2018

Evaluation of an E-learning training package by nurses for various designations for developing clinical skills and knowledge.

Nitasha A. Narayan
The University of Notre Dame Australia

Evaluation of an E-learning Training Package by Nurses of Various Designations for Developing Clinical Skills and Knowledge

Nitasha Aarni Narayan

This thesis is a partial requirement for the degree of Master of Nursing by research at the University of Notre Dame Australia, Fremantle Campus

2018

Contents

List of Appendices

List of Tables

List of Figures

List of Abbreviations

ACN	Australian College of Nursing
ACSQHC	Australian Commission on Safety and Quality in Health Care
AHPRA	Australian Health Practitioner Regulation Agency
AIHW	Australian Institute of Health and Welfare
ANF	Australian Nursing Federation
ANMF	Australian Nursing and Midwifery Federation
CPD	Continuing Professional Development
EN	Enrolled Nurse
HREC	Human Research Ethics Committee
ICN	International Council of Nurses
IQR	Interquartile Range
LMS	Learning Management System
NMBA	Nursing and Midwifery Board of Australia
NSQHS	National Safety and Quality Health Service
NUM	Nurse Unit Manager
PMS	Performance Management System
RN	Registered Nurse
SDN	Staff Development Nurse
UNDA	University of Notre Dame Australia
WHO	World Health Organization
ZPD	Zone of Proximal Development

List of Definitions

Assistant in nursing: A person who assists registered nurses by providing delegated aspects of nursing care within the limits specified by their education, training and experience, and in accordance with legislation. Assistants in nursing are accountable to registered nurses for all delegated activities (ANMF, 2015).

Australian Nursing and Midwifery Federation: The largest union in Australia, with over 268,000 members. The Australian Nursing and Midwifery Federation is operated by nurses and midwives to advance the industrial, political and professional status of its members (ANMF, 2014).

Australian Institute of Health and Welfare: A statutory authority established in 1987 by the *Australian Institute of Health Act 1987* to report to the nation on the state of its health. In 1992, the role and functions of the then Australian Institute of Health were expanded to include welfare-related information and statistics, thereby changing the institute to the Australian Institute of Health and Welfare. The Act is now titled the *Australian Institute of Health and Welfare Act 1987* (AIHW, 2017).

Enrolled nurse: A person with appropriate educational preparation and compliance with practice, who has acquired the requisite qualification to be an enrolled nurse with the Nursing and Midwifery Board of Australia. An enrolled nurse provides nursing care, working under the direction and supervision of the registered nurse (ANMF, 2016).

Nursing and Midwifery Board of Australia: A regulating board for Australia's nurses and midwives. The functions of the Nursing and Midwifery Board of Australia include:

- registering nursing and midwifery practitioners and students
- developing standards, codes and guidelines for the nursing and midwifery profession
- handling notifications, complaints, investigations and disciplinary hearings
- assessing overseas-trained practitioners who wish to practise in Australia

- approving accreditation standards and accredited courses of study (NMBA, 2015).

Nurse unit manager: Manages the human resources, business and clinical activities of the health unit or hospital (ANF, 2009).

Registered nurse: A person who has successfully completed the prescribed education program accredited by the Australian Nursing and Midwifery Accreditation Council, and acquired the requisite qualification to be a registered nurse with the Nursing and Midwifery Board of Australia (ANMF, 2016).

Staff development nurse: A registered nurse who is responsible for formulating educational tools that promote the appropriate training, education and professional development of new nurses and established nursing staff (All Nurses, 2014).

Abstract

An essential component of nurses delivering good healthcare is continuous education. However, nurses' participation in continuing education can be hampered by lack of time, limited access to educational resources and cost concerns. Globally, electronic learning has emerged in the last decade as a flexible mechanism to provide education for nurses.

The purpose of this research is to evaluate an e-learning training package used by nurses of various designations for developing clinical skills and knowledge at a private hospital in Perth, Western Australia ('The Hospital'). This study employs descriptive correlational design—a non-experimental quantitative approach. Data were collected via a survey method.

The findings from this study provide deeper insight into e-learning as a method of knowledge and skill enhancement for nurses. Recommendations are offered that may help strengthen the opportunities for effective e-learning for nurses, which could ultimately influence quality care and patient outcomes.

Declaration by Author

This thesis is composed of my own work and contains no material that has been accepted for the award of any other degree or diploma in any university or other institution.

To the best of the candidate's knowledge, the thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

Signed

Nitasha Aarni Narayan

June 2018

Acknowledgements

I am grateful for the support I have received for this study. My sincere gratitude to the following:

- Associate Professor Karen Clark-Burg, my principal supervisor, for your patience, guidance and care. You have a special way with people. Thank you for the continued encouragement and for keeping me focused on the end result.
- Associate Professor Frank Bate, my co-supervisor, for your tireless support, understanding and knowledge. Thank you for always making the time to help me and being a great supervisor. My journey was made easier with your knowledge and expertise.
- The nurses who participated in this research, for giving their time and willingness to provide their point of view in the matter of this study.
- Elite Editing, who edited this thesis and editorial intervention was restricted to Standards D and E of the Australian Standards for Editing Practice.
- My Mum and Dad, who are always there for me. Thank you for your continuous and unparalleled love, help and support. Both of you have guided me and believed in me. I am forever indebted to you both for giving me the opportunities and experiences that have made me who I am. This journey would not have been possible without your time and support. I dedicate this milestone to you both.
- My siblings, Neil and Niven, for your moral and emotional support. Thank you for being there for me.
- My husband, Manmit, who stands by my side. Thank you for your patience, continuous support and understanding. At times, I thought that it was not possible to continue, and you helped me keep things in perspective. I greatly value your contribution and deeply appreciate your belief in me.
- Finally, last but by no means least, my beautiful daughter, Zara—without you, the world would simply have no meaning. You are my inspiration.

Chapter 1: Introduction

1.1 Background

The health workforce in Australia is large and diverse, consisting of 15 types of health practitioners regulated by the Australian Health Practitioner Regulation Agency (AHPRA), as well as unregulated health practitioners. Health practitioners comprise workers who diagnose and treat physical and mental illnesses and conditions, or who recommend, administer, dispense and develop medications and treatment to promote or restore good health (Australian Institute of Health and Welfare, 2016). Nationally, nurses form the largest component of the healthcare workforce, providing healthcare to people across their lifespan (Australian Nursing Federation, 2012). Between July and September 2017, there were 672,978 people registered as health practitioners in Australia, over half of whom were practising as nurses (389,028) (NMBA, 2017).

As the largest health profession in Australia, nurses have a significant role in healthcare. Nursing practice encompasses the autonomous and collaborative care of individuals of all ages, families, groups and communities; individuals who are both sick and well; and individuals in all settings. Nursing includes the promotion of health; prevention of illness; and care of ill, disabled and dying people. Key nursing roles also include advocacy, promotion of a safe environment, research, participation in shaping health policy, in-patient and health systems management, and education (ICN, 2018).

Education helps nurses maintain, improve and broaden their professional knowledge, expertise and competence to meet their obligations to provide ethical, effective, safe and competent practice (NMBA, 2016a). An essential component of nurses delivering and maintaining good healthcare is education in the area of clinical skills and knowledge (Childs, Blenkinsopp, Hall, & Walton, 2005). Clinical skills, as they relate to nurses, are defined as all aspects of the competencies necessary for skill assessment by RNs (Tollefson, 2012). This includes clinical psychomotor skills, specialised knowledge, cognitive skills, technical skills and interpersonal skills for the overall process of patient care. Clinical knowledge is the theory behind the practice of clinical skills (Michels, Dason, & Block, 2012).

The Australian Commission on Safety and Quality in Health Care (ACSQHC) identifies education as one of the pivotal tools to protect the public from harm and improve the quality of health service provision. The ACSQHC in collaboration with the Australian Government, the states and territories, the private sector, clinical experts, patients and carers developed the eight National Safety and Quality Health Service (NSQHS) Standards, encompassing high-prevalence adverse events, healthcare-associated infections, medication safety, comprehensive care, clinical communication, the prevention and management of pressure injuries, the prevention of falls, and responding to clinical deterioration.

One of these standards involves clinical governance. There are four criteria to achieve clinical governance, one of which is clinical performance and effectiveness—that is, ensuring that the workforce has the right qualifications, skills and supervision to provide safe, high-quality healthcare to patients. NSQHS 1.20 outlines that this criterion is achieved by ensuring that the health service organisation uses its training systems to assess the competency and training needs of its workforce, implement mandatory training programs, provide access to training and monitor participation in training by the workforce (ACSQHC, 2017). NSQHS 1.22 outlines that performance management is achieved by the health service organisation having valid and reliable performance review processes that require members of the workforce to regularly participate in a review of their performance, identify needs for training and development in safety and quality, and incorporate information on training requirements in the organisation's training system (ACSQHC, 2017).

The need for ongoing education is critical as it has a significant impact on positive outcomes such as increased patient satisfaction, reduced length of stay, and reduced incidence of complications (Levett-Jones, 2005). However, nurses' efforts to engage in their professional development can be hampered by lack of time, limited access to educational resources and cost concerns (Bindon, 2017). Shahhosseini and Hamzehgardeshi (2014) identified time constraint, lack of coworker support and work commitments as the most important barriers to nurses' participation in continuing education. A study on continuing professional development (CPD) in nursing in Australia by Katsikitis et al. (2013) reported that the majority of nurses and midwives were completing sufficient annual hours of CPD; however, attendance of study leave

during work time was often conditional on staffing levels and workloads. In particular, lack of backfill of staff and concerns that CPD would interfere with time outside work were the main barriers to CPD engagement.

Globally, electronic learning (e-learning) has emerged in the last decade as a flexible mechanism to provide education for nurses in the knowledge, skill and attitudinal domains (D'Souza, Karkada, & Castro, 2014). E-learning is the delivery of training by using the internet or a company's intranet (Piskurich, 2015). Learning programs are delivered through a network to the learner's computer, either ahead of the physical learning experience or just as the learner is engaging in the learning. Nurses work different shifts; thus, scheduling three or four hours for class at the same time every week may be impossible (Frith & Clark, 2012). As such, the ability to access learning materials electronically at nurses' own convenience is extremely attractive (Frith & Clark, 2012). Awareness of the flexible benefits of e-learning has resulted in many health service organisations implementing e-learning.

The World Health Organization (WHO) acknowledges e-learning as a useful training package in facilitating the training of the healthcare workforce and enabling education to be more widely accessible for people who are isolated (WHO, 2015). The WHO (2016) is working towards universal health coverage to achieve better health and wellbeing and promote human development. The third global survey by the WHO on electronic-health (e-health) indicated that universal health coverage cannot be achieved without the support of e-health (WHO, 2015). E-health enhances patient diagnosis and treatment by providing accurate and timely patient information through electronic health records, and improves the operations and financial efficiency of healthcare systems (WHO, 2016). Governments, international organisations and non-government organisations have increasingly adopted e-learning to raise public awareness on health issues, and e-learning has been an important pillar in global e-health initiatives (Andriotis, 2014). For example, the United States Government is operating the 'Healthy People' e-learning website—an online educational resource designed to help students and health professionals meet the country's health goals—while the European Union has several e-health programs (Andriotis, 2014). The Australian Government has also developed e-learning programs to provide education services that are relevant to health professionals (Australian Government Department

of Human Services, 2018). For instance, the Australian Government Department of Health (2012) website provides e-health information for health professionals on how to educate patients about healthy living and disease prevention. The Department of Health also provides electronic menu links for consumers on health promotion and disease prevention activities. In addition, an e-health record is available from the Department of Health. (Australian Government Department of Health, 2013). This record is an electronic summary of a person's key health information, events and activities, including medical history, allergies and medications.

Continuing education in a clinical environment is challenging for all healthcare organisations. Thus, e-learning has emerged as a practical solution for learning and education in the hospital setting (Dalhem & Saleh, 2014). In hospitals, the process of e-learning implementation should be well prepared and properly managed by the nurse unit manager (NUM) (Korhonen & Lammintakanen, 2005). The NUM position combines leadership, management, clinical and teaching roles (ANMF, 2013). Korhonen and Lammintakanen (2005) reported that the NUM acts as a model of professional development for their staff, with their attitude and experiences affecting the use of e-learning. NUMs' positive experiences would likely encourage wider implementation of e-learning in the unit. Likewise, Katsikitis et al. (2013) stated that management support positively influences nurses' and midwives' attitudes towards CPD. Complementary to the NUM, the staff development nurse (SDN) is also pivotal in supporting nurses to integrate their learning and clinical practice (Conway & Elwin, 2007). The SDN is defined as a registered nurse who provides education to undergraduate and postgraduate students and staff in a hospital setting (Sayers & DiGiacomo, 2010). The role of the SDN in hospitals is varied and complex—some have the primary responsibility for organisation-wide programs, such as preceptor training, while others work within a specialty to provide specialty education (Conway & Elwin, 2007).

Despite the widespread use of e-learning in health service organisations, there is a lack of research of e-learning in healthcare. Thus, it is important and relevant to healthcare to study nurses' evaluation of an e-learning training package for developing their clinical skills and knowledge. As described above, SDNs and NUMs play a significant role in education for nurses therefore the current study explored registered nurses

(RNs), enrolled nurses (ENs), SDNs and NUMs responses to an e-learning training package which developed clinical skills and knowledge at a private hospital in Perth, Western Australia ('The Hospital').

1.2 The Nursing and Midwifery Board of Australia

In Australia, the nursing workforce has two groups of regulated nurses—RNs and ENs (Australia's Future Health Workforce, 2014). Of the 389,028 nurses registered in Australia, the majority are registered as RNs. As health professionals, all nurses and midwives are accountable to the Nursing and Midwifery Board of Australia (NMBA). The NMBA (2016a) regulates the practice of nursing and midwifery in Australia, and one of its key roles is to protect the public. The NMBA fulfils this role by developing registration standards, professional codes, guidelines and standards of practice.

The NMBA is supported by the AHPRA. The AHPRA's operations are governed by the Health Practitioner Regulation National Law, as in force in each state and territory (the National Law), which came into effect on 1 July 2010 (or 18 October 2010 for Western Australia). This law meant that, for the first time in Australia, 15 types of health practitioners—one of which was nurses and midwives—became regulated by nationally consistent legislation under the National Registration and Accreditation Scheme. This scheme has six key objectives, one of which is to facilitate high-quality education and training of health practitioners. Under the National Law, all registered health practitioners must undertake CPD (AHPRA, 2014) as one of the professional requirements to maintain registration for nurses in Australia (NMBA, 2017).

The formal requirement to demonstrate at least 20 hours of CPD yearly became part of the national system of registration for RNs and midwives from 2010 (NMBA, 2016b). Nurses are required to complete CPD hours of learning to maintain, improve and develop competent clinical skills and knowledge (NMBA, 2016b). Interestingly, e-learning is a growing trend in offering CPD for nurses (Ross, Barr, & Stevens, 2013). In 2008, the Australian Nursing and Midwifery Federation (ANMF) launched a CPD website, known as iFolio, with self-directed e-learning tutorials and online assessments. iFolio was specifically designed to provide free CPD for all members and to assist nurses and midwives to maintain a professional portfolio in order to retain their registration (ANMF, 2018). E-learning tutorials and online assessments continue

to be available by the ANMF for nurses to continue their professional education in order to develop clinical skills and knowledge (ANMF, 2014). Similar professional organisations offer similar services to their members, such as the Australian College of Nursing (ACN).

1.3 E-learning in Nursing

Both internationally and in Australia, nursing federations facilitate e-learning for the nursing workforce. The International Council of Nurses (ICN) (2015) represents nursing worldwide, advancing the profession and influencing health policy. The ICN has entered into a partnership agreement with the World Continuing Education Alliance to create a global electronic network of continuing nursing education courses. The online network of courses is accessed by organisations around the world, who can select the courses they would like for their nursing team. The aim of this initiative is to distribute education worldwide to the nursing workforce, including nurses in underdeveloped countries.

1.4 Categories of E-learning

Given the growing importance of e-learning and its use in healthcare, it is important to understand the categories of e-learning, benefits and drawbacks of e-learning, and factors that affect e-learning. There are two categories of e-learning: synchronous and asynchronous (Frith & Clark, 2012). In synchronous e-learning, all learners are online at the same time, and a facilitator is present via computer to lead the learning (Piskurich, 2015). Learning resources are delivered and received via mobile telephone, video conference, the internet or chats. This enables learners to avoid feeling isolated because they are in communication with others throughout the learning process. However, synchronous learning is not as flexible from a temporal perspective because learners have to designate specific timeslots to attend the online course in real time.

In contrast, asynchronous e-learning is largely undertaken in a self-instructional mode. There is no instructor available to answer learner questions or clarify issues in real time. However, learners can avail themselves of the learning at any time that best suits their needs (Piskurich, 2015). Self-paced online courses, discussion forums, groups and message boards are examples of asynchronous e-learning. In asynchronous e-

learning, learners are able to attend an online course at their own pace, without having to worry about scheduling conflicts. However, this learning can lead to feelings of isolation, as there can be deficits in student–student and student–facilitator interaction. These student–student and student–facilitator interactions can be replaced by e-learning training packages that offer videos, audio, text, worksheets and discussion boards for users to come together and discuss ideas concerning the topics (Erin, 2015). Another way to facilitate student–student and student–facilitator interaction is blended learning that combines e-learning and face-to-face methods. In healthcare, e-learning and blended learning approaches have been found to enhance knowledge, skills and learner satisfaction (Back et al., 2014; Barnard-Ashton et al., 2014; Lotrecchiano et al., 2013; Smyth et al., 2012; Ward et al., 2009).

1.5 Benefits of E-learning

One of the key benefits of e-learning is flexibility and convenience. E-learning places learners at the centre of the learning process. Learners choose the content, learning sequence and pace of learning based on their experience and personal learning objectives (Maxwell & Mucklow, 2012). This flexibility provides learners with a sense of autonomy and control. Other benefits of e-learning include flexibility of time management (McVeigh, 2009), cost reduction (Alavi & Gallupe, 2003; Sawchuk, 2013), the ability to network with colleagues in speciality areas without geographic limitations (Frith & Clark, 2012), consistency in the delivery of training and education (Sawchuk, 2013) and opportunities for learners to form critical thinking skills and take initiative and responsibility for their work (Kuimoval, Kiyanitsyna, & Truntyagin, 2016).

In healthcare, e-learning offers a beneficial way for healthcare professionals to stay abreast of the latest developments in diagnoses and treatments. An article by Erin (2015) described the benefits of e-learning in the healthcare industry. The healthcare industry focus is preventing and helping patients recover from illnesses and diseases. The best way to help patients is by learning as much as possible about the causes, symptoms and prognoses of these illnesses and diseases. After working all day and sometimes all night, it can be impossible to attend classes. With e-learning, healthcare professionals can study in the office, at home or even when commuting. E-learning is mobile, which means it can be accessed with a laptop, tablet or smartphone, as long as

the user has an internet connection. Health professionals can review the course materials anytime, can even print the materials out, and can progress through the course wherever and whenever. A report commissioned by the WHO found that e-learning for healthcare professionals is equally or more effective than traditional learning environments. This is most likely because of the abundance of features offered by e-learning packages, including videos, audio, text, worksheets and even discussion boards for users to come together and discuss ideas concerning the topics. This can replace the benefits gained from student interactions in a classroom setting (Erin, 2015).

E-learning is less expensive than traditional training methods. The costs for traditional training methods are incredibly expensive. The trainer must be paid, while the learning materials and location in which the training occurs can ultimately cost healthcare facilities thousands of dollars. E-learning is much less expensive because there is no need to pay a trainer (Erin, 2015), while the learning materials are already possessed by users with a desktop, laptop, tablet or smartphone. There is no need to reserve a training centre, and professionals can complete their learning whenever they are not caring for patients. This means that they ultimately obtain the important education they need to provide quality care to their patients.

E-learning provides a database for healthcare professionals to turn to when they have questions. Health professionals may remember that they read some information about a topic in one of the modules, yet not remember the details of this information. Within minutes, they can log into the system, go to the module and find the answers they need. E-learning is also conducive to all types of learners. Some people are visual learners, while others learn best by reading or listening. E-learning systems include videos, images, audio files and text to present information. This can be a great help to users who do not learn well in classrooms because of the limiting nature of lectures with few images and videos. In addition, some learners need to take breaks often to absorb information, or need to learn at a slower pace than others. With e-learning, users can take their time learning the information. They do not have to feel rushed and do not have to wait for others when they are ready to move on to the next module. This can be a great help to the healthcare industry because learners need to be certain they are

absorbing the information provided in training. If not, they increase the risk of not properly caring for patients because of their lack of accurate information (Erin, 2015).

1.6 Drawbacks of E-learning

As with any technology, there are some drawbacks to e-learning. Kuimoval et al. (2016) listed e-learning's drawbacks as lack of full-time direct communication between students and teachers, difficulty in motivating students, computer anxiety, and the time involved learning and mastering the technical aspects of completing an online course. Another drawback of e-learning derives from self-discipline. While being able to work at one's own pace can be an advantage, it can also be a disadvantage, especially for learners who have difficulty with time management and who are prone to procrastination. These learners tend to be more successful with the structure of traditional learning (Hinkle, 2017).

Specifically in healthcare, the drawback of e-learning is that there are some topics that healthcare professionals can only superficially address through e-learning because they are unable to discuss the issues with individuals to truly grasp the subject matter. E-learning is not suitable for topics that require a more sensitive, personalised approach (Erin, 2015).

1.7 Factors that Affect E-learning

The effectiveness and efficiency of e-learning systems depends on learners' acceptance of e-learning. Learners' acceptance is influenced by diverse factors, such as attitude, demographics, organisational influence, social influence and the perceived usefulness and ease of use of e-learning systems (Kanwal & Rehman, 2017). A study by Williamson and Janelle (2018) on students perception of technology use in nursing education highlighted that attitude about the use of technology can directly affect the intention to use technology. The study showed that participants had a positive attitude toward use of technology in nursing school because they perceive technology as useful and easy to use. Karaman (2011) highlighted that a positive attitude positively influences learning efficacy, motivation, knowledge application and learning outcomes. A study by Topkaya and Kaya (2014) on nurses' computer literacy and

attitudes towards using computers in healthcare reported a positive correlation between these two factors.

Demographic factors, such as age, influence the use of e-learning (Cooper, 2006). Meyer (2011) found that firms with an older workforce are less likely to adopt new technologies than are firms with a younger workforce. However, there still remain questions regarding whether age does present a challenge to the effective use of e-learning in the workplace (Fleming, Becker, & Newton, 2017).

Singh and Hardaker (2013) identified management support and commitment as an important factor that can influence the adoption of e-learning. Management teams who act as role models to use e-learning and exhibit willingness to continuously learn and search for new knowledge and ideas, so that employees imitate them, are usually more effective in implementing e-learning. Supportive information technology infrastructure to address staff issues with software and hardware may also improve staff adoption of e-learning. Further, Singh and Hardaker (2013) identified that social networks and interpersonal communication among staff enable sharing of experiences, values and norms, which may result in staff becoming familiar with e-learning outcomes and can help in e-learning adoption.

Another factor hindering the adoption of e-learning is the perceived time required to develop) and deliver e-learning courses (Callinan, 2014). Callinan (2014) also highlighted time constraints during already busy working schedule as a big inhibitor of using e-learning. A study by Williamson, Almaskari, Lester and Maguire, (2015) explored nurses knowledge, attitudes, and skills related to the evidence-based practice process. The findings of the study highlighted having the required resources can facilitate the process of evidence-based practice. Resources can be in the form of having more computers, more access to the Internet and databases, more time and staffing. In addition, providing resources and time for nurses to search for evidence and be involved in the process would have a positive impact on evidence- based practice process. The next section will focus on the background of the study Hospital.

1.8 Background of the Study Hospital

The Hospital at which this study was conducted has been providing high-quality healthcare to residents for over 30 years. With 224 patient-beds, it is one of the largest

private hospitals in Western Australia, and provides overnight, multi-day and same-day procedures and a comprehensive range of services across most adult specialties. The Hospital is a leading private provider of cardiac services in Western Australia, offering a 24-hour priority admission service for patients experiencing acute cardiac or respiratory problems. Patients are seen by onsite medical officers and on-call cardiologists. The Hospital has 24-hour emergency access to cardiac catheter laboratories, and the largest private critical care unit in Western Australia. A large number of medical specialists are located onsite, along with diagnostic services, including radiology, pathology, magnetic resonance imaging (MRI) and nuclear medicine. There are 340 RNs, 20 ENs, nine SDNs and nine NUMs employed at The Hospital.

1.9 E-learning Training Package Used at The Hospital

The e-learning training package used at the study hospital is called ELMO Talent Management Software. ELMO is Australia's and New Zealand's leading cloud-based talent management solutions provider. ELMO works with more than 500 organisations to hire, onboard, develop, engage and inspire their people. For more than 14 years, ELMO has partnered with the Australian Human Resource Institute, Human Resource Institute of New Zealand and wider human resources community to deliver innovative and best-practice software solutions. ELMO comprises two subsystems—the learning management system (LMS) and performance management system (PMS). The LMS is a cloud-based application for the administration, documentation, tracking, reporting and delivery of e-learning education courses or training programs across the organisation. The PMS provides instant access to all the data across the performance management process. This enables alignment of individual goals with strategic organisational objectives. The ELMO platform can address a single requirement or provide an integrated solution for the complete human resource lifecycle. ELMO solutions are flexible and scalable to suit organisations of all sizes. All solutions are developed, hosted, and supported within Australia and New Zealand (http://www.elmotalent.com.au).

ELMO was introduced to The Hospital in November 2015. ELMO was commissioned by the corporate organisation that owns this private hospital in Western Australia. ELMO covers all annual mandatory training in this hospital. Mandatory training—

such as manual handling and cardiopulmonary resuscitation—also has a practical component. Staff at this private hospital in Western Australia are expected to maintain 100% of all their mandatory training from ELMO to meet national competency standards and fulfil hospital accreditation requirements. The Department of Health requires mandatory training to be maintained at 92% or above in this private hospital to fulfil hospital accreditation requirements. Although staff have maintained 100% annual mandatory training from ELMO to meet national competency standards and fulfil the Department of Health requirements at this hospital, the extent to which ELMO has been effective in developing clinical skills and knowledge at the workplace remains unclear.

Prior to introducing ELMO, learning in The Hospital was undertaken by face-to-face approaches, followed by hands-on approaches. A shift from face-to-face and hands-on learning to e-learning raised concerns among nurses about the effectiveness of ELMO for developing clinical skills and knowledge. This concern gave the impetus for this research.

1.10 Implementation of ELMO at The Hospital

ELMO was implemented at The Hospital in November 2015. Prior to implementation of ELMO, the administrator of the ELMO centre trained the clinical development coordinator, deputy general manager and available SDNs in the use of ELMO. The clinical development coordinator and deputy general manager of The Hospital were the administrators of ELMO at The Hospital. A site administrator guide was provided to The Hospital administrators. The information in this document aimed to introduce ELMO and provide company administrators with a quick reference guide to administer the LMS. SDNs and NUMs were trained in the use of ELMO by the site administrators, with the intent that they would assist staff with ELMO access and training. SDNs were primarily involved with this process because of their role in education.

To introduce ELMO to nurses, a flyer was placed on the wall in each ward. SDNs on each ward provided available nurses with a brief overview of ELMO. This introduction typically included information on login details, basic navigation principles and The Hospital requirements in terms of the assessment components. To ensure that all nurses

were aware of the e-learning process, an ELMO e-learning user guide for The Hospital was made available in each ward. This user guide provided basic information on how to start using ELMO. Nurses were advised that they could access ELMO from work or home. The user guide provided information on how to log into ELMO. Logon details were kept simple and consistent for all staff. The username was the staff employee number, while the password was the same for everyone. This document also provided information such as how to change a password, how to find and start a learning component, how to search for specific learning, how to view a record of all completed learning and how to print certificates.

1.11 Purpose and Significance of the Study

This study aimed to explore RNs', ENs', SDNs' and NUMs' evaluation of an e-learning training package for developing clinical skills and knowledge at a private hospital in Perth, Western Australia ('The Hospital'). E-learning is becoming increasingly popular for the nursing workforce as it is a flexible method for nurses learning (Cheng, 2013); thus, it is beneficial to consider RNs', ENs', SDNs' and NUMs' responses to the e-learning training package.

This study adopted a quantitative approach that involved developing a survey instrument. RNs, ENs, SDNs and NUMs were invited to participate in this study by uploading a participant information sheet on The Hospital's e-learning website. Data collection was achieved through a questionnaire that was designed by the researcher. The survey questionnaire was also uploaded on The Hospital's e-learning website. Participation was voluntary.

The results generated from this research will help gauge how nurses at various designations evaluate an e-learning training package for developing clinical skills and knowledge. This information is significant because nurses require education to maintain, improve and broaden their professional knowledge, expertise and competence to meet their obligations to provide ethical, effective, safe and competent practice. Insight will be gained about the benefits, drawbacks and factors that affect e-learning. This insight should help healthcare organisations enhance learner engagement with e-learning and facilitate ongoing professional development, with the aim of improving patient care.

1.12 Research Questions

The following research questions guided the data collection for the quantitative evaluation study:

1. How did nurses at various designations evaluate an e-learning training package for developing clinical skills and knowledge?
2. What are the barriers to e-learning for nurses at various designations?
3. To what extent do the findings of this study have implications for the future delivery of training and education for nurses?

1.13 Thesis Outline

This thesis is presented in six chapters. Chapter 1 has introduced the nursing workforce in Australia; e-learning in nursing; the different categories of e-learning; the benefits and drawbacks of e-learning; and the factors that affect e-learning. Chapter 2 presents the literature review and a discussion of e-learning in nursing for developing clinical skills and knowledge. Chapter 3 outlines the methodology of the study, including how participants were recruited and how the data were collected, analysed and used in the study. Chapter 4 presents the findings of the study. Chapter 5 presents the discussion and interpretation of the findings. Finally, Chapter 6 presents the conclusions and recommendations for further practice.

Chapter 2: Literature Review

2.1 Chapter Overview

E-learning is a rapidly growing form of education and a new way of delivering education in general (Commission of the European Communities, 2000, 2001, 2003; Digital Agenda Assembly, 2011). This growth is also occurring in nursing, where e-learning affects almost every aspect of contemporary nursing practice (Bristol & Zerwekh, 2011). Having said this, e-learning is still in its infancy for developing clinical nursing skills and knowledge (Blackman, Mannix, & Sinclair, 2014). A number of studies have been conducted on e-learning for nursing students, yet not enough is known about how nurses view e-learning as continuing education, and whether the skills and knowledge gained are transferable to daily practice (Lahti, Kontio, Pitkänen, & Välimäkia, 2014).

For this reason, this literature review presents an overview of e-learning and its underpinnings. It explores learning theories and the design of e-learning. Moreover, it examines scholarly articles from the last five years regarding the effectiveness of e-learning training packages for developing clinical skills and knowledge among nurses, and identifies gaps in the literature. This study aims to address these gaps by exploring RNs, ENs, SDNs and NUMs responses to an e-learning training package which developed clinical skills and knowledge at a private hospital in Western Australia.

2.2 History of E-learning

The first distance education course was provided by Isaac Pitman in the 1840s, who taught his pupils shorthand via correspondence. Pitman was sent completed assignments by mail and would then send his students more work to be finished using the same system (Epignosis LCC, 2014). In 1924, the first testing machine was invented by Sidney Pressey, who designed a small apparatus that gave test scores and programmed learning (Holmes & Gardner, 2006). These behaviourist foundations were taken up by Burrhus Frederic Skinner, a Harvard psychologist, who, in 1958, built a teaching machine from which immediate feedback was given to students who undertook a clear and concise programmed instruction in relation to the learning objective (Holmes & Gardner, 2006). However, it was not until 1960 that the first

computer-based training program was designed for students, known as PLATO (Programmed Logic for Automated Teaching Operations). This program was originally designed for students attending the University of Illinois, but was ultimately used in schools throughout the area (Epignosis LCC, 2014). Following this, in the 1970s, the Palo Alto Research Center designed a portable, rugged computer with high-resolution graphics, known as Alan Kay's Dynabook. These early developments led to Macintosh and the graphical user interfaces used in various devices today (Holmes & Gardner, 2006).

Although developments in educational software were important, the trajectory of e-learning was given a massive boost with the emergence of the internet in the 1990s. The interconnectivity supplied by the internet and the vast resources made available through the World Wide Web are the primary underpinnings of e-learning today (Holmes & Gardner, 2006). By the early 1990s, several schools had been established that delivered courses online only, thereby maximising the internet's possibility to deliver education to people who were previously unable to attend a college because of geographical or time constraints. In the 2000s, businesses began using e-learning to train their employees. New and experienced workers had the opportunity to improve their industry knowledge base and expand their skillsets. At home, individuals were granted access to programs that offered them the ability to earn online degrees and enrich their lives through expanded knowledge (Epignosis LCC, 2014).

2.2.1 Effectiveness of E-learning for Developing Nurses' Clinical Skills and Knowledge

Lahti, Hätönen, and Välimäk (2012) conducted a systematic review of electronic databases—including MEDLINE (1948 to 2010), CINAHL (1981 to 2010), PsycINFO (1967 to 2010) and ERIC (1966 to 2010)—to investigate the influence of e-learning on the knowledge, skills and satisfaction of nurses and nursing students, compared with traditional education methods. Eleven studies were included in the review, and the results indicated that e-learning was not a superior learning method to traditional learning methods. No statistical differences were found between learning outcomes in regard to knowledge levels and improving learners' skills. Nurses' satisfaction levels were not possible to assess because of missing statistical information in these studies. E-learning methods were still fairly new at the time these 11 studies were undertaken;

thus, the e-learning interventions may not have adequately responded to the participants' needs and experiences in clinical practice.

Blackman et al. (2014) conducted a quantitative descriptive survey that aimed to identify and measure the strength of factors that would influence RNs' beliefs about their learning of buttonhole cannulation using e-learning. A convenience sample of Australian and New Zealand RNs was derived from 10 haemodialysis units. Two hundred and thirteen participants commenced the program, while 101 completed the program. Data were collected using a 26-item, four-point Likert-style survey tool that had a list of statements related to knowledge and skills in the area of buttonhole cannulation. Data were analysed using partial least squares path analysis. The participants in this study stated that the quality of instruction—such as clear aims and objectives, relevant and well-constructed content, and the ability to complete work in a flexible manner—contributed positively to the RNs' ability to complete the e-learning module. The key factors identified in this study leading to the success of e-learning were motivation, self-reflection, constructivism and authenticity. The study concluded that clinical skills can be successfully taught to adult learners using e-learning. One limitation of this study was that it used staff self-rating as a data collection method. Future research should consider how educational interventions influence patient care and outcomes.

Lapkin, Levett-Jones, and Gilligan (2014) conducted a study to examine the impact of web-based interprofessional learning modules on health professional students behavioural intentions in relation to medication safety and teamwork. A quasi-experimental approach was employed to evaluate the effectiveness of the learning modules, and 320 undergraduate health professions students were recruited. Students were allocated to either an experimental or control group. Participants in the experimental group completed a multimedia web-based learning module. The purpose-designed Theory of Planned Behaviour Medication Safety Questionnaire was used to compare behavioural intentions, attitudes, subjective norms and perceived behavioural control in relation to medication safety between the control and experimental groups. The findings demonstrate that the web-based interprofessional learning module had a positive impact on participants behavioural intentions, with participants in the experimental group having a stronger intention to behave in a way

that enhances medication safety after undertaking the module. The students in the experimental group imply that they were more likely to practise in a way that enhances medication safety than those in the control group. The experimental group participants also demonstrated positive attitudes towards the target behaviour, as demonstrated by higher mean attitude scores after exposure to the learning module. Participants who completed the module had higher subjective norm scores, reflecting greater social pressure from other health professionals, patients and patients' families to practise in a way that enhances medication safety. Lastly, the higher mean perceived behavioural control scores for participants in the experimental group indicated that, overall, these participants perceived that they have the capability and skills required for practising in a way that enhances medication safety after undertaking the module. Limitations of the study was the premise that positive change in behavioural intention will result in improved clinical behaviour in relation to medication safety cannot be fully supported solely on the basis of this study. The authors recommend further research in this area. Also convenience sampling method was used, and the majority of the participants were nursing students. Therefore, the ability to generalise to other health professionals involved in the medication process is limited.

Johnson, Kelly, Siric, Tran, and Overs (2015) conducted a study in two subacute hospitals in Sydney, Australia, investigating the influence of e-learning education on falls risk screening, falls prevention and post-falls management. Pre- (n = 119) and post-design (n = 99) observations of the patient, environment and patient healthcare record audits were conducted following the introduction of a falls e-learning education program. Descriptive data were analysed using frequencies and percentages. The findings indicated that nurses completing the online education attained improved engagement in key interventions. It was highlighted that nurses faced some difficulties accessing the program, including limited computer availability in the ward and short-term interruptions occurring because of remapping of the hospital services. Some nurses found it easier to access online learning at home. For e-learning to be successful, computer skills and access need to be available to nurses. The main limitation of the study was it was conducted in subacute areas with high falls risk, and may subsequently not be generalisable to general medical surgical wards.

Sinclair, Kable, and Levett-Jones and Booth (2016) conducted a systematic review of randomised controlled trials to assess the effectiveness of e-learning programmes on clinician behaviour and patient outcomes. Electronic databases including CINAHL, Embase, ERIC, MEDLINE, Mosby's Index, Scopus and Cochrane – CENTRAL were searched in July 2014 and again in July 2015. Studies were reviewed and data extracted by two independent reviewers using the Joanna Briggs Institute standardised critical appraisal and data extraction instruments. Seven trials met the inclusion criteria for the analysis. The results suggest that e-learning was at least as effective as traditional learning approaches, and superior to no instruction at all in improving health care professional behaviour. There was variation in behavioural outcomes depending on the skill being taught, and the learning approach utilised. No papers were identified that reported the effectiveness of an e-learning programme on patient outcomes. This review found insufficient evidence regarding the effectiveness of e-learning on healthcare professional behaviour or patient outcomes. The authors recommended future randomised controlled trials to adhere to the Consolidated Standards of Reporting Trials in order to improve the quality of reporting, to allow evaluation of the effectiveness of e-learning programmes on healthcare professional behaviour and patient outcomes.

Bredesen, Bjøro, Gunningberg, and Hofoss (2016) developed and tested an e-learning program for assessment of pressure ulcer risk and pressure ulcer classification. Forty-four nurses working in acute care hospitals or nursing homes participated and were randomly assigned into two groups—an e-learning group (intervention) and a traditional classroom lecture group (control). Data were collected before and after training (post-test I), and again after three months (post-test II). The data were analysed by comparing nurse evaluations in each of the two groups. Inter-rater reliability was measured by exact per cent agreement and multi-rater Fleiss' kappa. A Mann-Whitney U test was used for continuous sum score variables. The results showed that an e-learning program did not improve Braden subscale scoring; however, for pressure ulcer classification, the intervention group scored significantly higher than the control group on post-test after training. However, after three months, there were no differences in classification between the groups. Thus, the e-learning program appeared to have greater influence on the accuracy of pressure ulcer classification than did classroom teaching in the short term. For proficiency in Braden scoring, no

significant effect was detected of educational methods on learning results. The limitations of this study included no power calculation being undertaken prior to the study. The sample size was probably too small to detect clinically important differences between the groups for the Braden scale. Further, the nurses were not asked about their computer knowledge and preferred learning method; thus, some participants may not have been familiar with computers. In addition, those who completed the post-test II might have been more interested in pressure ulcer prevention and more familiar with risk assessment and classification of pressure ulcer than the dropouts resulting in

Lahti, Kontio, and Välimäki (2016) evaluated an e-learning continuing education course from the perspectives of nursing managers in a psychiatric hospital, using Kirkpatrick's (1996) four-level model. Kirkpatrick's model was used to evaluate the implications of an e-learning course for clinical practice. This model was developed in the late 1950s (Kirkpatrick & Kirkpatrick, 2006) to evaluate training programs and learning (Kirkpatrick, 1996). The main purpose of the model was to determine the effectiveness of a training program (Kirkpatrick & Kirkpatrick, 2006). The model is divided into four levels describing different aspects of learning evaluations: reaction, learning, behaviour and results (Kirkpatrick & Kirkpatrick, 2005). First, the participants' reactions should be measured on all programs to let the participants know that trainers value their reactions, and to obtain suggestions for improvement. Second, learning evaluation is used to evaluate the extent to which learning has occurred. Third, measuring behaviour change is necessary to determine whether behaviour has actually altered, or to determine why change has not occurred. Fourth, the results aspect focuses on the extent to which results have occurred because of the training (Kirkpatrick & Kirkpatrick, 2005).

The study was conducted in six psychiatric hospital districts and nine psychiatric hospitals in Finland, who were participating in the same e-learning course from 2008 to 2011. A qualitative descriptive design was used for data collection, and data were analysed using Kirkpatrick's levels. The sample size was 28. This study indicated that nurses had different reactions to the e-learning course. The managers described neutral and negative feelings among the nurses. Some knowledge transfer from course to clinical practice was also reported by managers. These results were based on the

respondents' subjective perceptions. The limitations of the study included a low participation rate and voluntary participation, which could cause bias because individuals with more positive attitudes may have participated more actively than those with negative attitudes.

The above results indicate that e-learning is effective for short-term knowledge transfer. The results also indicate that some skills can be taught using e-learning, yet this is dependent on factors such as the quality of e-learning design and instruction, computer availability at work and nurses' computer knowledge. Further research in the field of e-learning for nurses is important because e-learning is widely used for nurses' education. Therefore, it is important to further explore nurses' responses to e-learning for developing clinical skills and knowledge. The current study also explores the factors that affect e-learning to enable thorough analysis of this phenomenon.

A number of design weaknesses were evident in the papers reviewed, including the details of randomisation not being provided (Lahti et al., 2012), self-rating by staff (Blackman et al., 2014), ability to generalise findings on the basis of the study and to other health professional is limited (Lapkin et al., 2014), selection bias (Sinclair et al., 2016), nil power calculation prior to the study (Bredesen et al., 2016) and a small sample size (Lahti et al., 2016). The current study aimed to limit these design weaknesses; however, it is acknowledged that this study was conducted at a single site. The researcher was unable to limit this design weakness, and instead focused on the advantages of using a single site, such as having adequate time to provide a high level of detail and understanding to enable thorough analysis of the complex nature of the phenomenon. To address the risk of a small sample size, this study invited all nurses at The Hospital to participate.

2.3 Learning Theories

Most e-learning is grounded in some form of learning theories. While there are many learning theories, three are dominant in e-learning: behaviourism, cognitivism and social constructivism. First, behaviourism is a theory of animal and human learning that focuses on the behaviour of the learner and the change in behaviour that occurs when learning takes place (Woollard, 2010). It is a theory of learning focusing on observable behaviours, and discounting any mental activity. Learning is defined

simply as the acquisition of new behaviour. Behaviourists call this method of learning 'conditioning' (Pritchard, 2014). Learning is demonstrated by the behaviour of the learner in their actions or reactions to further stimulus (Woollard, 2010). Behaviourism is underpinned by the principles of stimulus and response. The basic premise of behaviourism is that people need to be directed, and, if the stimulus is something that the individual wants (a reward) or fears (a punishment), the individual will respond accordingly and there will be noticeable change in behaviour (Bates, 2015). Behaviourist learning theory emphasises two major types of conditioning: classical conditioning and operant conditioning (Harasim, 2012). The development of behaviourism is associated with many scientists; however, Ian Pavlov (1927), a Russian physiologist, is known for his work on classic conditioning. In his experiment, food was used as the unconditional stimulus. If the intake of food by the animal occurred simultaneously with the action of a neutral stimulus that had been hitherto no way related to food, the neutral stimulus readily acquired the property of eliciting the same reaction in the animal as food would (Pavlov, 1927). This was the case with a dog employed in an experiment with a metronome. On several occasions, the dog was stimulated by the sound of the metronome and then immediately presented with food. Thus, a stimulus that was neutral was superimposed on the action of the inborn alimentary reflex. After several repetitions of the combined stimulation, the sounds from the metronome acquired the property of stimulating salivary secretion and evoking the motor reaction characteristics of the alimentary reflex (Pavlov, 1927). Pavlov referred to this phenomenon as classical conditioning because the dog was conditioned to associate food with the sound of the metronome.

The second type of conditioning is operant conditioning. Burrhus Frederick Skinner, an American psychologist, introduced operant conditioning. He explored how a direct stimulus led to a positive response that created behavioural change. He emphasised the need for positive and negative reinforcement to manipulate or teach new behaviour (Harasim, 2012). Skinner experimented with rats that were placed in a box with a lever inside, which would produce either water or a food pellet when pressed. The rats discovered that water or food would appear when they pressed the lever, which Skinner referred to as positive reinforcement. In later experiments, he added grids that produced an electric shock when activated, which he referred to as negative reinforcement. In Skinner's experiments, the rats acted on the environment, which

became known as operant conditioning (Bates, 2015). Skinner (1953) explained behaviourism as follows: if the occurrence of an operant is followed by presentation of a reinforcing stimulus, the strength is increased. In contrast, if the occurrence of an operant that is already strengthened through conditioning is not followed by the reinforcing stimulus, the strength is decreased.

Behaviourism predicts that, with sufficient repetition of an experience, specific behaviours can be taught by reinforcing the desired behaviours with appropriate stimuli. Success is based on the use of rewards as reinforcement stimuli and sanctions as deterrents (Holmes & Gardner, 2006). This can be related to e-learning. For example, e-learning packages teach content through a tutorial presentation, followed by assessment of the learning through focused questions. If the learners answer the questions correctly, the system progresses them through to the next stage. If the learners answer some of the questions incorrectly, the system sends them through the tutorial again. The behaviourist rewards include progression to the next stage with congratulatory feedback, while the sanctions include repeating the task.

Although many experiments have been done showing evidence of both Pavolian conditioning and operant conditioning, all of these experiments have been based on animals and their behaviour. Some critical evaluation of behaviourism questions Skinners application of principles of animal behaviour to the much more complex human behaviour (Naik, 1998). Boulding (1984) states using animals as substitutes for humans in the exploration of human behaviour, Skinner is making the big assumption that general laws relating to the behaviour of animals can be applied to describe the complex relations in the human world. If this assumption proves false, then the entire foundation upon which behaviourism rests will no longer be valid. Another criticism includes the issue that behaviourism cannot explain all forms of learning especially learning that occurs without the use of reinforcement and punishment. It does not recognise that children are able to create new learning patterns that are not related to stimulus and response techniques. In addition, behaviourism cannot explain how language and speech develop in very young children (Woollard, 2010). Not to mention behaviourism emphasize so much on the external variables that they exclude other important ones, like genetics, insight world, motivations, thoughts, memory, communication and emotions (Parrish, 2014). Behaviourism does not take into account

that each person has different motivations, attitudes and emotions and therefore what motivates one person to learn may not motivate everyone.

Second, cognitivism focuses on the mind and learning processes of the brain. Cognitivism sees the individual as a processor of information, in much the same way that a computer takes in information and follows a program to produce an output (McLeod, 2015). The e-learning training packages at The Hospital relate to cognitivism. Two of the most prominent cognitive theorists are Jerome Bruner and Lev Vygotsky. Bruner focused on learners' development in a series of steps of increasing learning capability. Some learning capabilities are dependent on the consolidation of others, and may be framed in a scaffold of progressive steps of achievement (Holmes & Gardner, 2006). Behaviour modification is achieved through the person participating actively in the process, rather than merely being fed information, and thereby discovering important aspects of knowledge (Bates, 2015). ELMO is structured from concrete examples of a learning goal that progressively led the learner to an understanding of the concepts involved. ELMO initially provided tutorials and tasks that were tailored to nurses' current capabilities, and, once nurses had met the requirements of the specific tasks, they progressed to the next level of learning. Nurses were then able to construct their learning with sufficient resources and online activities, thereby progressing smoothly to the desired level of achievement, skill development and understanding.

A second cognitivist theorist, Vygotsky (1978) stated that learning is achieved when a person enters a zone of proximal development (ZPD). A ZPD is defined as the distance between the actual developmental level, as determined by independent problem solving, and the level of potential development, as determined through problem solving under adult guidance or in collaboration with more capable peers (Vygotsky, 1978). Holmes and Gardner (2006) also defined a ZPD as the gap between what a learner can achieve now and what is just beyond their reach, unless a more knowledgeable person is nearby to assist them to reach the new level of knowledge, skill or understanding. Bridging this gap is a learner-centred process in which learners monitor and regulate their own learning activity. The more knowledgeable person can be a tutor or fellow learner, who might act as a facilitator to guide the learners through challenging activities. In the context of e-learning at The Hospital, the learner is

offered problem solving or strategic reasoning tasks that place the learner at the centre of the learning activity, with assistance in the ZPD either from software prompts or from a more knowledgeable peer or SDN.

Cognitivism has been criticized by behaviourism. Behaviourism assumes that people are born a blank slate and are not born with cognitive functions like schemas, memory or perception (McLeod, 2015). Another criticism of cognitivism focuses on information processing where the mind is viewed in terms of a computer. However, although there are similarities between the human mind and the operations of a computer (inputs and outputs, storage systems, the use of a central processor) the computer analogy has been criticised by many. Such machine reductionism ignores the influence of human emotion and motivation on the cognitive system and how this may affect our ability to process information (McLeod, 2015).

Third, the need for assistance or scaffolding to progress from a more knowledgeable person evolves into social constructivism. Mok (2013) defined learning in social constructivism as knowledge sharing and meaning making through experience and exchange, embracing authenticity, intentionality, diversity and open mindedness. Social constructivism requires other people as a third dimension in the interaction between the learners and environment. Individuals learn in the company of each other and the organisation's goals are addressed by sharing their learning (Holmes & Gardner, 2006). In an article on the social role of the computer, McLoughlin and Oliver (1998) stated that social constructivism is most appropriate for technology-supported learning environments because it endorses the fact that learning occurs in a social context, recognises that language use is fundamental to learning, and acknowledges that learners need support and assistance to learn. All these elements provide the basis for maximising learning in technology-supported environments. However, individuals learning in the company of each other raises the question whether socially constructed knowledge is reliable. Criticism of social constructivism is that the objectivity of knowledge becomes problematic. Knowledge is constructed by individual thinkers as an adaptation to their subjective experience therefore it raises the question whether socially constructed knowledge is reliable (Steffe & Thompson, 2000).

The above learning theories explain the underpinnings of e-learning. However, it is also important to consider how adult education occurs to facilitate desired learning outcomes in adults. Thus, the next section will explore adult learning (andragogy).

2.3.1 Andragogy

Andragogy is a set of core adult learning principles that apply to all adult learning situations (Knowles, Holton III, & Swanson, 2012). Malcolm Shepherd Knowles, an American educator, pioneered the theory of andragogy. He formulated six principles of andragogy based on the learner's: (i) need to know, (ii) self-concept, (iii) prior experience, (iv) readiness to learn, (v) orientation to learning and (vi) motivation to learn (Knowles, Holton III, & Swanson, 2014). The following paragraph discusses these six principles.

The core principle that learners need to know *why* they are learning, before they engage in learning, has led to the belief that adults should be engaged in a collaborative planning process for their learning. Engaging adults as collaborative partners for learning satisfies their need to know, and appeals to their self-concept as independent learners. The self-concept of the learner focuses on learners being capable of taking control and teaching themselves a particular subject. It is also conceived as personal autonomy and leads to an integral change of consciousness in which the learner views knowledge as contextual and freely questions what is learnt. Adults' prior experiences can both help and hinder the learning process and outcome. The prior experiences of the learner can aid in learning new knowledge if the knowledge is presented in such a way that it can be related to existing knowledge, or can become a barrier to new learning when the new learning challenges them. Readiness to learn is closely associated with the need to know. Adults generally become ready to learn when their life situation creates a need to know. Thus, the more that adult teaching professionals can anticipate and understand adults' life situations and readiness for learning, the more effective they can be. Adults generally prefer problem-solving presentation to learning, and learn best when new information is presented in a real-life context. Motivation for learning occurs when adult learners believe that they can learn the new material, that the learning will help them with a problem or issue, and that the learning is important in their life. Adults tend to be more motivated towards learning that helps them solve problems in their lives or results in internal payoffs (Knowles et al., 2011).

Pappas (2014) applied these principles to e-learning to create more meaningful learning experiences for adult learners. Adult learners' need to know is applied when they are involved in the design and development of their learning experience. They must truly be an integral part of the development and implementation of e-learning, as well as the evaluation process. Gaining feedback from adult learners offers the opportunity to design learning materials based on the needs and wants of the adult learners (Pappas, 2014). Self-concept is applied when e-learning professionals create learning experiences that offer minimum instruction and maximum autonomy. It is important to provide an e-learning support system to offer guidance and help, while providing the e-learning training package and resources that adults require to learn on their own terms. The adult learner experience is promoted by including a variety of different instructional design models and theories in e-learning training packages to appeal to different adult learners, and creating e-learning packages that encourage adult learners to go out and explore the subject matter, thereby gaining experience. By doing so, adult learners can learn from their errors and master their skillsets through first-hand experience. Adult learners can assume their own approach to solving problems, which gives them the chance to use their knowledge in a practical way.

In addition, adult learners need to be able to link the subject matter to real-world benefits and applications. If learners cannot understand how an e-learning course will give them an advantage in real life, they will not be drawn to the e-learning process. E-learning professionals can increase e-learning engagement by integrating scenarios into adult e-learning courses (Pappas, 2014) so that adult learners have the opportunity to directly see how what they are learning can be used in the real world. A guide to authentic e-learning by Herrington, Reeves, and Oliver (2010) emphasises that organisations need to provide authentic contexts that will reflect the way the knowledge will be used in real life when designing e-learning courses. This provides purpose and motivation for learning, and offers a sustained and complex learning environment that can be explored at length (Reeves & Reeves, 1997).

Readiness to learn is encouraged by using social media and online collaboration training packages. As individuals age, they tend to gravitate more towards learning experiences that offer some sort of social development benefit (Pappas, 2014). This can help learners build their social network and collaborate with those who share the

same interests. Orientation to learning is essential. For learners to engage, there must be a valid reason for every e-learning training package. Adult learners need to know how the subject matter will solve the problems that they regularly encounter. Motivation is pivotal with adult learners. Thus, for the overall e-learning experience to be meaningful and engaging, e-learning professionals need to motivate learners by offering them a reason to study every e-learning training package they need to complete. This will help learners acquire new knowledge or skills. The next section focuses on the theoretical framework for this study.

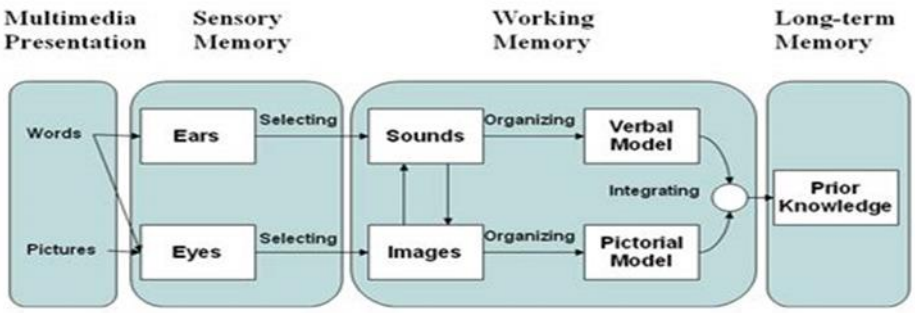
2.4 Theoretical Framework

Eisenhart (1991, p. 205, as cited in C. Grant & Osanloo, 2014) defined a theoretical framework as 'a structure that guides research by relying on a formal theory constructed by using an established, coherent explanation of certain phenomena and relationships'. Thus, the theoretical framework consists of the selected theory (or theories) that undergirds the researcher's thinking with regard to how the researcher understands and plans to research the topic, as well as the concepts and definitions from that theory that are relevant to the topic. The theoretical framework used in this study is the cognitive theory of multimedia. This theory focuses on how adults learn from multimedia, and is relevant for this study because this research examines nurses' use of multimedia for learning. The next section explores the cognitive theory of multimedia learning.

2.4.1 Cognitive Theory of Multimedia Learning

As increasing number of organisations around the world are relying more on e-learning as an effective means to educate and train their globally dispersed workforce. Therefore, it is important to understand how adults learn from multimedia. Mayer (2009) presented a cognitive theory of multimedia learning in which knowledge construction is based on three principles: dual channel, limited capacity and active processing. People have separate channels for processing visual/pictorial material and auditory/verbal material. This is the 'dual channel' principle. The 'limited capacity' principle indicates that people can actively process only a few pieces of information in each channel at one time. 'Active processing' learning occurs when people engage in appropriate cognitive processing during learning, such as attending to relevant

material, organising the material into a coherent structure, and integrating the material with what they already know. This model is illustrated in Figure 1.



Source: Clark and Mayer (2016).

Figure 1: Cognitive Theory of Multimedia Learning

In this figure, the dual channel principle is represented by the two rows—one for processing words (across the top) and one for processing pictures (across the bottom). The limited capacity principle is represented by the large 'working memory' box in the middle of the figure, in which knowledge construction occurs. The active processing principle is represented by the five arrows in the figure—selecting words, selecting images, organising words, organising images and integrating—which are the cognitive processes needed for meaningful learning. Meaningful learning occurs when the learner appropriately engages in all of these processes (Clark & Mayer, 2016).

The challenge for the learner is to undertake these processes within the constraints of severe limits on how much processing can occur in each channel of working memory at one time. This refers to the capacity limits of working memory—that is, people can only generally think about a few items at any one time. There are three kinds of demands on cognitive processing capacity (Mayer, 2014): extraneous, essential and generative processing. Extraneous processing is cognitive processing that does not support the instructional objective and is created by poor instructional layout (such as having large quantities of extraneous text and pictures). Essential processing is cognitive processing aimed at mentally representing the core material (consisting mainly of selecting the relevant material) and is created by the inherent complexity of the material. Generative processing is cognitive processing aimed at deeper understanding of the core material (consisting mainly of organising and integrating) and is created by the motivation of the learner to make sense of the material. It can be

supported by instructional methods that promote engagement with the material (Clark & Mayer, 2016). The challenge for instructional professionals is that all three of these processes rely on the learner's cognitive capacity for processing information, which is limited (Mayer, 2014; Sweller, Ayres, & Kalyuga, 2011). Overall, the goals for instructional designers are to create instructional environments that minimise extraneous cognitive processing, manage essential processing and foster generative processing. The following section will elaborate on these processes when designing e-learning courses.

2.5 Design of E-learning

The design of e-learning training packages can either support or inhibit active processing and meaningful learning, depending on which types of instructional methods are used (Clark & Mayer, 2016). As mentioned in the section above, the goals for instructional designers are to create instructional environments that minimise extraneous cognitive processing, manage essential processing and foster generative processing. Table 1 presents techniques to achieve these objectives.

Table 1: Techniques for Minimising Extraneous Processing, Managing Essential Processing and Fostering Generative Processing

Goal	Techniques
Minimising extraneous processing	Coherence principle: Do not use unneeded words, sounds or graphics. Contiguity principle: Place printed words near a corresponding part of a graphic. Redundancy principle: Use graphics and audio, rather than graphics, audio and on-screen text. Worked example principle: Provide step-by-step demonstrations.
Managing essential processing	Segmenting principle: Break a continuous lesson into manageable parts. Pre-training principle: Provide pre-training in the names and characteristics of key components. Modality principle: Use audio, rather than on-screen text.
Fostering generative processing	Personalisation principle: Use a conversational style, rather than a formal style. Multimedia principle: Present words and graphics, rather than words alone. Engagement principle: Ask learners to elaborate on the material.

Source: Clark and Mayer (2016).

Incorporating the above techniques in e-learning design will guide the learners' transformation of words and pictures in the lesson through working memory, so that they are incorporated into the existing knowledge in the long-term memory (Clark & Mayer, 2016). Herrington et al. (2010) highlighted the use of technology as a cognitive tool, rather than a delivery platform, to support learning. Herrington et al. (2010) described nine e-learning design elements that are learner centred, engaging and authentic for successful e-learning, as follows:

1. creating an authentic context that reflects the way the knowledge will be used in real life
2. providing authentic activities and tasks that have real-world relevance, and that present a single complex task to be completed over a sustained period, rather than a series of shorter disconnected tasks
3. providing access to expert performances and the modelling of processes
4. providing multiple roles and perspectives—for learners to be able to investigate a problem or task from more than one perspective, it is important to enable and encourage students to explore different perspectives on the topics from various points of view
5. supporting collaborative construction of knowledge—e-learning tasks need to be addressed to a group, rather than an individual, and appropriate means of communication (such as discussion forums, social networking and wikis) need to be established
6. promoting reflection for learners—this is achieved by learners readily returning to any element in the e-learning site if desired, and by offering the opportunity for learners to compare themselves with experts and other learners in varying stages of accomplishment
7. promoting articulation—this is achieved when e-learning tasks incorporate inherent (as opposed to constructed) opportunities to articulate, collaborative groups to enable articulation, and the public presentation of argument to enable defence of a position
8. providing coaching and scaffolding—to accommodate a coaching and scaffolding role principally by the teacher (but also by other learners), the e-learning course needs to provide the opportunity for more able partners to assist

with scaffolding and coaching, as well for the teacher to support learning via appropriate communication technologies

9. providing authentic assessment of learning within tasks—to provide integrated and authentic assessment of learners, the e-learning course needs to provide the opportunity for learners to be effective performers with acquired knowledge, and to craft polished performances or products in collaboration with others. It also requires the assessment to be seamlessly integrated with the activity, and to provide appropriate criteria for scoring varied products.

These design elements were also reported by Lister (2014), who conducted an analysis of the literature and, from 17 studies, identified the components that are important to include in the design of e-learning courses to enhance learning. The findings of the 17 studies suggested that there are four main considerations when choosing components to incorporate into the design of e-learning: course structure, content presentation, collaboration and interaction, and timely feedback. Lister (2014) described many studies that reported that a critical component of good online course design is a clear course structure with clearly communicated expectations, rubrics and assignment examples (Ausburn, 2004; Callahan, Saye, & Brush, 2013; Gedik, Kiraz, & Ozden, 2013; M. Grant & Thornton, 2007; Kim, Kim, Khera, & Getman, 2014; Lee, 2014; Swan, Day, Bogle, & Matthews, 2014; Teräs & Herrington, 2014). Including orientation at the beginning of e-learning and online courses also provides guidance and direction to learners to help them navigate the course successfully and understand the features of the learning environment (Callahan et al., 2013; Chen, 2007; Gedik et al., 2013; Kim et al., 2014; Lee, 2014).

Other options to consider in the design of content presentation include authentic tasks (Chen, 2007; Dahalan, Hasan, Hassan, Zakaria, & Noor, 2013; Gedik et al., 2013; Kearney, 2006), active learning through reflection (M. Grant & Thornton, 2007; Teräs & Herrington, 2014) and self-assessments (Domun & Bahadur, 2014). Using authentic tasks allows learners to see the relevance of the course content, supports the development of connections between real life and learning (Dahalan et al., 2013) and helps learners develop content knowledge (Kearney, 2006). Analysis of the studies revealed that nine of the 17 studies (Ausburn, 2004; Chen, 2007; Gedik et al., 2013; M. Grant & Thornton, 2007; Kim et al., 2014; Lee, 2014; Moallem, 2007; Swan et al.,

2014; Teräs & Herrington, 2014) reported that designing opportunities for collaboration and interaction in online courses was important. Student–student and student–instructor interaction was facilitated through discussion forums, chat and email (Chen, 2007; Gedik et al., 2013; M. Grant & Thornton, 2007). Prompt and timely feedback was highly valued by learners and viewed as a critical factor to consider in the design of e-learning (Chen, 2007; Dahalan et al., 2013; Domun & Bahadur, 2014; Gedik et al., 2013; M. Grant & Thornton, 2007; Lee, 2014; Teräs & Herrington, 2014). Incorporating self-assessments into the presentation of content allows for immediate feedback to learners, and provides support for content review (Domun & Bahadur, 2014; Kim et al., 2014; Swan et al., 2014). Instructors should take advantage of the features built into LMSs, such as auto-correcting, which can help them provide more rapid feedback to learners.

In short, design is important for successful e-learning. The above components for e-learning design allow learners to engage with the content and to collaborate, communicate and construct knowledge.

2.6 Summary

This chapter has provided an overview of the relevant studies and literature related to e-learning for developing clinical skills and knowledge among nurses. Much of the literature in this area indicates that e-learning is effective for short-term knowledge transfer, and that some clinical skills can be taught using e-learning; however, this is dependent on factors such as the quality of e-learning design, computer availability at work and nurses' computer knowledge. It is clear and widely understood that nurses' upskilling of knowledge and skills improves quality of care for patients, and, globally, e-learning is widely being used for nurses' education. However, there is limited research examining nurses' evaluation of e-learning for developing clinical skills and knowledge. Further study in this area is required to better understand the effectiveness of e-learning for developing nurses' clinical skills and knowledge, and subsequently to ensure quality care for patients. The following chapter presents the methodology used for this study.

Chapter 3: Methodology

3.1 Introduction

This chapter presents the research problem, questions to be addressed, paradigm, design and methodology used to collect and analyse data. It also addresses the limitations of the research, role of the researcher and ethical considerations.

3.2 Study Aim

The aim of this study was to explore RNs', ENs', SDNs' and NUMs' evaluation of an e-learning training package for developing clinical skills and knowledge at a private hospital in Perth, Western Australia ('The Hospital'). E-learning is becoming increasingly popular for the nursing workforce; thus, it is beneficial to consider RNs', ENs', SDNs' and NUMs' responses to an e-learning training package which developed clinical skills and knowledge. The literature review indicated the scarcity of information globally on nurses' evaluation of e-learning for developing their clinical skills and knowledge. This scarcity of information requires attention, as increasing numbers of organisations use this form of learning and development for staff and NUMs.

The study's specific aims were to investigate the following questions:

1. How did nurses at various designations evaluate an e-learning training package for developing clinical skills and knowledge?
2. What are the barriers to e-learning for nurses at various designations?
3. To what extent do the findings of this study have implications for the future delivery of training and education for nurses?

3.3 Research Approach

The planning and execution of research derives from the approaches and methods of enquiry used. There are two main ways in which planning a research project can proceed—a paradigm-driven approach and a pragmatic approach (Punch, 2014). A paradigm-driven approach begins with a paradigm, articulates the paradigm, and develops research questions and methods from the paradigm. A pragmatic approach

begins with research questions that need answers, and chooses methods to answer the questions (Punch, 2014). Often in professional fields, such as nursing, questions arise from practical and professional issues and problems associated with the workplace. Thus, the starting point is not a paradigm—the starting point is a problem that needs a solution or a question that needs an answer. This is a pragmatic approach (Punch, 2014).

The impetus for this research derived from concerns raised among nurses about the effectiveness of ELMO for developing clinical skills and knowledge at The Hospital. Considering the two approaches and the nature of how this study arose, the researcher felt that a pragmatic approach was the most appropriate for this research investigation. The researcher began with research questions that needed answers and then chose methods to answer them. The following sections describe how the chosen approach was implemented, and expand on the quantitative research methods used in this study.

3.3.1 The Pragmatic Worldview

Pragmatism as a worldview arises out of actions, situations and consequences, rather than antecedent conditions. It is concerned with application, what works and solutions to problems (Patton, 1990). The researcher emphasises the research problem and uses all approaches available to understand the problem. Individual researchers have freedom of choice. In this way, researchers are free to choose the methods, techniques and procedures for research that best meet their needs and purposes (Creswell, 2013). Pragmatists agree that research always occurs in social, historical, political and other contexts.

In the context of the current study, a pragmatic worldview was relevant because the introduction of ELMO at The Hospital raised concerns about its effectiveness for developing clinical skills and knowledge. The researcher emphasised this concern and chose quantitative research methods to meet the needs and purposes of this study. Research in this study occurred in a social context at The Hospital, involving RNs, ENs, SDNs and NUMs. At the heart of pragmatic approaches to health research is maintaining a focus on the issues and data relevant to making decisions and taking action. In this way, pragmatic approaches are also strongly aligned with patient-centred-outcomes research (Selby, Beal, & Frank, 2012). The applicability of this

approach was particularly beneficial for the purpose of this research study. The purpose of this research was to evaluate whether ELMO was developing clinical skills and knowledge for nurses'. Nurses require ongoing education for clinical skills and knowledge to provide safe, effective and competent patient care. Therefore, a pragmatic approach was applicable to this study.

3.4 Quantitative Research Methods and Design

Quantitative research methods employ quantitative theoretical and methodological principles and techniques, focusing on quantification and including statistics (Sarantakos, 2012). They involve collecting numerical data to explain a factor or situation (Muijs, 2011). Numbers are often used to make sense of the world. The primary aim in quantitative research is to determine the relationship between an independent variable and another set of dependent or outcome variables in a population (Singh, 2007). Broadly quantitative research designs are classified as either experimental or non-experimental designs. These two designs are described as follows.

3.4.1 Experimental Designs

Experimental designs seek to determine whether a specific treatment influences an outcome. The researcher assesses this by providing a specific treatment to one group and withholding it from another, and then determining how both groups scored on an outcome (Creswell, 2013). Experiments include true experiments with random assignment of subjects to treatment conditions, and quasi-experiments that use non-randomised assignments (Keppel, 1991). Included in quasi-experiments are single-subject designs, in which an experimental condition is administered over time to a single individual or small number of individuals (Cooper, Heron, & Heward, 2007).

3.4.2 Non-experimental Designs

Non-experimental designs do not have random assignment, manipulation of variables or comparison groups. There are many reasons for undertaking non-experimental designs. One reason is that a number of characteristics or variables are not subject to experimental manipulation or randomisation. Further, some variables cannot or should not be manipulated for ethical reasons. In some instances, independent variables have

already occurred, so control over them is impossible (Sousa, Driessnack, & Mendes, 2007). Non-experimental designs are typically classified as descriptive or correlational. Descriptive or exploratory studies are used when little is known about a phenomenon. The researcher observes, describes and documents various aspects of the phenomenon. There is no manipulation of variables or search for cause and effect related to the phenomenon. Descriptive designs describe what actually exists, determine the frequency with which it occurs, and categorise the information (Sousa et al., 2007). The two most common types of quantitative descriptive designs are case control studies and comparative studies. Case control studies involve a description of cases with and without a pre-existing condition or exposure. Comparative studies describe the differences in variables that occur naturally between two or more cases, subjects or units of study.

Correlation designs involve the systematic investigation of the nature of relationships, or associations between and among variables, rather than direct cause–effect relationships. These designs are used to examine whether changes in one or more variable are related to changes in another variable(s). It analyses direction, degree, magnitude and strength, or relationships and associations. The results from correlational studies provide the means for generating hypotheses to be tested in quasi-experimental or experimental studies (Sousa et al., 2007). Three of the most common correlation designs are descriptive, predictive and model testing correlational designs. Descriptive correlational design describes variables and the relationships that occur naturally between and among them. Predictive correlational design predicts the variance of one or more variables based on the variance of another variable(s). Model testing correlational design examines or pilot tests a proposed relationship for a model or theory. Variables are not manipulated, but occur naturally in all three designs (Sousa et al., 2007). This study employed descriptive correlational design.

3.4.3 This Study's Design

Considering the methodological steps described earlier in this chapter, this study's design of choice was descriptive correlational design. This research was conducted in 3 years. The research model is illustrated in Figure 2. In relation to the focus of the study, variation occurred in RNs', ENs', SDNs' and NUMs' evaluation of ELMO, yet it was not possible to manipulate or control that variation for research purposes.

Instead, relationships among variables were evaluated, and descriptive data about the population were enumerated.

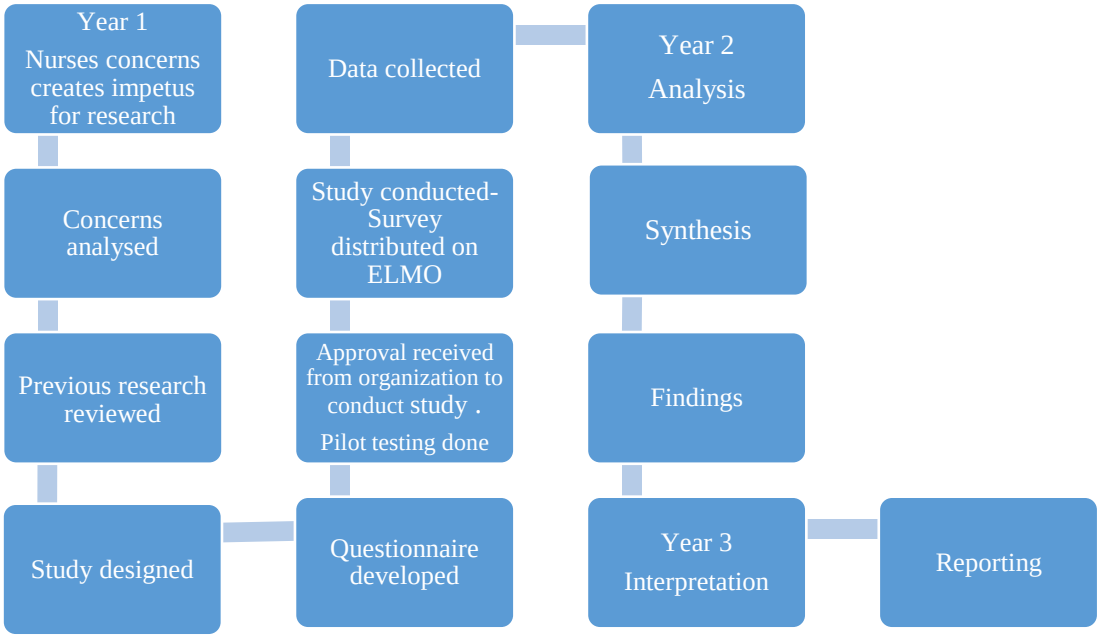


Figure 2: Research Model

3.5 Data Collection

Data were collected in this study by survey. Surveys are used for descriptive, explanatory and exploratory proposes, and are chiefly used in studies that have individual people as the units of analysis (Babbie, 2008). A survey was used because the researcher was interested in collecting original data from RNs, ENs, SDNs and NUMs. A survey was also convenient to use and easy to administer to participants. A questionnaire (Appendix A) was designed to elicit information that was used for analysis. The questionnaire addressed RNs', ENs', SDNs' and NUMs' evaluation of ELMO for developing clinical skills and knowledge, and provided a numeric description of opinions on ELMO. No testing of clinical skills was undertaken in this study. The questionnaire used for the survey was designed by the researcher. The purpose of the questionnaire was to explore RNs', ENs', SDNs' and NUMs' evaluation of ELMO for developing clinical skills and knowledge. The researcher chose to use closed-ended questions in the survey because these questions are popular in survey research as a result of their greater uniformity of responses and easier processing than open-ended questions (Babbie, 2008). The questionnaire focused on:

- demographic details, which allowed the researcher to analyse which group of nurses engaged more with ELMO and whether education using ELMO affected learner engagement
- the experiences of RNs, ENs, SDNs and NUMs with using ELMO for developing clinical skills and knowledge
- RNs, ENs, SDNs and NUMs views on the effectiveness of ELMO for developing clinical skills and knowledge
- RNs, ENs, SDNs and NUMs views on the barriers that affect ELMO
- RNs, ENs, SDNs and NUMs views on the design of ELMO.

Mayer's (2009) cognitive theory of multimedia learning informed the questionnaire. Cognitive theory of multimedia was chosen to inform the questionnaire as multimedia learning implies learning by pictorial and verbal modes; verbal learning can be from written or spoken words, whereas pictorial learning can be from still or dynamic images (Shamim, 2018). ELMO consisted of learning by textual, auditory and visual materials therefore cognitive theory of multimedia was chosen to inform the questionnaire. Other studies related to multimedia learning have also used a questionnaire based on cognitive theory of multimedia learning. Studies on multimedia learning conducted by Shamim (2018) on application of cognitive theory of multimedia learning used a questionnaire based on cognitive theory of multimedia learning. Ibrahim (2012) conducted a study on implications of designing instructional video using cognitive theory of multimedia learning also used a questionnaire based on cognitive theory of multimedia learning.

The questionnaire used in this study used a Likert scale, where the respondents indicated their degree of agreement or disagreement with a series of statements. Data were collected in this study by uploading the questionnaire to the e-learning site at The Hospital. The learning and development coordinator at The Hospital was responsible for uploading the questionnaires for the RNs, ENs, SDNs and NUMs. This method of data collection was convenient and did not require staff to provide their residential address; thus, the participants' anonymity was ensured.

A participant information sheet (Appendix C) from the University of Notre Dame Australia (UNDA) was attached with the questionnaire inviting nurses to take part in the survey and explaining the purpose of the survey, the significance of the study and

why nurses were chosen for this study. It also explained who the researcher was, provided the researcher's contact details and included assurance of confidentiality. The participant information sheet explained who should complete the questionnaire, explained why the response rate was important for the study, and provided closing instructions (such as the timeframe—14 days) to complete the survey. Contact details were provided in case the respondents encountered difficulties interpreting any of the questions or wished to verify the legitimacy of the survey.

Implied consent was provided by the participants if they completed the questionnaire. In the information letter, the RNs, ENs, SDNs and NUMs were also made aware of the sections of the questionnaire and the Likert scale being used in the questionnaire. The questionnaire was pilot tested once with 10 RNs to establish content validity. All 10 RNs have used ELMO at The Hospital therefore they formed a homogeneous group. The 10 RNs were randomly selected from different speciality areas in The Hospital to avoid selection bias. The pilot test also enabled the researcher to determine the extent to which the results measured what they were intended to measure.

3.5.1 Validity and Reliability

To demonstrate validity for the questionnaire, the researcher focused on face validity and content validity. Face validity was achieved by obtaining feedback from an expert in research questionnaire development at the UNDA and from the supervisors of this study, while content validity was achieved by piloting the survey. The survey questionnaire used in this study was piloted once with 10 RNs. A modified feedback form (Appendix B) from the European Organisation for Research and Treatment of Cancer was attached with the questionnaire to obtain feedback from RNs to determine the level of content validity. This pre-testing was undertaken to improve the questions and to determine the extent to which the items measured the content they were intended to measure.

To demonstrate reliability for the questionnaire, the focus was on internal consistency. To ensure consistency, the scale items were subjected to reliability tests using Cronbach's alpha as the measure. An alpha value of 0.7 or above was considered reliable (Reynaldo & Santos, 1999), and the set of items was internally consistent in measuring the intent of each factor. The survey used four scales: (i) experience with

e-learning, (ii) experience with training to use e-learning, (iii) e-learning effectiveness and (iv) e-learning barriers. The reliability analysis for the experience with e-learning, e-learning effectiveness and e-learning barriers scales deemed these scales to be reliable for use in subsequent analysis, since all Cronbach's alphas were greater than 0.7. However, the scale for experience with training to use e-learning had an alpha value of less than 0.7; thus, it was not reliable. The reliability of the scale could not be improved even after deleting certain items, it remained below the 0.7 alpha value. Further discussion of the reliability analysis of these scales will follow in the results chapter.

3.5.2 Sampling

All the RNs (340), ENs (20) SDNs (nine) and NUMs (nine) working in The Hospital were sent the questionnaire through the e-learning website for the hospital to obtain quantitative data. This sample size was chosen because it represented all the nurses in The Hospital, which helped avoid bias. A minimum sample size of 127 nurses (or 30%) was deemed sufficient to estimate the prevalence of using e-learning for developing clinical skills and knowledge. This sample was sufficient to estimate the population proportion to be within 8% of the true population percentage, and would estimate this with 95% confidence (Lemeshow, Hosmer Jr, Klar, & Lwanga, 1990). This response target was obtained from a biostatistician at the UNDA.

3.5.3 Diagram of Quantitative Research Method

This section summarises all the details of the quantitative methodology of this study through the diagrammatic summary in Table 2 of the key processes used.

Table 2: Key Processes

	Quantitative Research Method **Evaluation of E-learning Training Package**
Sampling	*n* = 340 RNs *n* = 20 ENs *n* = nine SDNs *n* = nine NUMs
Data collection	Data collection with the use of questionnaire Response rate: *n* = 237 RNs *n* = 20 ENs *n* = nine SDNs *n* = nine NUMs
Analysis	SPSS—quantitative software Descriptive statistics Fisher's exact test Cross-tabulation Kruskal-Wallis test Correlational analysis

3.6 Data Analysis

The aim of data analysis was:

1. to provide a demographic profile of the sample
2. to establish if the four scales used in the survey (experience with learning, experience with training to use e-learning, e-learning effectiveness and e-learning barriers) could be considered internally consistent and reliable
3. to establish if the views on e-learning training package for developing clinical skills and knowledge significantly differed based on the designation of the nurses in the workplace
4. to explore any significant correlations between nurses' views on e-learning training package for developing clinical skills and knowledge and participants' age, participants' experience, e-learning design and participants' meaningful learning with-learning.

Quantitative analysis was conducted using Version 23 of SPSS statistical software. The SPSS software has proven to be consistently reliable in a variety of statistical analysis projects (Arkkelin, 2014).

3.6.1 Fisher's Exact Test

The difference in group memberships—that is, whether experience with e-learning differed by nurse designation—could be tested for statistical significance using Fisher's exact test (Smith, Gratz, & Bousquet, 2009). This test was used to establish whether nurses' views on e-learning training package for developing clinical skills and knowledge was associated with the designation of the nurse in the workplace. The Likert scale responses for experience with e-learning, e-learning effectiveness and e-learning barriers were collapsed into fewer categories to maximise the chances of the large expected frequencies assumption being met. The categories of 'agree' and 'strongly agree' were collapsed into one category of 'agree', the categories of 'disagree' and 'strongly disagree' were collapsed into one category of 'disagree', the 'neutral' category was retained as it was, and the 'don't know' category was ignored. A 0.05 level of significance was used as the criteria for statistical significance. The level of significance was set as 0.05 for the Fisher's exact test because this criterion is commonly used for social science research (Katz, 2011).

3.6.2 Variable Scoring

Variable scores were created from the scales used in the survey as a reverse-coded average of the shortlisted individual items from a respective scale. The conceptual and operational definitions of the scores are shown in Appendix F.

3.6.3 Test of Normality

Prior to conducting statistical analyses, the assumptions of parametric statistics were inspected for continuous variables. The Shapiro-Wilk test was used to check the statistical significance of normal distribution of the continuous variables at alpha = .001. Depending on the outcome of the test, parametric or non-parametric statistics and techniques were used.

3.6.4 Kruskal-Wallis Test

The main multivariate analysis technique used to answer the research questions was the Kruskal-Wallis test. A Kruskal-Wallis test is a suitable test to compare the median scores of two or more samples (Katz, 2011; Tabachnick & Fidell, 2007). This test was used to compare RNs', ENs', SDNs' and NUMs' evaluation of the e-learning training package for developing clinical skills and knowledge.

3.6.5 Correlation Analysis

Correlation analysis is a useful technique to test the strength and direction of association between a pair of variables. This technique was used to test the nature of association between nurses' views on e-learning training package for developing clinical skills and knowledge and the participants' demographics, the e-learning design and the participants' meaningful learning with e-learning.

3.7 Role of the Researcher

Research is useful only to the extent that the researcher is disciplined, accurate and honest (Bouma, Wilkinson, & Ling 2012). The role of the researcher in this study was to ensure that the research process was honest and accurate. This was achieved by being as objective as possible. The researcher ensured there was no bias in the way survey questions were asked, and that the data were correctly recorded and honestly reported. Another important role of the researcher is recordkeeping the research activities in such a way that others can understand exactly what was done and why (Bouma et al., 2012). In this study, electronic data were stored on SPSS files in a personal password-protected computer. An external hard drive was used to back up the data, which was kept in a secure, locked cupboard. The completed pilot questionnaires were stored in a secure location in a locked filing cabinet.

3.8 Ethics

Written approval from the deputy director of nursing was granted for the research candidate to conduct this study at The Hospital (Appendix D). Prior to research commencement, an application for low-risk review of a research project involving

human participants was sought from the Human Research Ethics Committee (HREC) at the UNDA. Ethical clearance was obtained in July 2016 (Appendix E).

The participation information sheet provided participants with information about the study, including its purpose and significance. The participant information sheet stated that the RNs, ENs, SDNs and NUMs had the right to refuse and that participation was voluntary. For data collection, the participants were made aware that they were entitled to withdraw from the study prior to the survey being submitted. Once the survey was submitted, the participant could not withdraw from the study because the surveys were non-identifiable. The participants were assured that confidentiality would be maintained and that no individual would be identified by name in the thesis or in any subsequent report generated by this study. Completion of the questionnaire by the participants was viewed as implied consent.

The participants' anonymity was ensured by deleting the personal information of the participants from the data and replacing it with numerical identifiers, so that the RNs, ENs, SDNs and NUMs remained anonymous throughout the study. Any personal information was stored in a completely separate location from the data, so that participants were not traceable or identifiable.

3.9 Chapter Summary

This chapter has explained the research methodology used for this study, including the research design and the manner in which data were collected and analysed. This study explored nurses responses to an e-learning training package which developed clinical skills and knowledge for RNs, ENs, SDNs and NUMs at a private hospital in Western Australia. A survey questionnaire was used to collect data. The questionnaire was uploaded on the hospital's e-learning site and participation was voluntary. Quantitative analysis was conducted using Version 23 of SPSS statistical software. Written approval for the study was obtained from the hospital's deputy director of nursing, and ethics approval was obtained from the UNDA HREC. The findings of the research are detailed in the following chapter.

Chapter 4: Findings

4.1 Introduction

The primary purpose of this research was to investigate RNs', ENs', SDNs' and NUMs' evaluation of an e-learning training package for developing clinical skills and knowledge at a private hospital in Western Australia. Another purpose of the research was to identify the barriers to e-learning for nurses at various designations, and to determine the extent to which the findings of this study have implications for the delivery of training and education for nurses.

This chapter provides the quantitative results of the survey questionnaire, providing explicit information pertaining to the RNs', ENs', SDNs' and NUMs' experiences of using e-learning. It provides the factors that the RNs, ENs, SDNs and NUMs experienced as enablers or barriers for e-learning, and summarises the participants' demographic information, including gender, age, nursing experience, qualifications and employment status.

4.2 Reliability Analysis

The purpose of this section is to establish whether the four scales used in the survey (experience with e-learning, experience with training to use e-learning, e-learning effectiveness and e-learning barriers) could be considered internally consistent and reliable. The initial reliability analysis is presented in Table 3. The final reliability analysis is shown in Table 6.

Table 3: Initial Reliability Analysis

Scale	Number of Items (N)	Cronbach's Alpha
Experience with E-Learning	5	.401
Experience with Training to Use E-Learning	5	.388
E-Learning Effectiveness	6	.926
E-Learning Barriers	5	.736

The reliability coefficients for the ‘e-learning effectiveness’ and ‘e-learning barriers’ scales were greater than the 0.7 alpha value, which was acceptable. However, the reliability coefficients for the ‘experience with e-learning’ and ‘experience with training to use e-learning’ scales were less than the 0.7 alpha value.

Table 4: Experience with E-learning Items

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
I think that electronic learning is intuitive to navigate.	11.366	3.079	.522	.063
I think electronic learning is confusing in its design.	10.388	7.430	-.570	.809
I think electronic learning is graphically appealing.	11.051	3.019	.504	.066
I think electronic learning is well designed.	11.106	3.059	.562	.034
I think electronic learning is easy to follow.	11.443	3.498	.481	.144

A closer examination of the items from the ‘experience with e-learning’ scale (Table 4) indicated that removing the second item from the scale (‘I think electronic learning is confusing in its design’) made the scale reliable. Thus, this item was removed from the scale. However, a closer examination of the items from the ‘experience with training to use e-learning’ scale (Table 5) indicated that the reliability of the scale could not be improved even after deleting certain items (it remained below the 0.7 alpha value).

Table 5: Experience with Training to Use E-learning

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation
I was given training on how to use electronic learning.	11.930	4.256	.397
I was given enough time to engage with electronic learning.	11.663	4.268	.390
I was needing assistance when using electronic learning.	11.527	7.463	-.222
I was confident in using electronic learning.	12.766	6.121	.104
I was given support when I was struggling with electronic learning.	12.187	4.623	.423

Table 6: Final Reliability Analysis

Scale	Number of Items (N)	Cronbach's Alpha
Experience with E-Learning	4	.809
E-Learning Effectiveness	6	.926
E-Learning Barriers	5	.736

The final values for the experience with e-learning scale, e-learning effectiveness scale and e-learning barriers scale were deemed to be reliable for use in subsequent analysis, since all Cronbach's alpha values were greater than 0.7.

4.3 Final List of Questions on Each Scale

Three final scales—experience with e-learning, e-learning effectiveness and e-learning barriers scales—were used for analysis. Pertaining to the e-learning training package used at The Hospital, the final list of questions on each scale is given below.

Experience with e-learning:

- I think that electronic learning is intuitive to navigate.
- I think that electronic learning is graphically appealing.
- I think that electronic learning is well designed.
- I think that electronic learning is easy to follow.

E-learning effectiveness:

- Electronic learning helped me develop new clinical skills.
- Electronic learning is an effective way to develop clinical skills.
- Electronic learning is an engaging way to develop clinical skills.
- Electronic learning helped me develop new clinical knowledge.
- Electronic learning is an effective way to develop clinical knowledge.
- Electronic learning is an enjoyable way to develop clinical knowledge.

E-learning barriers:

- Rate the following barriers in regard to how they may affect your completion of electronic learning:
  - lack of management support
  - time
  - lack of training on the use of electronic learning
  - limited access to computers
  - lack of technological support.

4.4 Summary of Participants

The participants in this study were RNs, ENs, SDNs and NUMs. The sample consisted of 275 participants at The Hospital. Two respondents were removed from the final data analysis because of incomplete data, resulting in 273 participants for data analysis.

4.5 Demographic Data

The questionnaire collected the demographic data of the RNs, ENs, SDNs and NUMs, including gender, age, years of nursing experience, qualifications and employment status. The results for each demographic variable are addressed below.

4.5.1 Gender

The findings showed that the vast majority of participants in this sample were female (n = 253; 92%), while 8% (n = 22) of participants were male. Thus, there was a large difference between the percentage of female and male participants, which is consistent with the differences in the nursing profession, as nursing is predominately a female

profession. In 2016, 88.3% of nurses in Australia were female and 11.7% were male (AHPRA, 2018).

4.5.2 Age

The data regarding the age of participants showed that their ages ranged between 20 and 65 years. The largest percentage of participants (31.3%, *n* = 86) were aged between 25 and 35 years, followed by 30.2% (*n* = 83) of participants aged between 36 and 45 years, 22.2% (*n* = 61) of participants aged between 46 and 55 years, 10.2% (*n* = 28) of participants aged between 56 and 65 years, 5.5% (*n* = 15) of participants aged between 20 and 24 years and 0.7% (*n* = 2) of participants aged > 66 years. Figure 3 represents the percentages for each age range.

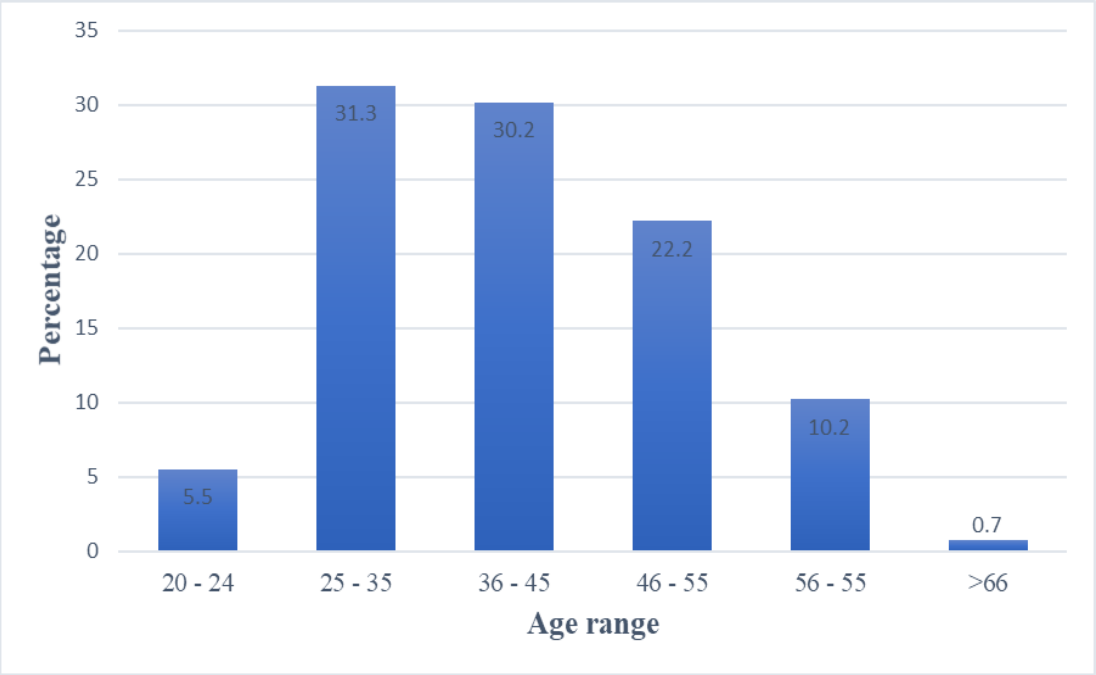


Figure 3: Percentage of Participants in Each Age Range

4.5.3 Response Rate by Designation

The response rates of participants by designation were 86.2% (*n* = 237) of RNs, 7.3% (*n* = 20) of ENs, 3.3% (*n* = 9) of SDNs and 3.3% (*n* = 9) of NUMs. Thus, RNs comprised the largest number of participants in this study. Figure 4 represents the percentages for each nursing designation.

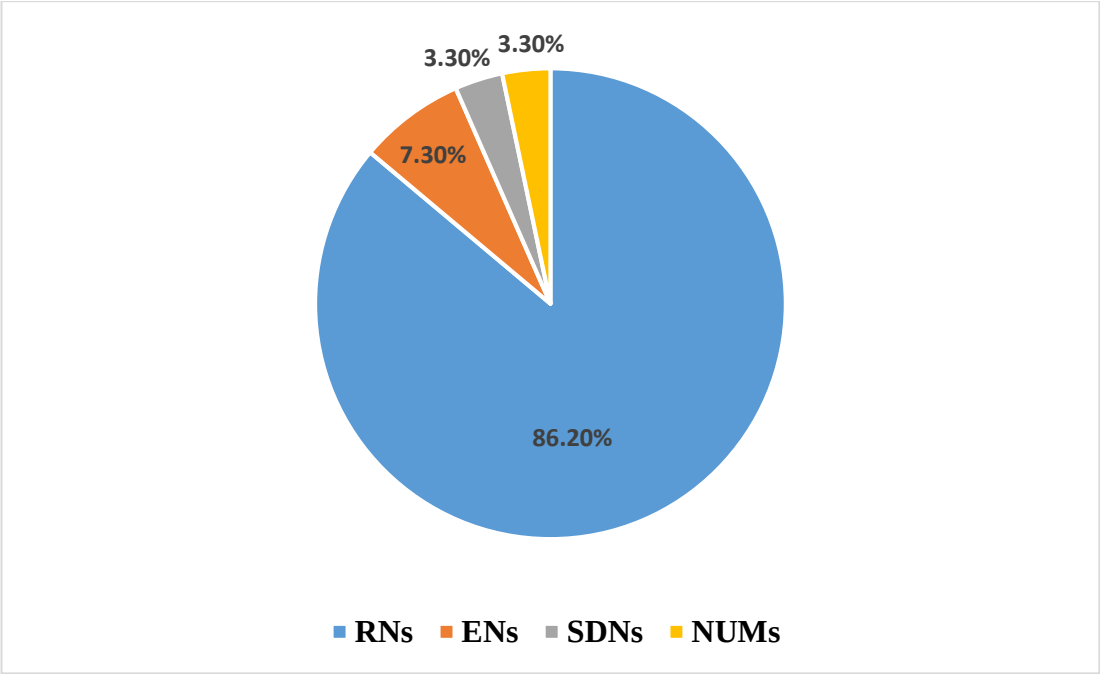


Figure 4: Percentage of Each Nursing Designation

4.5.4 Qualifications

The range of qualifications included a Diploma in Enrolled Nursing, Bachelor of Nursing, Master of Nursing, PhD and Doctor of Nursing. The vast majority of participants had completed the Bachelor of Nursing as their highest level of education (83.3%, *n* = 229). The next level of education completed was ENs (Diploma in Enrolled Nursing—10.5%, *n* = 29) followed by a Master of Nursing (5.5%, *n* = 15), PhD (0.4%, *n* = 1) and Doctor of Nursing (0.4%, *n* = 1). Figure 5 illustrates the highest qualifications held by the participants.

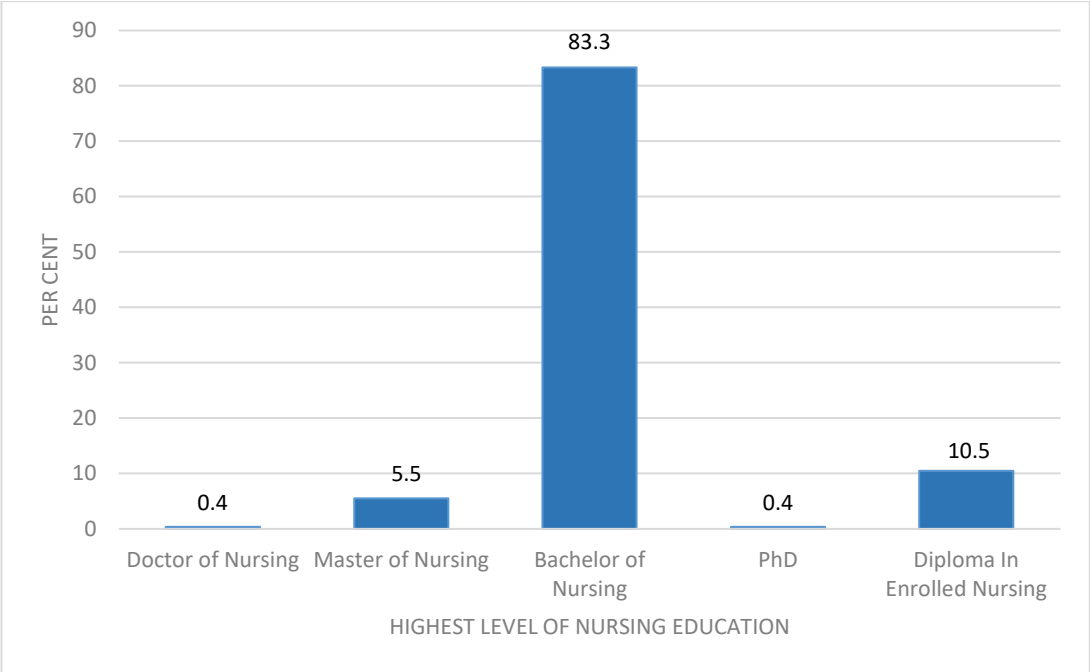


Figure 5: Participants' Highest Qualifications

4.5.5 Nursing Experience

In terms of work experience, the majority of participants had > 20 years of work experience (35.3%, *n* = 97), followed by participants with between five and nine years of work experience (22.5%, *n* = 62), participants with < 5 years of work experience (18.2%, *n* = 50), participants with between 10 and 14 years of work experience (12%, *n* = 33) and participants with 15 to 19 years of work experience (12%, *n* = 33). Figure 6 represents the nursing experience in years of the RNs, ENs, SDNs and NUMs who participated in the study.

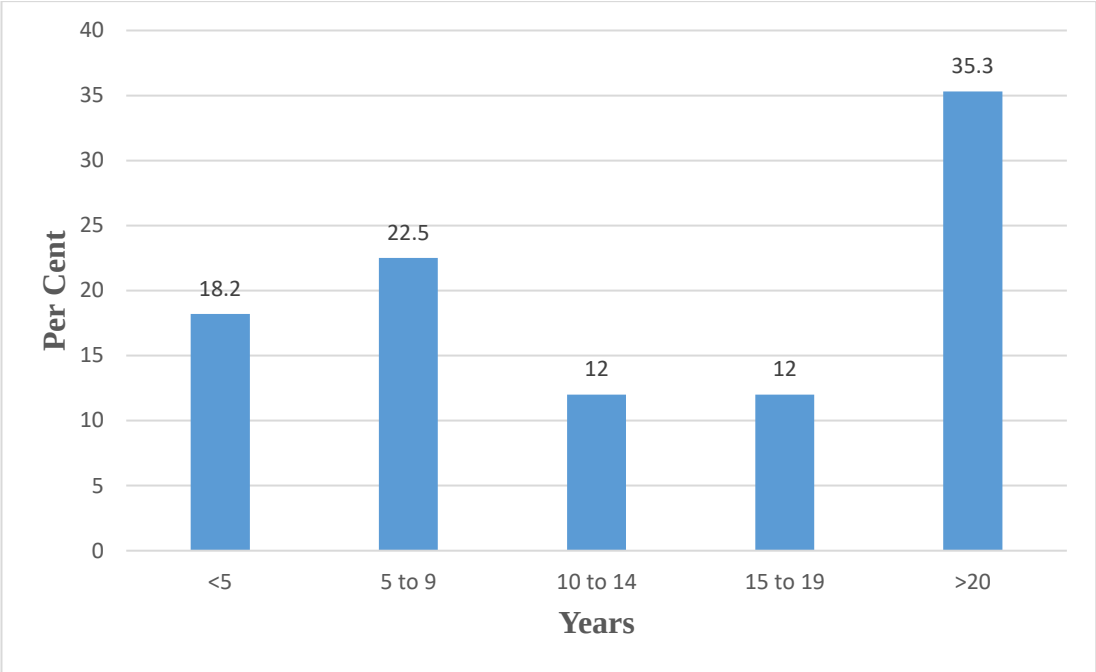


Figure 6: Participants' Years of Nursing Experience

4.5.6 Employment Status

The employment status of almost half of the participants was part-time (49.1%, *n* = 135). Full-time employment status comprised 43.6% (*n* = 120), while the casual pool comprised 7.3% (*n* = 20). Figure 7 represents the participants' employment status.

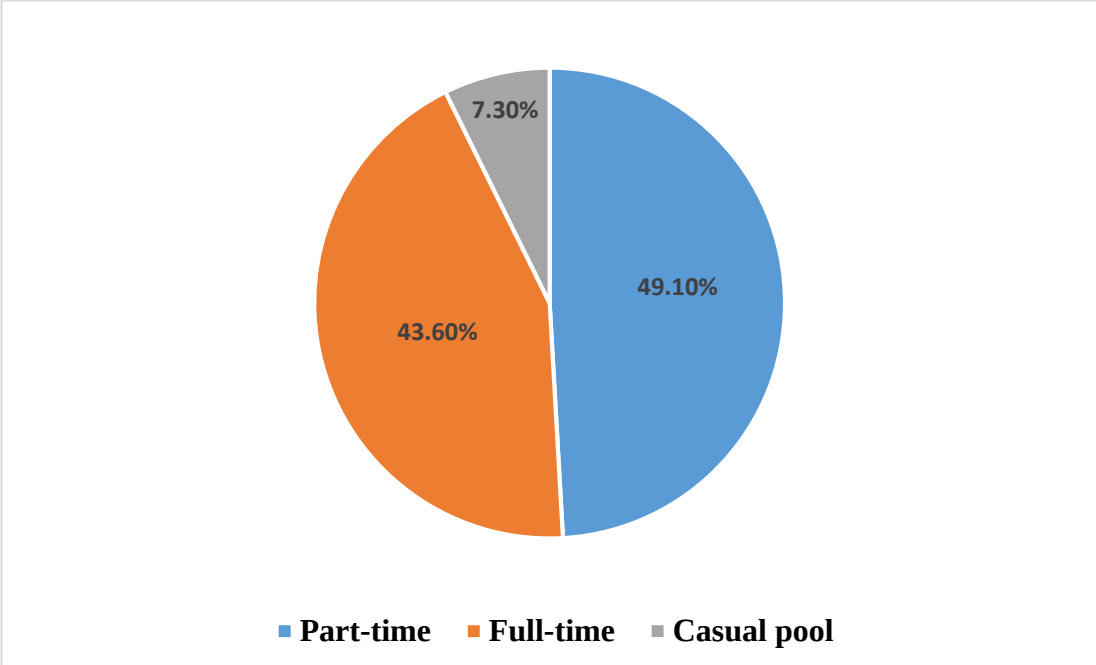


Figure 7: Participants' Employment Status

4.6 Participants' Engagement with E-learning

The questionnaire asked the RNs, ENs, SDNs and NUMs about their engagement with e-learning at The Hospital and their frequency of using e-learning in a week. The questionnaire also asked whether the participants had used other online learning training package for professional development. The vast majority of participants indicated that they had engaged with e-learning at their private hospital (98.9%, *n* = 272). Participants who had not engaged with e-learning at The Hospital comprised only 1.1% (*n* = 3). More than half of the participants engaged in e-learning less than once per week (58.2%, *n* = 159). The majority of participants had also used other online learning training package for professional development (87.5%, *n* = 239). The participants who had not used another online training package comprised 12.4% (*n* = 34). Table 7 illustrates the participants' engagement with e-learning. Valid % in Table 7 is the percent when missing data are excluded from the calculations. If there is no missing data for a question, then the valid % is the same as the actual percent.

Table 7: Participants' Engagement with E-learning

Item	Category	Frequency	%	Valid %	Cumulative %
Have you engaged with electronic learning at this private hospital?	Yes	272	98.9	98.9	98.9
	No	3	1.1	1.1	100.0
	Total	275	100.0	100.0	
How many times a week do you engage in electronic learning?	Less than once/week	159	57.8	58.2	58.2
	1–2 times/week	94	34.2	34.4	92.7
	3–4 times/week	13	4.7	4.8	97.4
	5–6 times/week	2	.7	.7	98.2
	> 6 times/week	5	1.8	1.8	100.0
	Total	273	99.3	100.0	
	Missing	2	.7		
Total		275	100.0		
Have you used other online learning training package for professional development?	Yes	239	86.9	87.5	87.5
	No	34	12.4	12.5	100.0
	Total	273	99.3	100.0	
	Missing	2	.7		
Total		275	100.0		

Table 8 demonstrates the participants' use of other online training packages. The most commonly used online training package was Google Search, followed by Wikipedia, Healthscope library resources via the intranet, and the UpToDate resource. This was a multiple response question in the questionnaire where participants could tick multiple boxes. % indicates the percentage of participants who choose that particular option. % of cases indicates the percentage of choice/particular-box that was ticked out of all he choices or boxes that were ticked.

Table 8: Participants' Use of Other Online Training Packages

		Responses		% of Cases
		No.	%	
Online training package	Google search	177	37.8	74.1
	Wikipedia	62	13.2	25.9
	UpToDate resource	36	7.7	15.1
	Healthscope library resources via the intranet	60	12.8	25.1
	Other	133	28.4	55.6
Total		468	100.0	195.8

4.7 Barriers Affecting RNs', ENs', SDNs' and NUMs' Use of E-learning

A number of barriers were listed in the questionnaire, and participants were asked to identify the most and least challenging barriers affecting their use of e-learning. Table 9 illustrates the most challenging barriers affecting the RNs', ENs', SDNs' and NUMs' use of e-learning at The Hospital. Participants listed time as the most challenging barrier to e-learning, followed by limited access to computers, and then lack of management support and technological support. The least challenging barrier was lack of training on the use of e-learning.

Table 9: Most Challenging Barriers to E-learning

		Frequency	%	Valid %	Cumulative %
Valid	Lack of management support	12	4.4	4.4	4.4
	Time	205	74.5	75.1	79.5
	Lack of training on use of electronic learning	11	4.0	4.0	83.5
	Limited access to computers	33	12.0	12.1	95.6
	Technological support	12	4.4	4.4	100.0
	Total	273	99.3	100.0	
Missing		2	.7		
Total		275	100.0		

Table 10 illustrates the least challenging barriers to e-learning at this private hospital. As aforementioned, the least challenging barrier indicated by participants was lack of training on the use of e-learning. Following this barrier was technological support, limited access to computers, lack of management support and lack of time.

Table 10: Least Challenging Barriers to E-learning

		Frequency	%	Valid %	Cumulative %
Valid	Lack of management support	51	18.5	18.7	18.7
	Time	31	11.3	11.4	30.0
	Lack of training on use of electronic learning	84	30.5	30.8	60.8
	Limited access to computers	53	19.3	19.4	80.2
	Technological support	54	19.6	19.8	100.0
	Total	273	99.3	100.0	
Missing		2	.7		
Total		275	100.0		

4.8 Design of E-learning

The questionnaire asked participants to identify the design of e-learning used at this private hospital. The design of e-learning given in the questionnaire was based on Mayer's (2009) cognitive theory of multimedia learning. This theory is based on three assumptions: (i) there are two separate channels (auditory and visual) for processing information; (ii) there is limited channel capacity; and (iii) learning is an active process of filtering, selecting, organising and integrating information (Mayer, 2009). The participants were asked to identify whether the e-learning was visual/pictorial or

auditory/verbal. In addition, they were asked whether many visual and auditory material or spoken words/sounds were presented at the same time. They were also asked to identify if they were actively engaged in the learning. Table 11 illustrates the design of e-learning at The Hospital.

Table 11: Design of E-learning

		Responses		% of Cases
		N	%	
Was the e-learning:	visual/pictorial?	187	39.2%	68.5%
	auditory/verbal?	89	18.7%	32.6%
	presenting a lot of visual material at one time?	98	20.5%	35.9%
	presenting a lot of spoken words/sounds at once?	25	5.2%	9.2%
	actively engaging you in the learning?	78	16.4%	28.6%
Total		477	100.0%	174.7%

The vast majority of participants stated that e-learning was visual/pictorial (68.5%, *n* = 187). The participants also indicated that a large quantity of visual material was presented at one time (35.9%, *n* = 98). Further, 32.6% (*n* = 89) indicated that the e-learning design was auditory/verbal. A small percentage of participants (9.2%, *n* = 25) indicated that a large quantity of spoken words/sounds was presented at once. Finally, only 28.6% (*n* = 78) of participants indicated that they were actively engaged with the e-learning. This is less than one-third of the sample size of this study.

4.9 Meaningful Learning with E-learning

The questionnaire asked the participants if they had attained meaningful learning through the e-learning at this private hospital. As described in Chapter 2, meaningful learning occurs when the learner appropriately engages in selecting words and images, organises words and images mentally in coherent verbal and pictorial representations, and integrates the incoming verbal and pictorial representations with each other and with existing knowledge. Table 12 demonstrates that the majority of participants (67%, *n* = 183) gained meaningful learning through e-learning. The remainder of participants (33%, *n* = 90) indicated that they did not experience meaningful learning through e-learning.

Table 12: Participants' Experience of Meaningful Learning through E-learning

		Frequency	%	Valid %	Cumulative %
Valid	Yes	183	66.5	67.0	67.0
	No	90	32.7	33.0	100.0
	Total	273	99.3	100.0	
Missing		2	.7		
Total		275	100.0		

4.10 Summary Statistics

Table 13 presents the summary statistics for the nurse responses to various questions relating to their views on e-learning training packages for developing clinical skills and knowledge. Note that no responses from the 'experience with training to use e-learning' scale are provided because this scale was not found to be reliable. In addition, the responses to the item 'I think electronic learning is confusing in its design' from the 'experience with e-learning' scale are not provided because this item was also not found to be reliable.

Table 13: Summary Statistics

What is your designation at your workplace?		N	Min.	Max.	Mean	SD
Registered Nurse	I think that electronic learning is intuitive to navigate.	235	0	5	2.39	0.84
	I think electronic learning is graphically appealing.	235	0	5	2.69	0.9
	I think electronic learning is well designed.	235	0	5	2.69	0.84
	I think electronic learning is easy to follow.	235	1	5	2.41	0.78
	Electronic learning helped me to develop new clinical skills.	235	0	5	2.88	1.02
	Electronic learning is an effective way to develop clinical skills.	235	0	5	2.93	1.03
	Electronic learning is an engaging way of developing clinical skills.	235	0	5	2.97	1.04
	Electronic learning helped me to develop new clinical knowledge.	235	1	5	2.55	0.92
	Electronic learning is an effective way to develop clinical knowledge.	235	1	5	2.62	0.87
	Electronic learning is an enjoyable way of developing clinical knowledge.	235	1	5	3.04	1
	Rate the barrier - Lack of management support - in regards to completing your electronic learning.	235	0	5	3.33	1.05
	Rate the barrier - Time - to how it may affect your completion of electronic learning.	235	0	5	3.77	1.09
	Rate the barrier - Lack of training on use of electronic learning - to how it may affect your completion of electronic learning.	235	0	5	2.92	1.06
	Rate the barrier - Limited access to computers - on how it may affect your completion of electronic learning.	235	0	5	3.51	1.16
	Rate the barrier - Technological support - as to how it may affect completion of your electronic learning.	235	0	5	3.26	1.03
Staff Development Nurse	I think that electronic learning is intuitive to navigate.	9	1	3	2.22	0.67
	I think electronic learning is graphically appealing.	9	2	4	2.78	0.67
	I think electronic learning is well designed.	9	2	4	2.56	0.73
	I think electronic learning is easy to follow.	9	1	3	2.22	0.67
	Electronic learning helped me to develop new clinical skills.	9	2	5	3.11	1.27
	Electronic learning is an effective way to develop clinical skills.	9	2	5	3.11	1.17
	Electronic learning is an engaging way of developing clinical skills.	9	2	5	3.44	0.88
	Electronic learning helped me to develop new clinical knowledge.	9	1	4	2.56	1.01
	Electronic learning is an effective way to develop clinical knowledge.	9	2	4	2.78	0.83
	Electronic learning is an enjoyable way of developing clinical knowledge.	9	2	4	2.89	0.93
	Rate the barrier - Lack of management support - in regards to completing your electronic learning.	9	1	5	2.78	1.2
	Rate the barrier - Time - to how it may affect your completion of electronic learning.	9	1	5	3.56	1.42
	Rate the barrier - Lack of training on use of electronic learning - to how it may affect your completion of electronic learning.	9	1	3	2.11	0.78
	Rate the barrier - Limited access to computers - on how it may affect your completion of electronic learning.	9	2	5	2.78	1.09
	Rate the barrier - Technological support - as to how it may affect completion of your electronic learning.	9	2	3	2.44	0.53
Enrolled Nurse	I think that electronic learning is intuitive to navigate.	20	1	4	2.45	0.69
	I think electronic learning is graphically appealing.	20	1	5	2.8	0.95
	I think electronic learning is well designed.	20	2	4	2.7	0.73
	I think electronic learning is easy to follow.	20	2	4	2.45	0.6
	Electronic learning helped me to develop new clinical skills.	20	2	4	2.9	0.64
	Electronic learning is an effective way to develop clinical skills.	20	2	4	2.9	0.72
	Electronic learning is an engaging way of developing clinical skills.	20	2	4	3.05	0.76
	Electronic learning helped me to develop new clinical knowledge.	20	2	4	2.65	0.75
	Electronic learning is an effective way to develop clinical knowledge.	20	2	4	2.75	0.64
	Electronic learning is an enjoyable way of developing clinical knowledge.	20	2	5	3.2	1.01
	Rate the barrier - Lack of management support - in regards to completing your electronic learning.	20	2	5	3.3	0.98
	Rate the barrier - Time - to how it may affect your completion of electronic learning.	20	2	5	3.65	0.99
	Rate the barrier - Lack of training on use of electronic learning - to how it may affect your completion of electronic learning.	20	2	5	3.25	0.97
	Rate the barrier - Limited access to computers - on how it may affect your completion of electronic learning.	20	1	5	3.4	1.19
	Rate the barrier - Technological support - as to how it may affect completion of your electronic learning.	20	2	5	3.3	0.86
Nurse Unit Manager	I think that electronic learning is intuitive to navigate.	9	1	3	2.22	0.83
	I think electronic learning is graphically appealing.	9	1	4	2.56	0.88
	I think electronic learning is well designed.	9	1	5	2.67	1.12
	I think electronic learning is easy to follow.	9	1	3	2.11	0.78
	Electronic learning helped me to develop new clinical skills.	9	1	5	2.67	1.41
	Electronic learning is an effective way to develop clinical skills.	9	1	5	2.89	1.45
	Electronic learning is an engaging way of developing clinical skills.	9	1	5	3.11	1.45
	Electronic learning helped me to develop new clinical knowledge.	9	1	5	2.56	1.42
	Electronic learning is an effective way to develop clinical knowledge.	9	1	5	2.33	1.12
	Electronic learning is an enjoyable way of developing clinical knowledge.	9	1	5	2.89	1.05
	Rate the barrier - Lack of management support - in regards to completing your electronic learning.	9	2	4	3	0.71
	Rate the barrier - Time - to how it may affect your completion of electronic learning.	9	1	5	2.89	1.36
	Rate the barrier - Lack of training on use of electronic learning - to how it may affect your completion of electronic learning.	9	1	4	2.11	1.05
	Rate the barrier - Limited access to computers - on how it may affect your completion of electronic learning.	9	1	4	3.11	1.17
	Rate the barrier - Technological support - as to how it may affect completion of your electronic learning.	9	1	5	3	1.22

4.11 Association between Nurse Designations and their response to E-learning Training for Developing Clinical Skills and Knowledge

4.11.1 Fisher's Exact Test: Experience with E-learning by Nurse Type

A two-sided Fisher's exact test was used to test if there was a statistically significant association between nurse designation and the four items from the 'experience with e-

learning' scale. The test did not find any significant difference in any of the instances. The cross-tabulations are shown in Tables 14 to 17.

Table 14: Experience with E-learning by Nurse Designation—'I think that electronic learning is intuitive to navigate'

			What is your designation at your workplace?				Total
			RN	SDN	EN	NUM	
Experience with e-learning: 'I think that electronic learning is intuitive to navigate'	Agree	Count	143	6	11	5	165
		%	61.9	66.7	55.0	55.6	61.3
	Neutral	Count	67	3	8	4	82
		%	29.0	33.3	40.0	44.4	30.5
	Disagree	Count	21	0	1	0	22
		%	9.1	0.0	5.0	0.0	8.2
Total		Count	231	9	20	9	269
		%	100.0	100.0	100.0	100.0	100.0

p = .882

Table 15: Experience with E-learning by Nurse Designation—'I think that electronic learning is graphically appealing'

			What is your designation at your workplace?				Total
			RN	SDN	EN	NUM	
Experience with e-learning: 'I think that electronic learning is graphically appealing'	Agree	Count	95	3	6	4	108
		%	41.1	33.3	30.0	44.4	40.1
	Neutral	Count	99	5	11	4	119
		%	42.9	55.6	55.0	44.4	44.2
	Disagree	Count	37	1	3	1	42
		%	16.0	11.1	15.0	11.1	15.6
Total		Count	231	9	20	9	269
		%	100.0	100.0	100.0	100.0	100.0

p = .953

Table 16: Experience with E-learning by Nurse Designation—'I think that electronic learning is well designed'

			What is your designation at your workplace?				Total
			RN	SDN	EN	NUM	
Experience with e-learning: 'I think that electronic learning is well designed'	Agree	Count	105	5	9	4	123
		%	45.1	55.6	45.0	44.4	45.4
	Neutral	Count	90	3	8	4	105
		%	38.6	33.3	40.0	44.4	38.7
	Disagree	Count	38	1	3	1	43
		%	16.3	11.1	15.0	11.1	15.9
Total		Count	233	9	20	9	271
		%	100.0	100.0	100.0	100.0	100.0

p = 1

Table 17: Experience with E-learning by Nurse Designation—'I think that electronic learning is easy to follow'

			What is your designation at your workplace?				Total
			RN	SDN	EN	NUM	
Experience with e-learning: 'I think that electronic learning is easy to follow'	Agree	Count	154	6	12	6	178
		%	65.5	66.7	60.0	66.7	65.2
	Neutral	Count	55	3	7	3	68
		%	23.4	33.3	35.0	33.3	24.9
	Disagree	Count	26	0	1	0	27
		%	11.1	0.0	5.0	0.0	9.9
Total		Count	235	9	20	9	273
		%	100.0	100.0	100.0	100.0	100.0

p = .781

4.11.2 Fisher's Exact Test: E-learning Effectiveness by Nurse Type

A two-sided Fisher's exact test was used to test if there were statistically significant associations between nurse designation and the six items from the e-learning effectiveness scale. The test did not find any significant difference in any of the instances. The cross-tabulations are shown in Tables 18 to 23.

Table 18: E-learning Effectiveness by Nurse Designation—'Electronic learning helped me develop new clinical skills'

			What is your designation at your workplace?				Total
			RN	SDN	EN	NUM	
E-learning effectiveness: 'Electronic learning helped me develop new clinical skills'	Agree	Count	103	4	5	6	118
		%	44.0	44.4	25.0	66.7	43.4
	Neutral	Count	69	2	12	1	84
		%	29.5	22.2	60.0	11.1	30.9
	Disagree	Count	62	3	3	2	70
		%	26.5	33.3	15.0	22.2	25.7
Total		Count	234	9	20	9	272
		%	100.0	100.0	100.0	100.0	100.0

p = .116

Table 19: E-learning Effectiveness by Nurse Designation—'Electronic learning is an effective way to develop clinical skills'

			What is your designation at your workplace?				Total
			RN	SDN	EN	NUM	
E-learning effectiveness: 'Electronic learning is an effective way to develop clinical skills'	Agree	Count	92	4	6	5	107
		%	39.3	44.4	30.0	55.6	39.3
	Neutral	Count	73	1	10	1	85
		%	31.2	11.1	50.0	11.1	31.3
	Disagree	Count	69	4	4	3	80
		%	29.5	44.4	20.0	33.3	29.4
Total		Count	234	9	20	9	272
		%	100.0	100.0	100.0	100.0	100.0

p = .338

Table 20: E-learning Effectiveness by Nurse Designation—'Electronic learning is an engaging way to develop clinical skills'

			What is your designation at your workplace?				Total
			RN	SDN	EN	NUM	
E-learning effectiveness: 'Electronic learning is an engaging way to develop clinical skills'	Agree	Count	89	1	5	4	99
		%	38.0	11.1	25.0	44.4	36.4
	Neutral	Count	69	4	9	1	83
		%	29.5	44.4	45.0	11.1	30.5
	Disagree	Count	76	4	6	4	90
		%	32.5	44.4	30.0	44.4	33.1
Total		Count	234	9	20	9	272
		%	100.0	100.0	100.0	100.0	100.0

p = .341

Table 21: E-learning Effectiveness by Nurse Designation—'Electronic learning helped me develop new clinical knowledge'

			What is your designation at your workplace?				Total
			RN	SDN	EN	NUM	
E-learning effectiveness: 'Electronic learning helped me develop new clinical knowledge'	Agree	Count	145	5	10	7	167
		%	61.7	55.6	50.0	77.8	61.2
	Neutral	Count	52	2	7	0	61
		%	22.1	22.2	35.0	0.0	22.3
	Disagree	Count	38	2	3	2	45
		%	16.2	22.2	15.0	22.2	16.5
Total		Count	235	9	20	9	273
		%	100.0	100.0	100.0	100.0	100.0

p = .212

Table 22: E-learning Effectiveness by Nurse Designation—'Electronic learning is an effective way to develop clinical knowledge'

			What is your designation at your workplace?				Total
			RN	SDN	EN	NUM	
E-learning effectiveness: 'Electronic learning is an effective way to develop clinical knowledge'	Agree	Count	126	4	7	7	144
		%	53.6	44.4	35.0	77.8	52.7
	Neutral	Count	74	3	11	1	89
		%	31.5	33.3	55.0	11.1	32.6
	Disagree	Count	35	2	2	1	40
		%	14.9	22.2	10.0	11.1	14.7
Total		Count	235	9	20	9	273
		%	100.0	100.0	100.0	100.0	100.0

p = .264

Table 23: E-learning Effectiveness by Nurse Designation—'Electronic learning is an enjoyable way to develop clinical knowledge'

			What is your designation at your workplace?				Total
			RN	SDN	EN	NUM	
E-learning effectiveness: 'Electronic learning is an enjoyable way to develop clinical knowledge'	Agree	Count	80	4	6	2	92
		%	34.0	44.4	30.0	22.2	33.7
	Neutral	Count	80	2	6	6	94
		%	34.0	22.2	30.0	66.7	34.4
	Disagree	Count	75	3	8	1	87
		%	31.9	33.3	40.0	11.1	31.9
Total		Count	235	9	20	9	273
		%	100.0	100.0	100.0	100.0	100.0

p = .540

4.11.3 Fisher's Exact Test: E-learning Barriers by Nurse Type

A two-sided Fisher's exact test was used to test if there were statistically significant associations between nurse designation and the five items from the e-learning barriers scale. The test did not find any significant difference in any of the instances. The cross-tabulations are shown in Tables 24 to 28.

Table 24: E-learning Barriers by Nurse Designation—'Rate the barrier in regard to completing your electronic learning: Lack of management support'

			What is your designation at your workplace?				Total
			RN	SDN	EN	NUM	
E-learning barriers: 'Rate the barrier in regard to completing your electronic learning: Lack of management support'	Unlikely	Count	92	2	7	2	103
		%	39.5	22.2	35.0	22.2	38.0
	Neutral	Count	96	3	9	5	113
		%	41.2	33.3	45.0	55.6	41.7
	Likely	Count	45	4	4	2	55
		%	19.3	44.4	20.0	22.2	20.3
Total		Count	233	9	20	9	271
		%	100.0	100.0	100.0	100.0	100.0

p = .620

Table 25: E-learning Barriers by Nurse Designation—'Rate the barrier in regard to completing your electronic learning: Time'

			What is your designation at your workplace?				Total
			RN	SDN	EN	NUM	
E-learning barriers: 'Rate the barrier in regard to completing your electronic learning: Time'	Unlikely	Count	140	5	12	3	160
		%	59.8	55.6	60.0	33.3	58.8
	Neutral	Count	70	2	5	3	80
		%	29.9	22.2	25.0	33.3	29.4
	Likely	Count	24	2	3	3	32
		%	10.3	22.2	15.0	33.3	11.8
Total		Count	234	9	20	9	272
		%	100.0	100.0	100.0	100.0	100.0

p = .306

Table 26: E-learning Barriers by Nurse Designation—'Rate the barrier in regard to completing your electronic learning: Lack of training on use of electronic learning'

			What is your designation at your workplace?				Total
			RN	SDN	EN	NUM	
E-learning barriers: 'Rate the barrier in regard to completing your electronic learning: Lack of training on use of electronic learning'	Unlikely	Count	62	0	8	1	71
		%	26.8	0.0	40.0	11.1	26.4
	Neutral	Count	91	3	7	2	103
		%	39.4	33.3	35.0	22.2	38.3
	Likely	Count	78	6	5	6	95
		%	33.8	66.7	25.0	66.7	35.3
Total		Count	231	9	20	9	269
		%	100.0	100.0	100.0	100.0	100.0

p = .100

Table 27: E-learning Barriers by Nurse Designation—'Rate the barrier in regard to completing your electronic learning: Limited access to computers'

			What is your designation at your workplace?				Total
			RN	SDN	EN	NUM	
E-learning barriers: 'Rate the barrier in regard to completing your electronic learning: Limited access to computers'	Unlikely	Count	124	2	10	5	141
		%	53.0	22.2	50.0	55.6	51.8
	Neutral	Count	56	2	5	1	64
		%	23.9	22.2	25.0	11.1	23.5
	Likely	Count	54	5	5	3	67
		%	23.1	55.6	25.0	33.3	24.6
Total		Count	234	9	20	9	272
		%	100.0	100.0	100.0	100.0	100.0

p = .420

Table 28: E-learning Barriers by Nurse Designation—'Rate the barrier in regard to completing your electronic learning: Technological support'

			What is your designation at your workplace?				Total
			RN	SDN	EN	NUM	
E-learning barriers: 'Rate the barrier in regard to completing your electronic learning: Technological support'	Unlikely	Count	92	0	9	3	104
		%	39.3	0.0	45.0	33.3	38.2
	Neutral	Count	87	4	7	3	101
		%	37.2	44.4	35.0	33.3	37.1
	Likely	Count	55	5	4	3	67
		%	23.5	55.6	20.0	33.3	24.6
Total		Count	234	9	20	9	272
		%	100.0	100.0	100.0	100.0	100.0

p = .169

4.12 Kruskal-Wallis Test

A Kruskal-Wallis test was performed to establish if evaluation of the e-learning training package for developing clinical skills and knowledge significantly differed based on the designations of the nurses in the workplace. The results are summarised in Table 29. The results indicated no significant differences between the experience with e-learning score (p = .947) and e-learning effectiveness score (p = .633) between the RNs, SDNs, ENs and NUMs. However, the e-learning barriers score was found to

be significantly different between the RNs, SDN, ENs and NUMs (p = .015). SDNs had the highest barrier score (median = 3.4, interquartile range [IQR] = .7), followed by NUMs (median = 3, IQR = .9), RNs (median = 2.8, IQR = 1.2) and ENs (median = 2.6, IQR = .9). The results indicated that the SDNs identified a higher level of barriers to e-learning compared with the other groups.

Table 29: Kruskal-Wallis Test

	Registered Nurse (N=235)				Staff Development Nurse (N=9)				Enrolled Nurse (N=20)				Nurse Unit Manager (N=9)				Kruskal-Wallis Test	
Score	Mean	Median	SD	IQR	Mean	Median	SD	IQR	Mean	Median	SD	IQR	Mean	Median	SD	IQR	χ^2	Sig.
Experience with E-Learnin	3	4	1	1	4	4	1	1	3	4	1	1	4	4	1	1	0.366	0.95
E-Learning Effectiveness	3	3	1	1	3	3	1	1	3	3	1	1	3	4	1	2	1.719	0.63
E-Learning Barriers	3	3	1	1	3	3	0	1	3	3	1	1	3	3	0	1	10.42	0.02

4.13 Correlation Analysis

A correlation analysis was performed to test for an association between the participants' age and nursing experience (ordinal variables) and their experience with e-learning, e-learning effectiveness and e-learning barriers. The results are shown in Table 30. The results of the correlation analysis indicated a significant negative correlation between age and experience with e-learning, which meant that younger participants had a more positive experience with e-learning than did older participants.

Table 30: Correlation Analysis

	Experience with E-learning	**E-learning Effectiveness**	**E-learning Barriers**	**Age**
E-learning effectiveness	.560**			
E-learning barriers	.278**	.220**		
Age	-.198**	-.095	-.047	
Years of nursing experience	-.086	-.045	-.060	.749**

**. Correlation is significant at the 0.01 level (two-tailed).

An additional correlation analysis was performed to test for an association between experience with e-learning, e-learning effectiveness and e-learning barriers and the questions relating to the design of e-learning (Question 34) and meaningful learning with e-learning (Question 35). The results are shown in Table 31. The results of the analysis indicated significant positive correlations between experience with e-learning and visual/pictorial designs, experience with e-learning and actively engaging in learning, experience with e-learning and meaningful learning with e-learning, e-learning effectiveness and actively engaging in learning, e-learning effectiveness and meaningful learning with e-learning, and e-learning barriers and meaningful learning with e-learning. Moreover, there was a significant negative correlation between experience with e-learning and a large quantity of visual material being presented at one time.

Table 31: Correlation Analysis

	Experience with E-learning	**E-learning Effectiveness**	**E-learning Barriers**	**Visual/Pictorial**	**Auditory/Verbal**	**Lots of Visual Material Presented at Once**	**Lots of Spoken Words/ Sounds Presented at Once**	**Active Engagement in Learning**
E-learning effectiveness	.560**							
E-learning barriers	.278**	.220**						
Visual/pictorial	.161**	.074	.016					
Auditory/verbal	.118	.046	.041	.270**				
Lots of visual material presented at once	-.182**	-.046	-.089	-.314**	-.129*			
Lots of spoken words/ sounds presented at once	-.004	.079	.047	.051	.267**	.265**		
Active engagement in the learning	.252**	.296**	.114	-.025	.027	-.135*	.108	
Meaningful learning with electronic learning	.494**	.697**	.166**	.028	.006	-.027	.034	.271**

**. Correlation significant at the 0.01 level (two-tailed).

*. Correlation significant at the 0.05 level (two-tailed).

4.14 Test of Normality

A Shapiro-Wilk test of normality was conducted to establish if the experience with e-learning score, e-learning effectiveness score and e-learning barriers score could be assumed to be from a normally distributed population, with an alpha value = .001 (Table 32). The results of the test indicated that these scores could not be assumed to be from a normally distributed population at alpha = .001 because the *p*-values of the test were all less than or equal to .001. Therefore, non-parametric statistics and techniques were subsequently used when these three scales were involved.

Table 32: Test of Normality

	Shapiro-Wilk		
	Statistic	**Df**	**Sig.**
Experience with e-learning	.959	273	< .001
E-learning effectiveness	.949	273	< .001
E-learning barriers	.980	273	.001

4.15 Summary

The survey questionnaire collected comprehensive information on RNs', ENs', SDNs' and NUMs' evaluation of an e-learning training package for developing clinical skills and knowledge at a private hospital in Western Australia.

In the sample profile of participants, 93% were engaged in e-learning training package fewer than once a week to three to four times a week. About 88% had used other online training packages. The main barriers to e-learning were time, followed by limited access to computers. The other barriers were less challenging. Only about two-thirds of the participants felt that they had experienced meaningful learning through e-learning.

Using Fisher's exact test for analysis, the enabling factors and barriers that affect e-learning at the hospital were identified. The results indicated no significant differences between experience with e-learning and e-learning effectiveness among the RNs, ENs, SDNs and NUMs. However, the e-learning barriers were found to be significantly different among the RNs, ENs, SDNs and NUMs, with the SDNs indicating the highest number of barriers, followed by the NUMs, RNs and ENs.

Chapter 5: Discussion

5.1 Introduction

The purpose of this research was to evaluate an e-learning training package used by nurses at various designations for developing clinical skills and knowledge at The Hospital. This chapter draws out the key themes from the findings and discusses these themes in the context of the current literature on e-learning in corporate environments.

Despite its significant investment in ELMO, The Hospital does not seem to be reaping the expected benefits in terms of the level of staff engagement. More than half of the participants (n = 159, 58.2%) indicated that they engaged in e-learning less than once per week. This relatively low level of engagement has implications in terms of ensuring that nurses at The Hospital are equipped with the skills and requisite knowledge to deliver an appropriate level of services for patients. In other corporate contexts, the flexible attributes of e-learning have led to an increase in staff engagement. In contrast, at The Hospital, engagement with ELMO was relatively low, with staff citing lack of time as the major barrier. Thus, this research is at odds with the published literature (McGowan, 2015; Wong & Sixl-Daniell, 2015; Wu, Chan, Tan, & Wang, 2018). Therefore, the discussion around the implications of the research will centre on the design of ELMO—particularly its inability to achieve a desired level of flexibility for its users.

Three themes were identified that could explain the way in which staff evaluated ELMO. The first theme is around the nature of flexibility and ELMO's attributes in terms of time, place and space (the process of learning) and in terms of how learning is packaged and sequenced (the content of learning). The second theme is concerned with the instructional design of ELMO, particularly the way in which the textual, auditory and visual materials are brought together. The final theme focuses on the nature of the nursing workforce and the factors that both encourage and inhibit their engagement with ELMO. This chapter discusses these three themes, and then further compares them with the literature.

5.2 Process and Content of Learning

E-learning has been implemented widely by major corporations, yet there is now recognition that success requires more than just installing software and programs. Focusing on the learner, rather than the technology alone, has improved the quality of e-learning (Bennink, 2004). The next sections discuss the process and content of learning at The Hospital by exploring time, place, space and the way learning is packaged and sequenced in ELMO.

5.2.1 Time

In the context of the current study, 'time' focuses on the implementation of ELMO and organisational structure at The Hospital. An Australian study conducted by Bennink (2004) explored e-learning implementation from the corporate perspective. Some of the key themes that emerged from Bennink's study included that a lack of time, skilled training personnel, understanding of e-learning and support can impair the successful implementation of e-learning, regardless of the size of the organisation. Moreover, Montgomerie, Edwards, and Thorn (2016) identified time allocation, good technical delivery and support as having the greatest influence on participants' organisational learning success. As described in Chapter 1, the implementation process of ELMO at The Hospital involved an administrator of the ELMO centre training the clinical development coordinator, deputy general manager and available SDNs in the use of ELMO. The clinical development coordinator and deputy general manager were the site administrators of ELMO. SDNs and NUMs were trained in the use of the ELMO by the site administrators, and then assisted staff with ELMO access and training. ELMO was introduced to nurses at The Hospital with a brief overview that typically included information on login details, basic navigation principles and hospital requirements in terms of the assessment components. An ELMO user guide for The Hospital was made available in each ward for nurses. This guide provided basic information on how to use ELMO. The implementation process of ELMO at The Hospital indicated that training and information in the use of e-learning was provided to nurses. This was evident in the analysis of the findings, where the participants (n = 84, 30.5%) indicated a lack of training in the use of e-learning as the least challenging barrier to e-learning completion.

After training in ELMO, the nurses were advised that they could access ELMO either from work or home. However, despite being given the option to access ELMO from work or home, there was no allocated time to use ELMO at work. This explained why 'time' was rated the most challenging barrier to e-learning by participants (n = 205, 74.5%). Nurses' patient care demands; the hospital staffing shortages; and people distraction from other staff, patients and patients' family members at work made it difficult for the nurses to access ELMO at work; thus, they generally accessed ELMO at home. People distraction was very much related to the place and space of the computer location at The Hospital. The next section will focus on the place and space of learning.

5.2.2 Place and Space

There was no specific designated e-learning centre at The Hospital. The Hospital computers that nurses accessed for ELMO were located at the nursing station, which was an open area in the ward used by other staff. Patients and family members also stopped by this nursing station if they had any queries. Distractions from other staff, patients and family members in this open area made it difficult to access ELMO at The Hospital. In addition, each ward at The Hospital had three to five computers. On average, six to seven nurses were on a ward for each shift. The number of nurses on each shift related to the number of inpatients in the ward. Moreover, the computers that the nurses accessed were not solely allocated for ELMO access. They were used by other staff of The Hospital for accessing and updating patient care information. Thus, nurses could only access these computers for e-learning when they were not in use for other purposes. This explains why 'limited access to computers' was rated the second most challenging barrier to e-learning completion. Limited computer access at work also contributed to nurses accessing ELMO at home.

The Hospital did not factor in the time spent on ELMO at home, with nurses undertaking e-learning at home not paid for the time they spent on ELMO. Nurses accessing ELMO at home would also be distracted by family and social demands, and, if there were no incentives to complete e-learning at home, e-learning engagement would be minimal. This was clearly evident in the findings, with nearly 60% of the participants engaging with e-learning less than once per week. Nil allocated time to

use ELMO and limited access to computers at work resulted in poor engagement with ELMO.

To seek to engage nurses with ELMO, The Hospital sent emails via ELMO to notify users of training. Monthly reports were also sent to staff to notify them of what was due via their e-learning, and ELMO was visible on desktop intranet pages on the computers at work. At The Hospital, nurses generally did keep up with their training requirements. A possible explanation for this could be that the nurses were required by The Hospital to maintain 100% of their training through ELMO. Thus, they did not have the choice to not complete their e-learning. The results indicated that engagement with e-learning can be facilitated if the course content aligns with learners' needs (Choi, Kim, & Kim, 2007). Thus, the next section focuses on the content of e-learning.

5.2.3 Content of E-learning

Pullen (2006) highlighted that, when e-learning uses material that participants can take away and use with their patients in the clinical setting, there is higher engagement and application of content to practice. Likewise, Blackman et al. (2014) identified that nurses' capacity to learn is enhanced when the content is perceived as relevant, particularly if it is related to their everyday work. At The Hospital, the content of ELMO was aimed at nurses applying knowledge to their real-world work. This aligned with the nurses' learning needs and would have enhanced the learners' interest because it was relevant to their work. However, the nurses did not have time to reflect on the information. This lack of 'time' would affect knowledge construction and professional development, with the nurses potentially unable to fully process the information.

In addition, ELMO did not ask learners to elaborate on the material, which could limit engagement with ELMO. This was evident in the findings of this study, with more than half of the participants (n = 159, 57.8%) engaged in ELMO less than once per week. Clark and Mayer (2016) identified that learners elaborating on material will engage learners with the e-learning training package and foster generative processing—this was not the case at The Hospital. According to Jonassen (1994), knowledge construction can be facilitated by providing real-world, case-based learning environments, rather than predetermined instructional sequences. This fosters

reflective practice and supports collaborative construction of knowledge through social negotiation.

Further, the focus of ELMO on knowledge construction meant that it did not promote the development of any generic skills, such as enhanced communication capabilities, problem solving or team skills. In addition, the design of ELMO assumed that nurses would have basic computer skills, and nurses who did not were required to rapidly develop competency. For experienced users of computers, ELMO would have posed no challenges, and it is doubtful that they would have learnt anything new from a technical perspective. However, for inexperienced computer users, simple procedures—such as using a mouse to open an additional window to view a text transcript of an audio—were usually problematic. With good technical support and practice, skills in these areas would no doubt have improved. However, to receive good technical support either from administrators, SDNs or NUMs, the nurses needed to use ELMO at work, which was not usually the case at The Hospital. The organisation did not offer technical support at home. Practice in improving computer skills was probably negligible in most cases because the nurses' engagement with ELMO was less than once per week.

In summary, although ELMO had flexible characteristics—in that it was available 24/7—its implementation did not support flexibility at The Hospital. The findings indicate that ELMO was introduced to nurses with a brief overview, and that user guides were available for nurses. However, no allocated time to use ELMO and the limited access to computers at work affected e-learning flexibility. As such, a robust organisational structure that includes allocated time for e-learning and computer access at work is fundamental to ensuring the sustainability of continuing education and professional development in this organisation. Following on from these results, it is important to examine what the literature states about flexible learning in corporate contexts. Interestingly, the flexible attributes of e-learning have generally led to an increase in staff engagement in corporate contexts. In contrast, at The Hospital, engagement with ELMO was relatively low, with staff citing a lack of time as the major barrier. Thus, it is possible that the flexible attributes of e-learning are lost when time is not allocated to use e-learning.

5.3 Comparing the Results with the Literature

An Australian study by Riley and Schmidt (2016) conducted research in three public health facilities in rural New South Wales, Australia. Participants in the study were health service managers, NUMs, clinical nurse specialists, RNs, ENs and assistants in nursing. The study identified that, because nurses work in a busy and constantly changing work environment, being able to access online learning provides much-needed flexibility. A systematic review by Wu et al. (2018) on articles published between January 2000 and June 2016 from six electronic databases—CINAHL, Ovid MEDLINE, PubMed, Science Direct, Scopus and Web of Science—also identified online learning as offering accessibility, convenience and flexibility, and providing an alternative for the nursing workforce, who face challenges in terms of workload and time. Similarly, Karaman (2011) reported the high flexibility and convenience of online learning as meeting nurses' working conditions and needs.

A case study in corporate e-learning by Wong and Sixl-Daniel (2015) explored the effects of introducing e-learning in training and development for leadership positions. They reported that participants valued e-learning flexibility, both in terms of time and location. E-learning in this corporate sector context allowed employees to train conveniently, working at times and locations that suited them. This e-learning program also had asynchronous discussion board activities and synchronous webinars. Participants reported that they valued the one-on-one interactivity with professors and interactions with peers within the asynchronous discussion boards. These interactions enabled participants to clarify doubts in their learning. McGowan (2015) also reported e-learning as enhancing opportunities for connectivity and flexibility in design, while overcoming the constraints of time and space.

In a study of the factors influencing the use of e-learning in post-registration nursing students, McVeigh (2009) found that time restraints limited the positive perception of e-learning being rated highly as a flexible option. Exploring the reasons underpinning this outcome has strong implications for e-learning's successful implementation. McVeigh reported that successful implementation of e-learning is dependent on work–time relationships and high access to computers and internet at the workplace. McVeigh's study found that no time allocated for e-learning, the pressures of a clinical workload, the number of computers and the number of people accessing the computers

affected the participants' propensity to engage in e-learning at work. The study reported that, of 70 participants, only one had received positive e-learning support in the workplace. The participants reported that they had personal computers at home; however, family commitments, telephone line access and time constraints affected their accessibility to these computers. The findings of the current study are consistent with those of McVeigh (2009) which show that successful implementation of e-learning is dependent on work–time relationships and high access to computers and internet at the workplace. In the current study ELMO implementation did not support flexibility at The Hospital. No allocated time to use ELMO and the limited access to computers at work affected e-learning flexibility.

Moule, Ward, and Lockyer (2010) found that the staff in their study had very little time to undertake any e-learning development, and computer access also hampered their learning. Johnson et al. (2015) identified that, for e-learning to be successful, computer access and computer skills need to be available to nurses. A study by Chong et al. (2016) examined access to computer and internet facilities, interest in and preferences regarding e-learning, and attitudes towards e-learning among nurses in Peninsular Malaysia. The research encompassed 300 RNs. One of the critical findings highlighted in their study was that, to increase and improve e-learning activity, organisations need to increase accessibility to computer and information and communications technology facilities for nurses.

In the current study, the implementation of e-learning was consistent with the literature. E-learning flexibility at The Hospital and in the studies by McVeigh (2009), Moule et al. (2010), Johnson et al. (2015) and Chong et al. (2016) was affected by the lack of time for e-learning, limited access to computers and the participants' family and social demands. An organisational culture that allocates time for e-learning at work and ensures computer access at work would yield the benefit of achieving the desired level of flexibility with e-learning.

The factors that inhibit nurses' engagement with e-learning are reported as barriers to e-learning and have been well documented in the literature. Atack and Rankin (2002) reported insufficient time and limited access to computers as factors contributing to disengagement in learning. Pullen (2006) stated that learners' time, interest, ability and technical challenges limit e-learning potential. Moule et al. (2010) noted limited

computer literacy, lack of computer confidence, technical challenges and access as barriers to e-learning. Kivuti and Chepchirchir (2011) reported lack of computers at work as a barrier to e-learning. Riley and Schmidt (2016) found that staff satisfaction and engagement in online learning increased when the education was linked to organisational priorities and when protected time was allocated for learning. Bindon (2017) also reported limited time, lack of computer access and irregular staffing patterns as barriers to e-learning.

The literature review in Chapter 2 indicated that e-learning studies that were undertaken in blended environments had benefits for both learners and institutions. Williams et al. (2008) defined blended learning as the use of multiple methods to deliver learning, typically by using a combination of traditional face-to-face teaching and some online or distributed activities. Blended learning is considered beneficial for both learners and institutions because it improves learning outcomes, allows flexibility and delivers effective use of resources. In addition, it has been shown to increase learners' satisfaction (Poon, 2012). Keleekai et al. (2016) demonstrated significant improvements in nurses' knowledge, confidence and skills through using a simulation-based blended learning program for peripheral intravenous catheter insertion. Hainey, Kelly, and Green (2017) used a blended teaching approach in caring for and maintaining central venous access devices. The results highlighted that introducing the e-learning training package supported nurses' practice and increased nurses' confidence around correct clinical procedures. Magtibay, Chesak, Coughlin, and Sood (2017) conducted a study to assess the efficacy of blended learning to decrease stress and burnout among nurses through using the Stress Management and Resiliency Training (SMART) program. The results supported the use of blended learning with SMART as a strategy to increase access to resiliency training for nursing staff. Dalhem and Saleh (2014) suggested that blended e-learning enriches the learning experience of nurses. All these prior studies indicate that blended learning might be a useful implementation strategy at The Hospital that could improve engagement with ELMO.

5.4 Instructional Design of E-learning

According to Clark and Mayer (2016), instructional design in e-learning must guide the learners' transformation of words and pictures in the lesson through the working memory, so that they are incorporated into existing knowledge in long-term memory.

This transformation relies on four key processes. First, the learner must focus on key graphics and words in the lesson to select what will be processed. Second, the learner must rehearse this information in the working memory to organise and integrate it with existing knowledge in the long-term memory. Third, to complete this integration work, the limited working memory capacity must not be overloaded. Lessons should apply cognitive load reduction techniques, especially when learners are novices to new knowledge and skills. Fourth, the new knowledge stored in the long-term memory must be retrieved during work. This is called 'transfer of learning'. To support this transfer, e-learning lessons must provide a job context during learning that will create new memories containing job-relevant retrieval hooks. All of these processes require an active learner who selects and processes new information effectively to achieve the learning result. The design of the e-learning can either support or inhibit active processing, depending on which types of instructional methods are used (Clark & Mayer, 2016).

The second theme in this study will link to the theoretical framework, cognitive theory of multimedia. The second theme in this study is concerned with the instructional design of ELMO—particularly the way in which the textual, auditory and visual materials were brought together. This theme has the potential to profoundly influence the active engagement of participants. The participants were asked to indicate whether ELMO was visual/pictorial, was auditory/verbal, presented large quantities of visual material at one time, presented large quantities of spoken words/sounds at once, or promoted active engagement in learning. The vast majority of participants in this study (n = 187, 39.2%) stated that ELMO was visual/pictorial and that large quantities of visual material were presented at one time (n = 98, 20.5%). The participants also stated that ELMO was auditory/verbal (n = 89, 18.7%) and that large quantities of spoken words/sounds were presented at once (n = 25, 5.2%). Presentation that contains both words and graphics is referred to as a multimedia presentation. Words can be mediated either as printed text (words printed on the screen that people read) or spoken text (words presented as speech that people listen to through earphones, speakers or telephones). Graphics refer to static illustrations, such as drawings, charts, graphs, maps or photographs, and dynamic graphics, such as animations or videos. Multimedia presentation refers to any presentation that contains both words and graphics.

Multimedia learning taps into the capacity of a dual-channel processing system, with simultaneous visual and auditory input (Clark & Mayer, 2016).

The cognitive theory of multimedia, presented by Mayer (2001), is particularly useful for research into corporate e-learning because it helps explain the mechanics of learning independently with a computer-based learning training package. The cognitive theory of multimedia learning focuses on dual channels, limited capacity and active processing for knowledge construction. As described in Chapter 2, people have dual channels—separate channels for processing visual/pictorial material and auditory/verbal material. The human mind operates with limited capacity. People can actively process only a few pieces of information in each channel at one time. Visual and auditory information is held in the sensory memory for a very short period. Sounds and images are selected from this sensory input and held in the working memory. According to Mayer (2001), the working memory is where cognitive activity occurs. Mental models, both verbal and pictorial, are developed and integrated with prior knowledge that is held in the long-term memory. Active processing is where learning occurs when people engage in appropriate cognitive processing during learning, such as attending to relevant material, organising the material into a coherent structure, and integrating the material with what they already know.

The findings of this study indicated that the design of ELMO contained large quantities of visual material (n = 98, 20.5%) and spoken words/sounds (n = 25, 5.2%) presented at once. Nurses at The Hospital would process several visual materials and spoken words/sounds in their dual channels; however, the question here is whether the relevant words and images were selected. Learners must select words/images that best match their goals for knowledge construction (Clark & Mayer, 2016). However, this may have not been the case with ELMO at The Hospital because of numerous visual materials and spoken words/sounds being presented at once, causing confusion about which information was the most relevant.

To undertake integration work, the limited working memory capacity must not be overloaded. At The Hospital, large quantities of visual material and spoken words/sounds filled the sensory and working memory of the nurses, thereby causing inefficient processing. Therefore, integration of knowledge in the long-term memory was affected. Consequently, this inefficient processing affected transfer of learning to

everyday work, as new knowledge stored in the long-term memory was affected by cognitive overload. According to Mayer (2009), people can actively process only a few pieces of information at one time. Extraneous text and pictures does not support the overall instructional objectives, and creates poor instructional layout. This is known as 'extraneous processing' (Clark & Mayer, 2016). The cognitive load caused by extraneous and essential processes exceeds mental capacity (Clark & Mayer, 2016). Based on cognitive load theory, ELMO at The Hospital may have placed extraneous overload on the learners by containing mostly visual/pictorial material and presenting large quantities of visual material at one time. The amount of extraneous and essential processing could exceed the learner's cognitive capacity—that is, the learner uses so much capacity on extraneous processing (such as reading extraneous material) that there is not enough capacity remaining for essential processing (that is, comprehending the essential material).

The design of the e-learning training package can support or inhibit active processing to achieve learning results, depending on which types of instructional methods are used (Clark & Mayer, 2016). In the case of ELMO at The Hospital, encountering numerous visual materials and spoken words/sounds would inhibit active processing. This was evident by the small number of participants (n = 78, 16.4%) who indicated that they were actively engaged with e-learning. This was less than half the sample size of this study. An implication of this finding is that other e-learning training packages may need to be considered by The Hospital to achieve the desired learning results through active engagement of their nurses. As a result, nurses would professionally develop their knowledge and skills with the e-learning training package at The Hospital, which would ensure safe and competent patient care.

5.5 Nature of the Nursing Workforce

The third theme focuses on the nature of the nursing workforce and the factors that encouraged and inhibited nurses' engagement with ELMO at The Hospital. In order of nursing hierarchy at The Hospital, the nursing workforce comprised NUMs, SDNs, RNs and ENs. Figure 8 presents a flowchart of the nursing workforce at The Hospital. The employment status of almost half of the participants was part-time (n = 135, 49.10%). The demographic details of the participants indicated that most of the nurses,

irrespective of hierarchical level and employment status, were engaged in ELMO at least once each week.

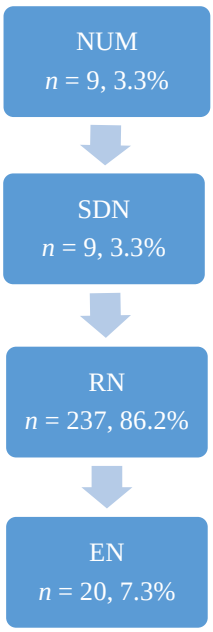


Figure 8: Flowchart of Nursing Workforce at the Study Hospital

The main driver that encouraged engagement with ELMO at The Hospital was the requirement that staff achieve 100% of all their mandatory training from ELMO to meet the national competency standards and fulfil the hospital accreditation requirement. This mandatory training included the Aseptic Technique Program, Pulse Oximetry and Monitoring of Oxygen Saturation Education Program, Healthscope—Clinical Handover, Healthscope—Patient Centred Care Program, Open Disclosure E-learning Program, Bloodsafe Program, Hand Hygiene Program, Basic Life Support Program, Patient Falls and Prevention Management Program, and Manual Handling Program. The mandatory training requirement of nurses was aimed to upgrade nurses' knowledge to ensure evidence-based care, which helps ensure safe, quality and competent patient care. Mandatory training is considered a fundamental ethical requirement for nurses by the NMBA. Nurses are expected to be trained afresh whenever their role changes, so that they have the updated skills required for the new role (Hind, Jackson, Andrewes, Fulbrook, Galvin, & Frost, 1999). Moreover, even nurses who perform the same role for a number of years must frequently update their knowledge and skills because of advancements in patient care through new research.

This effectively means that almost all nurses undergo training almost every year, either because of new roles or because of the need to refresh their knowledge and skills.

The factors that inhibited nurses' engagement with ELMO at The Hospital included time, limited access to computers, lack of management support, lack of technological support and lack of training on the use of ELMO. As discussed earlier in this chapter, the implementation of ELMO at The Hospital indicated 'time' as the most challenging barrier. Besides implementation of ELMO, the participants' employment status at The Hospital exacerbated the issue of 'time'. Almost half of the participants worked part-time at The Hospital; thus, they were only present at The Hospital on certain days. Time to undertake e-learning at work could be hampered by workload concerns or access to computers. This was also indicated by nurses at The Hospital, who rated limited access to computers as their second most challenging barrier to e-learning. As a result of the implied irregularity of part-time work, work–life adjustment also becomes irregular; thus, 'time' to complete e-learning may become a further barrier.

The vast number of nurses working part-time at The Hospital can be explained by examining Australia's nursing workforce. A report about the future health workforce in Australia identified that the nursing workforce in Australia generally works part-time (Australian Government Department of Health, 2015). There is also wide acknowledgement that the nursing workforce is ageing. Appendix G shows the age profile of employed nurses in 2009 and 2012 in Australia. The ageing workforce is reflected in both the increasing average age of nurses (from 44.3 years in 2009 to 44.6 years in 2012) and the increasing percentage of nurses aged 55 years and over (from 19.8% in 2009 to 23.1% in 2012). The ageing workforce may be a reason why nurses are working part-time, as full-time work is no longer suitable. The ageing of the nursing workforce is expected to continue into the future (Australian Government Department of Health, 2015).

A fourth theme that emerged from the data analysis was that e-learning barriers were found to be significantly different between RNs, ENs, SDNs and NUMs at The Hospital. One unanticipated finding was that SDNs indicated the highest barrier score (median = 3.4, IQR = .7), followed by NUMs (median = 3, IQR = .9), RNs (median =

2.8, IQR = 1.2) and ENs (median = 2.6, IQR = .9). This was an unanticipated finding because of the role of the SDN. SDNs in hospitals have primary responsibility for organisation-wide programs, such as preceptor training, while others work in a specialties providing specialty education (Conway & Elwin, 2007). It was surprising that the SDNs reported the highest barrier score because they are the leaders who promote the appropriate onboarding, training, education and professional development of new hires and established members of nursing staff. A possible explanation for these results may be that, because SDNs have an educational focus, they could have higher expectations of an e-learning training package and subsequently greater disappointment with ELMO.

5.6 Correlations

Correlations were identified between age and e-learning experience and age and nursing experience. There was a significant negative correlation between the nurses' age and e-learning experience (-0.198), as shown in Table 30. The nurses' age and working experience were not significantly related to their perceptions of online programs, although they considered e-learning suitable for their work and needs in the studies by Karaman (2011) and Ifinedo (2016). According to the findings reported by Kipturgo, Kivuti-Bitok, Karani, and Muiva (2014), younger nurses demonstrated greater enthusiasm in the use of technology and a positive attitude towards the use of computers. This supports the findings of Eley, Fallon, Soar, Buikstra, and Hegney (2008), who reported that younger nurses were more confident in their information technology skills and less likely to report confidence in use as a barrier than were older nurses. In a study of nurses using a sensor-based medication system by Kummer, Schäfer, and Todorova (2013), older nurses were more likely to suffer as a result of too many technical tasks and insufficient technical skills. In an Australian study of student nurses by Cooke et al. (2012), the older group (> 22 years) of nursing students found web-based lecture capture more useful to understand, learn and prepare for assessment, while the younger (< 19 years) first-year students found it helped them adjust to university life. As younger nurses report better confidence and subsequently better experience, there is a negative correlation between experience and age. With nurses' increasing age, e-learning experience decreases. Thus, younger nurses have a

more positive experience with e-learning than do older nurses. Therefore, the literature supports the results of this work.

5.7 Study Limitations

There are several possible limitations to this research. First, sampling from a single hospital could affect the generalisability of this study. Second, some scales and items may not have been efficient in measuring what they were intended to measure. Third, the reliability of the 'experience with training to use e-learning' scale could not be improved—even after deleting items, it remained below the 0.7 alpha value. A scale is considered reliable if its Cronbach's alpha is more than 0.7. (Reynaldo & Santos, 1999). When the scale has a Cronbach's alpha of less than 0.7, it is common practice to drop one or more questions from the scale and recompute the Cronbach's alpha to see if it becomes more than 0.7. In the case of 'experience with training to use e-learning' scale, the reliability could not be improved by dropping any items. Therefore, it was considered unreliable and not used subsequently. Fourth, providing only 'yes' or 'no' options in the item for meaningful e-learning could have been inadequate because it did not allow participants to include more information on the subject matter. Fifth, the work would have been strengthened by including some observation studies with a qualitative component to directly assess the effectiveness of ELMO with respect to using the knowledge and skills in practical daily work. Sixth, data collection was only conducted at one single point in time and the research only considered one e-learning training package—ELMO. Therefore, it is not possible to generalize the findings of this one e-learning training package to other e-learning training packages. Finally, data analysis was conducted by the researcher as a hospital employee, which raises the potential for bias.

5.8 Summary

In summary, implementation of an e-learning training package can increase nurses' learning engagement. However, the content of an e-learning training package is important to uphold a quality learning experience. The greater use of visual/pictorial content enhances the learning experience; however, too much of this content displayed at one time may confuse learners, which can reduce the learning experience. Content appropriate to the needs of the nurses, with sufficient visuals and attractive delivery,

may enhance the learning experience. The implication of these findings is that there is a strong case for blended learning as a method of knowledge and skill enhancement among nurses, with adequate support from the nursing organisations and hospitals in which the nurses' work.

Chapter 6: Conclusion

6.1 Introduction

This study has generated an in-depth understanding of an e-learning training package used by nurses of various designations for developing clinical skills and knowledge at a private hospital in Western Australia. The quantitative approach applied in this study resulted in identifying the barriers for e-learning faced by these participants at their workplace. The enabling factors to enhance the effectiveness of e-learning were also identified for ongoing education.

In the previous chapter, the findings of this study were explained and interpreted, with support from previous works in the published literature. The results answered all the research questions. From a broader perspective, the research has explored the implications of the study findings for the future delivery of training and education for nurses. This concluding chapter outlines the key findings generated by this study, and discusses their implications for ongoing education, practice development, health organisations and research.

6.2 Salient Features of the Study

The findings of this study indicated that an e-learning training package effectiveness and ability to achieve the desired level of flexibility for its users are mainly dependent on the implementation process, the way learning is packaged and sequenced, and instructional design of e-learning. The overview of the relevant literature demonstrated that the flexible characteristics of e-learning are dependent on the implementation process of the e-learning training package. This has been widely acknowledged among previous studies (Chong et al., 2016; Johnson et al., 2015; McGowan, 2015; McVeigh, 2009; Moule et al., 2010; Riley & Schmidt, 2016; Wong & Sixl-Daniel, 2015). Lack of allocated time to use ELMO and limited access to computers at work affected the ELMO flexibility at The Hospital. These findings align with those observed in earlier studies (Atack & Rankin, 2002; Bennink, 2004; Bindon, 2017; Johnson et al., 2015; Kivuti & Chepchirchir, 2011; Montgomerie et al., 2016; Moule et al., 2010; Pullen, 2006; Riley & Schmidt, 2016; Wu et al., 2018). To address this, a robust organisational structure with allocated time for e-learning and computer access at work is

fundamental to ensure the sustainability of continuing education and professional development in an organisation (Montgomerie et al., 2016; Singh & Hardaker, 2014).

The effectiveness of an e-learning training package is also related to how learning is packaged and sequenced. When the e-learning training package uses materials that participants can apply with patients in the clinical setting, there is higher active engagement and application of content to practice. According to Khan, Egbue, Palkie, and Madden (2017) active engagement can enhance e-learning effectiveness. Pullen (2006) and Blackman et al. (2014) identified that, when e-learning training packages use material that nurses can apply with their patients, the capacity to learn is enhanced. At The Hospital, the content of ELMO was aimed at nurses applying knowledge to patient care; however, time was not given to nurses to engage with ELMO. This could limit the effectiveness of ELMO at The Hospital.

This research has indicated that the design of the e-learning training package can affect active engagement with e-learning. Clark and Mayer (2016) emphasised that instructional design in e-learning requires active learning and engagement that guides learners' transformation of words and pictures in the lesson through the working memory to the existing long-term memory. Active learning and engagement with an e-learning training package is fundamental for staff working in healthcare organisations to provide best practice and optimal patient outcomes. To implement an e-learning training package, it is necessary for organisations to consider the design of the e-learning training package to facilitate active learning and engagement. The next section will answer the research questions for this study. The research questions were:

1. How did nurses at various designations evaluate respond to an e-learning training package for developing clinical skills and knowledge?
2. What are the barriers to e-learning for nurses at various designations?
3. To what extent do the findings of this study have implications for the future delivery of training and education for nurses?

6.3 Effectiveness of ELMO

The evaluation of the ELMO used by the nurses of various designations to develop clinical skills and knowledge at The Hospital indicated that effectiveness was measured in terms of developing new clinical skills and knowledge. The different

response patterns among the different nursing levels answered the first research question. The responses are listed below:

- NUMs—engaging way to develop clinical skills
- SDNs—helping, effective and engaging way to develop clinical skills
- RNs—enjoyable way to develop clinical knowledge
- ENs—engaging way to develop clinical skills and enjoyable way to develop clinical knowledge.

The above responses suggested that both NUMs and SDNs found ELMO to be less effective with respect to clinical skills. This could be related to the role of NUMs and SDNs. NUMs and SDNs focus on developing clinical skills and knowledge for their staff. Therefore, NUMs and SDNs may have had higher expectations of ELMO for developing clinical skills, and subsequent greater disappointment. RNs could have found ELMO to be less effective in developing clinical knowledge in an enjoyable manner. However, for RNs, developing knowledge was adequately possible with ELMO. For ENs, ELMO was less effective in terms of engagement for developing clinical skills and enjoyment in developing clinical knowledge.

Blended learning might be a useful implementation strategy at The Hospital to improve the engagement and effectiveness of ELMO. This could be provided by the flexible approach offered by blended learning in presenting content. Complex topics can be presented in an environment in which a facilitator, such as SDNs, teach content and have discussions to ensure that nurses understand the topic. By using a variety of mediums and techniques in teaching, blended learning can cover all adult learning styles and improve the effectiveness of ELMO. An example of content in ELMO where blended learning could be applied is the Aseptic Technique Program. Currently, ELMO provides theoretical knowledge on aseptic technique, followed by an online assessment in applying aseptic technique. Aseptic technique is a complex topic because it aims to prevent pathogenic organisms (in sufficient quantity to cause infection) being introduced to susceptible sites by hands, surfaces and equipment (National Health and Medical Research Council, 2010). Its focus is on protecting patients during invasive clinical procedures by employing infection control measures that minimise, as far as practicably possible, the presence of pathogenic microorganisms. To ensure nurses understand how to apply aseptic technique, a face-

to-face demonstration of the skill by an SDN would be beneficial to grasp the principles of the technique. As an organisation, a topic that can reduce the risk of healthcare-associated infections should include a face-to-face practical assessment of nurses demonstrating aseptic technique to ensure that they have understood the principles of the technique and are able to perform procedures by applying these principles. This will ensure patient protection and reduce the risk of infection.

6.3.1 Barriers

The barriers that inhibit nurses' engagement with ELMO at The Hospital include lack of time, lack of management support, lack of technological support and limited access to computers. This has also been acknowledged by other studies (Atack & Rankin, 2002; Bindon, 2017; Kivuti & Chepchirchir, 2011; Moule et al., 2010; Pullen, 2006; Riley & Schmidt). However, these barriers were also found to be significantly different for nurses of various designations at The Hospital. SDNs indicated the highest barriers, followed by NUMs, RNs and ENs. This answered the second research question. A possible explanation for this is the different roles of staff and their expectations in learning and development. SDNs' rating of the highest barrier may be related to their role as educators. SDNs are required to ensure that their staff are competent and prepared to deliver care in a highly regulated environment. Thus, SDNs routinely support and maintain professional development for nurses in the workplace. Therefore, the SDNs may have had higher expectations of ELMO and subsequently greater disappointment. To implement e-learning in healthcare, it may be useful to involve SDNs in the strategic planning stages of implementing the e-learning training package. SDNs could ensure that the implementation process of the e-learning training package is effective and meets the educational needs of nurses. Meeting nurses' educational needs would promote a more efficient and productive nursing workforce.

6.3.2 Enabling Factors

Evident throughout the analysis and findings of this study was the vast need for nurses to have a flexible mechanism to continue their professional development. ELMO has flexible characteristics because it is available 24/7. This characteristic enabled nurses to access ELMO, even with the barriers identified above. A second enabling factor was training and education in the use of e-learning, which was provided to nurses at

The Hospital. This helped the nurses log in, navigate ELMO and attend to hospital requirements in terms of assessment components. Ongoing support for training and education in the use of e-learning is necessary, particularly because e-learning is widely used by corporate environments for learning and development of their staff. The final enabling factor was the age of nurses. The typical profile of the e-learning nurses was available from the demographic details of this study. The e-learning nurse was likely to be between 25 and 55 years of age. Younger nurses demonstrate a greater enthusiasm for the use of technology and a positive attitude towards the use of computers (Eley et al., 2008; Kipturgo et al., 2014). With nurses' increasing age, the e-learning experience decreases. Thus, younger nurses have a more positive experience with e-learning than do older nurses.

6.4 Implications for Future Delivery of Training and Education for Nurses

The section answered the last research question. The findings of this study have provided valuable insights from a group of nurses who used e-learning for developing clinical skills and knowledge. The implications for future delivery of training and education for nurses are necessary for providers to review their e-learning offerings and ensure they best suit learners' needs. These matters can be incorporated in the NMBA policies and ACN certification requirements. The experience of e-learning can be enhanced by providers by attending to the content and design, in which pictorials and videos are sufficient, yet not in excess. The e-learning training package should be easy to follow and should facilitate intuitive learning. Rather than merely expecting providers to attend to these requirements, the ACN and NMBA could introduce these as standards for e-learning providers to be recognised. The practice of accrediting e-learning providers by the ACN could verify that the learning content of the provider is as per the standards. To some extent, this step may limit the freedom of the provider; however, it would ensure that the content and design in the e-learning training package would enhance learning.

Overall, the findings of this study support blended learning as a useful implementation strategy to facilitate learning for nurses. To date, there is increasing attention to blended e-learning as a flexible way of developing continuing education programs for nurses (Hoffman et al., 2011; Jonas & Burns, 2010; Smyth et al., 2012 as cited in

Cheng 2014). Blended learning can facilitate nurses access to continuing education (Johansen, Harding, & Ljosaa, 2012) because it provides nurses with an effective approach that allows them to develop professional knowledge and advanced clinical skills through participation with peers and facilitators. An important Australian study on designing authentic multimedia resources by Levett-Jones, Gilligan, Lapkin and Hoffman (2012) highlighted that nurses guided by a trained facilitator can ensure that the key concepts are understood and nurses develop a broad understanding of the issues rather than retain a profession-centric view. Dalhem and Saleh (2014) suggested that blended e-learning enriches the learning experience of nurses. At The Hospital, blended e-learning may improve nurses' engagement with ELMO and improve the effectiveness of e-learning.

6.5 Recommendations for Future Research

This study has captured and compared the views of the nurses who used ELMO for ongoing education at The Hospital, thereby giving greater insight into the current state of e-learning in the corporate environment. However, further research in this area is still necessary. Some recommendations for future research include:

- Testing different types of e-learning training packages for their effectiveness. In the corporate environment, many types of e-learning training packages can be created with advanced developmental tools that are suited to the needs of the workplace learners. Most e-learning methods are synchronous and asynchronous in nature. Testing different types of e-learning training packages for their effectiveness would enable organisations to determine which type of e-learning best suits the needs of the learners and organisation.
- Testing whether blended learning is a more effective learning strategy for nurses. Blended learning approaches are recognised for encouraging learner self-responsibility and active learning. Learning retention is promoted through participation. Enhancing learning from peers and facilitators provides learning opportunities that align with learner schedules and promote learner understanding (Lowenstein, 2011). Blended learning complements the principles of effective adult learning and the andragogical model, in which a climate of mutual respect, collaborativeness, mutual trust, supportiveness, openness and authenticity provides the conditions for learners to identify their

own learning needs and develop plans to achieve them (Brookfield, 1986; Knowles, 1990; Knowles & Associates, 1984; Murray, 2014). Blended learning may be a more effective learning strategy for nurses because it is grounded in sound andragogical principles that ensure learning outcomes and improve educational practices.

- Examining whether self-report surveys are the best method to assess the effectiveness of e-learning. It would be worthwhile to undertake research measuring whether self-report surveys are the best method to assess the effectiveness of e-learning.
- Undertaking more direct studies on the effect of hierarchical levels and effectiveness of e-learning. The current study seems to be one of the few studies examining nurses' views of e-learning's effects on nurses of different hierarchical levels. As such, direct evidence relating to this factor was unavailable from the published literature. Most other research was completed with nursing students, rather than practising nurses in hospitals. This limitation also presented difficulties in relating the results of this study to the nurses' hierarchical levels.
- Testing whether removing barriers, such as time, improves e-learning flexibility. Time was rated as the most challenging barrier for e-learning at The Hospital. Thus, it would be interesting to determine whether removing time as a barrier would improve learner participation. This would provide insight into gaining knowledge and skills and enhancing e-learning effectiveness.

6.6 Conclusions

This study's findings have revealed new information about e-learning. While workplace barriers do exist, e-learning still offers numerous benefits. The results demonstrate that e-learning can be a flexible mechanism for educating nurses, provided that the implementation process, content and design of e-learning help nurses acquire new knowledge and skills. The recommendations identified in this chapter could help address some of the concerns raised in this study. Ongoing education for nurses and support from NUMs and SDNs is fundamental for professional development. Thus, further research in this area, including research addressing the proposed recommendations, should be explored and completed in the future.

6.7 Final Personal Reflection

As the author and researcher of this study, it has been a privilege to be a part of this incredible journey. Today, while I reflect at the end of this study and experience, it is gratifying to know that nurses can access e-learning as a flexible mechanism to gain clinical skills and knowledge for ongoing patient safety. It is humbling to recognise that this experience has taught me a great deal. Through embarking on this higher-degree education journey, not only have I gained a good understanding about research and the various methodologies involved, but I have also gained a greater appreciation of CPD in nursing. To my fellow nurses, despite the daily challenges and barriers to learning, you have demonstrated that you are capable of developing clinical skills and knowledge. I appreciate that navigating a pathway to implement the recommendations of my study will require significant commitment by all concerned; however, I truly believe that, with support from the organisation and management, this positive change can be enacted. Thus, to this end, in the words of Clare Fagin (as cited in Ng, 2017), 'Knowledge will bring you the opportunity to make a difference'. Embrace the opportunity and keep moving forward.

References

ACSQHC. (2017). *National Safety and Quality Health Service Standards (second edition).* Retrieved from http://www.National-Safety-and-Quality-Health-Service-Standards-second-edition.pdf

AHPRA. (2014). *Continuing professional development*. Retrieved from http://www.ahpra.gov.au/Education/Continuing-Professional-Development.aspx

AHPRA. (2018). *Annual report* summary 2016/17. Retrieved from http://www.ahpra.gov.au/annualreport/2017/downloads.html

Alavi, M., & Gallupe, R. B. (2003). Using information technology in learning: Case studies in business and management education programs. *Academy of Management Learning & Education, 2*(2), 139-153. doi:10.5465/AMLE.2003.9901667

All Nurses. (2014). *Nursing Professional Development / Staff Development Coordinators.* Retrieved from http://allnurses.com/nursing-educators-faculty/nursing-professional-development-910548.html

Andriotis, N. (2014). eLearning in the healthcare industry [blog post]. Retrieved from https://www.efrontlearning.com/blog/2014/12/e-learning-healthcare-industry.html

ANF. (2009). *A snapshot of nursing careers, qualifications and experience: Fact sheet 3.* Retrieved from http://anmf.org.au/documents/reports/Fact_Sheet_Snap_Shot_Nursing_Career_Paths.pdf

ANF. (2012). *A snapshot of nursing in Australia: Fact sheet 2.* Retrieved from http://anf.org.au/documents/reports/Fact_Sheet_Snap_Shot_Nursing.pdf

ANMF. (2013). *Position statement*. Retrieved from http://www.num_position_statement.pdf

ANMF. (2014a). *About the Australian Nursing and Midwifery Federation.* Retrieved from http://anmf.org.au/pages/about-the-anmf

ANMF. (2014b). Continuing professional education. Retrieved from http://anmf.org.au/cpe

ANMF. (2015). *ANMF Position Statement: Assistants in nursing providing aspects of nursing care.* Retrieved from http://anmf.org.au/documents/policies/PS_AINS_Nursing_Care.pdf

ANMF. (2016a). *ANMF Policy-Nursing education: enrolled nurse.* Retrieved from http://www.anmf.org.au/documents/policies/P_Nursing_education_EN.pdf

ANMF. (2016b). ANMF Policy-Nursing education: registered nurse. Retrieved from http://anmf.org.au/documents/policies/P_Nursing_education_RN.pdf

ANMF. (2018). *iFolio*. Retrieved from https://www.anfiuwp.org.au/ifolio.php

Arkkelin, D. (2014). "Using SPSS to Understand Research and Data Analysis" (2014). *Psychology Curricular Materials.* Book 1. Retrieved from http://scholar.valpo.edu/psych_oer/1

Atack, L., & Rankin, J. (2002). A descriptive study of registered nurses' experiences with web-based learning. *Journal of Advanced Nursing, 40*(4), 457–465. doi:10.1046/j.1365-2648.2002.02394.x

Ausburn, L. J. (2004). Course design elements most valued by adult learners in blended online education environments: An American perspective. *Educational Media International, 41*(4), 327–337. Retrieved from https://www.uwec.edu/AcadAff/resources/edtech/upload/CourseDesignElementsMostValued ByAdultLearners.pdf

Australian Government Department of Health. (2012). *Education and Prevention*. Retrieved from *http://www.health.gov.au/internet/main/publishing.nsf/Content/Education+and+Prevention-2*

Australian Government Department of Health. (2013). *For you & your family: What is My Health Record?* Retrieved from https://www.myhealthrecord.gov.au/for-you-your-family/what-is-my-health-record

Australian Government Department of Health. (2015). *Australia's Future Health Workforce–Nurses Overview Report.* Retrieved from http://health.gov.au/internet/main/publishing.nsf/Content/australias-future-health-workforce-nurses

Australian Government Department of Human Services. (2018). *Education services for health professionals*. Retrieved from

https://www.humanservices.gov.au/organisations/health-professionals/subjects/incentive-programs-education-health-professionals#a1

AIHW. (2016). *Australia's health 2016: Australia's health series no. 15* (Cat. no. AUS 199). Retrieved from https://www.aihw.gov.au/getmedia/cce76972

AIHW. (2017). *Our charter.* Retrieved from https://www.aihw.gov.au/about-us/our-governance/our-charter

Babbie, E. R. (2008). *The basics of social research* (4th ed.). Belmont, CA: Thomson/Wadsworth.

Back, D. A., Haberstroh, N., Antolic, A., Sostmann, K., Schmidmaier, G., & Hoff, E. (2014). Blended learning approach improves teaching in a problem-based learning environment in orthopedics - a pilot study. *BMC Medical Education, 14*(1), 17-17. doi:10.1186/1472-6920-14-17

Bates, B. (2015). *Learning theories simplified: And how to apply them to teaching: 100+ theories and models from great thinkers*. Los Angeles, CA: SAGE.

Bennink, R. (2004). Implementing e-learning from the corporate perspective. *Training and Development in Australia, 31*(5), 6–9. Retrieved from https://search-informit-com-au.ipacez.nd.edu.au/fullText;dn=153982;res=AEIPT> ISSN: 0310-4664

Bindon, S.L. (2017). Professional development strategies to enhance nurses' knowledge and maintain safe practice. *The AORN Journal, 106*(2), 99–110.

Blackman, I. R., Mannix, T., & Sinclair, P. M. (2014). Developing renal nurses' buttonhole cannulation skills using e-learning. *Journal of Renal Care, 40*(1), 55–63. doi:org.ipacez.nd.edu.au/10.1111/jorc.12047.

Boulding, K. E. (1984). B. F. Skinner: A dissident view. *Behavioral and Brain Sciences, 7,* 483-484.

Bouma, G. D., Wilkinson, L., & Ling, R. (2012). *The research process* (2nd Canadian ed.). Don Mills, Canada: Oxford University Press.

Bredesen, I. M., Bjøro, K., Gunningberg, L., & Hofoss, D. (2016). Effect of e-learning program on risk assessment and pressure ulcer classification—A randomized study. *Nurse Education Today, 40,* 191–197. doi:10.1016/j.nedt.2016.03.008

Bristol, T. J., & Zerwekh, J. (2011). *Essentials of e-learning for nurse educators*. F. A. Davis Company. ProQuest Ebook Central. Retrieved from https://ebookcentral.proquest.com/lib/unda/detail.action?docID=2038720.org

Brookfield, S. D. (1986). *Understanding and facilitating adult learning*. San Francisco, CA: Jossey-Bass.

Callahan, C., Saye, J., & Brush, T. (2013). Designing web-based educative curriculum materials for the social studies. *Contemporary Issues in Technology and Teacher Education, 13*(2), 126–155. Retrieved from http://www.editlib.org/p/41444/

Callinan, J. (2014). *Healthcare professionals' barriers and facilitators to adopting e-learning in palliative care education*. Retrieved from https://aiihpc.org

Chen, S. J. (2007). Instructional design strategies for intensive online courses: An objectivist constructivist blended approach. *Journal of Interactive Online Learning, 6*(1), 72-86. Retrieved from http://pdf.aminer.org/000/270/261/online_learning_support_in_constructivist_environments.pdf

Cheng, Y. (2013). Exploring the roles of interaction and flow in explaining nurses' e-learning acceptance. *Nurse Education Today, 33*(1), 73-80. doi:10.1016/j.nedt.2012.02.005

Cheng, Y. (2014). What drives nurses' blended e-learning continuance intention? *Journal of Educational Technology & Society, 17*(4), 203-215.

Childs, S., Blenkinsopp, E., Hall, A., & Walton, G. (2005). Effective e-learning for health professionals and students—Barriers and their solutions. A systematic review of the literature—Findings from the HeXL project. *Health Information & Libraries Journal, 22*(s2), 20–32. doi:10.1111/j.1470-3327.2005.00614.x

Choi, D. H., Kim, J., & Kim, S. H. (2007). ERP training with a web-based electronic learning system: The flow theory perspective. *International Journal of Human-Computer Studies, 65*(3), 223–243. doi:10.1016/j.ijhcs.2006.10.002

Chong, M. C., Francis, K., Cooper, S., Abdullah, K. L., Hmwe, N. T. T., & Sohod, S. (2016). Access to, interest in and attitude toward e-learning for continuous education among Malaysian nurses. *Nurse Education Today, 36*, 370–374. doi:10.1016/j.nedt.2015.09.011

Clark, R. C., & Mayer, R. E. (2016). *E-learning and the science of instruction*. Hoboken, New Jersey: Wiley.

Commission of the European Communities, 2000. e-Learning – Designing tomorrow's education. Communication from the Commission. Brussels, 24.5.2000. COM (2000) 318 final.

Commission of the European Communities, 2001. Communication from the Commission to the Council and the European Parliament. The eLearning Action Plan. Designing tomorrow's education. Brussels, 28.3.2001. COM (2001)172 final.

Commission of the European Communities, 2003. e-Learning – Designing tomorrow's education. Commission staff working paper eLearning: designing tomorrow's Education A Mid-Term Report As requested by the Council Resolution of 13 July 2001. Brussels, 30.7.2003 SEC (2003) 905.

Conway, J., & Elwin, C. (2007). Mistaken, misshapen and mythical images of nurse education: Creating a shared identity for clinical nurse practice. *Nurse Education in Practice, 7*(3), 187–194. doi:10.1016/j.nepr.2006.08.005

Cooke, M., Watson, B., Blacklock, E., Mansah, M., Howard, M., Johnston, A., & Murfield, J. (2012). Lecture capture: First year student nurses' experiences of a web based lecture technology. *Australian Journal of Advanced Nursing, 29*(3), 14–21.

Cooper, J. (2006). The digital divide: The special case of gender. *Journal of Computer Assisted Learning, 22*(5), 320–334. doi.org/10.1111/j.1365-2729.2006.00185.x

Cooper J.O, Heron T.E, Heward W.L. (2007). *Applied behavior analysis* (2nd ed.). Upper Saddle River, NJ: Pearson.

Creswell, J. W. (2013). *Research design: Qualitative, quantitative, and mixed method approaches* (4th ed.). Los Angeles, CA; Thousand Oaks, CA: SAGE.

Dahalan, N., Hasan, H., Hassan, F., Zakaria, Z., & Noor, W., A., W., M. (2013). Engaging students online: Does gender matter in adoption of learning material design? *World Journal on Educational Technology, 5*(3), 413–419. Retrieved from http://www.world-educationcenter.org/index.php/wjet/article/view/371/pdf_224

Dalhem, W. A., & Saleh, N. (2014). The impact of eLearning on nurses' professional knowledge and practice in HMC. *Canadian Journal of Nursing Informatics, 9*(3&4), 3819. Retrieved from http://cjni.net/journal/?p=3819

Digital Agenda Assembly. (2011). *Report from the workshop 08. "Mainstreaming e-Learning in education and training".* Retrieved from https://ec.europa.eu/digital-single-market/en/blog/1st-digital-agenda-assembly-success-thanks-your-contribution-and-feedback-digital-agenda-now

Domun, M., & Bahadur, G. (2014). Design and development of a self-assessment tool and investigating its effectiveness for e-learning. *European Journal of Open, Distance and e-Learning, 17*(1), 1-25. Retrieved from http://www.eurodl.org/materials/contrib/2014/Domun_Bahadur.pdf

D'Souza, M. S., Karkada, S. N., & Castro, R. (2014). Exploring e-learning among nurse educators in undergraduate nursing. *Nursing Education and Practice, 4*(7), 73–84. doi:10.5430/jnep.v4n7p73

Epignosis LLC (2014). *E-learning concepts, trends, applications*. Version 1.1. San Francisco, CA: E-learning concepts, trends, applications.

Eley, R., Fallon, T., Soar, J., Buikstra, E., & Hegney, D. (2008). Nurses' confidence and experience in using information technology. *Australian Journal of Advanced Nursing, 25*(3), 23–35.

Erin, A. (2015). Top 5 benefits of eLearning in the healthcare industry: E learning industry [blog post]. Retrieved from https://elearningindustry.com/top-5-benefits-elearning-in-the-healthcare-industry

Fleming, J., Becker, K., & Newton, C. (2017). Factors for successful e-learning: Does age matter? *Education + Training, 59*(1), 76–89. doi:org/10.1108/ET-07-2015-0057

Frith, K. H., & Clark, D. J. (2012). *Distance education in nursing* (3rd ed.). New York, NY: Springer Publishing Company.

Gedik, N., Kirax, E., & Ozden, M.Y. (2013). Design of a blended learning environment: Considerations and implementation issues. *Australasian Journal of Educational Technology, 29*(1), 1-19. doi:10.14742/ajet.6

Grant, C., & Osanloo, A. (2014). Understanding, selecting, and integrating theoretical framework in dissertation research: Creating the blueprint for your house. *Administrative Issues Journal, 4*(2), 12–26. doi:10.5929/2014.4.2.9

Grant, M. & Thornton, H. (2007). Best practices in undergraduate adult-centered online learning: Mechanisms for course design and delivery. *Journal of Online Learning and Teaching, 4*(3), 346–356. Retrieved from http://jolt.merlot.org/documents/grant.pdf

Hainey, K., Kelly, L. J., & Green, A. (2017). A blended learning approach to teaching CVAD care and maintenance. *British Journal of Nursing, 26*(2), S4–S12. doi:10.12968/bjon.2017.26.2.S4

Harasim, L. M. (2012). *Learning theory and online technologies*. New York, NY: Routledge.

Health Workforce Australia. (2014). *Australia's future health workforce—Nurses overview*. Retrieved from https://www.health.gov.au/internet/main/publishing.nsf/Content/34AA7E6FDB8C16AACA257D9500112F25/$File/AFHW%20-%20Nurses%20overview%20report.pdf

Herrington, J., Reeves, T. C., & Oliver, R. (2010). *A guide to authentic e-learning*. New York, NY: Routledge.

Hind, M., Jackson, D., Andrewes, C., Fulbrook, P., Galvin, K., & Frost, S. (1999). Exploring the expanded roleof nurses in critical care. *Intensive & Critical Care Nursing, 15*(3), 147-153. doi:10.1016/S0964-3397(99)80045-7

Hinkle, L. (2017). *Advantages & disadvantages of e-learning*. Retrieved from http://classroom.synonym.com/advantages-disadvantages-elearning-4743220.html

Hoffman, K., Dempsey, J., Levett-Jones, T., Noble, D., Hickey, N., Jeong, S., … Norton, C. (2011). The design and implementation of an Interactive Computerised Decision Support Framework (ICDSF) as a strategy to improve nursing students' clinical reasoning skills. *Nurse Education Today, 31*(6), 587–594.

Holmes, B., & Gardner, J. (2006). *E-learning concepts and practice*. London, England: Sage.

Ibrahim, M. (2012). Implications of designing instructional video using cognitive theory of multimedia learning. *Critical Questions in Education, 3*(2), 83-104. Retrieved from http://search.ebscohost.com

ICN. (2015). *Our mission, strategic intent, core values and priorities.* Retrieved from http://www.icn.ch/who-we-are/our-mission-strategic-intent-core-values-and-priorities

ICN. (2018). *Definition of nursing.* Retrieved from http://www.icn.ch/who-we-are/icn-definition-of-nursing

Ifinedo, P. (2016). The moderating effects of demographic and individual characteristics on nurses' acceptance of information systems: A Canadian study. *International Journal of Medical Informatics, 87*, 27–35. doi:10.1016/j.ijmedinf.2015.12.012

Johansen, E., Harding, T., & Ljosaa, T. M. (2012). Norwegian nurses' experiences with blended learning: An evaluation study. *Seminar.Net, 8*(1)

Johnson, M., Kelly, L., Siric, K., Tran, D. T., & Overs, B. (2015). Improving falls risk screening and prevention using an e-learning approach. *Journal of Nursing Management, 23*(7), 910–919. doi:10.1111/jonm.12234

Jonassen, D. (1994). Thinking technology. *Educational Technology, 34*(4), 34–37.

Kanwal, F., Mariam Rehman, M., Komal Bashir, K., & Qureshi, U. (2017). Critical factors of e-learning adoption and acceptance in Pakistan: A literature review. *Engineering, Technology & Applied Science Research, 7*(4), 1888–1893.

Karaman, S. (2011). Nurses' perceptions of online continuing education. *BMC Medical Education, 11*(1), 1. doi:org/10.1186/1472-6920-11-86

Katsikitis, M., McAllister, M., Sharman, R., Raith, L., Faithfull-Byrne, A., & Priaulx, R. (2013). Continuing professional development in nursing in Australia: Current awareness, practice and future directions. *Contemporary Nurse, 45*(1), 33–45. doi:10.5172/ conu.2013.45.1.33

Katz, M. H. (2011). *Multivariable analysis*. Cambridge, England: Cambridge University Press.

Kearney, M. (2006). Prospective science teachers as e-learning designers. *Australasian Journal of Education Technology, 22*(2), 229–250.

Keleekai, N. L., Schuster, C. A., Murray, C. L., King, M. A., Stahl, B. R., Labrozzi, L. J., & Glover, K. R. (2016). Improving nurses' peripheral intravenous catheter insertion knowledge, confidence, and skills using a simulation-based blended learning program: A randomized trial. *Simulation in Healthcare, 11*(6), 376–384, doi:10.1097/sih.0000000000000186

Keppel, G. (1991). *Design and analysis: A researcher's handbook* (3rd ed.). Englewood Cliffs, NJ, US: Prentice-Hall, Inc.

Khan, A., Egbue, O., Palkie, B., & Madden, J. (2017). Active learning: Engaging students to maximize learning in an online course. *Electronic Journal of E-Learning, 15*(2), 107.

Kim, M. K., Kim, S. M., Khera, O., & Getman, J. (2014). The experience of three flipped classrooms in an urban university: An exploration of design principles. *Internet and Higher Education*, *22*, 37–50.

Kipturgo, M. K., Kivuti-Bitok, L. W., Karani, A. K., & Muiva, M. M. (2014). Attitudes of nursing staff towards computerisation: A case of two hospitals in Nairobi, Kenya. *BMC Medical Informatics and Decision Making*, *14*(1), 35. doi:10.1186/1472-6947-14-35

Kirkpatrick, D. (1996). Great ideas revisited. *Training & Development,* 50 (1), 54. Retrieved from https://ndaus.summon.serialssolutions.com/#!/search?bookMark

Kirkpatrick, D., & Kirkpatrick, J. (2006). *Evaluating training programs* (3rd ed.). San Francisco, CA: Berrett-Koehler Publishers.

Kirkpatrick, D. L., & Kirkpatrick, J. D. (2005). *Transferring learning to behavior*. San Francisco, CA: Berrett-Koehler Publishers.

Kivuti, L., & Chepchirchir, A. (2011). Computerization readiness. *Online Journal of Nursing Informatics*, *38*(1), 178. Retrieved from http://ojni.org/issues/

Knowles, M. (1990). *The adult learner: A neglected species* (4th ed). Houston, TX: Gulf Publishing.

Knowles, M. S., & Associates. (1984). *Andragogy in action: Applying modern principles of adult learning.* San Francisco, CA: Jossey-Bass.

Knowles, M. S., Holton, E., III, & Swanson, R. (2011). *The adult learner* (6th ed.). Burlington, MA: Elsevier.

Knowles, M. S., Holton III, E. F., & Swanson, R. A. (2012). *The adult learner*. (7th ed.). London, England: Routledge. doi:10.4324/9780080964249

Knowles, M. S., Elwood, F., Holton, III, & Swanson, R. A. (2014). The adult learner: The definitive classic in adult education and human resource development (8th ed.). London, England: Routledge.

Korhonen, T., & Lammintakanen, J (2005). Web-based learning in professional development: Experiences of Finnish nurse managers. *Journal of Nursing Management, 13*(6), 500–507. doi:10.1111/j.1365-2934.2005.00556.x

Kuimoval, M., Kiyanitsyna, A., & Truntyagin, A. (2016). E-learning as a means to improve the quality of higher education. *SHS Web of Conferences*, *28*, 1129. doi:10.1051/SHS 2 shsconf/2016280 8 1 RPTSS 2015 129

Kummer, T. F., Schäfer, K., & Todorova, N. (2013). Acceptance of hospital nurses toward sensor-based medication systems: A questionnaire survey. *International Journal of Nursing Studies, 50*(4), 508–517. doi:10.1016/j.ijnurstu.2012.11.010.

Lahti, M., Hätönen, H., & Välimäk, M. (2012). Impact of e-learning on nurses' and student nurses knowledge, skills, and satisfaction: A systematic review and meta-analysis. *International Journal of Nursing Studies, 51*(1), 136–149. https://doi.org/10.1016/j.ijnurstu.2012.12.017

Lahti, M., Kontio, R., Pitkänen, A., & Välimäki, M. (2014). Knowledge transfer from an e-learning course to clinical practice. *Nurse Education Today, 34*(5), 842. doi:10.1016/j.nedt.2013.09.003

Lahti, M., Hätönen, H., & Välimäki, M. (2014). Impact of e-learning on nurses' and student nurses knowledge, skills, and satisfaction: A systematic review and meta-analysis. *International Journal of Nursing Studies, 51*(1), 136-149. doi:10.1016/j.ijnurstu.2012.12.017

Lahti, M. E., Kontio, R. M., & Välimäki, M. (2016). Impact of an e-learning course on clinical practice in psychiatric hospitals: Nurse managers' views. *Perspectives in Psychiatric Care, 52*(1), 40–48. doi:10.1111/ppc.12100

Lapkin, S., Levett-Jones, T., & Gilligan, C. (2014). The effectiveness of web-based interprofessional learning modules on health professional students' behavioural intentions in relation to medication safety: A quasi-experimental study. *Focus on Health Professional Education: A Multi-Disciplinary Journal, 16*(1), 46-58. doi:10.11157/fohpe.v16i1.45

Lee, J. (2014). An exploratory study of effective online learning: Assessing satisfaction levels of graduate students of mathematics education associated with human and design factors of an online course. *International Review of Research in Open & Distance Learning, 15*(1), 1-23. Retrieved from http://facultyecommons.org/wp-content/uploads/2014/01/APLeePDF.pdf

Lemeshow, S., Hosmer Jr, D. W., Klar, J., & Lwanga, S. K. (1990). *Adequacy of sample size in health studies*. Chichester, New York: John Wiley & Sons on behalf of the World Health Organization.

Levett-Jones, T. L. (2005). Continuing education for nurses: A necessity or a nicety? *Journal of Continuing Education in Nursing, 36*(5), 229.

Levett-Jones, T., Gilligan, C., Lapkin, S., & Hoffman, K. (2012). Interprofessional education for the quality use of medicines: Designing authentic multimedia learning resources. *Nurse Education Today, 32*(8), 934-938. doi:10.1016/j.nedt.2011.10.013

Lister, M. (2014). Trends in the design of e-learning and online learning. *Journal of Online Learning and Teaching, 10*(4), 671.

Lotrecchiano, G. R., McDonald, P. L., Lyons, L., Long, T., & Zajicek-Farber, M. (2013). Blended learning: Strengths, challenges, and lessons learned in an interprofessional training program. *Maternal and Child Health Journal, 17*(9), 1725-1734. doi:10.1007/s10995-012-1175-8

Lowenstein, A. J. (2011). Blended learning. In M. J. Bradshaw & A. J. Lowenstein (Eds.). *Innovative teaching strategies in nursing and related health professions* (5th ed. 93-112). Burlington, MA: Jones-Bartlett Learning.

Magtibay, D. L., Chesak, S. S., Coughlin, K., & Sood, A. (2017). Decreasing stress and burnout in nurses: Efficacy of blended learning with stress management and resilience training program. *Journal of Nursing Administration*, *47*(7/8), 391.

Maxwell, S., & Mucklow, J. (2012). e-Learning initiatives to support prescribing. *British Journal of Clinical Pharmacology*, *74(*4), 621-631. doi:10.1111/j.1365-2125.2012.04300.x

Mayer, R. E. (2009). *Multimedia learning* (2nd ed.). New York, NY: Cambridge University Press.

Mayer, R. E. (2001). *Multimedia learning*. New York: Cambridge University Press.

Mayer, R. E. (2014). Cognitive theory of multimedia learning. In R. E. Mayer (Ed.), *The Cambridge handbook of multimedia learning* (2nd ed., pp. 43–71). New York, NY: Cambridge University Press.

McGowan, B. S. (2015). The rise and stall of eLearning: Best practices for technology-supported education. *The Journal of Continuing Education in Nursing*, *46*(7), 292–294. doi:10.3928/00220124-20150619-11

McLeod, S. A. (2015). *Cognitive psychology.* Retrieved from www.simplypsychology.org/cognitive.html

McLoughlin, C., & Oliver, R. (1998). Maximising the language and learning link in computer learning environments. *British Journal of Educational Technology, 29*(2), 125–136. doi:https://doi.org/10.1111/1467-8535.00054

McVeigh, H. (2009). Factors influencing the utilisation of e-learning in post-registration nursing students. *Nurse Education Today, 29*(1), 91–99. doi:10.1016/j.nedt.2008.07.004

Meyer, J. (2011). Older workers and the adoption of new technologies. *SSRN Electronic Journal, 37*(3), 305–324. doi:10.1007/s11187-009-9246-y

Michels, M. E. J., Dason, E. V., & Block, G. A. (2012). What is a clinical skill? Searching for order in chaos through a modified Delphi process. *Medical Teacher, 34*(8), 573–581. doi:10.3109/0142159X.2012.669218

Moallem, M. (2007). Accommodating individual differences in the design of online learning environments: A comparative study. *Journal of Research on Technology in Education, 40*(2), 217-245. doi:10.1080/15391523.2007.10782506

Mok, S (2013). Which learning theory would be most appropriate for our education system? Instructivism, constructivism, or connectivism? [blog post]. Retrieved from http://suifaijohnmak.wordpress.com/2013/03/27/which-learning-theory-would-be-most-appropriate-for-our-education-system-instructivism-constructivism-connectivism

Montgomerie, K., Edwards, M., & Thorn, K. (2016). Factors influencing online learning in an organisational context. *Journal of Management Development, 35*(10), 1313–1322. doi:10.1108/JMD-05-2016-0067

Moule, P., Ward, R., & Lockyer, L. (2010). Nursing and healthcare students' experiences and use of e-learning in higher education. *Journal of Advanced Nursing, 66*(12), 2785–2795. doi:10.1111/j.1365-2648.2010.05453.x

Muijs, D. (2011). *Doing quantitative research in education with SPSS* (2nd ed.). Los Angeles, CA: SAGE.

Murray, D. S. (2014). Navigating toward andragogy: Coordination and management of student–professor conversations. *Western Journal of Communication, 78*, 310–336. doi:https://doi.org/10.1080/10570314.2013.866687

Naik, P. (1998). *Behaviorism as a Theory of Personality: A Critical Look.* Retrieved from. http://www.danapayne.net

Ng, Y.I. (2017). *The effect of continuing professional development from the perspective of nurses and midwives who participated in continuing education programs offered by Global Health Alliance Western Australia: A mixed-method study.* Retrieved from https://researchonline.nd.edu.au/theses/155/

National Health and Medical Research Council. (2010). *Aseptic technique*. Retrieved from https://www.nhmrc.gov.au/book/australian-guidelines-prevention-and-control-infection-healthcare-2010/b1-7-aseptic-technique

NMBA. (2015). *About: Functions of the Board.* Retrieved from http://www.nursingmidwiferyboard.gov.au/About.aspx

NMBA. (2016a). *Registered nurse standards for practice.* Retrieved from http://www.Nursing-and-Midwifery-Board---Fact-sheet---Registered-nurse-standards-for-practice---June-2016.PDF

NMBA. (2016b). *Guidelines: Continuing professional development.* Retrieved from http://www.nursingmidwiferyboard.gov.au/Codes-Guidelines-Statements/Codes-Guidelines/Guidelines-cpd.aspx

NMBA. (2017). *Registrant data.* Retrieved from https://www.Nursing-and-Midwifery-Board---Report---Registration-Data-Table---March-2017.PDF

Pappas, C. (2014). *9 tips to apply adult learning theory to eLearning*. Retrieved from https://elearningindustry.com/9-tips-apply-adult-learning-theory-to-elearning

Parrish, M. (2014). *Social work perspectives on human behaviour* (2nd ed.). Berkshire, England: Open University Press.

Patton, M. Q. (1990). *Qualitative evaluation and research methods* (2nd ed.). Newbury Park, CA: Sage Publications.

Pavlov, I.P. (1927). *Conditioned Reflexes.* Dover Publications. Mineola, New York: Dover Publications, INC.

Piskurich, G. M. (2015). *Rapid instructional design: Learning ID fast and right* (3rd ed.). Hoboken, NJ: John Wiley & Sons.

Poon, J. (2012). Use of blended learning to enhance the student learning experience and engagement in property education. *Property Management, 30*(2), 129–156. doi:https://doi.org/10.1108/02637471211213398

Pritchard, A. (2014). *Ways of learning: Learning theories and learning styles in the classroom* (3rd ed.). London, England: Routledge. doi:10.4324/9781315852089

Pullen, D. L. (2006). An evaluative case study of online learning for healthcare professionals. *The Journal of Continuing Education in Nursing, 37*(5), 225. doi:10.3928/00220124-20060901-04

Punch, K. (2014). *Introduction to social research: Quantitative & qualitative approaches* (3rd ed.). Los Angeles, CA: SAGE.

Reeves, T. C., & Reeves, P. M. (1997). Effective dimensions of interactive learning on the World Wide Web. In B. H. Khan (Ed.), *Web-based instruction* (pp. 59–66). Englewood Cliffs, NJ: Educational Technology.

Reynaldo, J., & Santos, A. (1999). Cronbach's alpha: A tool for assessing the reliability of scales. *Extension Journal, 37*(2), 2TOT3.

Riley, K., & Schmidt, D. (2016). Does online learning click with rural nurses? A qualitative study: Online learning with rural nurses. *Australian Journal of Rural Health, 24*(4), 265–270. doi:10.1111/ajr.12263

Ross, K., Barr, J. A., & Stevens, J. A. (2013). Mandatory continuing professional development requirements: What does this mean for Australian nurses? *BMC Nursing, 12*(1). 9-9. doi:10.1186/1472-6955-12-9

Sarantakos, S. (2012). *Social research* (4th ed.). Basingstoke, England: Palgrave Macmillan.

Sati Gürdas Topkaya, S. G., & Kaya, N. (2014). Nurses' computer literacy and attitudes towards the use of computers in health care. *International Journal of Nursing Practice, 21*(2), 141–149. doi:10.1111/ijn.1235

Sayers, J. M., & DiGiacomo, M. (2010). The nurse educator role in Australian hospitals: Implications for health policy. Collegian, 17(2), 77–84. Retrieved from https://search-informit-com-au.ipacez.nd.edu.au/documentSummary;dn=201008516;res=IELAPA

Sawchuk, M. (2013). Jump on the e-learning bandwagon? *Ishn, 47*(1), 26.

Selby, J. V., Beal, A. C., & Frank, L. (2012). The Patient-Centered Outcomes Research Institute (PCORI) national priorities for research and initial research agenda. *Journal of the American Medical Association, 307*, 1583–1584.

Shahhosseini, Z., & Hamzehgardeshi, Z. (2014). The facilitators and barriers to nurses' participation in continuing education programs: A mixed method explanatory sequential study. *Global Journal of Health Science, 7*(3), 184–193. doi:10.5539/gjhs.v7n3p184

Shamim, M. (2018). Application of cognitive theory of multimedia learning in undergraduate surgery course. International Journal of Surgery Research and Practice, 5(2). 1-6. doi: 10.23937/2378-3397/1410065

Sinclair, P. M., Kable, A., Levett-Jones, T., & Booth, D. (2016). The effectiveness of internet-based e-learning on clinician behaviour and patient outcomes: A

systematic review. International Journal of Nursing Studies, 57, 70-81. doi:10.1016/j.ijnurstu.2016.01.011

Singh, G., & Hardaker, G. (2014). Barriers and enablers to adoption and diffusion of e-learning: A systematic review of literature. *Journal of Education and Training, 56*(2/3), 105–121. doi:http://dx.doi.org/10.1108/ET-11-2012-0123

Singh, K. (2007). *Quantitative social research methods* (1st ed.). Thousand Oaks, Calif: Sage Publications.

Skinner, B. F. (1953). Some contributions of an experimental analysis of behavior to psychology as a whole. *American Psychologist, 8*(2), 69–78. doi:10.1037/h0054118

Smith, L. F. Gratz, Z. S., & Bousquet, S. G. (2009). *The art and practice of statistics* (1st ed). Belmont, CA: Wadsworth/Cengage Learning.

Smyth, S., Houghton, C., Cooney, A., & Casey, D. (2012). Students' experiences of blended learning across a range of postgraduate programmes. *Nurse Education Today, 32*(4), 464-468. doi:10.1016/j.nedt.2011.05.014

Sousa, V., Driessnack, M., & Mendes, I. (2007). An overview of research designs relevant to nursing: Part 1: Quantitative research designs. *Revista Latino-Americana De Enfermagem, 15*(3), 502-507. doi:10.1590/S0104-11692007000300022driess

Steffe, L. P., & Thompson, P. W. (2000). *Radical constructivism in action: Building on the pioneering work of ernst von glasersfeld.* New York: Falmer. doi:10.4324/9780203487518

Swan, K., Day, S., Bogle, L., & Matthews, D. (2014). A collaborative, design-based approach to improving an online program. *The Internet and Higher Education, 21,* 74–81. doi:http://dx.doi.org/10.1016/j.iheduc.2013.10.006

Sweller, J., Ayres, P., & Kalyuga, S. (2011). *Cognitive load theory*. New York, NY: Springer.

Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Boston: Allyn and Bacon.

Teräs, H., & Herrington, J. (2014). Neither the frying pan nor the fire: In search of a balanced authentic e-learning design through an educational design research process. *The International Review of Research in Open and Distance Learning, 15*(2). 233- 253. Retrieved from http://www.irrodl.org/index.php/irrodl/article/view/1705/2835

Tollefson, J. (2012). *Clinical psychomotor skills: Assessment tools for nursing students.* Melbourne, VIC: Cengage Learning Australia.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes.* Cambridge, MA: Harvard University Press.

Ward, R., Moule, P., & L. Lockyer, L. (2009). Adoption of web 2.0 technologies in education for health professionals in the UK: where are we and why? *Electron. J. e-Learning, 7* (2) 165-172.

White, J., & Myers, S. (2001). You can teach an old dog new tricks: The faculty's role in technology implementation. *Business Communication Quarterly, 64*(3), 95–101. doi:10.1177/108056990106400310

WHO. (2015). *Global observatory for eHealth: Third Global Survey on eHealth.* Retrieved from http://www.who.int/goe/survey/2015survey/en/

WHO. (2016). *Global diffusion of eHealth: Making universal health coverage achievable*. Retrieved from http://www.who.int/goe/publications/global_diffusion/en/

Williams, N. A., Bland, W., & Christie, G. (2008). Improving student achievement and satisfaction by adopting a blended learning approach to inorganic chemistry. *Chemistry Education Research and Practice, 9*(1), 43-50. doi:10.1039/b801290n

Williamson, K. M., & Muckle, J. (2018). Students perception of technology use in nursing education. CIN: *Computers, Informatics, Nursing, 36*(2), 70-76. doi:10.1097/CIN.0000000000000396

Williamson, K. M., Almaskari, M., Lester, Z., & Maguire, D. (2015). Utilization of evidence-based practice knowledge, attitude, and skill of clinical nurses in the planning of professional development programming. Journal for Nurses in Professional Development, 31(2), 73-80. doi:10.1097/NND.0000000000000140

Wong, A., & Sixl-Daniell, K. (2015). A case study in corporate e-learning. *International Journal of Advanced Corporate Learning, 8*(1), 52. doi:10.3991/ijac.v8i1.4438

Woollard, J. (2010). *Psychology for the classroom: Behaviourism*. Oxfordshire, England: Routledge.

Wu, X. V., Chan, Y. S., Tan, K. H. S., & Wang, W. (2018). A systematic review of online learning programs for nurse preceptors. *Nurse Education Today, 60*, 11–22. doi:https://doi.org/10.1016/j.nedt.2017.09.010

Appendices

Appendix A: E-learning Survey 2016

This survey is anonymous

Nitasha Narayan - Clinical Nurse on Karri is undertaking her Masters in Nursing (Research). This survey to assist Nitasha in gathering data for her research thesis. She would be extremely grateful if you could complete this brief survey.

Questions with * are compulsory.

1. Please indicate your gender *
    - Male
    - Female
2. Please indicate your age group *
    - 20-24
    - 25-35
    - 36-45
    - 46-55
    - 56-65
    - >66
3. What is the highest level of nursing education you have completed? *
    - Doctor of Nursing
    - Master Of Nursing
    - Bachelor of Nursing
    - PhD
    - Diploma in Enrolled Nursing

4. What is your designation at your workplace? *

    - Registered Nurse
    - Staff Development Nurse
    - Enrolled Nurse
    - Nurse Unit Manager

5. How many years of experience in Nursing do you have? *

    - <5 yrs
    - <5-9 yrs
    - <10-14 yrs
    - <15-19 Yrs
    - >20 years

6. Employment status? *

    - Part-time
    - Full-time
    - Casual

7. Have you engaged with electronic learning at this private hospital? *

    - Yes
    - No - IF NO YOU CAN FINISH HERE - Thank You

8. How many times a week do you engage in electronic learning? *

    - Less than once/week
    - 1-2 times/week
    - 3-4 times/week
    - 5-6 times/week
    - > 6 times/week

9. Have you used other online learning training package for professional development? *

    - Yes

- No

10. Which other online learning training package have you used for professional development. (can choose more than one) *

    - Google search
    - Wikipaedia
    - UpToDate resource
    - Healthscope library resources via the Intranet
    - Other

11. Think about the experience you have had with electronic learning over the past 12 months and then indicate the extent to which you agree or disagree with the next series of questions. I think that electronic learning is intuitive to navigate. *

    - Strongly agree
    - Agree
    - Neutral
    - Disagree
    - Strongly disagree
    - Not sure

12. I think electronic learning is confusing in its design. *

    - Strongly agree
    - Agree
    - Neutral
    - Disagree
    - Strongly Disagree
    - Don't know

13. I think electronic learning is graphically appealing. *

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree
- Don't know

14. I think electronic learning is well designed. *

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly disagree
- Don't know

15. I think electronic learning is easy to follow. *

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree
- Don't know

16. The following series of questions relate to your experience with training to use electronic learning. I was given training on how to use electronic learning *

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree
- Don't know

17. I was given enough time to engaged with electronic learning. *

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree
- Don't know

18. I was needing assistance when using electronic learning. *

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree
- Don't know

19. I was confident in using electronic learning. *

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly agree
- Don't know

20. I was given support when I was struggling with electronic learning. *

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree
- Don't know

21. The following series of questions relate to electronic learning and its effectiveness for developing clinical skills and clinical knowledge. Electronic learning helped me to develop new clinical skills *

    - Strongly agree
    - Agree
    - Neutral
    - Disagree
    - Strongly disagree
    - Don't know

22. Electronic learning is an effective way to develop clinical skills *

    - Strongly agree
    - Agree
    - Neutral
    - Disagree
    - Strongly disagree
    - Don't know

23. Electronic learning is an engaging way of developing clinical skills *

    - Strongly agree
    - Agree
    - Neutral
    - Disagree
    - Strongly disagree
    - Don't know

24. Electronic learning helped me to develop new clinical knowledge. *

    - Strongly agree
    - Agree
    - Neutral
    - Disagree
    - Strongly disagree
    - Don't know

25. Electronic learning is an effective way to develop clinical knowledge *

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree
- Don't know

26. Electronic learning is an enjoyable way of developing clinical knowledge. *

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree
- Don't know

27. The following questions are on barriers (lack of management support, time, lack of training on use of elearning, limited access to computers, technological support) that may affect learning with electronic learning. Please rate the barrier - lack of management support - in regard to completing your electronic learning. *

- Highly unlikely
- Unlikely
- Neutral
- Likely
- Highly likely
- Don't know

28. Please rate the barrier - Time - to how it may affect your completion of electronic learning. *

    - Highly unlikely
    - Unlikely
    - Neutral
    - Likely
    - Highly likely
    - Don't know

29. Please rate the barrier - lack of training on use of electronic learning - to how it may affect your completion of electronic learning *

    - Highly Unlikely
    - Unlikely
    - Neutral
    - Likely
    - Highly likely
    - Don't know

30. Please rate the barrier - Limited access to computers - on how it may affect your completion of electronic learning. *

    - Highly unlikely
    - Unlikely
    - Neutral
    - Likely
    - Highly likely
    - Don't know

31. Please rate the barrier - Technological Support - as to how it may affect completion of your electronic learning. *

    - Highly unlikely
    - Unlikely
    - Neutral
    - Likely
    - Highly likely
    - Don't know

32. What is the most challenging barrier? *

    - Lack of management support
    - Time
    - Lack of training on use of electronic learning
    - Limited access to computers
    - Technological support

33. Which is the least challenging barrier? *

    - Lack of management support
    - Time
    - Lack of training on use of electronic learning
    - Limited access to computers
    - Technological support

34. This series of questions relate to the design of electronic learning. Was electronic learning (can tick multiple answers - tick those you want to respond - yes) *

    - Visual - pictorial?
    - Auditory-verbal?
    - Lot of visual material presented at one time?
    - Lot of spoken word/sounds presented at once?
    - Your are actively engaged in the learning?

35. Do you think you had meaningful learning with electronic learning? *

- Yes
- No

Appendix B: Nurses' Evaluation of Electronic Learning for Developing Clinical Skills and Knowledge

Please, answer by circling **the number** that best applies to you.

1. How long did it take you to complete the questionnaire?

   1 = less than 10 mins,
   2 = 11-15 mins
   3 = 16-20 mins,
   4 = 21-30 mins,
   5 = more than 30 mins

2. Did anyone help you to complete the questionnaire?

   0 = No
   1 = Yes Who provided you with help? _____

3. What kind of help did you receive?

   _____
   _____

4. Were there questions that you found confusing or difficult to answer?

   0 = No
   1 = Yes

5. Please list below the number(s) of the question(s) that you found confusing or difficult to answer:

   Question number(s) ____,____,____,____,____,____

6. Please use the space below if you have other comments on the questionnaire

   _____
   _____
   _____
   _____

Appendix C: Participant Information Sheet

Project Title: Evaluation of an e-learning training package by nurses at various designations for developing clinical skills and knowledge

Registered Nurses, Staff Development Nurses, Nursing Unit Managers and the Director of Nursing are invited to participate in the research project described below:

What is the project about?

This research project will explore nurses evaluation of electronic learning (e-learning) for developing clinical skills and knowledge. Your experiences of using e-learning training packages for clinical skills and knowledge will be used to help in understanding whether e-learning is a good way to develop clinical skills and knowledge in the Australian nursing context.

Who is undertaking the project?

This project is being conducted by Nitasha Narayan and will form the basis for the degree of Masters of Nursing (Research) at The University of Notre Dame Australia, under the supervision of Associate Professor Karen Clark-Burg and Dr Frank Bate.

What will I be asked to do?

Your participation involves completion of the attached questionnaire and will take an estimated 5-10min of your time.

The questionnaire begins with some personal demographic questions and then includes questions about what your experience has been using e-learning and training, the effectiveness of e-learning training packages for developing clinical skills and knowledge and on barriers that affect learning. The last section, focuses on design of e-learning training packages.

Are there any risks associated with participating in this project?

There is no foreseeable risk in you participating in this research project.

What are the benefits of the research project?

Your participation is this research may help in understanding how effective e-learning is for developing clinical skills and knowledge for nurses in Australia and if improvements are needed to aid the continuing professional development for nurses.

Will anyone else know the results of the project?

Due to your role in the hospital, you may be identifiable to the researchers. The information you provide will be held in strict confidence and only the researchers will have access to this information. The outcomes of this research will be reported in a way that you will not be identifiable.

Once the study is completed, the data collected from you will be de-identified and stored securely in the School of Nursing & Midwifery at The University of Notre Dame Australia for at least a period of five years. The results of the study will be published as a thesis.

What if I change my mind?

Participation in this study is completely voluntary. Whether you choose to participate or not will have no impact on your ongoing employment in the hospital.

Once you submit the completed questionnaire, you cannot withdraw it as the questionnaires will be non-identifiable (unless you are identifiable by your role in the hospital).

Will I be able to find out the results of the project?

A summary of the research findings will be sent to each ward in the hospital for participants to access.

Who do I contact if I have questions about the project?

Please do not hesitate to contact me or any of the other researchers if you have any questions about this study. Researchers contact details are as below:

Nitasha Narayan
Masters student
School of Nursing and Midwifery
Email: nitasha.narayan1@my.nd.edu.au
Phone: 0420309116

Associate Professor Karen Clark-Burg
Associate Dean
School of Nursing and Midwifery
University of Notre Dame Australia
Email: Karen.clark-burg@nd.edu.au
Phone: (08) 94330278

Associate Professor Frank Bate
Director, Medical Education Support Unit
School of Medicine
University of Notre Dame Australia
Email: frank.bate@nd.edu.au
Phone: 94330944

What if I have a concern or complaint?

The study has been approved by the Human Research Ethics Committee at The University of Notre Dame Australia (approval number 016112F). If you have a concern or complaint regarding the ethical conduct of this research project and would like to speak to an independent person, please contact Notre Dame's Ethics Officer at (+61 8) 9433 0943 or research@nd.edu.au. Any complaint or concern will be treated in confidence and fully investigated. You will be informed of the outcome.

How do I sign up to participate?

If you wish to participate in the study, please complete the questionnaire. A completed questionnaire will mean consent has been given by participants for this research.

Who do I contact if I wish to comment further about the project?

Please do not hesitate to contact the researcher (Nitasha Narayan) if you wish to comment further.

Thank you for your time.

Yours sincerely,
Nitasha Narayan

Appendix D: Letter of Approval

Mount Hospital

150 Mounts Bay Road
Perth WA 6000

Ph: (08) 9327 1100
Fax: (08) 9321 2208
www.healthscope.com.au

A Healthscope Hospital

12 July 2016

Ms Nitasha Narayan

Via email; narayan_tash@hotmail.com

Dear Nitasha,

RE: APPROVAL OF RESEARCH PROJECT

I acknowledge receipt of ethical clearance from the Human Ethics Committee, Notre Dame. As such, I am in a position to approve the following project to be undertaken at the Mount Hospital; "Nurses perceptions of the effectiveness of electronic learning for developing clinical skills and clinical knowledge."

Please advise if I can be of any further assistance in this regard, I wish you all the best with your study.

Yours sincerely,

Mareza Meyer
Director of Nursing

Appendix E: Ethical Clearance

THE UNIVERSITY OF NOTRE DAME AUSTRALIA
CELEBRATING 25 YEARS 1989 - 2014

19 Mouat St (PO Box 1225) Fremantle WA 6959
+61 8 9433 0555 | enquiries@nd.edu.au

11 July 2016

Associate Professor Karen Clark-Burg & Mrs Nitasha Narayan
School of Nursing & Midwifery
The University of Notre Dame Australia
Fremantle Campus

Dear Karen and Nitasha,

Reference Number: 016112F

Project Title: "Nurses perceptions of the effectiveness of electronic learning for developing clinical skills and clinical knowledge."

Your response to the conditions imposed by a sub-committee of the university's Human Research Ethics Committee, has been reviewed and assessed as meeting all the requirements as outlined in the *National Statement on Ethical Conduct in Human Research* (2014). I am pleased to advise that ethical clearance has been granted for this proposed study.

Other UNDA students and researchers identified as working on this project are:

Name	School/Centre	Role
Dr Frank Bate	School of Medicine	Co-Supervisor to student

All research projects are approved subject to standard conditions of approval. Please read the attached document for details of these conditions.

On behalf of the Human Research Ethics Committee, I wish you well with your study.

Yours sincerely,

Dr Natalie Giles
Research Ethics Officer
Research Office

cc: A/Prof Caroline Bulsara, SRC Chair, School of Nursing & Midwifery

Broome Campus 88 Guy St (PO Box 2287) Broome WA 6725
Sydney Campus 140 Broadway (PO Box 944) NSW 2007

Fremantle Broome Sydney

ABN 69 330 643 210 | CRICOS Provider Code: 01032F nd.edu.au

Appendix F: Conceptual and Operational Definitions of Three Variable Scores

Variable	Conceptual Definition	Operational Definition		
		Number of Items	Computation	Interpretation of Scores
Experience with E-Learning Score	Level of experience with e-learning	4	Assigning a score of zero to the 'don't know' response then 6 minus the average score for all items	1=Low levels 5=High levels
E- Learning Effectiveness Score	Level of effectiveness of e-learning to develop clinical skills and knowledge	6	Assigning a score of zero to the 'don't know' response then 6 minus the average score for all items	1=Low levels 5=High levels
E-Learning Barriers Score	Level of barriers which may affect learning with e-learning	5	Assigning a score of zero to the 'don't know' response then 6 minus the average score for all items	1=Low levels 5=High levels

Appendix G: Employed Registered Nurses and Enrolled Nurses, Age Profile, 2009 and 2012

	2009		2012	
Type of nurse	Average age (years)	Percent aged 55 and over	Average age (years)	Percent aged 55 and over
Registered nurses	44.2	19.9	44.3	22.5
Enrolled nurses	44.9	19.3	46	25.9
All nurses	**44.3**	**19.8**	**44.6**	**23.1**

Source: AIHW Nursing and Midwifery Labour Force Survey 2009 and NHWDS: nurses and midwives 2012.