily. For example, the disposable SpO2 sensor was lost. If you maintain it well, it can help me working better. It's just one of the problems. It needs to be well maintained ... They (nurses) will search substitutes, some well-functioning one. I don't think it is an effective measure ... It should be convenient for us, but it is not in reality because there are many troublesome processes (when using machine). It is useless.'* (Jackie (G2): Interview, 2020, Lines: 76-78, 86, 736)

This study reflected the inadequate clinical machinery resources similar to the findings of Carlson et al. (2003) and helped enrich the reasons behind such problems. For students, HT resources for basic routines were sufficient, but non-functioning equipment was a common problem. The comments implied that the reason may relate to the funding distribution, hospital policy and leaders of clinical setting. Students expected enough demonstration sessions and supervision of learning HT devices in the university and clinical setting in this study. It answered the finding of Locsin (2001), who discussed that technologies exert influence on nursing practice and emphasised that health providers, including leaders, should provide sufficient resources for nurses. Teaching and demonstration of new models and

equipment from manufacturing organisations were necessary to enhance their confidence and safety in using such technologies for patients. In brief, the present study reflected that HT resource also plays an important role that affects on students learning.

### **5.2.3 Practice Opportunities Decreased in HT-integrated CLE**

Findings showed the trend of HT integrated into clinical settings, and students care for patients daily using such electronic equipment daily. Fiona said:

*'I thought there would be getting more devices in electronic because there were more and more patients. And it was impossible that all procedure were completed manually because the medical staff was not enough, and more and more patients ...'* (Fiona (S4): Interview, 2020, Lines: 991-992)

Students reported that their learning of the electronic equipment starts from educational institutions which was applied using electronic equipment on patients in clinical settings during their clinical training. Most importantly, HT development was a feature of the health care system to improve the quality of patient care (Locsin, 2001). Therefore, stakeholders of nursing were required to practise and provide care in this setting. In other words, students also developed their knowledge in this similar CLE in the future. However, all respondents mentioned that staff were busy in the clinical setting and that students spent all their time in routine tasks rather than in learning. Cecilia remarked:

*'... the ward is quite busy as well, so I have a lot of routine work to do. On the other hand, the staff is very busy. In fact, don't have a chance for learning.'* (Cecilia (S4): Interview, 2020, Lines: 281-283)

Inadequate HT resources constituted another factor limiting the opportunities for student practice. The inadequate resource support and shortage of equipment for patient care were important. Also important were personnel interactions, lack of opportunities to practise, sense of inadequate knowledge, lack of the support of nursing staff due to time constraints, lack of equipment for nursing, and different expectations of the hospital from those of the educational staff. All these factors could cause student anxiety and confusion in practice (Carlson et al., 2003). The present study increased the awareness of the effect on student learning in a HT-integrated CLE with scarce resources. Ren stated:

*'Students experience was different in the same clinical training period of the same year. If there were more health technologies available to*

*use, more new health technologies were available to use, such as in a busy environment, so more chance was available to explore those machines for students. In contrast, the setting such as convalescent, rehabilitation, in a non-busy setting, several infusion pump were available only and other health technologies were not available in ward, then there was fewer chance for practice indeed.'* (Ren (A1): Interview, 2020, Lines: 219-223)

Gopee (2011) explained that a practice setting or competency-based activities allow students to enrich their professional skills. Gopee (2011) supplemented the factors of a good CLE, including a culture of knowledge sharing, awareness of student learning and providing constructive comments to students. Flott and Linden (2016) stated that HT could affect the CLE and influence student learning. The present study has enriched information about how HT-integrated CLE settings shaped student learning during clinical training and how HT has restrictions such as the availability of the HT devices and the access rights to HT usage for student learning in clinical settings. Furthermore, HT could change nursing practice in the clinical setting.

#### **5.2.4 Effect of HT Dependence on Student Learning**

All respondents agree that HT allows nurses to work 'faster' and 'accurately'. Data can be more systematic in accessing, storing and transferring to the healthcare system, which is consistent with the previous literature (Barnard and Locsin, 2007). Sharon stated:

*'I think it's good at present, because can help nurse to do more quickly. More accurate ... not easy to administrate incorrectly ... Regarding ward practice administration, it is convenient.'* (Sharon (S4): Interview, 2020. Lines: 15-17)

This finding is also consistent with previous studies on the perspective of nurses who commented that HT could give them an efficient and effective working environment; it could also enhance the quality of care (Benner & Wulner, 1989; Quail, 2015; Ball, 2011; Barnard and Locsin, 2007; Glandon et al., 2014). However, the students in this study were dissatisfied that the various equipment functions and settings increased the barriers to their learning. Students depended on guidance from the nursing staff to learn. Otherwise they could not know how to operate specific HT. Ting said:

*'I had asked about this machine to the clinical mentor. But it's really hard, because there was many setting inside the system. Then Miss (clinical mentor) explained to me ...'* (Ting (S5): Interview, 2020,

Lines: 314-315)

Moreover, HT dependence in daily nursing practice was acknowledged in the literature (Marden, 2005), which is at present unavoidable because of the shortage of nurses and of safety assurance in the global health system. The effects of these phenomena were alleviated by using more HT to facilitate nursing care and health service management at present and in the future (Polifko, 2010; Risling, 2017). Six respondents described the HT as ‘an assistant’ in healthcare systems and agreed that nursing should avoid such dependence. They placed greater value on critical thinking and human assessment that could not be excluded in their learning. Maggie said:

*‘I think it is convenient for health staff to do assessment. Well, it may be a bit dangerous ... we will rely too much on the technology... There may be an error. It is just a machine ... It acts assistant in function ...’*  
(Maggie (S4): Interview, 2020, Lines:17, 19-20, 30)

Interestingly, students’ concerns matched the ideas of Weber (1958) that technology could not replace the work of nurses. Students in the present study commented that nurses should pay attention to patient needs instead of referring to the reading from devices. Students struggled to benefit from HT usage because nurses had no extra time for their interaction. Nurses could not shorten their workflow times consumed by using HT. First, their activities were evenly distributed with workload and HT usage. Second, they were often assigned new routines. Hence, nurses’ interactions with patients, colleagues and physicians were limited. This finding also implied that nursing students could not be a priority under this workflow pace (Cornell et al., 2010a & 2010b). Browne and Cook (2011) emphasised a risk to nursing quality safety if HT reliance occurs, wherein critical thinking and human assessment may be ignored. Sharon stated:

*‘... So couldn’t rely on the equipment completely ... I thought the nurse also was dependent to the equipment ... not clarified the problem (reading abnormal) really ... not asking about the situation, just informed to the doctor directly ...’* (Sharon (S4): Interview, 2020, Lines: 603-604, 701-702, 708-709)

Hence, further concerns of the enhancement of nursing curriculum to solve HT dependence has been raised because this practice may be a risk to the nursing students’ development of critical thinking during their clinical training. Nurse educational institutions may need to focus more on critical thinking teaching of nursing professionals and must be required in any

nursing activity, including using HT for patient care. Otherwise, students' competence and confidence in nursing care may be limited. Fiona claimed:

*'No confidence (in blood pressure monitoring by manual! I had used advanced machine (blood pressure monitoring equipment) during studying time, and I hadn't used this (by manual) method, all is done by machine ...'* (Fiona (S4): Interview, 2020, Lines: 1008, 1012-1013)

The findings also showed that students prefer to have more laboratory demonstrations. All respondents recognised gaps in theory and practice on HT usage. Sharon declared:

*'I have seen it in school but the mode (learning) was depending on our self exploration. just like a lab (laboratory session) mode, placed a machine there, you explored it by yourself and touched.'* (Sharon (S4): Interview, 2020, Lines: 104-105)

HT development in clinical settings in this study elucidated its importance in the practice of nursing students. Educational institutions focused on the reinforcement of avoiding HT dependence and enhancing students' critical thinking in using HT. This not only strengthened students' competence in nursing practice but also sustained the safety quality in healthcare.

### **5.2.5 Continue Adaptation and Learning of HT**

All students commented that the various equipment models lead to a lack of confidence in operating HT safely. The functions and settings were likewise unfamiliar. Thus, students required time to adapt and learn to use the equipment. Mathew and Sharon stated:

*'I thought it's related, because you had to be familiar with the equipment, and then you could evaluate the patient's physical condition. After that, a proper intervention could be provided for the patients. The use of instruments was a basic need of knowledge, which could help learning.'* (Mathew (S5): Interview, 2020. Lines: 126-128)

*'Indeed, it was Okay for simple equipment but it was IPMOE, it had too many functions. For some functions, I was not familiar to operate, and I would like to explore it.'* (Sharon (S4): Interview, 2020, Lines: 420-421)

Six respondents expressed that HT is unavoidable in the development of the healthcare system, and there was a sense that such technology would be more user-friendly and helpful. Maggie said:

*'... computer will develop very fast. And so that clinical setting has developed at the same pace. It's easy to get started with as well as those who are accustomed to using computers. And it is expected to use easily.'* (Maggie (S4): Interview, 2020, Lines: 1146-1147).

A previous study conducted from the view of nurses showed that HT must facilitate their works more efficiently and effectively rather than create the need to increase processes (Dunphy et al., 2011). However, the barriers to using HT in learning during a clinical training have not been explored from the views of students. Huston (2017) stated that technology could drive the nurses to work with improved care quality and interpersonal relations. The development and design of HT should address the needs of end-users, such as patients and healthcare providers. Thus, HT resources were necessary for students' learning.

Hospitals and educational institutions needed to bear the responsibility for students' adaptation to changing CLE (Gopee, 2018). Other than unsatisfactory curriculum coverage, students expected nurse teachers to share more information about HT, such as IPMOE and CMS. Fiona stated:

*'The simulation system (IPMOE) provided from school did not create more other functions, mainly involved how to conduct drug distribution, it had a bit different from reality.'* (Fiona (S4), Interview: 2020. Lines: 397-398)

This comment reflected the concern of Jokelainen et al. (2011) that the contact hours with HT was insufficient. The direct effect of the minimal contact time was highly inadequate with only a brief introduction to the information technology, such as CMS and IPMOE. Academic mentors mentioned that other electronic equipment or devices were inconsistently demonstrated in laboratory sessions because of time constraints. Ren and Amy said:

*'Regarding to the curriculum, it was good to have more technology in the laboratory room and more laboratory sessions. There was no need to chase the technology, no need to buy all, it's impossible. However, you needed to let them know the presence of technology, for example, you knew what a bladder scan was about.'* (Interview: Ren (A1), 2020. Lines: 1039-1041)

*'... Indeed it is basic and really generic (curriculum of health technology information and usage), cannot cover their application in reality at all.'* (Amy (A2): Interview, 2020. Line: 590)

In this study, the nursing curriculum could not support and prepared students to obtain

sufficient knowledge to adapt to new clinical settings because only 20 hours theory time was allocated to HT education in university (Nursing Council of Hong Kong, 2017a). In particular, all respondents commented on the various models of machinery and unfamiliar new equipment during their clinical training. Students even expressed their difficulties with handling the changing electronic equipment or systems after graduation. Strategies to help students adapt to new CLE were needed for shifts from human-powered to computer-controlled in nursing. All these findings enriched the information of HT-integrated CLE and explained the findings from two papers (Arpanantikul and Pratoomwan, 2017; Chang and Daly, 2016) that students were not familiar with using devices in the ward during clinical training.

### **5.2.6 HT Access Rights Hindering Student Learning**

Apart from inadequate resources, Craig and Smith (2015) mention the importance of available information technology access rights. Students and academic mentors are unable to use several HT, such as IPMOE and CMS, that requires access rights to practice medication administration and search patient information, respectively. Students also experience refusal of or incomplete access to HT with passwords. The reason for this restriction is ‘liability’. Students are concerned about their learning, and expressed that their competence in operating HT after graduation cannot be guaranteed because of this limitation. Angel said:

*‘It’s because nurses concerned that we did not know how to use (IPMOE) and worried about the consequence (liability). So there was no solution and it’s understandable to have observation only.’ (Angel (S4): Interview, 2020, Lines: 296-297)*

Angel’s experience echoes previous findings from the perspective of health agencies and educational institutions, in which both parties suggest modifying resources to support student learning by providing access rights to non-clinical staff (Fetter, 2009b). This study provides a background about practising the technology, and not merely emphasising on the learning theory in educational institutions but also the hands-on practice opportunity during clinical training. The results echo two studies (Jokelainen et al., 2011; Nkois et al., 2011) that students’ skills training on computerised systems is important and practice during mentoring can be motivated. Six students are displeased about the inadequate curriculum on HT and three students are disappointed about insufficient practical laboratory sessions. Maggie noted:

*'... had touched it (equipment in laboratory session), have pressed some buttons, but had only once time. When I was back to ward, I forgot most memory. It's not taught in lecture, no lecture notes available to show any ICON interfaces ... I hoped my school gave us more chance to practise, more laboratory sessions to practice the equipment which is used commonly in ward.'* (Maggie (S4): Interview, 2020. Lines: 552-554; 558 & 562)

In brief, the perception of nursing students of HT reflected their understanding of its emerging global prevalence including within HK. However, the gap between reality and the curriculum did not currently match students' expectation or equip them to operate competently.

### **5.3 Factors Influencing an Effective CLE**

Craig and Smith (2015) mentioned that the value of staff support in CLE is paramount to student learning in clinical placements. By using the CLES+T, findings show five predominant factors (leadership style, supervision, learning opportunity, nurse teacher and atmosphere of setting) that influencing student learning in clinical settings.

#### **5.3.1 Supervisory Role is Important in Learning Support**

Students express having close relationships with clinical supervisors and ward nurses, in terms of the importance of learning. WMs play an essential role in shaping the ward atmosphere. This study provides further information on how leaders influence the ward climate. Echoing previous findings by Doyle et al. (2017), the ward atmosphere affects staff morale and can demotivate clinical supervisors to provide assistance to students, who in turn, become dissatisfied with their practice. As would be expected, a tense atmosphere in wards leads the nurses becoming stressed, which occurs in the students in this study. As mentioned, health policy can shape the organisational culture that affects the senior staff administrating leadership in the wards. Respondents show that nurses, including students, cannot escape from such a reality during placement.

Regarding the learning impact from supervision, students rate effectiveness of support from the clinical supervisor with a high score (29%). Students expect to have the same duty as their supervisor, who can support their learning in the ward. However, this case does not always occur in reality. One student recalled making a mistake at the beginning of his clinical training, and that this would have been less likely to have occurred if his clinical supervisor



was available in the ward. Mathew shared his experience:

*'... it lasted 7seven weeks at beginning (first clinical training), he (the supervisor) had two weeks holidays. I was like a lonely soul without a master. I was not taught by others. I didn't know anything; I didn't know to ask which person.'* (Mathew (S5): Interview, 2020. Lines: 283-285)

Students also expect the same working roster schedule as their supervisors. The barrier to clinical supervision is presented because of different roster schedules, an unfriendly teaching style and busy supervisor routines. The finding of the dual role and lack of time of supervisors is aligned with previous literature (Jokelainen et al., 2011; Broadbent et al., 2014). Lack of time for the clinical supervisor who was occupied by other routines or on leave creates various effects on the relationship development with the students. Thus, students felt frustrated and confused when asking for support during a clinical training. Cecilia stated:

*'... the ward is quite busy as well, so I have a lot of routine work to do. On the other hand, the staff is very busy. In fact, don't have a chance for learning.'* (Cecilia (S4): Interview, 2020, Lines: 281-283)

Relevant mentoring training and role reinforcement with guidelines must then be provided by educational institutions and healthcare providers (Gopee, 2018). Ward nurses seemed to support the role of clinical supervisors. Students rated the second highest score to ward nurses in terms of support. Students commented that they could learn more when welcomed by nurses despite their busy schedules. Several respondents expressed that their relationship with ward nurses could be directly affected by their relationship with the clinical supervisor, who might be unavailable as mentioned above. Thus, students could only question the ward nurses. This study also indicated that the clinical supervisor could not coordinate the relationship between students and ward nurses. Relationship building in the interpersonal clinical setting was crucial and influenced student learning to a certain extent (Jokelainen et al., 2011). Nurses were always interrupted by heavy workloads and patient treatment schedules, which could not allow for focused teaching and interaction with students (Bastable, 2014). Despite not being responsible for assessing performance, ward nurses contributed to learning during clinical training and were valued by students.

With regard to the clinical mentor, students shared their insight about the importance of this

role during their clinical training, which could increase their learning opportunities in hospitals. This mentor was assigned from the hospital administrative department. This study added further insight into the role of the clinical mentor. Students tended to be more favourable to being mentored by the clinical mentor rather than by others assigned from the ward. The reason was that clinical mentors could spend more time with students because the mentors have no clinical work and are tasked to provide guidance to students in the ward. Not all students were assigned a clinical mentor during their clinical training, but students and graduated nurses positively reflected that they learnt much through the role model of the clinical mentor during placement. However, one respondent was even disappointed and stated that the clinical mentors' support should start at the beginning of their clinical training and another commented that their supervision should be longer. This finding reflected the idea of Carlson et al. (2003) that sufficient mentoring was important to student learning in clinical training. Formal support from clinical mentors might benefit student learning by providing a regular mentoring period during clinical training. This finding indicated that sufficient interaction with mentors could promote learning, and was highly valued by students.

The lowest rate on the score of effectiveness in terms of support for student learning was given to WMs, who were commonly occupied by administrative workload. All respondents had not interacted with the WM at all, apart from the arrangement of the duty roster. Students placed value in gaining knowledge from a role-model WM who could share health information with nursing staff, including students. However, most WMs only concentrated on their administrative work without being concerned with students' learning needs. In addition, students commented that WMs influence the ward atmosphere, which in turn affected the work of nursing staff and student learning. Students reported that a tense atmosphere in wards causes stress for staff and reduces student learning opportunities. Dunn and Hansford (1997) reinforced that the hierarchical effects in clinical settings added pressure on nursing staff and demotivated them to share experiences or even supervise students in high-risk procedures, such as giving medication. This finding was consistent with previous work by Sand-Jecklin (2009), Chuan and Barnett (2012), and Flott and Linden (2016) that organisational policy could change the behaviours of leaders and staff and cause a different ward atmosphere for nursing students, whose opportunities of participation and learning could likewise be hindered.

Although academic mentors received the highest scores in terms of support, the good

impression was limited in the first clinical training. The general health stream students comment that the support of academic mentors was adequate and useful for basic knowledge because the setting was new and fresh. Students reported not having academic mentors in the latter parts of their clinical training, and not having a supporting person assigned from the university on a regular schedule. Fiona said:

*'Academic mentor will to share her experience to us. And it was our first practice at that time ... the basic knowledge such as etiquette, she told to us because I haven't experienced too much...I won't see the academic mentor anymore ... No more, except exam period (AOM exam).'* (Fiona (S4): Interview, 2020, Lines: 599-617)

Findings identify another issue that academic mentors who lack assigned passwords can affect the opportunities for student practice. Cecilia remembered:

*'... IPMOE needed ward staff account (password) but academic staff did not get it.'* (Cecilia (S4): Interview, 2020, Lines: 691-692)

Students are also concerned about their learning in this arrangement and in CLE with HT integration. Cecilia said:

*'So I think the barrier is, the teacher doesn't have access such as CMS, and now these things (patient information) come to electronic a lot, it can only be seen in the CMS. During the duck tour (first clinical training), our teacher wanted to let us see a patient history, some basic information was found in document, but it needed CMS account if needing to read more detail background, it was happening frequently ... I think that would be much better to our learning if they get an account.'* (Cecilia (S4): Interview, 2020, Lines: 728-732, 748)

This finding was aligned with previous results by Nkois et al. (2011) and Fernández-Alemán et al. (2015). Nkois et al. (2011) indicated that students desire to learn more computer knowledge in clinical settings, similar to comments about learning more about IPMOE and CMS in the present study. However, Fernández-Alemán et al. (2015) concluded that the security of passwords for nurses is reinforced in health systems to protect patient privacy and data loss. Nkois et al. (2011) summarised the result that managerial-level nursing staff must provide supervision and create a positive environment to enable all types of nursing professionals to use health information technology. This study suggested that the support from managerial level staff for students learning was not enough. It also indicated that the limitation of access rights could not be unnoticeable to student learning.

Benner (1984) discussed that novices needed to develop their critical thinking through practice in clinical settings and that guidance must be provided by all means. Heinonen et al. (2019) emphasised the importance of the role of academic mentors, who could help students to develop the integration of theoretical and practical knowledge with the provision of feedback and emotional support. A qualified and knowledgeable mentor was important in the clinical training support and systematic preparation. Coordination of subsequent clinical training was also desired by students.

### **5.3.2 Effect of Atmosphere and Policy on Learning**

Various factors can facilitate or hinder the teaching and learning of nursing students (Figure Y). One factor is the culture of an environment. Benner (1984) also commented that novices may find difficulties in adapting to the new working environment. Given that organisational operations are affected by culture rather than by rationalised charts. Thus, novices need to apply situation adjustment techniques by taking up various practices to understanding the value inside the organization.

With the policy emphasis on safety, high-risk procedures such as medication through IPMOE system are restricted from nursing students, such that their practice before assessment depends on the assistance of supervisors and ward nurses. However, as discussed in Section 5.3.1, not all clinical supervisors, ward nurses and academic mentors can provide such support. Most of the academic mentors have no passwords, and their supervisory function in the practice of AOM is limited. However, medication assessment is a part of the requirements of NCHK (Nursing Council of Hong Kong, 2017b). As such, students cannot participate in essential practices. Matching Benner's (1984) suggestion to explore the culture of a new learning environment, such as HT-integrated CLE, is difficult. Arguably, the tense learning atmosphere presented by students in this study is created by hospital policy and managerial staff. Such a tense atmosphere increases the pressure on nurses and affects not only the supervisory intent of nurses but also reduces the learning opportunity of nursing students.

Under the influence of ward atmosphere and policy, all students reflect on not having many practice opportunities. This lack is linked to the WM. Maggie recalled:

*'The atmosphere was harmonious and I would be bold enough to ask*

*questions. The atmosphere was not fusion. I should ask which nurse ... A medical ward, its atmosphere was not harmonious, so I asked a nurse who would be more familiar with me. I would not be bold enough to ask other nurses ... the ward manager is easily to scold staff for minor issues ... I would be more careful if I talked to WM.'*  
 (Maggie (S4): Interview, 2020, Lines: 445-446, 450-451)

Given this analysis and discussion of the factors using the CLES+T data and findings emerged from interviews. Interestingly, findings from this study reveal similar factors which influence students' learning in CLE, these factors are illustrated in Figure Y, below.

**Fig. Y: Factors affecting student learning in the study**



Figure Y is a representation of the factors affecting students' learning in this study. The diagram primarily shows two forces, not necessarily in opposition to each other, but do interact with each other. In the diagram, it can be seen that three pressures: 'health policy, leadership, and atmosphere', are exerting pressure the HT-integrated CLE. In the opposite direction, there are four pressures: clinical supervisor, ward nurses, clinical mentors, and academic mentors exerting an oppositional pressure on the HT-integrated CLE.

### 5.3.3 Proactive learning attitudes in HT-integrated CLE

In this study, the 'active' strategy is used by students for their learning in HT-integrated CLE. Six students reinforce that their active attitudes to asking questions when they encounter problems, including the equipment operation during clinical training, satisfy them. They also

value the responses given by staff. Ting, Sally, Maggie, and Sharon claimed:

*'When they distributed (medication), I approached them intentionally, said "Miss, I wanted to see".'* (Ting (S5): Interview, 2020. Line: 217)

*'... commonly you needed, they did not teach if you hadn't requested.'* (Sally (S4): Interview, 2020. Line: 332)

*'Yes, because you didn't know the reason about the noise making of the infusion pump, I had tried many ways to understand at that moment ...'* (Maggie (S4): Interview, 2020. Line: 1011)

*'I felt you needed to learn actively when you had clinical placement. Maybe they were not actively asking you to observe together; that meant you noted them having (nursing activities), approached and asked whether I could observe or not together.'* (Sharon (S4): Interview, 2020. Lines: 614-615)

However, this strategy does not help students to learn actively in all cases. Sally said:

*'One night, I had night shift together with her (supervisor), I asked her whether I could practise or not, she replied "next time".'* (Sally (S4): Interview, 2020. Lines: 299-300)

Students also mentioned asking for opportunities to observe if they were not allowed to participate in high-risk procedures. Such opportunities are considered valuable. Students expect that observation can allow enhancing their memory. Sharon stated:

*'For nurses, not supervise you closely and even not let you distribute medication, might ask you to observe nearby how the steps had been done.'* (Sharon (S4): Interview, 2020. Lines: 370-371)

Four students remarked that they talk with classmates after duty, to vent their emotions about making mistakes or to clarify questions encountered in the wards or departments. They remembered that they searched for answers online rather than asking other people. Angel and Mathew said:

*'Yes, I had discussion with classmates sometimes ... yes, so I had heard more, more classmates also said (same answers), then I believed really.'* (Angel (S4): Interview, 2020. Lines: 802, 807)

*'ECG (electrocardiogram), its function, this machine, all of us learnt online at that moment. I didn't know the reason. I heard a student from University S, also had learnt by own through online.'* (Mathew (S5): Interview, 2020. Lines: 452-453)

Both health streams of students value the chance to practise. Behaviourism relies on the instruction given, observation in a situation and communication with mentors (Bottomley & Prymachuk, 2018). Based on the analysis from the above sections, the availability of equipment, hospital policy, supervisory relationship, pedagogical atmosphere, and mentoring design can affect the learning opportunity of students. All respondents experience gaps in learning, such as the lack of teaching from clinical supervisors, participation in procedures, feedback from supervisors and specific task completion in their clinical training. In addition, two respondents also stated that nurses' dependence on readings from measuring devices prevents approaching the patient for any assessment. Thus, students miss the chances to learn from ward staff on how to care for patients in specific situations. O'Connor (2015) stated that students can learn the philosophies of nursing care through review and reflection on the actions of each nursing staff, thus understanding the general attitudes of concern and compassion toward patients.

Another finding is that poor supervisory relationships among the hospital staff can hinder student learning. In this study, password assignment has a considerable effect on students' exposure to several procedures. Fewer practice opportunities and observations only reduce clinical experiences and cause uncertainties among students (Löfmark and Wikblad, 2001; Carlson et al., 2003; Mikkonen et al., 2016).

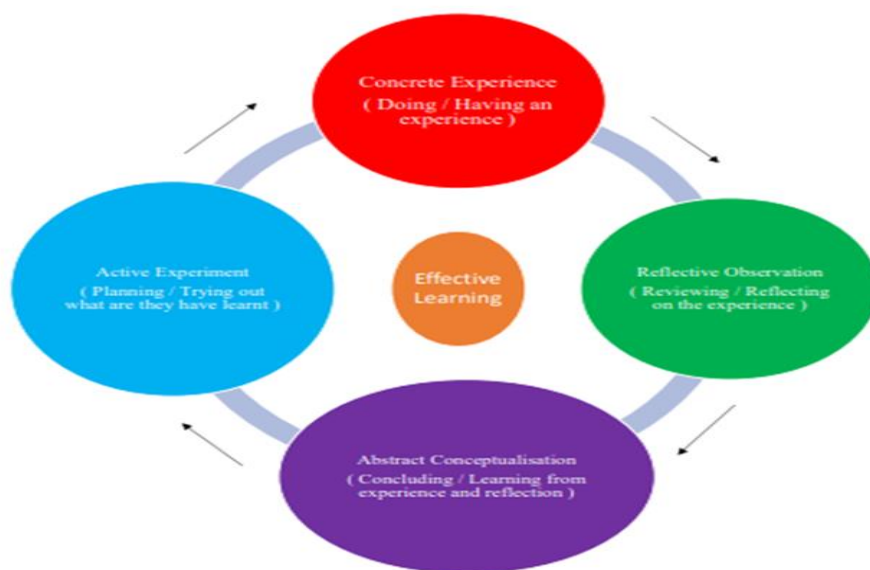
Regarding learning, including HT operations, the students and the academic staff have varying feedback. Students are eager to learn more in laboratory sessions and through exposure in the wards. However, academic mentors determine that the contents taught in school and wards sufficiently cover basic skills. Concerns about more complex and high-risk procedures lead to their preference that students learn these tasks in later clinical training. The reasons include the liability of access rights and time constraints. Academic mentors have limited spare time to teach more complicated skills or equipment operation. This finding resonates with the idea of Benner (1984) regarding the different expectations and reality regarding the perception and understanding of skilled performance between the healthcare providers and nurse educational institutions. Chan and IP (2007) identified differences between CLE and the educational setting in HK CLE. Sercekus and Baskale (2016) also repeated similar results of a discrepancy between theory and practical contexts in their country.

Parallel to the concept from Gopee (2011), scattered learning with incomplete participation, observation and feedback for students during clinical training must severely limit the new knowledge accumulation as required under the theories of behaviourism, constructivism and situated learning. Zerwekh and Garneau (2018) encouraged nursing students to gain knowledge from classroom and clinical settings. A positive learning organisation encourages nursing students to participate in patient care, which can build their knowledge and improve their critical thinking.

#### 5.4 Kolb's Experiential Learning Theory in Current CLE

Kolb (1984) emphasised the importance of learning to build knowledge. Figure Z shows four stages in which learners develop their concrete experiences based on observation and reflection. Then, conceptual formation begins after reviewing and reflecting on the experience. Knowledge from the experience can be concluded and generalised in practice. According to Kolb, effective learning is dependent on the completion of all four stages, otherwise, learning can be interrupted and conceptualisation of the experience cannot be constructed. Kolb also discussed that acquiring experience is shaped by various factors, such as the interaction between a person and the environment.

**Figure Z: Experiential Learning Cycle (Kolb, 1984)**



The premise of nursing can enhance students' learning opportunities. Students can gain concepts through observation and further consolidate their knowledge through repeated



practice (Saarikoski et al., 2008). This study discovers that learning in a chaotic environment and observation are common, and thus students cannot undergo all the learning stages or consolidate their knowledge through repeated practices. Kolb comments that incomplete learning can reduce the memory gained, and students cannot experience the transfer of knowledge from the beginning to subsequent development steps (Kolb, 1984). In the interviews of the present study, the academic mentors and graduated nurses are asked ‘which factor is the most influential on student learning during clinical training?’. Both groups of respondents stated that opportunity is the most important in contemporary clinical settings. Apart from the shortage of staff leading to the inadequate number of supervisors, the restriction of access rights to advanced technological systems may also be a factor shaping student learning in this study.

### **5.5 Clinical Facilitating Model in Wu-Zee University**

Feedback to the reviews indicated that technology had affected the mentoring in CLE. As advocated by Jokelainen et al. (2011), building a mutual relationship between students and mentors and providing adequate resource support to academic mentors from the managerial organisation are vital to facilitating effective mentoring. They were also concerned with the development of HT in clinical settings impacting on nursing education. Given that the nursing clinical training is an essential part of nurse education and clinical facilitation is indispensable in clinical training, the current CLE may affect the CFM used by Wu-Zee University. Facilitating models vary with nursing clinical training phases. Each education institution or provider can apply one model or combine models in their nursing programmes. This study found that students were well-supported by using the preceptor and facilitator models. Wu-Zee University employed a facilitating model interchangeably, aligned with the paper summarised by McKellar and Graham (2017).

#### **5.5.1 Mentoring in HT-integrated CLE**

Regardless of which models were chosen, Ren shared considerable experiences in local supervision and mentoring. Ren reinforced that various role of academic mentors or nurse teachers were still needed. She stated:

*‘They couldn’t be compared [academic mentor, NSD nurse (clinical mentor) and ward clinical supervisor]. Nurse might not supervise (students) closely, it was difficult to measure how much they have*

*taught. They would teach student if they had encountered some students. For academic mentor, they had close supervision for six weeks during first clinical training. For clinical mentor from hospital, they set specific time to visit individual student for specific procedures. All of them had their specific role.* (Interview: Ren (A1): Interview, 2020, Lines: 542-552)

Each academic mentor played a specific role in student learning. Notably, all academic mentors of Wu-Zee University commonly had multiple roles during their mentoring, such as preparing course materials for the next academic terms, acting as supervisors to student research projects, and other administrative duties. This also echoed previous studies (Landers, 2000; Jokelainen et al., 2011) and students sentiment in present study that reflected the inadequate support from academic teachers of the university during clinical training.

Appendix P showed that the role of teaching staff was integrated into the CFM (Clinical Facilitating Model) and discussed its relationship. Among the models, the last two (Dedicated Education Unit and Mentor) may not be appropriate to the students' experience in this study. A dedicated unit needs a well-designed ward and staff support, which may not yet exist in HK. A dedicated mentor also needs a long-term relationship, such as one year. However, the formal relationship between mentor and mentee only lasted for a few weeks for the students from Wu-Zee university. The findings revealed that a clinical supervisor acting as a preceptor is assigned from wards to students during the second clinical training of the general health stream and whole clinical training of the mental health stream. The assumption is that the preceptor and students have regular interaction, but the unmatched roster and double role of the clinical supervisor lead to the ineffectiveness of this model (Jokelainen et al., 2011; Broadbent et al., 2014). Ren justified this by saying:

*'... It's because there is not enough nursing staff in the ward. They may want to guide students but there is not enough nursing staff. And this is the main reason that they cannot provide the guidance.'* (Ren (A1): Interview, 2020. Lines: 121-122)

The second was the facilitation/supervision model, in which an academic mentor from Wu-Zee University was assigned to supervise students for a few weeks during the first clinical training. For the first clinical training, a 1:8 mentoring ratio was requested by NCHK (2017). Students could be mentored by their own university, potentially reducing the barriers to familiarise themselves with the ward environment because the academic mentor helped in the

coordination and communication. Thus, students learnt how to act appropriately from this role model. However, more attention should be given to students who had a solo clinical training later. This stage could decrease retention in the programme because they needed to experience the practice in the wards, where anxiety and unfamiliarity are common to students (Gopee, 2018). In this study, students reported that would feel reassured with an academic mentor assigned from the school to accompany them during clinical training. More visitation and assigning a fixed academic mentor or resource person can provide strong support to students, especially to the senior ones. The students highly valued the contribution of mentorship and aligned with the findings of previous study by Hall-Lord et al. (2013). The students' feedback was also aligned with the findings of Croxon & Maginnis (2009); the students preferred to have a fixed clinical facilitator which they commented was better than being supervised by a clinical preceptor (ward nurse). The reason was the varying supervision experience, academic background and passion, as well as inadequate support from educational institution and health providers. Regardless of the supervisory relationship or mentoring model used, Ren reinforced the critical point that influences the learning of students. She stated:

*'The most influencing factor to their learning is that whether there is any opportunity to students to provide nursing care or not ... Yes la! It means that they have opportunity to perform nursing care. If they lack of it, they cannot learn anymore even they desire to learn ... The reason they lack of it because no one is available to supervise them. Take Catheterisation as a example, academic mentor can supervise as much as she can but they would lack this chance to exercise this procedure if there is no academic mentor to supervise. May be you ask nurse staff to supervise but whether they have time or not ... They would express this problem during reflection session or feedback collection.'* (Ren (A1): Interview, 2020. Lines: 98 & 102, 106-107 &111)"

In this study, students also desired to have a fixed supervisor and appreciated the contribution of a clinical mentor provided by the hospital. They preferred to extend the supervision by clinical mentors rather than by the supervisor from a ward or an academic mentor from the university. Students expected to learn with greater support from the university and still appreciated the important role of academic mentors that facilitate their familiarity with the new clinical environment during the first clinical training.

However, exposure to advanced equipment such as IPMOE depends on the availability of a

password, either from an academic mentor or ward staff. In addition, even though ward staff may be willing to access the system, the academic mentor could decide whether to teach the procedures. Students also reflected that academic mentors were not fully equipped to mentor students in terms of being familiar with the equipment and ward routines. Ren added:

*'... Actually, there was a lot of skills to be learnt for students in that period. It was better to learn the basic skills. Regarding student practising drug distribution, they have assessment of drug in second clinical training, they can drill frequently in that period. So it's better to practise the basic skills during the first clinical training placement. Those like AT (aseptic techniques), Foley insertion, stomach tube insertion, vital sign should be practised well. It is enough that you just know what is IPMOE and have observed its usage once. It is not a necessary to let them practise it.'* (Ren (A1): Interview, 2020. Lines: 619-624)

Given this background, students may lack of competence to manage the HT which in turn would affect their learning. Ren said:

*'... Yes (this a learning problem)! ... regarding to the technology influencing their learning. I think it is better to have more machines available for students exploring and practising in ward before implementing to the patients.'* (Ren (A1): Interview, 2020, Lines: 800; 819-823)

*'... Yes, they are not competent. I get back to my mentioned reason. It is because the learning in school is simulation. The scenario of case is simulated but equipment is not exactly the same to ward. It just likes a mobile phone, the models are various. Students need to relearn because the models in each hospital are different but principle is same. Thus I think that students need to explore early, like learning in school, learning in ward, let them to touch the equipment. Principle is same. If a new model of equipment is developed, let them learn again.'* (Ren (A1): Interview, 2020. Lines: 379-383)

Regarding supervision from the clinical supervisor, this model was commonly used for the general health stream students after their first clinical training and for the entire clinical training of mental health stream students. The advantage of this model is providing support to students, and learning one by one in wards. However, previous studies showed that various barriers hindered the clinical supervisor from fulfilling their teaching role, despite their passion to supervise students in the wards (Broadbent et al., 2014). In relation to the support from Wu-Zee University after the first clinical training, a resource person was assigned to visit the students in the later training. During visits, the resource person might observe a

student carrying out procedures and provide feedback during a briefing or listen to the comments from students or staff in the wards. Several groups of resource persons were established and responsible for various hospitals. In the general health stream, resource persons planned the date on which students visit the ward in the same hospital. Academic staff distributed the schedule among the members of their group. Unfortunately, this arrangement might not work well because students in this study said that they had different rosters in visiting schedule and they missed the visit due to being occupied with nursing care. The guideline and review areas of the visit was designed by the resource person and not the university, and thus might not facilitate student learning in the current CLE.

Regarding the supervision of the mental health stream students, only five academic staff in Wu-Zee University were responsible for teaching theory and providing clinical training support. From the perspective of students, academic mentors or resource persons might not be as important as a ward nurses because all practical assessments of the mental health stream students were carried out by ward nurse rather than by academic staff. Thus, the academic staff acted as emotional and technical supporters, apart from sharing knowledge. Academic staff visited the students and commonly provided briefings and case sharing. There also presented a risk of missing to meet one or two students who might have conflicting meeting times with the roster schedule because of random meeting schedules applied by academic staff. Therefore, mental health stream students might feel more stress during clinical training than the general health students who had academic mentors accompanying them. Supportive resources should be increased for mental health stream students.

Regardless of streams, the problem remains of mentoring related to inadequate visits to students. Students complained that they met resource persons 1-2 times only during the clinical training. One student met the resource person only once within the whole nurse educational programmes. This arrangement indicated that the availability of supervision was more important than the impact of HT development on students in a clinical setting. Ren's experience also revealed the impact of HT on student's learning in terms of inadequate knowledge of technology operation and access rights not being available. These issues need to be solved with the cooperation between educational institutions and health care providers.

## **5.6 Summary**

In this Chapter, themes including the perception of the HT from the view of students, students learning experience and their learning opportunities under this HT-integrated CLE were discussed. Applying Kolb's experiential learning theory, the students' learning situation was analysed. Through analysing the mentoring system of Wu-Zee University to the CFM, the students learning phenomenon was complemented in the current CLE. The students reflected on the important impact on their learning because of fewer opportunities, inadequate supervisory relationships and poor learning atmosphere in the HT-integrated CLE in this study. Relevant intertwined factors were also discussed.

Based on this study, poor time arrangement and a qualified nurse with dual roles for mentoring were the main problems that students encountered during their clinical training. Santucci (2004) evaluated and concluded several ideas that the shortage of nurses led to the low supply of clinical preceptors (supervisors). Thus, fresh graduates might be supervised by multiple preceptors in graduate mentoring programmes, resulting in poor communication, inconsistent assessment tools and standards and lack of follow-through. Burnout was common when mentoring workload falls to one person. Given that this problem occurred in the mentoring of graduated staff by Santucci (2004), the present study suggests that nursing students could not be excluded from the effect of shortages of nurses on their clinical mentoring. Of importance was an awareness of Kolb's experiential learning theory to support students in the CLE.

## **Chapter 6: Conclusion**

### **6.1 Introduction**

This chapter offers a conclusion to this study. It provides a summary of its contribution to the existing literature, as well as the implication, limitation and recommendation of this study. It also comments on possible research recommendation for future research.

### **6.2 Contribution of the Study**

All respondents recognised that HT enabled nursing students to carry out patient care faster. HT enabled the storing of information in an accurate and systematic way. Nurses need to update their knowledge and development through education. Students are concerned about issues of HT inside their CLE during clinical training as well. Students learning experience was identified by using Kolb's experiential learning theory. Relevant factors were shaped by the development of HT in the present CLE and how they interacted to impact student learning in a clinical setting.

#### **6.2.1 Student learning as regards to Kolb's Experiential Learning Theory**

Regarding student learning in HT-integrated CLE, this study enriched the information on how students learn in the current CLE. Students could not go through all learning processes by integrating Kolb's experiential learning theory. Observation tended to be the main learning route in their current CLE. However, students reported that they lacked supervision and valuable feedback. Students found it difficult to receive supervision because supervisors were occupied by other duties, and a misaligned roster schedule contributed to their frustrations. This phenomenon could not facilitate the subsequent learning processes of consolidating abstract conceptualisation, gaining active experience, and needing to accumulate concrete learning experiences. Chang and Daly (2016) also discussed that the learning of nursing students was not complete, and knowledge could not be accumulated under contemporary CLE with technology developments in healthcare systems.

#### **6.2.2 Student learning concerns in HT-integrated CLE**

This study also aligned with previous literature about the CLE factors (leadership, atmosphere, supervisory relationship, nurse teacher, learning opportunity) in an HT-integrated CLE. Unfortunately, student learning opportunities were limited due to limited conducive settings and a lack of managerial support in the current CLE. Students felt

awkward and distressed with asking questions to engage with their supervisor. Despite this, all nursing professionals sharing the settings with different purposes, students considered that supervision was the most decisive factor for their learning during clinical training. Students did attempt to develop better relationships with their clinical supervisor during clinical training. In this study, students reinforced that busy staff' and 'ward atmosphere' were key aspects of their clinical training that required mastery of the clinical environment and which exerted leverage on student learning opportunities. They valued the role of their supervisor, clinical mentors and nurse teacher. In terms of the ward atmosphere, managerial impact could shape the CLE, thereby influencing the students' learning opportunities.

Crombie et al. (2013) pointed out several factors that enhance rates of completion and reasons why students stay in the nursing field. Findings showed that poor support from clinical supervisors, nurse teachers and senior nurses could affect student retention in nursing programmes. Senior nurses should create a supportive culture to shape a successful mentoring environment. Similar situations were experienced by students, namely, that poor supervision, relationship and attitudes affect opportunities for student practice. Poor supervision resulted in reduced feedback to students and affected their knowledge construction. Modification measures of mentoring and supervision from nursing staff to students may be designed for future education.

Although student's reflection did not highlight the impact of HT on their learning, both students and academic mentors encountered barriers to accessing and operating some devices or systems. A previous study also found that students had insufficient knowledge of HT (Löfmark and Wikblad, 2001). Students reflected on the effect of HT on their practice in theoretical and practical settings, regardless of how many times the respondents repeated that they embraced an active learning approach during their clinical training. Specific HT systems, including ePAF, IPMOE and CMS were commonly restricted from student use. Understandably, these systems involved patients' privacy data. Students also indicated that they carefully used unfamiliar equipment models and reinforced the effect of access rights to real-life student learning opportunities. Dependency on HT was also another concern among students in this study, such that their critical thinking and traditional nursing skills were limited in this CLE. Students noted that several nurses worked in a depersonalised way, ignoring assessment and reducing counter-checking the readings generated from electronic equipment. Students found difficulties in learning and observing required procedure steps



from nurses. Thus, they could not reflect on the tasks in practice.

### **6.2.3 Mentoring in HT-integrated CLE**

In this study, both survey and interviews revealed that the term ‘busy’ was most used by students to reflect their relationship with their mentors, regardless of whether the latter were assigned from Wu-Zee university or the wards. Other comments from graduated nurses and academic mentors also used identical descriptive terms to explain the rare opportunities for student practice. By integrating the CFM into Wu-Zee university and analysing their mentoring model shows that academic staff of the Wu-Zee university took multiple roles and had various duties during the clinical training period. Their mentoring quality to students was, therefore, negatively affected.

As noted, nurse teachers had supervised and supported students but not systematically. In contemporary terms, the design of the clinical training and supervision is complex. However, its design was expected to be more structured to students. Thus, both educational institutions and healthcare providers would benefit from closer collaboration and open communication in order to ensure a positive CLE for students. Although representative academic mentors with assigned passwords were employed in several hospitals to support the assessment of IPMOE, HT education for students remained inadequate. Written guidelines, curriculum design and resource support must be addressed.

### **6.2.4 Summary of the Thesis**

This case study provided insight into the HT development in the CLE and its impact on students’ learning, including the perception and characteristic of HT from the view of the nursing students. As a member of the health staff working in hospitals, I witnessed the change to a paperless and HT-equipped healthcare system. HT has been present in every corner of the clinical setting. Respondents were aware that HT would affect the next generation of nurses. They also emphasised the importance of professional knowledge and clinical judgment to patients rather than the dependence on the record generated from the HT. In sum, a competent nurse educational programme does not only rely on students’ motivation in learning and participation but also need the responsibility of educational institutions and coordination and support from industrial partner to minimise barriers to learning. Moreover, the education and skills training on HT need enhancement for students to develop their skills in information sharing in this technologically challenging clinical setting. The findings can

provide information to HT manufacturers and policymaker to enhance their support of healthcare education. Overall, this study demonstrated the importance of examining the impact on student learning in the current HT-integrated CLE. A critical perspective has been a better understanding of the CLE regarding the impact of HT to nursing education and the students' learning.

### **6.3 Recommendations and Implications of the Study**

At least seven possible recommendations have emerged. First, nursing educational providers would benefit from improving the curriculum on nurse education to strengthen the adaptation of students to HT-integrated CLE. Second, increasing contact hours of HT before clinical training and content covering critical thinking can be considered. Third, with regard to the usage of HT, during demonstration, nursing educational providers should introduce various models of technology devices to students and integrate sharing sessions about their use. Fourth, with respect to teaching and learning, more tutors could be available to provide feedback about the required skills to students during laboratory session in university. Academic staff can visit the mentoring area and update their clinical knowledge before mentoring students to refresh and enhance their knowledge to support students during clinical training. Fifth, with respect to health care providers, more support should be provided regarding their access rights when using HT during clinical training. Sixth, the role of clinical mentors can be expanded to supporting nursing students during clinical training; and, seventh, the supervisor role should be clearly delineated from their clinical duty during supervising students during clinical training.

With respect to HT manufacturers, the designed system and equipment of any HT should be more user-friendly. Cooperation with educational institutions should be increased as regard practising with mock technological devices or systems. More relevant design of devices or systems can be developed .

Regarding government, they should ensure enough financial support to enhance HT education for the health sector. Government policy also enacts a relevant authoring body to discuss any improvement on the curriculum regarding to the development of HT in nursing education.

#### **6.4 Limitation of the Study**

The study's philosophical framework aligned with social constructionism, and utilized a case study methodology, using both interviews and a questionnaire as methods of data collection. The study had not considered more participatory forms of research, and this may have been a potential limitation. Participatory action research involves the sharing of knowledge between researcher and participants, it allows empowering participants to voice out their ideas and reflect on issues. It contributes to collaborating changes throughout the research . It takes account of the different views of participants. Given future opportunities, participatory styles of research could be considered. This would involve inviting participants to review their own transcripts, to conduct follow-up interviews, for participants to offer feedback on the analysis of data, and to review/comment on the conclusions to the study, for example, read Chapter 7 and Chapter 12 by Gray (2009) and Chapter 1, 2, 6 and 9 by De Chesnay (2015). Participatory research methods would also involve attending to ethical issues.

Another major limitation of this case study emerged due to the restriction imposed by the COVID-19 pandemic. This posed challenges with recruiting interview candidates. Another limitation was related to the commitment of student participants when they were already under pressure to focus on their own course programmes, needing to complete assessments and further clinical training. Final-year students also have to focus on their own final-year projects, potentially limiting their motivation to participate in research studies of this kind. Another possible perceived limitation relates to this study being carried out in a single institution with eight interviewees.

#### **6.5 Future Research**

Further research on HT is needed from the perspective of students. Other relevant CLE factors can be covered and explored in future case study research. Recruiting more programmes education institutions and participants would extend the insights into nursing students within HT-integrated CLE. The perspectives of additional different parties would also widen the perspectives of healthcare providers, potentially adding to future research findings. Research about the relationship between HT and nursing curriculum design can be considered. Further research about the relationship between critical thinking and operating HT could be included. For healthcare providers, research on clinical support to nursing students and graduate staff can be conducted to enhance the quality of care. In the future, it is hoped that an identified journal (for example, the '*Journal of Nursing Education*') would be a

place to disseminate the research findings. Also it is hoped there may be opportunity to share the findings from this study with professional colleagues in the clinical settings where I work.

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## **Appendices**



## **Appendix A: Interview schedule of Student**

### A: Personal perception

1. What do you think about the development of the Health Technology in clinical area? How and why do you have these ideas?
2. What do you think about the impact of the HT-integrated CLE to your clinical learning? How and why do you have these ideas? Can you describe with example?
3. How effective of HT development in the clinical learning environment as practice in health care institution?
4. How do you think the HT can develop in future?

### B: Supervisor relationship impact on the learning in a health technology (HT) integrated CLE

1. Do you have any supervisor to follow your learning in the HT-integrated CLE?
2. Please describe your relationship with your supervisor regarding to the learning in clinical area.
3. What type of activities do you do/learn with your supervisor?
4. What do you think about the role of supervisor relationship on the nursing students' learning in the HT-integrated CLE?

### C: Leadership style of ward manager impact to the learning of nursing student in a HT integrated CLE

1. Can you describe with example the leadership style of your ward manager in a HT integrate CLE
2. How do you think about the underlying reason of suggested leadership style?
3. What do you think about impact of leadership style of ward manager on the nursing student's learning in the HT-integrated CLE? Why?

### D: Nurse teacher (academic mentor from academic institution) impact to the learning the learning of nursing student in a HT integrated CLE

1. Can you describe your relationship with your nurse teacher (academic mentor) regarding to the learning in clinical area.
2. What do you think about impact of nurse teacher (academic mentor) on the student's learning in the HT-integrated CLE? Why so you have these ideas?
3. How does the nurse teacher (academic mentor) adapt in this HT integrated CLE?
4. Can you comment the underlying reason for his/her adaptation?

5. Do you think about this adaptation to be changed in future? How to change?

E: Pedagogical atmosphere impact to the learning of nursing student in a HT integrated CLE

1. Can you comment the atmosphere you experienced in a HT integrated CLE with example?
2. Can you comment which factor to contribute this atmosphere ? Please describe with example.
3. What do you think about the impact of the atmosphere on the nursing student's learning in the HT-integrated CLE?

F: Premises of nursing on the ward that impact student's learning in a HT integrated CLE

1. What do you think about the relationship between nurse and patient under a HT-integrated CLE?
2. Following question 1, what do you think about the impact of their relationship influencing the relationship between student to patient
3. What do you think about the impact of their relationship to the learning of nursing student in a HT-integrated CLE?
4. Can you share your experience of learning through premise of nursing with using HT in clinical? Please describe with example?
5. What is the main reason for your experience?

G: What is challenge to student's learning in a HT-integrated CLE in contemporary and future?

H: Any other comments on the impact of HT-integrated in clinical learning environment to the learning of nursing student?

## **Appendix B: Interview schedule of Academic Mentor**

### A: Personal perception

1. What do you think about the development of the health technology in clinical area? How and why do you have these ideas?
2. What do you think about the impact of the HT-integrated CLE to the learning of nursing students? How and why do you have these ideas? Can you describe with example?
3. What do you think about its development in future? Why?

### B: Supervisor relationship in ward

1. What do you think about the role of supervisor relationship on the nursing students' learning in the HT-integrated CLE?

### C: Leadership style of ward manager

1. What do you think about impact of leadership style of ward manager on the nursing student's learning in the HT-integrated CLE?

### D: Nurse teacher (academic mentor)

1. What do you think about impact of nurse teacher (academic mentor) on the student's learning in the HT-integrated CLE?

### E: Pedagogical atmosphere on the ward

1. What do you think about the impact of the pedagogical atmosphere on the ward on the nursing student's learning in the HT-integrated CLE?

### F: Premises of nursing on the ward

1. What do you think about the Premises of nursing on the ward to the nursing student's learning in the HT-integrated CLE?

### G: What is challenge to student's learning in the HT-integrated clinical areas?

- ### H: Any other comments on the impact of HT-integrated in clinical learning environment to the learning of nursing student?

## **Appendix C: Interview schedule of graduate nurse**

### **A: Personal perception**

1. What do you think about the development of the Health Technology in clinical area? How and why do you have these ideas?
2. What do you think about the impact of the HT-integrated CLE to the learning of nursing students? How and why do you have these ideas? Can you describe with example?
3. What do you think about its development in future? Why?

### **B: Supervisor relationship in ward**

1. What do you think about the role of supervisor relationship on the nursing students' learning in the HIT-integrated CLE?

### **C: Leadership style of ward manager**

1. What do you think about impact of leadership style of ward manager on the nursing student's learning in the HT-integrated CLE?

### **D: Nurse teacher: from educational institution (relationship with supervisor and mentor from Health organization)**

1. What do you think about impact of nurse teacher (academic mentor) on the student's learning in the HT-integrated CLE?

### **E: Pedagogical atmosphere on the ward**

1. What do you think about the impact of the pedagogical atmosphere on the ward on the nursing student's learning in the HT-integrated CLE?

### **F: Premises of nursing on the ward**

1. What do you think about the Premises of nursing on the ward to the nursing student's learning in the HT-integrated CLE?

### **G: What is challenge to student's learning in HT-integrated clinical areas?**

### **H: Any other comments on the impact of HT-integrated in clinical learning environment to the learning of nursing student?**

## Appendix D: Information sheet

University of Bristol

A Research Study of the School of Education

Participant Information Sheet

**The impact of the health technology integrated clinical environment to the learning of the nursing student**

### **What will the project researcher(s) do?**

My name is Lam Lai Chun, a doctoral candidate from Bristol University. I sincerely invite you to participate in this research study on the clinical learning of nursing students. You are selected as a possible participant because you are a major stakeholder in clinical area, your information will be valuable to the study. Please read this form and ask any questions you may have before agreeing to be in the study.

### **What is this project about?**

This research aims to study on the clinical learning of nursing students.

### **What is the purpose of the project?**

The purpose of the study is to investigate the learning environment of the nursing student. In particular, contemporary clinical environment has been changed corresponding to the reform of health care system globally. Updated information will be beneficial to the improvement for enhancing clinical learning of nursing students.

### **What do I have to do?**

This research will require about 15 minutes of your time. During this time, you will be invited to answer five sheets of questions about your learning experiences in your latest / current clinical area.

### **What happens to my personal details?**

All of the response in this study will be recorded anonymously and confidentially. Data can only be accessed by researcher. All the data will be used in this study only. Your provided information will not be disclosed

to health organizations and irrelevant persons. The information will be kept in a locked cabinet.

**How long will you be using the information you collect?**

All information will be kept till the academic writing complete or journal published. The results from this study will be presented in academic writing and journals read by nursing education professionals to help them better understand the experience of nursing students.

**What happens if I change my mind?**

There are no anticipated risks and inconvenience resulting from this study. If there are any questions posed to you during the study that cause discomfort or embarrassment or you feel are infringing on your personal privacy, you are free to refuse answering the questions. Your participation in this research is completely voluntary. Refusal to participate or withdrawal of your consent or discontinued participation in the study will not result in any penalty or loss of benefits. All information from you will be also destroyed.

**Who can I contact if I have any questions?**

If you require any information about this study, please call Lam Lai Chun at 92271883 at the University of Bristol. If you have any other questions regarding your rights as a participant in this research, you may also contact the ethics coordinators at: [gsoe-ethics@bristol.ac.uk](mailto:gsoe-ethics@bristol.ac.uk).

**Many thanks for reading this information sheet.**

By completing and returning this questionnaire you will have given voluntary consent to participate this study.

## Appendix E: Ethical Approval of Bristol University

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From: Research Governance and Ethics Officer <[Liam.McKervey@bristol.ac.uk](mailto:Liam.McKervey@bristol.ac.uk)>

Sent: 05 September 2019 08:53

To: Lai Chun Lam

Subject: Ethics Online Tool: application signed off

Your online ethics application for your research project "The perception of technology impact to the learning of nursing Student" has been granted ethical approval. Please ensure that any additional required approvals are in place before you undertake data collection, for example NHS R&D Trust approval, Research Governance Registration or Site Approval.

For your reference, details of your online ethics application can be found online here:

<http://www.bristol.ac.uk/red/ethics-online-tool/applications/92763>

## Appendix F: Letter for access

### MEMO

To: Ms Celine Lam Lai Chun, Lecturer, N&HS  
Cc: Professor Linda Lee Yin King, Acting Dean, N&HS  
From: Dr K C Li, Secretary, REC  
Date: 17 September 2019

#### Ethical Review regarding Human Research

**REC Reference No.:** HE-SF2019/09  
**Principal Investigator:** Ms Celine Lam Lai Chun  
**Project Title:** The perception of technology impact to the learning of nursing Student

This informs you that, according to the University's guidelines and procedures for ethical review regarding human research, your ethical clearance application for the project listed above has been approved by the Research Ethics Committee (REC). Kindly note the following standard terms:

#### Standard Terms of Approval

1. **Ethics approval effective period:** the ethics approval period will be from 1 October 2019 to 31 December 2020.
2. **Future correspondence:** please quote the REC reference no. and the project title above in any future correspondence relating to ethical issues of your project.
3. **Ethical conduct for your research:** you should ensure that all investigators (if any) are aware of the terms of approval and take reasonable care to ensure that the study is conducted in accordance with the University's *Guidelines and Procedures for Ethical Review regarding Human Research*.
4. **Amendments to the approved project:** any amendments to the project (including applications of extension of ethics approval effective period and changes in research protocol) should be reported to REC by completing the *Amendment Application Form*. For cases when there are substantial variations or the amendment involves any major change to the methodology described in the research proposal for application, a new application for ethical review will be required.
5. **Monitoring:** your project may be subject to an audit or any form of monitoring by REC (which will include e.g. review of the signed consent forms for participants and the data storage arrangements) at any time to ensure that ethical requirements are met.



K C Li, PhD



## Appendix G: Instrument Approval Letter of CLES+T Usage

Mikko Saarikoski  
RN, PhD, Adjunct Professor, Docent  
Camilla Strandell-Laine  
RN, MNSc, Doctoral candidate  
cgs@utu.fi  
University of Turku, Department of Nursing Science, Finland

Agreement form  
  
01.01.2015

### Agreement for using the Clinical Learning Environment, Supervision and Nurse Teacher (CLES+T) evaluation scale

I agree to abide by the following principles in using the CLES+T evaluation scale as a research tool in my/ our empirical study:

- The CLES+T should only be used in its original form (minor alterations are permissible, for example in order to ensure the terminology of CLES+T reflects different cultural aspects). All other changes should be reported to the authors.
- Any research reports that have used the CLES+T should acknowledge the original source by using the following reference: Saarikoski et al. 2008. The nurse teacher in clinical practice: Developing the new sub-dimension to the Clinical Learning Environment and Supervision (CLES) scale. *International Journal of Nursing Studies* 45: 1233-1237.
- The instrument cannot be published in its original form (e.g. as Appendix) without the permission of the copyright holder, Elsevier Science Ltd, UK. The CLES+T scale has been published originally in the above article.
- Authors should be sent one copy of publications in which the CLES+T scale has been used as a research instrument (see the address above).

Name of the re-user: Celine Lam Lai Chun  
nam  
your signature

Research organisation: University of Bristol

Address: Beacon House, Queens  
Road, Bristol, BS8 1QU, UK

Name of the research (or research project): Clinical Learning Environment in  
a public Hospital

Language version: English

We give the permission: [Redacted]  
Camilla Strandell-Laine

Date: 18.6.2015

Please, complete this agreement form informing about your study and send the scanned \*.pdf -document to the following email: [cgs@utu.fi](mailto:cgs@utu.fi). The filled form (signed by Strandell-Laine) will be returned to you by email.

## Appendix H: Last clinical setting of students

<b>Appendix H: Respondents of the study (N=211)</b>					
<b>Current Health Sector</b>		<b>Gender</b>		<b>Academic Stream</b>	
Public Hospital n=209	Private Hospital n=2	Male n=52	Female n=159	General health stream n=145	Mental health stream n=66
<b>Last Clinical Setting</b>					
<b>Nature of ward</b>		<u>No. of respondents</u>			
		n	Percentage (%)		
Surgical Ward		59	27.96		
Medical Ward		51	24.17		
Orthopaedic Ward		3	1.42		
Oncology Ward		3	1.42		
Accident and Emergency Department		2	0.95		
General Acute Ward		14	6.64		
General Rehabilitation Ward		8	3.79		
Mental Acute Ward		23	10.9		
Mental Rehabilitation Ward		20	9.48		
Community Psychiatric Nursing		14	6.64		
Psychiatric Day Center		6	2.84		
Unknown		8	3.97		
Total		211	100%		

## Appendix I: Ward can be regarded as a good learning environment

Appendix I : Ward can be regarded as a good learning environment (n=211)			
	No. of respondent		
General health stream	145		
Mental health stream	66		
Total	211		
Distribution of rating “The ward can be regarded as a good learning environment” between streams			
	Frequency	Mental health stream	General health stream
Fully Disagree	12	4 (6.06%)	8 (5.52%)
Disagree to some extent	15	7 (10.61%)	8 (5.52%)
Neither agree nor disagree	79	32 (48.48%)	47 (32.4%)
Agree to some extent	98	21 (31.81%)	77 (53.1%)
Fully Agree	7	2 (3.03%)	5 (3.45%)
Total	211	66	145

## Appendix J: Supervisor assigned to student

<b>Appendix J Supervisor assigned to student</b>		
	No. of student	Percent (%)
Assigned	193	91.5
NO Assigned	18	8.5
Total	211	100.0
<b>Occurrence of Supervision</b>		
Statement	No. of student	Percent (%)
I did not have a supervisor at all	8	3.8
A personal supervisor was named, but the relationship with this person did not work during the placement	47	22.3
The named supervisor changed during the placement, even though no change had been planned	21	10.0
The supervisor varied according to shift or place of work	40	19.0
Same supervisor had several students and was a group supervisor rather than an individual supervisor	32	15.2
A personal supervisor was named and our relationship worked during this placement	63	29.9
Total	211	100.0
<b>How often did you have separate private unscheduled supervision with the supervisor (without nurse teacher)</b>		
Statement	No. of student	Percent (%)
Not at all	67	31.8
Once or twice during the course	59	28.0
Less than once a week	27	12.8
About once a week	28	13.3
More often	30	14.2
Total	211	100

## Appendix K: Content of supervisory relationship

Appendix K: Content of supervisory relationship						
Statement	Fully Disagree	Disagree to some extent	Neither agree nor disagree	Agree to some extent	Fully Agree	Percent
My supervisor showed a positive attitude towards supervision	6 (2.8%)	14 (6.6%)	81 (38.4%)	93 (44.1%)	17 (8.1%)	100
I felt I that received individual supervision	8 (3.8%)	35 (16.6%)	67 (31.8%)	83 (39.3%)	18 (8.5%)	100
I continuously received feedback from my supervisor	10 (4.7%)	30 (14.2%)	79 (37.4%)	73 (34.6%)	19 (9%)	100
Overall I am satisfied with the supervision I received	11 (5.2%)	21 (10%)	72 (34.1%)	88 (41.7%)	19 (9%)	100
The supervision was based on a relationship of equality and promoted my learning	8 (3.8%)	18 (8.5%)	79 (37.4%)	91 (43.1%)	15 (7.1%)	100
There was mutual interaction in the supervisory relationship	7 (3.3%)	30 (14.2%)	74 (35.1%)	81 (38.4%)	19 (9%)	100
Mutual respect and approval prevailed in the supervisory relationship	6 (2.8%)	20 (9.5%)	78 (37%)	85 (40.3%)	22 (10.4%)	100
The supervisory relationship was characterized by a sense of trust	9 (4.3%)	15 (7.1%)	83 (39.3%)	80 (37.9%)	24 (11.4%)	100

## Appendix L: Leadership style of ward manager

Appendix L: Leadership style of ward manager						
Statement	Fully Disagree	Disagree to some extent	Neither agree nor disagree	Agree to some extent	Fully Agree	Percent
The WM regarded the staff on her/his ward as a key resource	4 (1.9%)	13 (6.2%)	76 (36%)	96 (45.5%)	22 (10.4%)	100
The WM was a term member	10 (4.7%)	34 (16.1%)	69 (32.7%)	80 (37.9%)	18 (8.5%)	100
Feedback from the WM could easily be considered	9 (4.3%)	31 (14.7%)	94 (44.5%)	68 (32.2%)	9 (4.3%)	100
The effort of individual employees was appreciated	4 (1.9%)	17 (8.1%)	83 (39.3%)	95 (45%)	12 (5.7%)	100

## Appendix M: Pedagogical atmosphere

<b>Appendix M:</b>		<b>Pedagogical atmosphere</b>				
Statement	Fully Disagree	Disagree to some extent	Neither agree nor disagree	Agree to some extent	Fully Agree	Percent (%)
The staffs were easy to approach	6 (2.8%)	20 (9.5%)	72 (34.1%)	97 (46%)	16 (7.6%)	100
I felt comfortable going to the ward at the start of my shift	19 (9%)	33 (15.6%)	69 (32.7%)	80 (37.9%)	10 (4.7%)	100
During staff meeting (e.g. before shifts) I felt comfortable taking part in the discussion	16 (7.6%)	47 (22.3%)	96 (45.5%)	45 (21.3%)	7 (3.3%)	100
There was a positive atmosphere on the ward	11 (5.2%)	26 (12.3%)	81 (38.4%)	83 (39.3%)	10 (4.7%)	100
The staff were generally interested in student supervision	23 (10.9%)	40 (19%)	73 (34.6%)	70 (33.2%)	5 (2.4%)	100
The staff learned to know the student by their personal names	25 (11.8%)	35 (16.6%)	72 (34.1%)	68 (32.2%)	11 (5.2%)	100
There were sufficient meaningful learning situations on the ward	9 (4.3%)	21 (10%)	81 (38.4%)	90 (42.7%)	10 (4.7%)	100
The learning situations were multi-dimensional in terms of content	10 (4.7%)	20 (9.5%)	85 (40.3%)	87 (41.2%)	9 (4.3%)	100
The ward can be regarded as a good learning environment	12 (5.7%)	15 (7.1%)	79 (37.4%)	98 (46.4%)	7 (3.3%)	100

## Appendix N: Nurse Teacher

<b>Appendix N: Nurse teacher as enabling the integration of theory and practice</b>					
Statement	Fully Disagree	Disagree to some extent	Neither agree nor disagree	Agree to some extent	Fully Agree
In my opinion, the nurse teacher was capable to integrate theoretical knowledge and everyday practice of nursing	7 (3.3%)	11 (5.2%)	75 (35.5%)	102 (48.3%)	16 (7.6%)
The teacher was capable of operationalising the learning goals of this clinical placement	7 (3.3%)	15 (7.1%)	74 (35.1%)	102 (48.3%)	13 (6.2%)
The nurse teacher helped me to reduce the theory-practice gap	9 (4.3%)	18 (8.5%)	75 (35.5%)	96 (45.5%)	13 (6.2%)
<b>Cooperation between placement staff and nurse teacher</b>					
Statement	Fully Disagree	Disagree to some extent	Neither agree nor disagree	Agree to some extent	Fully Agree
The nurse teacher was like a member of the nursing team	13 (6.2%)	27 (12.8%)	83 (39.3%)	75 (35.5%)	13 (6.2%)
The nurse teacher was able to give his or her pedagogical expertise to the clinical team	11 (5.2%)	18 (8.5%)	93 (44.1%)	79 (37.4%)	10 (4.7%)
The nurse teacher and the clinical team worked together in supporting my learning	17 (8.1%)	13 (6.2%)	93 (44.1%)	79 (37.4%)	9 (4.3%)
<b>Relationship among student, mentor and nurse teacher</b>					
Statement	Fully Disagree	Disagree to some extent	Neither agree nor disagree	Agree to some extent	Fully Agree
The common meetings between	14 (6.6%)	18 (8.5%)	97 (46%)	77 (36.5%)	5 (2.4%)



myself, mentor and nurse teacher were comfortable experience					
In our common meetings I felt that we are colleagues	19 (9%)	33 (15.6%)	93 (44.1%)	57 (27%)	9 (4.3%)
Focus on the meetings was in my learning needs	12 (5.7%)	20 (9.5%)	92 (43.6%)	79 (37.4%)	8 (3.8%)

## Appendix O: Nursing care in the ward

Appendix O		Nursing care in the ward				
Statement	Fully Disagree	Disagree to some extent	Neither agree nor disagree	Agree to some extent	Fully Agree	Percent
The ward nursing philosophy was clearly defined	5 (2.4%)	27 (12.8%)	89 (42.2%)	86 (40.8%)	4 (1.9%)	100
Patients received individual nursing care	3 (1.4%)	23 (10.9%)	74 (35.1%)	98 (46.4%)	13 (6.2%)	100
There were no problems in the information flow related to patients' care	3 (1.4%)	17 (8.1%)	98 (46.4%)	90 (42.7%)	3 (1.4%)	100
Documentation of nursing (e.g. nursing plans, daily recording of nursing procedures etc.) was clear	2 (0.9%)	11 (5.2%)	80 (37.9%)	106 (50.2%)	12 (5.7%)	100

## Appendix P: Clinical Facilitating/Supervision Model

Model	Components of model	Wu-Zee University (Institution P)
Preceptor	1:1 model that a registered nurse is assigned to a student	<ul style="list-style-type: none"> <li>- 1:1 Clinical supervisor assigned from ward, mentoring skill trained provided from hospital. They are commonly APN, senior RN.</li> <li>- First time and later clinical training of the mental health students and second time clinical training of the general health students</li> </ul>
Facilitation/Supervision	A registered nurse is assigned to students in 1:6 or 1:8 model, facilitator can be either employed from hospitals or educational institutions.	<ul style="list-style-type: none"> <li>- 1:8 Academic mentor assigned to first clinical training in general health students.</li> <li>- Academic mentor is staff of Wu-Zee University only</li> </ul>
Facilitation/Preceptor	is combination of preceptor and facilitation/supervision model, in which, a student is assigned to a registered nurse for precepting while a facilitator model supervise group of students such as 1:8.	<ul style="list-style-type: none"> <li>- 1:1 Nurse from hospital</li> <li>- 1:8 Academic mentor from university</li> <li>- Concurrently used in the Wu-Zee University</li> </ul>
Dedicated education unit  (1:1 and 1:6 both assess students) Whittle et al. 2008	A combined model of the preceptor and facilitator model; One more role is nurse educator who is a person communicating with both hospitals and universities.	<p>Preceptor 1:1 and facilitator 1:6</p> <ul style="list-style-type: none"> <li>- Both can assess each student</li> <li>- Resource person (no assessment)</li> <li>- Course Coordinator of clinical training arrangement is available</li> </ul>
Mentor	A model that is similar to the preceptor model but is less commonly used in undergraduate clinical education as the clinical supervision is more often than not, indirect. The mentor model involves a long-term relationship between the student and the registered nurse.	<p>1:1 longer relationship</p> <ul style="list-style-type: none"> <li>- Even though there is a Cohost master role in the Wu-Zee University. This role helps students to go through five years nursing program and solve students' problem on education. It does not focus on clinical training.</li> </ul>

(Sources: Franklin, 2013; Mckellar & Graham, 2018; Whittle et al. 2008)