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The transferability of Open Reusable Learning Objects (RLOs) to nursing clinical skills education in the Saudi context: a mixed method study

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Abstract

Background: A key challenge in nursing education now, in light of the ongoing 'fitness to practise' debate, is to make nursing clinical skills education (CSE) suitable, accessible, available, and smart for a larger student cohort. Web-based/online learning technology has gained popularity in supporting nursing clinical skills education in an era of rapid expansion of technology. However, the development of these e-learning interventions needs financial and human investment. With the ease of uploading material to the internet, recent years have seen a rapid increase in the development and use of Open Educational Resources (OERs) globally. Nevertheless, the spread of OERs to many countries is delayed for reasons such as cultural, social, and legal factors. While there is potential to use existing resources of this kind in the form of OERs, there is no evidence as to how these may transfer to another setting in nursing CSE. Reusable Learning Objects (RLOs) are one form of OERs and the focus of this study.

Aim: To explore the transferability of open Reusable Learning Objects (RLOs) created in the UK to a clinical skills education context in Saudi nursing education. The transferability model Population-Intervention-Environment-Transfer (PIET) was used as a theoretical framework for a comprehensive consideration of RLOs transferability.

Method: This sequential mixed method research was comprised of three phases. Data for the first exploratory phase were collected through think-aloud sessions and focus-groups for senior nursing students and tutors to gain a deep understanding of their perspectives on the open UK RLOs and elucidate any new variables that could emerge to inform the content of the student self-evaluation questionnaire (SSEQ). These influenced the following study phases. The second phase involved the implementation of six clinical skills RLOs on a Saudi nursing course. Data was collected for the third evaluation phase through the developed SSEQ to evaluate the educational value, usability and impact of UK RLOs for clinical skills learning in Saudi nursing education. This was followed by a focus-group

for nursing tutors to gain a deep understanding of their experiences of the implementation of RLOs.

Findings: The findings of the exploratory phase suggested that most students and tutors exhibited positive views about the potential usefulness of, attitude towards and engagement with the RLOs. Despite this, there were many limitations of the RLOs usability related to the content of RLOs and technical characteristics. Based on the findings, the SSEQ was developed for the evaluation phase. 138 students (98% response rate) responded to the SSEQ. The SSEQ was subjected to a construct validity analysis using Principal Component Analysis (PCA). It revealed three components in the SSEQ with high internal consistency: students' views on the educational values of clinical skills RLOs for Saudi nursing students; students' views on the utility and usability of the RLOs and students' views on the impact of the RLO media attributes in supporting clinical skills learning. The descriptive statistics revealed that RLOs were effective in supporting the students' understanding of basic clinical skills and contributing to perceived support in performance, knowledge and confidence in basic clinical skills competency outcomes compared with other educational resources that students used.

Conclusion: This study suggests that RLOs created in the UK, which is more familiar with producing and using OERs, are transferable to another context which is less experienced in using OERs. This is in light of the four main factors that influenced the RLOs transferability: 1) participants' acceptance and attitudes toward the RLOs; 2) the RLOs themselves as an intervention in terms of quality, evidence-based content, and usability; 3) the environment that includes practice change and policy and legislation; 4) the successful implementation process of the RLOs. Transferable to a wider setting, this research makes a new and original contribution to the existing knowledge and evidence-base of nursing literature about open RLOs specifically, and OERs in general, by exploring the transferability and acceptability of a novel format of web-based learning using RLOs in Saudi nursing CSE. It is hoped this research will influence future studies in this important area.

List of publications and presentations

Published conference proceedings

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Dedication

To my dear mother

To the soul of my dear father

To my beloved husband

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List of abbreviations

CSE	Clinical skills education
CSL	Clinical skills laboratory
EBP	Evidence based practice
FG	Focus-group
HEI	Higher Education Institution
ICT	Information and Communication Technology
IMS	Instructional Management System
IT	Information technology
KAU	King Abdulaziz University
KSA	Kingdom of Saudi Arabia
LMS	Learning management systems
MCQ	Multiple choice question
MMR	Mixed methods research
MoE	Ministry of Education
NCAAA	National Commission for Academic Accreditation and Assessment
NCeL	National Centre for e-Learning
NMC	Nursing & midwifery council
OER	Open Educational Resource
PCA	Principle component analysis
PIET-T	Population-Intervention-Environment-Transfer Model of Transferability
RCT	Randomized control trial
RLOs	Reusable Learning Objects
SPSS	Statistical Package for the Social Science
SSEQ	Students self-evaluation questionnaire
TAM	Technology Acceptance Model
TAP	Think-aloud protocols
UK	United Kingdom
UoN	University of Nottingham

Chapter 1: Introduction and background

The primary goal of nursing education is to equip nursing students with the clinical skills and knowledge commensurate with the demands of the role of the nurse. It is also important for safe practices and for the effective fulfilment of patient care needs and safety. Therefore, it is important that the most effective methods to promote learning are employed. This is especially important in terms of nursing clinical skills, which guide the practice of nursing and are vital to the delivery of quality care. In an era of rapid technological change, nursing education providers face a major challenge in designing and implementing teaching approaches that ensure student learning and satisfaction by promoting flexible accessibility and utilizing the strengths of new technology to create learning experiences of the highest quality.

The methods used to teach nursing clinical skills need continuous innovative strategies, as the best approach is not yet known (Francis and O'Brien, 2019). In the last decade the higher education landscape has been transformed and this trend will continue with the emergence of new technologies. With the advent of the internet; interactive, multimedia, web-based learning is gaining popularity as a supportive method of delivering clinical skills education (CSE). The ease of uploading material to the internet has also led to the

proliferation of open educational resources (OERs). Reusable learning objects (RLOs) are one form of OERs and the focus of this study. The aim of this thesis is to explore the transferability of open RLOs created in the UK to Saudi nursing clinical skills education.

This chapter will provide an overview of nursing clinical skills education. Then, it will briefly introduce e-learning in nursing education. Following that, the research context will be presented, which will provide a background to nursing education and e-learning in the Kingdom of Saudi Arabia (KSA). Finally, the thesis structure will be presented.

1.1 Nursing clinical skills education: a brief introduction

The aim of nursing education is to prepare students today to meet tomorrow's challenges. This preparation must encompass more than simply mastering the necessary facts and knowledge (Gerdprasert, Pruksacheva, Panijpan et al., 2011, Blake, 2009). The acquisition of clinical skills is a crucial part of learning to be a nurse and a lack of clinical skills ability can compromise patient care and safety. Much of the literature agrees that, internationally, there is a concern that, at the time of qualification, new nurses are neither competent nor confident in core skills, and concern has been raised about the adequacy of CSE in existing nursing curricula (Jamshidi, Molazem, Sharif et al., 2016, Missen, McKenna, Beauchamp et al., 2016,

McCutcheon, Lohan, Traynor et al., 2015, Chesser-Smyth and Long, 2013, McNett, 2012, Bloomfield, While and Roberts, 2008, Hilton and Pollard, 2005).

Usually, clinical skills are initially taught on static or interactive manikins in a clinical skills laboratory (CSL) at nursing schools, allowing for a safe controlled setting where students can learn skills at their own pace without fear of harming a patient (Silveira and Cogo, 2017, Ross, 2012). Clinical skills demonstrations have traditionally been used to teach clinical skills to undergraduate nursing students, following procedure practice under supervision to consolidate skills acquisition (Ellis, 2016, Sheahan, While and Bloomfield, 2015). Although traditional teaching methods are often promoted as an opportunity for students to learn directly from subject experts, such methods can lack flexibility, do not ensure teaching consistency and are unlikely to accommodate the diverse learning needs of students (Jeffries, Woolf and Linde, 2003).

The use of simulation is another widespread method as an immersive education strategy in nursing CSE, as an assistant to clinical practice rather than as an alternative (Kim and Suh, 2018). An increasing number of nursing schools provide nursing simulation scenarios for students to better prepare them for professional practice in complex real-world settings (Burns, O'Donnell and

Artman, 2010). Moreover, as a direct response to increased pressure by nurses and other healthcare professionals to provide healthy, efficient treatments, simulation allows students to practice a variety of tasks and skills and apply knowledge and decision-making without fear of harming the patient (Lopreiato and Sawyer, 2015, Mitchell, Henderson, Jeffrey et al., 2015). Nevertheless, despite the benefits, simulation is not without its problems. Substantial financial and personal resources are needed, meaning that this teaching method may not suit all nursing schools (Nevin, Neill and Mulkerrins, 2014, Burns et al., 2010).

As debate continues about the adequacy of conventional teaching methods of nursing clinical skills (Francis and O'Brien, 2019, McCutcheon, O'Halloran and Lohan, 2018, McNett, 2012, Bloomfield, Roberts and While, 2010), the support available for nursing students to learn in practice placement has become ever more limited as the demands of caring for increasing numbers of acutely-ill patients, shorter hospital stays and staffing shortages have reduced teaching opportunities in many clinical practice placements (Jamshidi et al., 2016, NACNEP, 2010). Collectively, these issues have compelled nursing educators to seek other approaches to support CSE through more agile and flexible approaches to teaching. Thus, nursing education faces a major challenge in designing and implementing

learning activities that provide students with opportunities to develop their practical skills (Peddle, 2011).

The landscape of higher education has been transformed over the last decade, and this trend will continue as new technologies emerge (Skiba, Connors and Jeffries, 2008). With the advent of the internet, interactive, multimedia, web-based learning is gaining popularity as a supportive way of delivering CSE (McNett, 2012, Bloomfield et al., 2008). Recently, the content of nursing education curriculums have been developed to meet students' changing needs, including digital ones, using innovative strategies in the health science field (Kim and Suh, 2018, Bauman, 2016, Furió, Juan, Seguí et al., 2015). The ease of uploading content to the internet has also contributed to the expansion of open educational resources (OERs).

1.2 E-learning in nursing education

Information and communication technologies (ICT) have been used in nursing education for a variety of educational purposes, either to supplement or replace traditional teaching methods. This use has increased in recent decades, and the spread of network technologies has caused e-learning practices to develop significantly (İlkay and Zeynep, 2012, Kahiigi Kigozi, Ekenberg, Hansson et al., 2008). Generally, e-learning is considered to be the application and integration of educational technology into the learning process (Al-

Shorbaji, Atun, Car et al., 2015). However, the meaning of e-learning has changed over time and has different nuances, and the variety of perspectives surrounding e-learning can cause confusion and, sometimes, even contradiction (Mason and Rennie, 2006). Not only have different concepts been attributed to e-learning, but the term has also been substituted by others. A review of literature has indicated the array of terms used to describe the use of computers in general and within nursing education specifically, including: computer-based learning, computer assisted instruction, computer-facilitated teaching, computer-aided education, web-based learning, Internet learning, e-learning, interactive multimedia learning, and online learning (Sangrà, Vlachopoulos and Cabrera, 2012, Friesen, 2009, Adams, 2004). According to Sangrà et al. (2012), who reviewed the concept of e-learning extensively, the precise way that the term 'e-learning' is used is often dependent on an author's particular purpose or specific research agenda.

For the purpose of this study, the less general terms 'web-based learning' or 'online learning' will be employed alternatively in this research to refer specifically to the use of any internet network-based e-learning, either as a blended or complete e-learning form. Web-based learning encompasses all educational interventions that make use of the internet (Al-Shorbaji et al., 2015, Cook, Gelula, Dupras et al., 2008). Accordingly, 'online resources' or 'web-based

resources' will be used interchangeably in this research to refer specifically to educational resources that are accessible via the internet and World Wide Web to facilitate nursing CSE and which may include multimedia and/or interactive features.

It has become evident that e-learning could offer advantages in healthcare education generally, and nursing education specifically. It could overcome physical limitations of time and space, supporting teaching methods that are hard to achieve using textbooks (Gray and Tobin, 2010). It has also been proposed that e-learning can enhance learning by increasing the quantity of relevant information accessible to the student (Jeffries, 2001). A recent systematic review by Al-Shorbaji et al. (2015) in e-learning for health professional education indicated that e-learning and blended learning allow for the combination of hands-on, skills-based training as well as self-directed, and knowledge-based learning. They can facilitate the development and scalability of educational interventions. Nevertheless, they are not without drawbacks, for instance costs, lack of engagement and technical problems can spoil users' overall learning and teaching experiences (Cook et al., 2008, Adams, 2004). The following are examples of studies that support e-learning and were conducted within nursing education in general.

A Randomised Control Trial (RCT), by Gagnon, Gagnon, Desmartis et al. (2013) in Canada aimed to assess the effectiveness of a blended-teaching intervention using 11 interactive, internet-based tutorials combined with traditional lectures in an 'Introduction to research' undergraduate nursing course. The outcome measures were to compare 131 first-year nursing undergraduates' knowledge, satisfaction, and self-learning readiness on both the conventional (n=65) and traditional methods (n=66). The data showed that the e-learning intervention was comparable to traditional teaching in an introductory research course for nursing undergraduates. They concluded that blended-teaching could better suit some students, depending on their degree of motivation and level of self-directed learning readiness. Nevertheless, one of this RCT's limitations was the validation of the motivation instruments. It is recommended that future studies use a validated instrument for assessing motivation and its potential relationship with e-learning success.

The previous study's results are in line with a meta-analysis of Randomized Controlled Trials (RCT) by Lahti, Hatonen and Valimaki (2014) to review the impact of e-learning on nurses' and nursing students' knowledge, skills and satisfaction related to e-learning, and which identified 11 RCTs including a total of 2491 nurses and student nurses. Studies included in the review utilized a range of different interventions such as computer programs and/or e-

learning. They concluded that there was no statistical difference between groups in e-learning and traditional learning relating to nurses' or student nurses' knowledge, skills and satisfaction. E-learning can, however, offer an alternative method of education. Nevertheless, the e-learning interventions were rather heterogeneous which might raise the question around the meaningful use of the meta-analysis. Additionally, this review included both nurses and nursing students, where the impact of e-leaning might be different between the two sample groups. The systematic review recommended a further study to assess the impacts of e-learning in nursing education based on Kirkpatrick's model of learning outcome evaluation.

Another cluster randomised controlled trial by McMullan, Jones and Lea (2011) compared an interactive e-drug calculations package (internet independent e-learning PDF drug calculations package), with traditional handout learning support on nursing students' drug calculation ability, self-efficacy and support material satisfaction. The comparison was conducted with a September cohort (n = 137) and a February cohort (n = 92) of second year diploma nursing students. Students from each cohort were geographically dispersed over 3 or 4 independent sites in the UK. This study found that students in both cohorts randomised to e-learning were more able to perform drug calculations than those receiving the handout, there

was no difference in improved self-efficacy between intervention and control for students, and students who used the package were more satisfied with its use than the students who used the handout.

Lymn, Bath-Hextall and Wharrad (2008) developed and evaluated a series of pharmacology flexible learning tools (RLOs). This study used questionnaire data from three cohorts of nurse prescribing students (n=84) to evaluate the use of pharmacology-focused RLOs to facilitate students' awareness of these concepts. The data showed that the use of the RLOs significantly increased perceived understanding of the pharmacology component. Another study by Windle, McCormick, Dandrea et al. (2011) investigated the effectiveness of RLOs when delivered in a workshop or released for self-study for student-nurses studying chemistry. The findings suggest that RLOs are more effective in terms of students' attainment than the traditional lecture format.

In a study by Young, Moore, Griffiths et al. (2010), short message service (SMS) texting was used to allow educators to provide additional support to nursing students during clinical practice placements. They found that, although the students did not utilize the tool as much as anticipated, those who had been positive about the potential of this type of technology could improve communication and support for the students. Furthermore, Rush,

Walsh, Guy et al. (2011) implemented and evaluated an innovative method using videoconferencing to help student nurses link theory learned in the classroom to clinical practice. Thirty-eight student nurses in a classroom were connected in real time to a diabetes clinic to observe and interact with nurse specialists, patients and carers. This study concluded that the students positively evaluated the approach used and the tool had the potential to strengthen links between theory and practice settings.

Moreover, it is important to highlight that commercial nursing clinical skills packages and software play a crucial role in many nursing institutions. For example, different clinical skills websites such as up to date (https://www.uptodate.com/home), clinical skills.net (https://www.clinicalskills.net/), and Elsevier clinical skills (https://www.elsevierclinicalskills.co.uk/) are frequently used. Other institutions use commercial video recorded-procedures on CD-ROMs or those which can be accessed through the web after purchasing some nursing books such as Kozier, Berman and Synder (2012) and Lippincott (2015). Currently, many commercial clinical skills applications also are available for smart phones such as Davis's Guide to Clinical Nursing Skills, and Mosby Nursing Clinical Skills. Ever more commercial, and increasingly user-friendly, software has been produced as the computing power of computers has increased (Al-Shorbaji et al., 2015). Commercial resources may include video

demonstrations of many skills, checklists for competency reviews, and self-tests. These commercial resources could have many advantages. They might be robust and have a high standard of media. Many of them are up to date, quick and easy to use, and available in different platforms, such as web-based or in applications for the smart phone (Clinical Skills Net, 2020, Elsevier Clinical Skills, 2020). Nevertheless, the high cost of the market procedures restricts their availability at many nursing schools (Sowan and Idhail, 2014). Furthermore, they might be not easy to customise to adapt to institution guidelines in conducting the procedures. However, despite the fact that commercial clinical skills packages potentially form a large part of the market in nursing education, it is not easy to find evidence regarding their impact or effectiveness from researchers or educators, nor from the producer companies.

All the previous evidence supports e-learning in nursing education in general. Nevertheless, the development of these e-learning interventions needs financial and human resources (Mikhailova, Stiglitz, Post et al., 2018, Williams, 2018, Littlejohn and Pegler, 2015, Blake, 2010). In an era of rapid technological development, the web-based/online learning is gaining popularity in supporting nursing education. The challenge in nursing education at the moment is to make programmes suitable, accessible and smart for a broader cohort of students (Ali, 2016). However, as will be

discussed in the next chapter, web-based/ online learning adoption in nursing education and specifically in clinical skills has been primarily examined through research within the organisations who invented the resources only. This research sought to address this issue by exploring in more depth the issues related to the transferability and reuse of open educational resources available on the web.

1.3 Open educational resources: an overview

Recent years have seen a rapid increase in the development and use of Open Educational Resources (OERs) in Higher Education Institutions (HEIs) globally. It has the ability to truly transform the way education is regulated, delivered and experienced (Windle, Wharrad, McCormick et al., 2010). However, although OERs were introduced by UNESCO in 2000 there is no authoritatively accredited definition for the term (Wiley, 2007). The most often used definition introduced by the Organization for Economic Cooperation and Development (OECD) refers to OERs as 'digitized materials offered freely and openly for educators, and learners, to use and reuse for teaching, learning and research' (OECD, 2007, p.10). Typically, they are made free and accessible to all over the web and aim to provide access to knowledge for the public good. OERs can include the following: a) learning content such as modules, full-

courses/programmes, articles, videos, multimedia applications, learning objects, and any other learning materials; b) software tools to develop, use and distribute content such as learning management systems (LMS); and c) implementation resources, for instance open licences (Kurelovic, 2016, Butcher, 2015). The main feature of OERs is that they can be freely and legally downloaded, used, and reused without requesting permission from the copyright holder while their authors retain credit for original creation and licences (Kurelovic, 2016). This is how OERs differ from other digital teaching and learning resources available on the internet (Butcher, 2015).

A survey by McKerlich, Ives and McGreal (2013a), to measure the use of OERs, suggests that one of the key purposes for OERs is to support education; they do so with heightened accessibility for users on the world-wide web, and they have the potential to reduce barriers to learning through enhanced motivation, engagement, and retaining the attention of students. The recycling and reuse of OERs could increase the cost-effectiveness of online education (McGreal, 2011) and provide a sustainable approach to e-learning (Littlejohn and Pegler, 2015). Furthermore, a case study in open educational practice with a focus on the South-Mediterranean region by Nascimbeni, Stefanelli, Wimpenny et al. (2016), highlighted that open education approaches could help make international collaboration easier, more sustainable and more attentive to the

needs of the stakeholders involved by developing trust, early sharing of ideas and collaborative preparation and collaboration across cultural and linguistic boundaries. Nevertheless, open education related international shared interactions are rare and fragmented (Nascimbeni et al., 2016).

According to OECD (2007), the OER movement grows both top-down and bottom-up: new projects are initiated at the institutional level while individual educators and researchers use and produce OERs from their own initiative; most institutions involved in producing OERs seem to be well-reputed nationally or internationally. Globally, 27% of Massive Open Online Courses (MOOCs), the most popular open educational resources, are initiated in the USA, and the greatest number of MOOCs in Europe are provided by the UK (Kurelovic, 2016). Accordingly, mostly OERs are from English-speaking, developed countries. Despite the potential benefits offered by OERs, their use in many HEIs in Arabic countries ranges from very low to none (Hoosen, 2012). MIT OCW[1] shows that only 4% to 9% of users come from Arabic countries (MIT, 2016).

Reusable learning objects (RLOs) are open digital educational resources and the focus of this study. They can be reused and shared

[1] The Massachusetts Institute of Technology first talked about placing learning materials for free on the internet in 2001.

from a central online repository to support learning (Grunwald and Corsbie-Massay, 2006). Chapter 3 will discuss the context of the RLOs intervention including the reasons for selecting them for this study.

1.3.1 Advantages of OERs

Proponents of OERs have suggested a number of advantages. It is suggested that learners are exposed to different educational resources which are suited to their learning needs, and they can become more active participants in the educational process (McGreal et al, 2013). Freedom and access to education is enhanced, leading to better opportunities for self-directed learning approaches (McGowan, 2019, Henderson and Ostashewski, 2018, Elf, Ossiannilsson, Neljesjo et al., 2015).

Educators also benefit from the availability of quality peer-reviewed material which aid them in enhancing their curriculum (McGill, 2013). They can compare their own teaching material with peers around the world, learn how to release their work via an open licence platform and thus improve the quality of teaching practices and encourage pedagogical innovation. OERs are likely to accelerate changes in the traditional teaching role and in the evolution of more independent-learners (OECD, 2007). Wright and Reju (2012) add that OERs could also benefit educators who do not have teaching

experience and subject matter knowledge of the topics that they are already teaching.

According to McGill (2013) OERs can enhance the reputation of HEIs, increase capacity to educate distantly located students, make the content production efficient, help build new partnerships with other organizations outside the education sector, support sustainability of legacy materials, and significantly aid in reducing the cost of educational content development through sharing and reusing. Yuan, MacNeill and Kraan (2008) claim that OERs offer new chances for teaching and learning, at the same time challenging the already established views about teaching and learning practices in higher education.

Kurelovic (2016) suggested that OERs could reduce the gap between different levels of society and between countries, improve the quality of education, accelerate knowledge flow and increase the number of people involved in the educational process. OERs have gained increased attention for their potential promise to avert demographic, economic, and geographic educational boundaries and to promote life-long learning (Pirkkalainen, Pawlowski and Pappa, 2017, Elf et al., 2015, Yuan et al., 2008).

1.3.2 Barriers to using OERs

Despite the fact that OERs have many advantages, they are still in the early adoption stage (Henderson and Ostashewski, 2018, McKerlich et al., 2013a), which draws attention to the barriers that slow the spread of their usage. An overview of the literature suggest that these barriers can be divided into technological, economical, legal, and social (Mtebe and Raisamo, 2014, Pawlowski, Pirkkalainen, Gervacio et al., 2014, Hodgkinson-Williams, 2010):

- **Technological barriers:** such as lack of broadband availability (Hatakka, 2009, OECD, 2007), and lack of access to computer and internet (Hodgkinson-Williams, 2010).

- **Economical barriers:** such as lack of resources (human, and funding) to invest in software and hardware for developing and sharing OERs especially in developing countries (Mtebe and Raisamo, 2014). Also, difficulties in covering costs for developing OERs or sustaining an OER project in the long run might inhibit the spread of OERs (Mtebe and Raisamo, 2014).

- **Legal barriers:** One of the legal barriers delaying the larger-scale use of OERs is the lack of awareness regarding the copyright on the educational content (Kurelovic, 2016, Hylén, 2006).

- **Social barriers:** such as lack of skills to use the technical innovations and cultural obstacles against sharing or using resources produced by other educators or institutions (Hodgkinson-Williams, 2010, OECD, 2007), lack of skills to select appropriate OERs and re-use or re-mix them and lack of incentives or reward systems for instructors (Henderson and Ostashewski, 2018, Mtebe and Raisamo, 2014).

Additionally, Torres (2013), who provides an overview of the challenges facing the OER in Latin-American countries, suggested that the usage of OERs may require adaptation to an actual pedagogic context, and also to a country's cultural context. According to Hatakka (2009) OERs created for a specific context might be inappropriate or useless in another context. For example, OERs from developed countries may not be applicable for students originating from other cultures as the pedagogy used or the level of the content might not be appropriate (Nascimbeni et al., 2016). Relevance and aligning resources to the specific learning needs of users could also be an inhibiting factor for reuse of OERs, as the content might not be relevant to use in different cases or might not fit the scope of the course (Pounds and Bostock, 2019, Henderson and Ostashewski, 2018, Hatakka, 2009).

Furthermore, another challenge exists, related to questioning the quality of OERs. Educators, and learners may not have difficulties

accessing OERs, but could still have problems judging their quality and relevance (Clements, Pawlowski and Manouselis, 2015, Hylén, 2006). Content quality is an important parameter and if the content is context related, it is considered to be of good quality, else not (Hylén, 2006).The content which is considered to be high quality in one context might be unsuitable for use in another context and therefore could be called low quality content. Moreover, it has been suggested that trust is another issue related to quality; users often do not trust internet material, and if users do not trust the quality of the information in OERs, they will not use them (Pounds and Bostock, 2019, Pirkkalainen et al., 2017, Nascimbeni et al., 2016, Hatakka, 2009). According to Hatakka (2009), the trust of content depends on: 1) what type of content it is (users usually trust scientific papers) and 2) from where the producers get the content (users do not see any reliability problems if the content is provided by a well-known organization).

Moreover, the spreading of OERs in developing countries is additionally delayed by: a) the lack of OER implementation policy at national or institutional levels; b) educational practices which are mostly founded on traditional educational methods; and c) the language gap (Pirkkalainen et al., 2017, McKerlich et al., 2013a). Additionally, an online questionnaire in aquaculture filed to examine students' and educators' perspectives on OERs by Pounds and

Bostock (2019) revealed that low awareness and availability of OERs is one barriers to using OERs. Finally, in the OER movement, educational systems face the greatest of challenges 'to break the aversion to openness' as the mind-set of the majority is set on the culture of non-openness (Torres, 2013). Thus, it will be important to explore some of these challenges in this study and consider them in the context of transferability to the Saudi context.

1.4 Research context

In order to implement a new educational intervention in nursing education in KSA, we should understand their nursing education system. This section will provide a general background on nursing education and e-learning in the Kingdom of Saudi Arabia (KSA).

1.4.1 Nursing education in KSA

With rapidly expanding oil production from the 1970s onwards, the Saudi government began to encourage development by investing in infrastructure, including education (Harb, 2019). Furthermore, since 2016, Saudi Arabia's Vision 2030 represents a major structural shift in all economic sectors, and healthcare is one of the largest sectors significantly contributing to achievement of the vision (Albejaidi and Nair, 2019). The vision aims to expand the quality of healthcare and education to meet national needs and international standards of

accreditation (Saudi Vision 2030, 2016). In the Saudi healthcare sector, nurses make up the majority of healthcare providers (Al-Dossary, 2018, Almalki, 2011). Therefore, an educated and skilled nursing workforce is crucial for meeting national demand through the provision of quality health services (Alharbi et al. 2017).

The Saudi 2030 Vision is a major part of the government's drive to address the immediate and serious challenges facing the nursing profession, which primarily concerns the workforce, education and scope of practice (Harb, 2019). Thus, the Kingdom is considering the education standards for nursing degrees to help achieve this vision (Al-Dossary, 2018). Nursing education is one area that has received significant investment in response to an increase in the demand for nurses in KSA and the provision of high quality and effective nursing care (Al-Dossary, 2018). Currently, the nursing education system in KSA is going through interesting changes. There are more than twenty faculties that offer free nursing programs in KSA at Bachelor and Master level in different specialties (Harb, 2019). Furthermore, the Ministry of Education (MoE) in KSA is providing free bridging programs for all nurses with diplomas and national and international scholarships to achieve a higher degree such as a Master or Doctoral degree, acknowledging the need to have effective leaders to influence the future of the nursing profession (Almalki, FitzGerald and Clark, 2011).

Usually, students are awarded a Bachelor degree after five academic years (a foundation year and three specialized years) and one obligatory internship year for practice. Most nursing faculties in KSA use similar traditional methods in teaching theoretical and practical aspects of nursing programs. The theoretical parts are usually delivered as face-to-face lectures by nursing lecturers. Although KSA is witnessing changes in both the health delivery system and education system, and the emphasis is on the need for nursing students to acquire skills which will enable them to become independent and self-directed learners, students are rarely offered the opportunity for self-directed learning (AlMutair, 2015, El-Gilany and Abusaad, 2013). Generally, educators in KSA place little importance on independent thinking, and use teaching methods that emphasise transfer of information, rather than investigation and discovery (Alghamdi, Albloushi, Alzahrani et al., 2019, Harb, 2019, Robertson and Al-Zahrani, 2012).

The students' clinical training starts in the nursing clinical skills laboratories (CSLs), followed by training in hospitals, for 2 to 3 days/week throughout the semester. The traditional methods of teaching clinical skills, in most Saudi nursing faculties, depend on the demonstration of clinical skills by the nursing tutor followed by the students being assigned to different CSLs to practice these skills (Fallatah, 2016). This is often done within a very limited time period.

In addition, although the teaching of these skills is based on the steps laid out in the main reference textbooks, it is rare that the tutors have agreed and standardized how to actually conduct the procedure before the practical session (Alghamdi et al., 2019, AlMutair, 2015). This means that each tutor's own experience and background influences the way in which the skill is demonstrated to students, and although each step appears the same on paper, the practical reality may differ from class to class, depending on who is teaching. Thus, there may be differences in the ways that students learn to conduct the skill in practice (AlMutair, 2015). This, indeed, is one of the challenges that educators face in CSE in KSA.

There are many further challenges in nursing education in KSA. For example, time pressure. In many instances, because the curriculum requires a certain number of hours to teach clinical skills on major nursing courses, the time for students to practice clinical skills is limited and many students do not have enough time for hands-on practice (AlMutair, 2015). This might negatively affect the students' confidence and ability to conduct the skills in real placements and impacts on the ultimate outcome of providing high quality nursing education that prepares highly qualified nurses. An additional challenge is that the number of clinical tutors is fewer than required compared to the number of students (AlMutair, 2015). There is a limited number of clinical teachers to supervise nursing students in

their clinical practice, meanwhile the number of nursing students significantly increases annually (Aldawsari, Babenko-Mould and Andrusyszyn, 2016).

Moreover, the use of English language is one of the challenges in nursing education in general and clinical practice specifically. A qualitative study to explore the challenges in nursing education in KSA by Alghamdi et al. (2019) found that Saudi students find it difficult to interact in open and busy places using English. Regardless of the fact that the entire nursing curriculum is taught in English, students usually find it challenging to communicate and understanding the information in English. Students before enrolling in college are not adequately exposed to the English language and English is not taught intensively to allow them to use it sophisticatedly later in the workplace (AlMutair, 2015). Accordingly, the process of transferring, understanding, interpreting, and receiving information is being influenced due to the English language proficiency of many nursing students.

Cumulatively, although these challenges are not unique to KSA, these might act as a barrier to promoting a positive learning environment for clinical teaching in KSA. Nursing education in KSA should move forward from the traditional teaching methods base to more advanced and modern web-based learning to meet the

generational needs in using technology (Harb, 2019), and to meet the Saudi Vision 2030.

1.4.2 E-Learning in KSA

Internet usage in KSA has increased significantly in the last few years. The number of internet users in KSA reached 19.6 million in 2014, which is nearly one third of the Saudi population (about 30 million) (CITC, 2020) . One reason for the growth is that approximately 60% of the Saudi population is comprised of young people who are 20 years old or younger (RPD, 2020), and they are adapting quickly to new technologies. It is estimated that internet use will continue to grow rapidly in KSA, thereby raising the issue of providing new learning strategies that include use of technology (Ali, 2016).

In KSA, online courses are an important part of the future of higher education as they have the potential to improve students' learning, and encourage students to be more interested in learning (ALBALAWI, 2007). KSA, as the largest market economy in the Middle-East, has of late witnessed huge expansions in e-learning (Quadri, Muhammed, Sanober et al., 2017, Al-Shehri, 2010). There have been a number of initiatives to introduce e-learning including the establishment of e-learning units in universities and educational organizations; the establishment of a National Center for e-Learning

(NCeL); and the launching of local e-learning programs that are aimed at national certification for e-learning (Al-Shehri, 2010).

Higher Education in KSA has encouraged the use of e-learning in education by providing development projects to establish adequate ICT infrastructures, as well as content development for higher education students. Recently, some universities have provided commercial Learning Management Systems (LMS), such as Blackboard to facilitate learning and teaching online (Alharbi, 2013). However, the number of lecturers who utilize these systems is very limited. A possible reason for this could be that the universities do not provide sufficient training workshops for online learning systems, and/or the high rate of educator turnover (Alshammari, 2015). A few lecturers, who are personally interested in e-learning and have adequate skills, provide online materials as supplementary resources for their courses (Almalki, 2011). Furthermore, all the universities in KSA, now, provide introductory and advanced computer courses to their students as required courses (AlMutair, 2015). The Information and Communication Driving License (ICDL) program has already been implemented in the foundation year for the students, as well as the educator, in all Saudi universities. This program is offered to provide students and educators with the computer and internet skills to make accustomed of nowadays enhance technology in education (KAU, 2020, KSU, 2020b).

Currently, many universities have agreed to implement systems of e-learning, and all have Memos of Understanding to introduce e-learning schemes (NCeL, 2016). As part of these agreements, the NCeL provides technical and consultative support to universities in the use of e-learning, in facilitating the transition to this kind of education and to set out the basic rules for its application (NCeL, 2016). The centre has also started to create a digital repository, called Maknaz, which will contain educational content such as Learning Objects, which can be uploaded, modified by lecturers and retrieved by students (Alebaikan, 2010). However, it is impossible to predict whether or how educators will use these resources. Also, unfortunately, this digital repository and its contents are still largely unknown to many faculties, and it is not clear if it is open access or restricted to specific users. Despite this, KSA has positively engaged with the movement of OERs in this age of information explosion, though these open access resources mainly only include access to Saudi journals and do not contain any other multimedia or interactive repositories (AlMarwani, 2013).

Although there are few experimental studies in this area, some identified descriptive reports and discussion papers have highlighted the need for research in the field of e-learning in healthcare generally and nursing specifically to construct a foundation of knowledge to refer to. Alharbi (2013) reviewed the Saudi literature

and other published academic materials that investigate different multimodal delivery methods and technologies currently being employed by education institutions in KSA. He highlighted the need for further research to establish an accurate description of e-learning in KSA; and case studies with in-depth interviews and observation. Moreover, on the 13th World Congress on Healthcare & Technologies, ALHMOUD (2018) need for study of the adoption of healthcare professionals of newly implemented e-learning and to investigate this unexplored area in the fast-growing e-learning field in KSA. Furthermore, a cross-sectional design study to assess readiness of nursing students for e- learning (n=113) by Ali (2016) concluded that nursing students are ready for e-learning and implementation of new technologies with instruction should be made. The study also suggested further study to investigate the drivers that motivate Saudi nursing students to engage in e- learning.

Regardless of the urgent need of the Saudi MoE to adopt e-learning and to provide all available facilities to encourage e-learning, yet this concept in Saudi education still growing and consider new to this filed. Additionally, it is clear that the research conducted in KSA to explore rudimentary e-learning is limited, with few dedicated interventional studies to explore its adoption in nursing CSE to date. Thus, this supports the justification for conducting this study

exploring the transferability and adoption of RLOs a particular form of OERs created in the UK to Saudi nursing CSE.

1.5 Thesis organisation

Following the overview of the research background and context, this thesis is structured as follows:

Chapter 2: provides a critical analysis of the literature surrounding the efficacy of web-based resources for the teaching of healthcare undergraduate clinical skills, the pedagogical values of web-based resources, and investigates the methods of evaluation. The findings show that there is no evidence in the available literature of how RLOs as OERs may transfer to another setting. Finally, this chapter will present the research aim and objectives and the significance of the current study.

Chapter 3: provides a background for the RLOs intervention, including the reasons for selecting the RLO format. The RLO development process, and the pedagogy underpinning their design will be presented. Furthermore, this chapter provides a critical analysis of the theoretical underpinnings of transferability and acceptability of RLOs that guided the design and analysis of this study.

Chapter 4: provides in-depth consideration of the study's research design. Having identified the background context, it outlines the philosophical assumptions that underpin the mixed method approach, identifying the adoption of Pragmatic philosophy. As an exploratory mixed method research design (MMR), this research involved three sequential phases: an exploratory qualitative phase, the implementation of the RLOs, and an evaluation phase. This chapter will briefly introduce the methods used in each of these three phases.

Chapter 5: presents the method of data collection selected in the first exploratory phase of the study. It provides the reader with an in-depth look at the think-aloud and focus-group processes, sampling, data analysis and ethical consideration for the first phase.

Chapter 6: presents the findings and the discussion from the think-aloud and focus-group of the first phase. This chapter concludes that most students and tutors exhibited positive views about the usefulness, attitude and engagement, and usability of the RLOs in teaching and learning clinical skills. Accordingly, participants expressed positive intentions to use the RLOs in the Saudi nursing curriculum. Following that, it discusses the developmental process of the questionnaire, its validity, reliability and its translation.

Chapter 7: discusses the second implementation phase of the RLOs into the Saudi nursing curriculum. Then, it presents the method utilized in the third evaluation phase of the research for both the questionnaire and the follow-up focus-group, including sampling, and ethical considerations. This chapter also outlines the data collection process and analysis including Principle Component Analysis (PCA), descriptive statistics, and the focus-group.

Chapter 8: presents and discusses the findings from the third evaluation phase of the study. This chapter concludes that UK RLOs were evaluated positively by the students and in most of the aspects were accepted to support the CSE.

Chapter 9: presents the final meta-inference for the study, comparing and synthesising the findings from all phases. Additionally, strengths, limitations and implications for the research will be discussed. Finally, this chapter provides the thesis conclusion, which reviews and assesses how the aims and objectives of the research were met.

Chapter 2: Review of the literature

This chapter presents a critical analysis of the literature reviewed regarding the efficacy of web-based learning on clinical skills education for healthcare professionals. This chapter will also present the research aim and objectives and the significance of the current study.

2.1 Aim of the literature review

The previous chapter presented an overview of literature concerning the growth of open RLOs and OERs, but little research is available on the user experience of them generally, and in clinical skills education (CSE) specifically. For this reason, this literature review turns to a more thoroughly researched area -the efficacy of web-based/online resources for clinical skills learning. These web-based resources may not be OERs, but in many respects can be considered similar to them. Indeed, as indicated in the last chapter, OERs are web-based educational resources and include all types of resources - from modules to learning objects. This body of review is fundamental because if web-based resources do not have educational value for the intended users then their transferability for other user groups becomes irrelevant or indeed potentially harmful. In addition, while open education is not the primary focus of these

articles, there may be reference to reuse or transferability to other user groups hidden in the narrative. The aims of this review are:

1- To explore the existing evidence for the efficacy of web-based/online resources for the teaching of undergraduate clinical skills.

2- To explore the pedagogical value of web-based resources as teaching tools in CSE for undergraduate healthcare students based on the Kirkpatrick learning and training evaluation framework. Understanding the pedagogical value of the web-based resources within the institution of origin will provide baseline knowledge for exploring the transferability of RLOs.

3- To investigate the methods and methodologies used in the included studies to evaluate the efficacy of the web-based/online resources.

4- To ascertain whether transferability or reuse of web-based/online resources are explored in the literature.

The review question formulated to guide the literature search strategy is:

What is the value of web-based/online learning for students and teaching staff of healthcare professional courses in relation to CSE?

2.2 Method of conducting the literature review

The question and aims of this literature review are broad and need a systematic approach to identify a wide relevant range of research studies. However, the question is not as precise as the systematic review method requires. Therefore, this review follows a systematic scoping review method in order to comprehensively explore the relevant literature in the field of technology in clinical education for healthcare professions, and to identify the research gaps in the existing literature.

Unlike other reviews that address relatively specific questions, for instance a systematic review of the effectiveness of a particular intervention based on a particular set of outcomes, systematic scoping reviews can be used to map the key concepts underpinning a research area, the main sources and types of evidence available, and to clarify the working definitions, or the conceptual boundaries of a topic (Peters, Godfrey, Khalil et al., 2015, Mays, Roberts and Popay, 2001). They are useful for examining emerging evidence when it is still unclear what other, more specific, questions can be modelled and valuably addressed (Arksey and O'Malley, 2005). Also, it helps the researchers to identify more precise questions and suitable inclusion criteria (such as the nature of the interventions, comparators and outcome/s of interest) (Algoso, Peters, Ramjan et

al., 2016). Moreover, the value of scoping reviews to evidence-based practice is the examination of a broader area to identify research gaps in the current literature. This by drawing conclusions from existing literature regarding the overall state of research activity from previous research or relevant systematic reviews (Davis, Drey and Gould, 2009).

2.3 Steps in conducting scoping review

According to Arksey and O'Malley (2005) who have been influential in conducting and endorsing scoping reviews, the method adopted for identifying literature in a scoping study needs to achieve in-depth and broad results, it is guided by a requirement to identify all relevant literature regardless of study design. Reviewers, therefore, could redefine search terms and undertake more sensitive searches of the literature. Moreover, they may not place strict limitations on search terms, identification of relevant studies, or study selection at the outset. The process of scoping is not linear but iterative, requiring reviewers to engage with each stage in a reflexive way and, where necessary, repeat steps to ensure a comprehensive cover of literature (Arksey and O'Malley, 2005). Table 1 shows the Joanna Briggs Institute (JBI) framework for conducting a scoping review, which will be followed in this systematic scoping review.

N	Steps in conducting scoping review
1	Identifying the research question and aims
2	Identifying relevant studies
3	Study selection
4	Charting the data
5	Collating, summarizing and reporting the results
6	Consultation (optional)

Table 1 Scoping review framework (JBI, 2015)

2.4 Identifying relevant studies

This scoping review aims to answer stated review questions and aims by collecting as much evidence as possible. It is conducted through a thorough and comprehensive search by development of an understandable and clear search strategy. In this scoping review, the question posed has three manageable parts according to the PCC (Population, Concept and Context) elements of the inclusion criteria (Algoso et al., 2016).

- **Population:** any healthcare student and clinical skills tutors
- **Concept:** online/web resources
- **Context:** clinical skills education

2.5 Search strategy

The search strategy of this review involved three stages:

First stage: A limited initial search of MEDLINE and Google Scholar was undertaken by employing keywords such as 'clinical skills', web-based learning', 'nursing students', 'e-learning', and 'open educational resource'. This was followed by an analysis of the text words encompassed in the title of the studies, abstracts, and of the index terms utilized to describe the article.

Second stage: A further search using all recognized keywords and index terms was then performed across all included databases; MEDLINE, CINHAL, Embase, PSYCHINFO, ASSIA, EBISCO, HighWire, PubMed, SAGE, and ERIC (Table 2). This was carried out from April 2016 to July 2016, and updated in January 2020, giving particular attention to the subject headings used across each database. All the keywords were reviewed with experts in the field and a senior research librarian to ensure the feasibility and thoroughness of the search strategy, as per guidance CRD (2009). Each keyword was inserted into the database individually, for instance, 'nursing students' was inserted alone, then 'web-based learning' alone. This was in order to track the number of studies resulting from each keyword and ease the editing when needed (De Brún and Pearce-Smith, 2011). No time limitation was imposed in the review.

The common abbreviations and alternative spellings (British and American English) in relation to the topic were considered during the

search. The terms in search strategy were linked by the Boolean operator 'OR' between each element in PCC and the main result of each PCC element was combined with 'and' to reach the final number of articles, titles and abstracts to be scanned. Moreover, a hand search in some key journals, such as Zetoc and the Directory of Open Access Journals (DOAJ), was conducted in order to optimise the search for relevant literature. In addition to the results of the systematic searches, studies found through broad searches using Google Scholar and from reference lists of the systematic searches were included.

Population	And	Concept	And	Context
"Healthcare students".mp. or exp Students, Dental/ or exp Students, Nursing/ or exp Students, Medical/ or exp Students, Pharmacy/ or exp Students, Public Health/ or exp Students, Premedical/ or exp Midwifery/ or exp Students, Health or Occupations/ or exp Physical Therapists/		RLO.mp. or RLOs.mp. or Reusable learning object.mp. or Blending Learning.mp or E-learning.mp or Online courses.mp or exp Computer-Assisted Instruction/ or Web-based learning.mp Or Online learning.mp or Integrated learning.mp or Hybrid learning.mp or Reusable learning objects.mp or Education, Distance/ or learning objects.mp or exp User-Computer Interface/ or Open educational resources.mp or MOOCs.mp or MOOC.mp or "Massive open online courses".mp or exp Computer Simulation/ or exp Multimedia/ or Computed-based.mp or E-technologies.mp or Mixed-mode.mp. Online teaching.mp or Collaborative learning.mp. or Technology enhanced learning.mp. or Computers/ or Low fidelity.mp. or High fidelity.mp. or Immersive learning.mp. or Online education.mp. or exp Online Systems/		exp Students, Health or Occupations/ or exp Physical or Therapists/ or exp Clinical Competence/ or exp Motor Skills/ or exp Nursing, Practical/ or Clinical education.mp. or exp Health Education/ or Education, Dental/ or exp Education, Medical/ or exp Education, Nursing/ or exp Education, Pharmacy/ or exp Clinical skills/

Table 2 Search terms and Medical Subject Heading (MeSH) used with regard to PCC framework from MEDLINE database

Third stage: a total of 11520 studies were exported to reference manager Endnote. The reference lists and bibliographies of all retrieved studies were screened against the eligibility criteria:

Inclusion criteria:

- *Type of participants:* all undergraduate healthcare students who came into contact with clinical skills practice and experienced web-based learning.

- *Type of interventions:* web-based/online portable learning resources for clinical skills that can be used off campus.

- *Outcome measures:* any outcomes related to clinical skills education based on Kirkpatrick framework. All outcome measures that explored student learning experiences, and student satisfaction were also included.

- *Study design:* all types of study design published in the English language.

Exclusion criteria:

- *Type of participants:* postgraduate or continuing professional training.

- *Type of interventions:* any online resources designed for in campus use and which cannot be accessed from anywhere else. Any smart

phone/tablet application (Apps). Learning Management Systems (LMS) used only for uploading materials. Any online learning teaching strategies used primarily for the development of theoretical knowledge in healthcare and not clinical skills were also excluded.

- *Outcome measures:* any outcome not related to clinical skills education.

- *Study design:* non empirical studies such as descriptive reports and discussion papers. Any studies which did not provide clear information as to whether the educational intervention was portable or not were excluded.

2.6 Study selection

A total of 6863 studies were retrieved after duplicates were removed. 6771 were clearly irrelevant and removed following critical examination of titles and abstracts, they included irrelevant subject matters. For instance, in campus online resources, not related to clinical education, different population and research design, or not related topics and were thus excluded. Next, a full text examination of the remaining 92 studies was carried out. A final selection of 19 studies and 6 reviews was identified as suitable for inclusion in this review. The assessment of the actual relevance of studies was decided through the eligibility criteria and through agreement with

experts in the field. Figure 1 is a PRISMA flow diagram illustrating the literature scanning process, and the result.

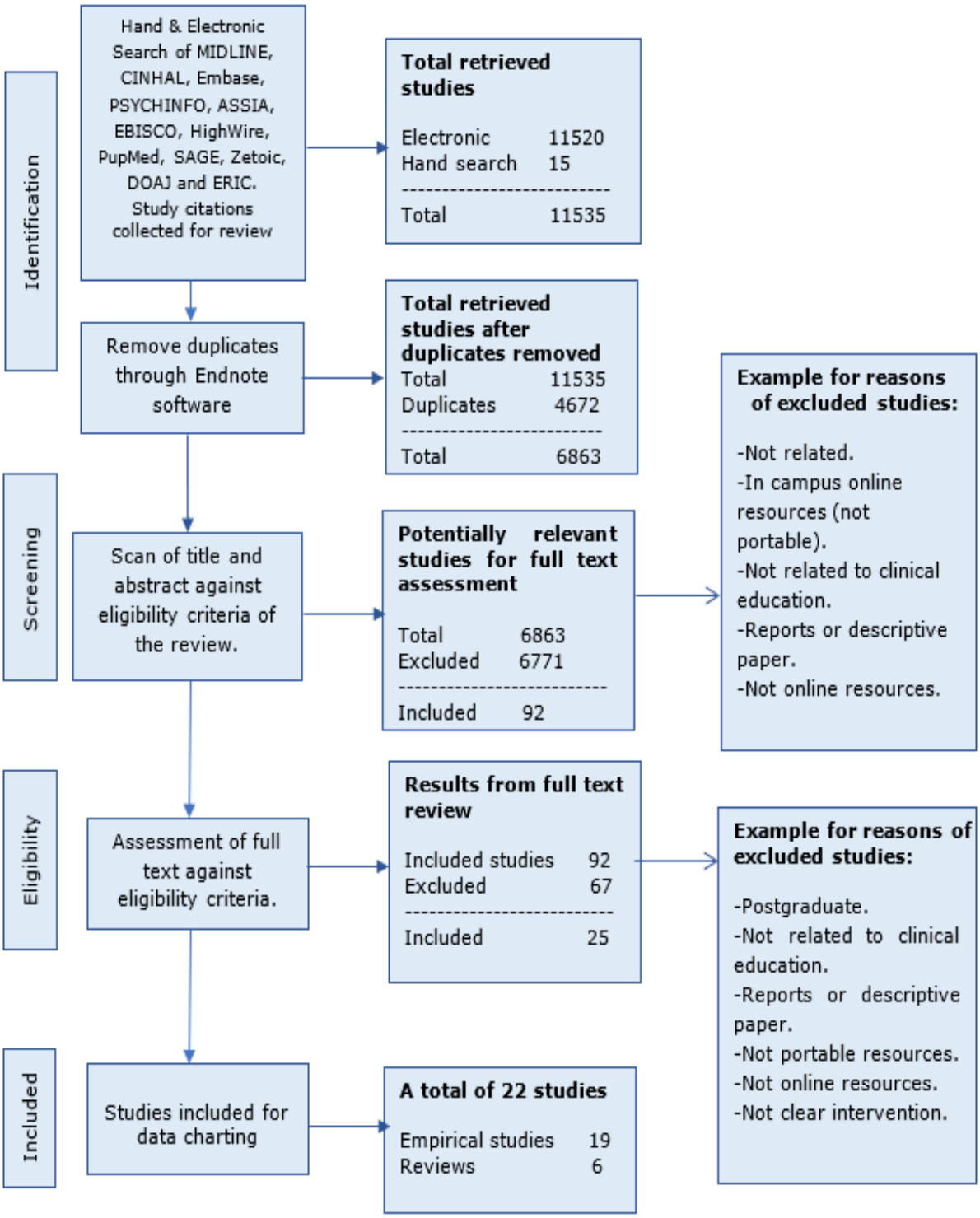


Figure 1 A PRISMA flow diagram for the scoping review process

2.7 Charting the data

Data extracted in this review were gathered and presented in a charting table which includes specific details about:

- Inclusion of a conceptual or theoretical framework to design the educational intervention

- Study-level characteristics such as populations, design and methods, country, context, and analysis.

- Educational intervention that involves name, content, design theoretical framework, quality assurance, tracking option, accessibility, and interactivity (whether they are multimedia or include activities).

- Descriptive or contextual data.

- Significant outcomes such as changes in knowledge, skills and attitudes, or perception through use of the web-based resource in clinical skills education.

- The publication characteristics (publication type, journal of publication, year etc.)

Table 3 summarises the included empirical studies and Table 4 summarise the included reviews.

Table 3 Summary of included empirical studies

N	Authors	Background		Research		Outcomes				
		Participants	Country	Design	Educational intervention	Experience & perception	Satisfaction	Performance	Knowledge	Confidence
1	Preston, Ada, Dean et al. (2012)	Physiotherapy	Australia	Non RCT	E-skills training online resource.	Survey	-	Practical exam	`-	-
2	Lehmann, Thiessen, Frick et al. (2015)	Medicine	Germany	RCT	Interactive Life basic support Web-based VPs	-	-	Skill examination	MCQ	-
3	Lehmann, Bosse, Simon et al. (2013)	Medicine	Germany	Evaluation	Interactive lumber puncture Web-based VPs	-Survey -Semi-structured interviews	-	-	-	-
4	Keefe and Wharrad (2012)	Nursing	UK	Randomised cohort design	Pain management RLOs	-	-	-	Questionnaire	-
5	Williams, O'Connor, Windle et al. (2015)	Nursing	UK	Evaluation	Injection skills RLOs package	Survey	-	-	Survey	-
6	Redmond, Davies, Cornally et al. (2018)	Nursing	Ireland	Evaluative study	Wound care RLOs package	Questionnaire	-	Pre- and posttrial questionnaire	Questionnaire	Survey
7	Clay (2011)	Midwives	UK	Evaluation	New-born Infant Physical Examination RLOs	Survey	-	-	-	-
8	Gerdprasert, Pruksacheva, Panijpan et al. (2010)	Nursing	Thailand	Mixed methods design	Web-based learning unit on the process and mechanism of labour	Survey and interview	-	Competency test Performance skills checklist	MCQ	-
9	Gerdprasert et al. (2011)	Nursing	Thailand	Quasi-experimental	Web-based learning unit on the intrapartum nursing care	Questionnaire	-	Competency test Performance skills checklist	Conceptual knowledge test	-
10	Junsawang, Jittivadhna, Luealamai et al. (2019)	Nursing	Thailand	Pre-test and post-test design.	Multimedia-aided instruction for Basic life support (BLS) package	Focus group discussions	-	-	Questionnaire	-

11	Kaveevivitchai, Chuengkriankrai, Luecha et al. (2009)	Nursing	Thailand	A randomized experimental design	Multimedia Computer-assisted learning on vital signs	-	Semi-structured interviews	Performance checklist	MCQ	-
12	Sowan and Idhail (2014)	Nursing	Jordan	Mixed methodology design	A web-based virtual course with streaming videos on medication administration	-	Survey	Skill examination	-	Survey
13	Hibbert, Lambert, Carter et al. (2013)	Medicine	Australia	A randomized controlled pilot trial	Online video demonstration on endocrinology skills	Survey	-	OSCE	-	-
14	Holland, Smith, McCrossan et al. (2013)	Nursing	UK	Mixed method prospective design	Online video of the oral medication administration process	-	-Survey -Focus group	OSCE	-	-
15	Lu, Lin and Li (2009)	Nursing	Taiwan	Experimental design	Web-based video-taped with narration on intramuscular injection skills	-	-	Post-test	Pre-, post-test	-
16	Arroyo-Morales, Cantarero-Villanu, Fernandez-Lao et al. (2012)	Physiotherapy	Spain	RCT	ECOFISIO website on musculoskeletal palpation and ultrasound assessment	-	Survey	OSCE	MCQ	-
17	Gormley, Collins, Boohan et al. (2009)	Medicine	UK	Survey	Online resources with videos on basic skills procedures	Self-administered questionnaire & focus group	-	Questionnaire linked to OSCE result	-	-
18	Benino, Girardi and Czarniak (2011)	Nursing	Australia	Evaluation	WebCT	-	-	-	-	-
19	Wheeler, Whittlestone, Salvador et al. (2006)	Medicine	UK	Evaluation	Website and online resource on drug administration	-	-	OSCE	MCQ	-

T/F: underpinning theory or framework for resource design; RLOs: Reusable Learning objects; VPs: Virtual patients; RCT: Randomized controlled trial; OSCE: Objective Structured Clinical Examination; MCQ: Multiple Choice Questions.

Table 4 Summary of included reviews

N	Authors	Area	Review	Aim
1	Cant and Cooper (2014)	Nursing	Integrative review	To review the literature on utilization and place of Web-based simulation within nursing education.
2	Du, Liu, Liu et al. (2013)	Nursing	Systematic review	To examine the efficacy of the web-based distance education for nursing students.
3	Macznik, Ribeiro and Baxter (2015)	Physiotherapy	Systematic review	To critically review the effectiveness, and user perceptions of online technology for physiotherapy teaching and learning.
4	McCutcheon et al. (2015)	Nursing	Systematic review	To determine whether the use of an online or blended learning paradigm has the potential to enhance the teaching of clinical skills in undergraduate nursing.
5	Rowe, Frantz and Bozalek (2012)	Healthcare	Systematic review	To determine the impact of blended learning in the clinical education of healthcare students.
6	Coyne, Rands, Frommolt et al. (2018)	Healthcare	Integrative review	To inform future educational strategies by synthesising research related to blended learning resources using simulation videos to teach clinical skills for health students

2.8 Collating, summarizing and reporting the results

The main aims for this scoping review are to examine the efficacy of web-based online resources for clinical skills learning for undergraduate healthcare students and staff. In this section, the findings of the review will be confined to comparing types of educational interventions, study designs, and the outcome measures in included studies. Thus, the review will provide a flavour of the main areas of interest and identify where significant gaps may lie.

All included studies were conducted in university settings and shared the aim of examining and evaluating online resources and their pedagogical values in terms of students' clinical performance and/or knowledge and/or attitudes towards to clinical education, or students' experiences of and perceptions toward e-learning. Moreover, it was noted that most of the included studies were undertaken in western countries, which are considered to be high ranked countries in education in the world (Top Universities, 2020).

2.8.1 Educational intervention

Technology can play an important role in the achievement of learning outcomes, yet the challenge is to describe how technology allows underlying processes common to all learning to function effectively (Beetham and Sharpe, 2013). Well-designed e-learning

resources with good academic content might be motivating for learning and yield as good quality outcomes as lectures (Reime, Harris, Aksnes et al., 2008). To make web-based learning more successful is not simply about putting large amounts of text onto a website, the educators need to do more than just develop new ICT skills; the online resources should be pedagogy-based and well-understanding of diversity, context, and group dynamics (Islam, Beer and Slack, 2015). Therefore, in this section, it is important to draw attention not only to the types of educational intervention in the included studies, but also to their reporting of how the online resource was designed, its theoretical framework basis, its implementation and content quality assurance, and to highlight the level of interactivity and methods of tracking use. Table 5 summarizes the educational interventions in the included studies.

Although the educational interventions in the literature included in this review were different, all of them were portable and students could access them from anywhere. The web-based resources could be categorized under three groupings: using of multimedia web-resources invented by authors or their institutions, using videotaping for previous clinical skill demonstrations, and using a website that involves different clinical skills learning material invented by authors or their institutions.

Table 5 Summary of the educational interventions in the included studies

	Category of online resource	Author	Resource	Mode of delivery	T/F	OERs	Reporting		
							Content quality assurance	Tracking	Interactive
1	Multimedia web-resource invented by authors or their institutions	Preston et al. (2012)	E-skills training online resource.	Blended learning	No	No	NC	NC	Yes
2		Lehmann et al. (2015)	Interactive Life basic support Web-based VPs	Blended learning	No	No	Yes	Yes	Yes
3		Lehmann, Bosse, Simon et al. (2013b)	Interactive lumber puncture Web-based VPs	Blended learning	No	No	Yes	Yes	Yes
4		Keefe and Wharrad (2012)	Pain management RLOs	Supplement	AGILE	Yes	Yes	Yes	Yes
5		Williams et al. (2015)	Injection skills RLOs package	Supplement	AGILE	Yes	Yes	Yes	Yes
6		Redmond et al. (2018)	Wound care RLOs package	Supplement	AGILE	No	Yes	NC	Yes
7		Clay (2011)	New-born Infant Physical Examination RLOs	Supplement	No	NC	NC	NC	NC
8		Gerdprasert et al. (2010)	Web-based learning unit on the process and mechanism of labour	Blended learning	Constructivism and the 5E model	No	Yes	No	Yes
9		Gerdprasert et al. (2011)	Web-based learning unit on the intrapartum nursing care	Blended learning	Constructivism and the 5E model	No	Yes	No	Yes
10		Junsawang et al. (2019)	Multimedia-aided instruction for Basic life support (BLS) package	Supplement	No	No	Yes	No	Yes
11		Kaveevivitchai et al. (2009)	Multimedia Computer-assisted learning on vital signs	Supplement	The 5Es inquiry cycle	No	Yes	No	Yes

12	Videotaping for previous skill demonstrations	Sowan and Idhail (2014)	A web-based virtual course with streaming videos on medication administration	Supplement	No	No	Yes	No	No
13		Hibbert et al. (2013)	Online video demonstration on endocrinology skills	Supplement	No	No	Yes	No	No
14		Holland et al. (2013)	Online video of the oral medication administration process	Supplement	No	No	No	NC	No
15		Lu, Lin and Li (2009b)	Web-based video-taped with narration on intramuscular injection skills	Supplement	No	No	No	Yes	Yes
16	website	Arroyo-Morales et al. (2012)	ECOFISIO website on musculoskeletal palpation and ultrasound assessment	Blended learning	No	No	No	No	Yes
17		Gormley et al. (2009)	Online resources with videos on basic skills procedures	Blended learning	No	No	No	No	No
18		Bhatti, Jones, Richardson et al. (2011)	Colorectal surgery website on diagnosis and management of haemorrhoid	Replace the traditional method	No	No	No	No	NC
19		Wheeler et al. (2006)	Website and online resource on drug administration	Supplement	No	No	No	Yes	No

T/F: Underpinning theory/ framework for designing online resource; NC: Not clear; 5E model: engagement, exploration, explanation, elaboration, and evaluation; VPs: virtual patient (interactive questions, static & interactive image & videos); F2F: Face to face; BL: Blended learning; EL: E-learning; AGILE: framework to design online resource; OERs: Open Educational Resource.

Six of the online resources used in the included studies were invented and evaluated by authors or their institutions: E-skills training online resources; RLOs; web-based virtual patients; web-based learning unit; multimedia-aided instruction; multimedia computer-assisted learning (Table 5). These resources were stand-alone, multimedia, and included different types of activities and assessments. Most of the studies that used this media form provided clear reporting about the content quality of the online resource which had been validated by peer review or internal experts in the subject area. However, two studies did not provide any information regarding quality assurance and there was poor reporting in many aspects related to the intervention (Preston, Ada, Dean et al., 2012, Clay, 2011).

Moreover, most provided good reporting in their studies about the implementation of web-based resources and information about interactivity and tracking. However, only three educational interventions had a clear underpinning framework for their design. The RLO resources by Keefe and Wharrad (2012), Williams, O'Connor, Windle et al. (2015), and Redmond, Davies, Cornally et al. (2018) all used the AGILE framework for development and quality assurance of the RLOs, this framework will be explained in the next chapter. Moreover, the web-based learning unit by Gerdprasert et

al. (2011) and Gerdprasert, Pruksacheva, Panijpan et al. (2010), and the multimedia-aided instruction by Junsawang, Jittivadhna, Luealamai et al. (2019) indicated that they utilised the 5Es inquiry cycle (engagement, exploration, explanation, elaboration, and evaluation) as a theoretical foundation for their resource. Nevertheless, this 5Es inquiry cycle does not include a rigorous method and quality assurance process for developing the online resource. Furthermore, the RLOs by Keefe and Wharrad (2012) and Williams et al. (2015) were the only OERs while the others were restricted to institutional-users.

Four of the included studies used videotaping of previous clinical skills demonstrations (Table 5). Only Sowan and Idhail (2014)and Hibbert, Lambert, Carter et al. (2013) validated the online resources content through internal experts and none of these studies based their resource design on a theory or framework.

Four of the included studies used a website that involved different clinical skills learning material invented by authors or their institutions. These studies did not provide sufficient reporting about the resource other than to indicate that they used video, text, and images. Some studies provided a link, but these were not currently working. It was not clear what type of materials they used or how

this could affect the outcome of each study, either positively or negatively.

Most of the educational interventions in the included studies were introduced in a blended learning delivery form to supplement clinical education in different healthcare disciplines. One study by Bhatti, Jones, Richardson et al. (2011) used the online intervention as an alternative method of teaching with an experimental group. Moreover, few web-based resources in the included studies could be tracked as shown in Table 5. If tracking the resources were possible, student engagement could be examined through an empirical analysis of students (Morris, Finnegan and Wu, 2005). This could be used for research purposes, or to evaluate the resource through feedback. Furthermore, the essence of interactive media is to offer resources for students to explore, to make their own links between topics, and follow their own line of investigation, and this is valuable (Holliman and Scanlon, 2013). However, few included studies considered this principle in their intervention.

To sum up, this section presents the findings of educational interventions in all included studies. There was a clear deficit in reporting about the design and quality of online resources. Only three of the fourteen online resources had a clear underpinning framework for their design. Three of the included systematic reviews

concluded that there is a need for well-described studies on the use of blended learning in CSE (Coyne, Rands, Frommolt et al., 2018, McCutcheon, 2014, Rowe, Frantz and Bozalek, 2012).

2.8.2 Study characteristics

A range of study designs were used in the included studies. Eight used comparative evaluation with a control group, and eleven did not. The samples consisted of healthcare students across a range of disciplines, and sample sizes varied across the studies. However, in the studies that included a comparison between control and experimental groups, the samples were considered small in size, ranging from 32 to 146 participants in total for each study, which makes generalization of results across different domains challenging, if not impossible. Although sample size numbers are low in most of the included studies, it would be difficult to increase the samples by any substantial figure, as most of the interventions were implemented among single classes of students within single institutions (Lehmann, Thiessen, Frick et al., 2015, Hibbert et al., 2013, Arroyo-Morales, Cantarero-Villanu, Fernandez-Lao et al., 2012, Preston et al., 2012, Gerdprasert et al., 2011, Kaveevivitchai, Chuengkriankrai, Luecha et al., 2009, Wheeler, Whittlestone, Salvador et al., 2006), though there were larger sample sizes in

some studies within single institutions (Holland, Smith, McCrossan et al., 2013, Gormley, Collins, Boohan et al., 2009).

Although, in a scoping review, quality appraisals are not required (JBI, 2015), the risk of bias in some included comparative studies was clear. Besides the risk of bias, the quality of this type of research also relies on the design of the web-based resource itself (Raaff, Glazebrook and Wharrad, 2014). Assessing the studies enables important cross referencing of the extent to which the evidence they hold is potentially valid in terms of the study's findings. Gerdprasert et al. (2011), and Arroyo-Morales et al. (2012) were not clear about how study subjects were assigned to either the comparison or intervention group. In addition, there was insufficient balance in data reporting and discussion in some included studies as discussed previously (Bhatti et al., 2011, Clay, 2011, Gormley et al., 2009, Wheeler et al., 2006).

2.8.3 Pedagogical value of web-based resources

The pedagogical values of online resources included as outcome measures in the selected studies are comprised of; experience of using the resource and perception, participants' satisfaction, skills performance, knowledge related clinical skills, and self-efficacy. The wide variation of outcome measures used in each study in this review made the synthesis of data difficult. However, the outcomes

in this review could be categorized and evaluated based on Kirkpatrick's four level evaluation framework (1967). Kirkpatrick's framework (1967) offers a useful framework for assessing the various levels of evaluation reported in this scoping review and for analysing the pedagogical values of the educational intervention in an objective and systematic way. The framework involves four levels: reaction, learning, behaviour and results criteria as shown in Figure 2.

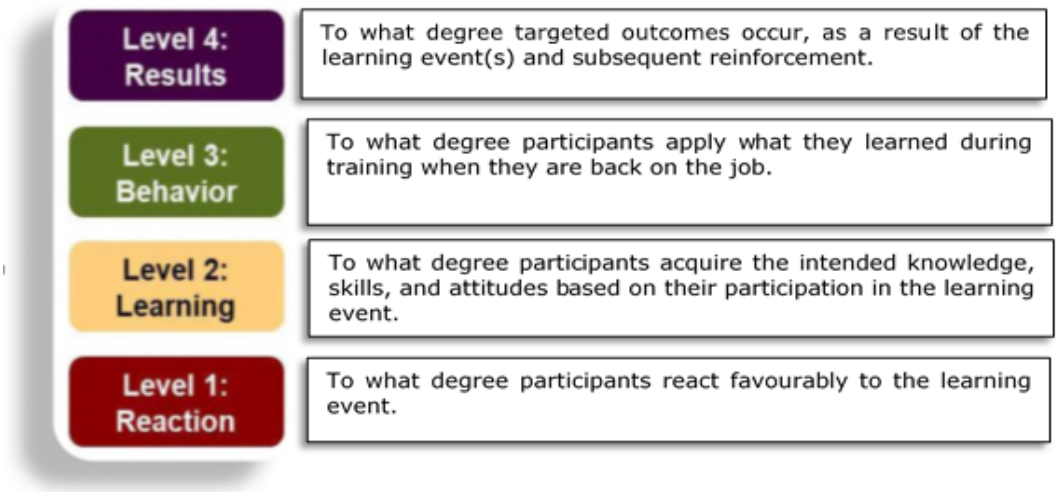


Figure 2 Kirkpatrick's four level evaluation framework (1967) (Kirkpatrick, 2009)

Nevertheless, some limitations of Kirkpatrick's framework (1967) have been reported. Kirkpatrick's framework assumes that the levels of criteria represent a causal chain such that positive reactions (level 1) lead to greater learning (level 2), which produces greater transfer and subsequently more positive organizational results (level 4) (Praslova, 2010). It is suggested that this could potentially lead to

course providers assessing reaction/ satisfaction in learners with the expectation that high (but not measured) levels are to be achieved (Praslova, 2010, Bates, 2004). However, Kirkpatrick's framework in this scoping review will be utilised to evaluate and organise the included studies' outcomes using different levels of evaluation. Most of the included studies evaluate more than one outcome and these outcomes could be categorized within level one and/or level two of the Kirkpatrick evaluation framework (1967), although none of them obtain data for behaviour or, particularly, results criteria, as will be presented in the following sections.

2.8.3.1 Level one of Kirkpatrick framework (1967): reaction

This level of evaluation is intended to evaluate how well participants liked a program. It generally cover learners' perceptions of the learning experience, satisfaction with program objectives, content, teaching methods, materials, and instructors (Curran and Fleet, 2005). Ten of the included studies evaluated the students' perception and their experience of web-based resources as an educational intervention in their outcomes, and five included satisfaction as an outcome. Despite the fact that many researchers caution against the use of reactions alone for the assessment of learning, reaction level criteria remain the most often assessed (Dysvik and Martinsen, 2008, Arthur , Tubré, Paul et al., 2003,

Alliger, Tannenbaum, Bennett et al., 1997). According to Arthur et al. (2003), one of the likely reasons for the wide use of reaction level measures is the ease of collection. However, most researchers also agree that learning, behavior and results criteria need to be measured in order to accurately evaluate training outcomes.

2.8.3.1.1 Evaluation of students' perception and experience of educational intervention

Eleven of the selected studies evaluated the students' perception and their experience of the educational intervention, for example, its usefulness, design, access, or integration, either on its own (Junsawang et al., 2019, Redmond et al., 2018, Williams et al., 2015, Lehmann, Bosse, Simon et al., 2013, Preston et al., 2012, Gerdprasert et al., 2011, Gerdprasert et al., 2010, Gormley et al., 2009); or as part of the whole learning experience (Holland et al., 2013) or, as in the case of Hibbert et al. (2013) and Clay (2011), it is not clear. Regardless of the different educational interventions utilized in individual studies, generally the results from all the included studies investigated students' perceptions on web-based learning mostly positive. The feedback suggest that the student view the use of web-based intervention is valuable to supplement the traditional methods within CSE. Also, it provides an on-demand, portable resource. Web-based learning provides flexibility in terms

of the time and place of learning and immediate access to clinical skills information and enables enjoyable, independent learning. However, a study by Hibbert et al. (2013) found that the lack of interactivity in online resources was a problem.

Different tools were used to measure students' and/or educators' experiences and some studies used more than one tool, these included questionnaires, semi-structured interviews and focus-groups. Nine of the included studies used post-intervention questionnaires, and some of them included open questions to measure perception. These tools, in some studies, were validated by experts or the researchers themselves and piloted prior to the study or adapted from a previous study (Redmond et al., 2018, Williams et al., 2015, Lehmann et al., 2013, Preston et al., 2012, Gerdprasert et al., 2011, Gerdprasert et al., 2010, Gormley et al., 2009). Two studies did not report on validation of the tools (Holland et al., 2013, Clay, 2011). Three studies used a focus-group to measure students' perception: the first study by Gormley et al. (2009) was based on a perception questionnaire, it included staff and students but the authors did not provide any details. The second study by Holland et al. (2013), used a student focus-group, and one interesting finding was that the video used for the intervention group was found to be particularly useful to refer to for guidance during self-directed study. The third study by Junsawang et al. (2019) found that the majority

of the students had positive perceptions towards the multimedia-aided instruction of Basic Life Support (BLS) which supplemented CSE and preferred this learning method over the traditional learning method. Their findings also showed that the online package helped the students to link basic science knowledge to BLS concepts as they were employing a fragmented memorization strategy and practice using a step-by-step BLS guideline without much clear understanding.

One study by Redmond et al. (2018) used open-ended questions in the questionnaire to allow the students to add their comments and perceptions about the online resource utilized in their study (RLOs). Their findings were predominately positive regarding the enjoyment of learning, value of the multimedia, flexibility of learning, and interactivity level of the RLOs. Their study supports evidence from the students' interview by Gerdprasert et al. (2010) who found that most of the students felt that the content of web-based resources was appropriate, pictures and animations attracted their attention, and they enjoyed doing the quizzes due to the interactive features.

Two of the selected studies evaluated the tutors' experiences and their perceptions. One study by Williams et al. (2015) used an open-ended questionnaire via email to evaluate tutor experience of the access, usefulness, impact, and integration of the online resource.

Tutors expressed overall satisfaction with the online package but were concerned about levels and timeliness of student-RLO access. The study by Lehmann et al. (2013) used semi-structured interviews of nine CSLs tutors. Tutors' perceived students as generally very well prepared for the skills laboratory training. According to the tutors, student groups usually did not need initial instructions and were able to immediately start hands-on training.

This section concludes that using web-based tools to supplement CSE was highly accepted among students and tutors and could provide a positive learning experience. However, these resources need to be well-designed to engage the students. One of the included systematic reviews by Macznik, Ribeiro and Baxter (2015) demonstrated that users' perceptions of the use of technologies for teaching and learning purposes were mostly positive.

2.8.3.1.2 Students' satisfaction

Satisfaction with web-based learning in CSE was reported on in five papers. Most of the results seemed to indicate that the students were satisfied with online intervention as a blended form or to supplement the traditional method of teaching the clinical skills. Among the five studies, three experimental design studies found that the students' experimental groups who had integrated the web-based learning with their clinical skills learning reported higher levels

of satisfaction compared with the control groups who only had the traditional method of CSE (Holland et al., 2013, Arroyo-Morales et al., 2012, Bhatti et al., 2011).

In Sowan and Idhail (2014), students were satisfied with the online resources, especially with video content, and the posting of the streaming videos before the lab sessions. They highlight that the lab videos were extremely useful for preparing students for the upcoming laboratory sessions and for decreasing their anxiety. Negative comments were mainly related to technical difficulties in accessing the course. Furthermore, Kaveevivitchai et al. (2009) used a 20 item survey to explore 77 nursing students' satisfaction with the multimedia computer-assisted resources on vital signs. They found that high satisfaction and quality of the computer-assisted multimedia afforded an independent interactive learning experience and stimulated joy of learning.

The findings of the three included reviews suggest higher than or equal levels of learner satisfaction towards web-based resources for teaching clinical skills when compared to traditional means, and when used as a blended form or to supplement other teaching methods (McCutcheon et al., 2015, Cant and Cooper, 2014, Du, Liu, Liu et al., 2013). However, Du et al. (2013) found some negative viewpoints, including the need for more technical and expensive

support in software, and dependence on participants' computer skills. Therefore, all these concerns should be considered in designing web-based educational resources.

2.8.3.2 Level two of Kirkpatrick framework (1967): learning

This level of evaluation involves some form of assessment of changes in skills, knowledge, or attitudes among learners; which is most commonly conducted through pre and post-test study designs (Curran and Fleet, 2005). Learning criteria are measures of the learning outcomes, typically assessed through various forms of knowledge tests, but also by immediate post-training measures of performance and skills in the training context (Praslova, 2010). While reaction criteria are operationalized using self-report measures, the learning criteria are typically indexed by objective, quantifiable learning outcome measures such as traditional tests of declarative and procedural knowledge, usually in the form of formal examinations (Arthur et al., 2003). In the classroom situation, pre and post-tests provide the most direct measure of learning, and such measures are typically used in Higher Education settings (Arthur et al., 2003). Also, the original four levels of training evaluation have been clarified in the New World Kirkpatrick Model. For level two (learning), the original definitions have updated explanations which indicate the degree to which participants acquire; the intended

knowledge (*"I know it.")*, skills (*"I can do it right now.")*, attitude (*"I believe this will be worthwhile to do on the job.")*, confidence (*"I think I can do it on the job.")* and commitment based on their participation in the training (*"I intend to do it on the job.")* are measured (Kirkpatrick, Kirkpatrick and Kirkpatrick, 2016). In this scoping review, all included studies evaluated performance, knowledge, and self-efficacy as outcomes measures.

2.8.3.2.1 Skills performance

Clinical skills performance was the impact most explored by fourteen of the included studies in this scoping review. These results, in most cases, contribute evidence that web-based learning is an effective educational strategy for students and significantly contributes to a higher or similar level of clinical skill performance in the clinical examination among different specialities when used as a supplement or blended learning method within CSE.

The tools used to evaluate clinical skills performance varied between studies. Many studies used OSCEs as a tool to measure students' clinical skills abilities (Hibbert et al., 2013, Holland et al., 2013, Arroyo-Morales et al., 2012). Other studies used their usual clinical examination (Lehmann et al., 2015, Preston et al., 2012, Gerdprasert et al., 2011, Kaveevivitchai et al., 2009) or created exams with specific checklists for the explored clinical skills (Lu, Lin

and Li, 2009). All these studies indicated that the students who had the web-based learning showed an improvement in clinical skills performance.

Wheeler et al. (2006) used part of the final OSCE to assess students' knowledge retention in the specific skills related to the research topic 6 months later, the amount of interest they showed in the teaching module correlated positively with their performance in questions about the researched skills. Gormley et al. (2009) observed a number of significant associations when comparing responses in the survey used to evaluate the students' perception and experience to their performance in a clinical skills OSCE. Sowan and Idhail (2014) compared the grades of the experimental group in their final skills examination with the grades from the previous year's students who had not experienced the e-learning. They found that the mean achievement score of students in the virtual class was significantly higher than that of a previous comparable cohort who were taught in the traditional method. Moreover, Redmond et al. (2018) used a pre-test/post-test wound care competency outcomes questionnaire and measured central tendency and variability. They found that the post-test data indicated that on all items students had made positive gains in their perceived wound care ability when compared with the pre-test scores.

The results of this investigation show that a web-based resource could be an effective supplementary learning tool for teaching skills. Systematic reviews by Kim, Gilbert, Suh et al. (2016), Macznik et al. (2015), McCutcheon et al. (2015), Cant and Cooper (2014), Du et al. (2013) demonstrated better or equivalent performances for web-based learning compared with a control group using only traditional methods. However, not all studies had sufficient reporting on the examination as a measurement tool, pre-intervention information as baseline data, time, or validation. However, this is perhaps because all these studies mainly focused on exploring the impact of e-learning rather than reporting these factors. Nevertheless, some indication about the measurement tools, such as validation, could help more in terms of understanding the results. In the included review by Rowe et al. (2012) a few high-quality studies were found to evaluate the role of blended learning in CSE, but these provided only rudimentary evidence that integrating technology-enhanced teaching with traditional approaches has the potential to improve clinical competencies among health students.

2.8.3.2.2 Knowledge

The outcome measures used to evaluate knowledge varied between studies. There were ten papers that assessed knowledge after the intervention of an online learning modality. Some papers reported

highly significant results that indicated a higher level of knowledge following intervention, most of them used MCQs as a tool to measure knowledge (Lehmann et al., 2015, Gerdprasert et al., 2011, Gerdprasert et al., 2010, Kaveevivitchai et al., 2009, Lu et al., 2009, Wheeler et al., 2006). Lu et al. (2009) initially showed that there was no significant difference in knowledge gain between the two groups; however, after controlling the confounding variables, both the RCTs revealed that the experimental group scores were significantly higher than those of the control group. Conversely, Arroyo-Morales et al. (2012) reported no significant difference in the students' level of knowledge between online and traditional learning methods. However, in addition to its small size (n=46), this study lacked reporting about the online education intervention (not-working link) which could be an ineffective resource that did not meet the needs of the explored skills objective.

Gerdprasert et al. (2011), Lehmann et al. (2015), and Lu et al. (2009), compared procedural knowledge of research skills both pre- and post-intervention, where they found that the intervention group showed a significantly superior increase in knowledge compared with the control group. Thus, including a pre-intervention test could help to build baseline data so the impact of online resources could be measured as Kirkpatrick's four levels indicate.

Three selected studies evaluated knowledge using a questionnaire. Keefe and Wharrad (2012) used an adapted valid self-administered questionnaire that related to the explored clinical skill (pain management) to measure knowledge and they did find overall improvement for web-based learning (RLOs). They recommend that introducing e-learning has substantial benefits in enhancing pain education in nursing. Williams et al. (2015) utilized a questionnaire to assess impact of the online intervention (RLOs) in teaching injection skills and suggested that the online intervention had a positive impact on student knowledge and on knowledge retention. These results are in agreement with those obtained by Redmond et al. (2018) who found that the majority of the students agreed and strongly agreed that the RLOs impacted their wound care knowledge positively and help them on knowledge retention.

Overall, web-based distance education has equivalent, or even better, effects in improving students' clinical skill knowledge. These results are supported by two systematic reviews that concluded that web-based education has encouraging effects in improving participants' knowledge and is no less effective than traditional means (Cant and Cooper, 2014, Lu et al., 2009).

2.8.3.2.3 Confidence

There were two studies that assessed students' confidence after the intervention of an online learning modality using a questionnaire. The findings from Redmond et al. (2018) highlight the low level of wound care skills that third-year students entered this module with, and subsequently the learning and confidence students gained from engaging with the developed RLOs. Moreover, Sowan and Idhail (2014)measured self-efficacy and concluded that the use of multimedia features within an interactive online learning environment is a valuable teaching strategy that yields a high level of nursing student self-efficacy. They tailored their instrument which was validated by faculty experts.

One selected review by McCutcheon et al. (2015) found that three studies demonstrated a significant increase in students' self-efficacy and one study reported no significant difference in students' self-efficacy pre- and post-online intervention. Although the findings suggest a positive result in using the web-based intervention to enhance self-efficacy, this most probably depends on the online resource itself, the content, production, and implementation.

2.9 Summary of the scoping review

The aim of this review was to explore the evidence that would give a comprehensive understanding of the efficacy of web-based resources for the teaching of undergraduate clinical skills, the pedagogical values of web-based resources, and investigate the methods used to implement and evaluate them. The review has successfully achieved these objectives and reached the following conclusions.

According to Raaff et al. (2014) the design and development of any multimedia intervention is inseparably linked to the success of the intervention as a whole. However, there is a clear deficit in reporting on the online intervention, design, implementation, and content validation in most of the included studies. Thus, there is a need for further well-described studies into the use of online resources in clinical education in order to have a clear understanding of the outcomes and validity, in terms of findings. Only four online resources demonstrated the underpinning theory/framework for designing the online resource. Therefore, there is a need for more research that uses quality web-based resources based on these criteria.

Reviews of existing studies in the area of e-learning in CSE have found various limitations in research methods, including bias and/or

small samples, methodological flaws, and the use of instruments with questionable reliability and validity. Moreover, most of the included studies were experimental design or few mixed method designs with most of them focusing on students as participants. Although some studies used qualitative methods in data collection, there are insufficient details about the method used. Thus, there is a need for further research, specifically a qualitative exploration, to address current challenges in educational research and to move beyond comparisons with the traditional education system to explore the experience of making changes to CSE more deeply. Also, to find the most effective approaches and technologies to deliver CSE in terms of staff and their teaching, students and their learning, and other technology- related factors.

All the pedagogical values in the included studies have been categorized within level one and/or level two of the Kirkpatrick framework. This is perhaps because the main aims of the included studies were to evaluate the newly integrated educational resources. Using web-based tools as an educational intervention to supplement CSE appears to be highly acceptable among students and tutors and enhances their satisfaction levels, despite the differences among the online interventions used in the included studies. Also, it provides a positive learning experience that aligns with other approaches and augments face-to-face teaching. Furthermore, web-based education

shows encouraging effects in improving students' performance, knowledge, and self-efficacy, (regardless of the fact that a very limited number of studies (n=2) included self-efficacy) and it is no less effective than the existing traditional means. However, the results from these studies could be limited in their generalizability as only one type of clinical skill was evaluated in most of the studies, and they have moderate sample sizes in one setting. Furthermore, the review highlights the need for more technical, and potentially expensive, support for online resources.

Using online technology as an innovative approach to clinical teaching might be effective, nevertheless, as this review suggests that it also requires a deep understanding of the institution's context, and users' behaviour with newly integrated online resources, which has implications for its effective implementation. However, none of the included studies have explored the significance of context and its impact on resource efficacy.

These studies, even though the samples included students from a wide range of cultures, have been mostly conducted in western countries. The limited number of studies with student nurses in developing countries limits the generalizability of these findings. It is possible that cultural and other contextual factors might open a different dimension to this discourse. Additionally, From the review,

the researcher found that most of the web-based resources employed in the literature have been invented internally within the institution of origin (there was no evidence of use by other groups of learners) and only two resources (RLOs) by Keefe and Wharrad (2012) and Williams et al. (2015) was an OERs.

In conclusion, the scoping review demonstrates that web-based learning is valuable to CSE. Nevertheless, producing these resources content-focused, costly, and labour-intensive (Mikhailova et al., 2018, Williams, 2018, Blake, 2010). To the author's knowledge, while there is potential to use existing resources of this kind in the form of OERs, there is no evidence as to how these may transfer to another setting in CSE, particularly in nursing.

2.10 Study aim and objectives

The scoping review of the literature has identified an area of study that is under-researched in relation to the use of RLOs in the form of OERs. The aim of this study, therefore, is to explore the transferability of open reusable learning objects (RLOs) created in the UK to clinical skills education in Saudi nursing education.

In order to address this broad aim, more specific objectives are listed as follows:

1- To establish the perspectives of nursing clinical skills multi-stakeholders - (students, decision makers, and educators) of the clinical skills UK RLOs.

2- To evaluate the educational value, usability and the impact of UK RLOs for clinical skills learning in Saudi nursing education.

2.11 Significance of the current study

This research makes a new and original contribution to the existing knowledge and evidence-base of OERs by exploring the transferability of clinical skills RLOs in the form of OERs from a context which is more familiar with producing and using OERs to another context which is less experienced in using OERs. It appears that no studies have been published concerning the transferability of RLOs, as most research on this topic simply evaluates the implementation of online resources within the institution of origin.

Studies in the scoping review also show that there is value in web-based learning for CSE, but these resources are costly and time consuming to produce and need specialist staff (technologists), and while there is potential to use existing resources of this kind in the form of OERs, there is no evidence as to how these may transfer to another setting, particularly that of KSA and neighbouring countries. Therefore, using quality multimedia OERs could help to explore

potential transferability, thus contributing to saving effort, time and resources. Thus, the aim of this study was to explore the transferability of UK RLOs to Saudi nursing clinical skills education.

Furthermore, examining the merit of RLOs in the Saudi context could serve as a baseline for future use, development and improvement of RLOs in KSA and reduce the time spent in iterative design of future online resources, while resulting in more efficient and acceptable designs. According to Jaspers, Steen, van et al. (2004), computer systems and their user interfaces should be designed and developed with explicit consideration of the needs, abilities and working practices of their ultimate users.

2.12 Summary

The scoping review demonstrates that online resources are valuable to CSE, nevertheless, producing these resources needs time, human resources, and funding. There is potential to reuse existing resources of this kind in the form of OERs but there is no evidence of how these may transfer to another setting. The research aim and objectives and the significance of the current study have been presented. The next chapter will discuss the theoretical context of the RLOs intervention. Additionally, it will discuss the conceptual context of the transferability of RLOs in the form of OERs to another context, that of a country and organisation other than that of origin.

Chapter 3: Theoretical context of the RLOs intervention and transferability

This chapter will be divided into two main parts. Firstly, it will provide an overview of the Reusable Learning Objects (RLOs) context, including the development process, and the pedagogy underpinning their design. Secondly, it will provide a critical analysis of the concepts and theories underpinning the transferability and acceptability of RLOs that guided the design and analysis of this study.

3.1 OERs and Reusable Learning Objects (RLOs)

OERs , as indicated in chapter 1, are defined as teaching, learning or research materials that reside in the public domain or have been released under an open license that allows for their legal and free access, use, adaptation and distribution with no or limited restrictions (UNESCO & CoL, 2015). The types of learning resources that can be considered to be OERs are very diverse, they may range from videos that can be used to enrich the learning method as supplementary material, to whole courses.

A number of studies have explored the use of OERs in higher education and the experiences of various stakeholders such as students and educators (Elf et al., 2015, McKerlich, Ives and McGreal, 2013b, Ossiannilsson and Creelman, 2012), Nevertheless,

few studies have focused on how OERs could be used in courses with a large number of practical elements, such as nursing education specifically and in healthcare education generally. Exploring experiences of using OERs from educators' and students' perspectives is important for understanding the best ways in which to implement and use OERs. The use of the web as an open source for knowledge acquisition resources is not yet fully used or accepted, perhaps because of the confusion in the understanding of the characteristics and definitions of OERs and low awareness about the use and availability of different alternative OERs available on the web (Pounds and Bostock, 2019, de Oliviera Neto, Pete, Daryono et al., 2017, Elf et al., 2015, Bone and McNichol, 2014, Torres, 2013, Masterman, Wild, White et al., 2011).

However, studies on the impact of OERs are mixed for students, educators and organisations but encouraging, as indicated previously in section 1.3. For example, in the context of nursing education, Elf et al. (2015) explored how students and educators experience the use of OERs and how it impacts on the learning process in a clinical practice course. They designed and recorded scenarios (instructional videos) for several nursing activities and uploaded them to the web with an open licence through Creative Commons as there were limited resources available that corresponded to Swedish conditions and legislation. They found that

the students reported that their learning was encouraged by the OERs, and that to make full use of OERs, they required the necessary skills and knowledge. Similarly, they found that the educators were convinced that the approach supported the students' learning. Further evidence comes from Margaryan, Littlejohn and Vojt (2011) who found that students use a limited range of open resources for learning, with established technologies such as VLEs, Google, YouTube, and Wikipedia being the most frequently used.

Reusable Learning Objects (RLOs) are one example or an OER and are the open educational resources chosen for investigation in this study. All RLOs in this study are released under the Creative Commons Attribution-Non-Commercial 2.0 UK: England & Wales licence. The licence allows for free non-commercial use and repurposing of the resources. The following sections will explain in detail about the RLOs and their development process, including the reasons for selecting RLOs for this study.

3.2 Reusable Learning Objects (RLOs)

Reusable learning objects (RLOs) are open digital educational resources and the focus of this study. They can be reused and shared from a central online repository to support learning (Grunwald and Corsbie-Massay, 2006). The definition of RLOs can be very broad, when RLOs first appeared in the literature, around 2000, their

definition was ‘any digital resource to support learning’ ranging from, for example, a digital image through to a whole module (Wiley, 2000, p.6). In this study, the RLO format is somewhere between these two extremes, that is they are multimedia, interactive learning tools, focused on a single or discrete set of learning objectives (Williams et al., 2015, Leeder, McLachlan, Rodrigues et al., 2004). Currently developed at the University of Nottingham, this ‘brand’ of RLO historically emerged from two collaborative projects involving multiple UK university partners; Universities Collaboration in e-learning (UCEL) and the Centre for Excellence in Teaching and Learning (RLO-CETL) (Boyle, Cook, Windle et al., 2006, Leeder et al., 2004). RLOs, then, are relatively small ‘chunks’ of learning that take only 5-15 minutes to complete, involve activity and assessment elements and are accessible anytime, anywhere (Windle and Wharrad, 2010). RLO activities include those such as crosswords, drag and drop, open text, annotating diagrams, and multiple-choice quizzes (MCQs). Screenshots from some clinical skills RLOs are shown in Figure 3.



Figure 3 Screenshot taken from examples of clinical skills RLOs (HELMOpen, n.d)

Many studies suggest that RLOs are an effective teaching supplement in different healthcare contexts (Fenton, 2014, Bath-Hextall, Wharrad and Leonardi-Bee, 2011, Windle et al., 2011, Blake, 2010) and in clinical skills education (CSE) in particular (Redmond et al., 2018, Williams et al., 2015, Clay, Brown, Lees et al., 2012). Furthermore, RLOs used as a healthcare intervention where more rigorous outcome measures have been adopted have shown that they do change knowledge and health behaviours in clinicians (Lymn et al., 2008) and patients (Ferguson, Brandreth,

Brassington et al., 2016). Additionally, many studies suggest that RLOs are an effective teaching supplement in different contexts at different levels such as psychology, sport, engineering, computer science, and fashion (Holley and Boyle, 2012, Dibattista, 2011, Kay and Kletskin, 2010, Gilhespy, 2009, Balci and Inceoglu, 2006). However, many of these studies are local studies carried out by the producers of the RLOs themselves.

It is suggested that RLOs have many benefits. Sharing and reusability are, as the name suggests, important drivers of e-learning's RLO model. It affects every aspect of the design, production and resource delivery at its best (Wharrad and Windle, 2010). Also, many studies suggest that RLOs promote autonomous learning (Redmond et al., 2018, Blake, 2010, Lymn et al., 2008). Such an economy reduces the production costs of high-quality, media-rich learning resources by how many times they can be reused; by different groups on the same course (vertical reuse), by different courses within the same institution (horizontal reuse) and between institutions, making the final cost per student a small amount (Wharrad and Windle, 2010). Also, such learning resources could provide a life-long learning.

3.3 Clinical skills RLOs selected for this study

RLOs created by the Health E-learning and Media (HELM) team at the University of Nottingham (UoN), UK have been selected for this study for many reasons. They are based on empirically derived evidence, as explained in the previous section. They are also based on the effective ASPIRE framework[2], and they are peer reviewed and quality assured, as will be explained in the following sections.

Six basic nursing clinical skills RLOs were selected to explore their transferability to a clinical skills curriculum in KSA. These RLOs were selected in discussion with King Abdulaziz University (KAU) in the Kingdom of Saudi Arabia (KSA) colleagues as they are the most relevant to the Saudi nursing curriculum. Table 6 lists the title, time needed, and a brief description of each of these RLOs.

[2] The HELM team has adopted the ASPIRE name recently but they have published the method before this in WHARRAD, H. & WINDLE, R. 2010. Case studies of creating reusable inter professional e-learning objects. In: **Interprofessional E-Learning and Collaborative Work: Practices and Technologies: Practices and Technologies.** US: IGI Global.

Table 6 RLOs selected in this study

RLOs N	RLOs and abbreviation	Time	Content	Design	URL
1	Hand hygiene	6 Minutes	Practical hand hygiene techniques for infection control in healthcare settings. Last updated in 2014.	Fixed linear navigation. Numbered access to sections. Large on-screen text, audio, and video demonstration. Activities include true and false quiz and video quiz.	http://sonet.nottingham.ac.uk/rlos/placs/handwashing/
2	Glove use	6 Minutes	Explains the appropriate use of gloves in a clinical environment. Last updated in 2014.	Fixed linear navigation. Numbered access to sections. Large on-screen text, audio, and video demonstration. Optional audio and/or on screen text. Activities include drag and drop quiz.	https://www.nottingham.ac.uk/nursing/sonet/rlos/placs/gloves/2.html
3	Intramuscular Injection sites for adults	5 Minutes	Designed to help learners correctly identify which muscles may be used to safely administer intramuscular injections. Last updated in 2009.	Flexible navigation including. Menu-based access to sections. Small on-screen screen text, audio, and animated pictures. Activities include drag and drop and MCQs quiz.	https://www.nottingham.ac.uk/nursing/sonet/rlos/placs/nctl178-injection-sites/index.html
4	Skin preparation prior to intramuscular and subcutaneous injections	3 Minutes	To gain an understanding of the issues associated with skin preparation for intramuscular and subcutaneous injections. Last updated in 2009.	Flexible navigation including menu-based access to sections. Small on-screen screen text, audio, and animated pictures. Activities include drag and drop and MCQs quiz.	https://www.nottingham.ac.uk/nmp/sonet/rlos/placs/skin-prep/
5	Intramuscular injection by the	6 Minutes	Intramuscular Injection sites (for adults) is designed to help you correctly identify	Flexible navigation including menu-based access to sections. Small on-screen screen text, audio, and	https://www.nottingham.ac.uk/nursing/sonet/r

	Z-track technique		which muscles may be used to safely administer intramuscular injections. Last updated in 2009.	animated pictures. Activities include MCQs quiz.	los/placs/nctl176_ztrack/index.html
6	Subcutaneous injection sites	6 Minutes	To gain an understanding of the issues associated with Subcutaneous injection sites. Released on 2011.	Flexible navigation including menu-based access to sections. Small on-screen screen text, audio, and animated pictures. Activities include MCQs quiz.	https://www.nottingham.ac.uk/nmp/sonet/rlos/placs/injectionsites/

3.3.1 Development process

Qualities of RLOs rely on the developmental process. RLOs created by the Health E-learning and Media (HELM) team at the University of Nottingham (UoN), UK are based on the clear and effective ASPIRE framework for production and quality assurance that can be transferred and applied to different contexts. The ASPIRE framework, has been developed over time in early collaborations (Boyle et al., 2006, Leeder et al., 2004) and enhanced by the HELM team (Taylor, James, Windle et al., 2016). The ASPIRE framework, is a logical, systematic, peer reviewed, and dynamic process and thus, fits the nature of this project because this rigorous process contributes to producing high-quality resources.

The schematic diagram shows the stages of the RLO development process, starting with team meetings with project leads, in order to refine ideas, aims and project scope (Figure 4). The written storyboard is sent to experts for peer review prior to production. Once the prototype has been developed, the RLOs undergo peer review prior to packaging and release (Wharrad and Windle, 2010). These RLOs are available openly online under the Creative Commons 2.0 licence[3].

[3] http://creativecommons.org/licenses/by-nc/2.0/uk/.

The process of developing RLOs begins with workshops that involve the widest possible team of stakeholders including tutors, students and media developers to scope the content and ideas to illustrate the concepts (Windle et al., 2010). Multiple stakeholder involvement leads to resources well-aligned to user needs and the production of high-quality resources as shown by the positive results from rigorous evaluations studies and trials in multiple studies (Ferguson et al., 2016, Manning, Latif, Carter et al., 2015, Lymn et al., 2008). However, it is still questionable if they align with the tutor and student needs in other contexts for example Saudi Arabia. Therefore, more research is needed to explore the transferability of UK RLO open resources to other contexts, such as the Saudi context.

Aim: Concerned with getting the learning goal for the resource correct.

Storyboarding: This allows participants to begin to think about their ideas and how these might be represented by sketching and annotating on an A0 storyboard.

Population: Combining all of the ideas and the framework developed at the storyboarding stage by populating a fully-formed specification or outline for the resource. A quality control step in the form of a peer review on this stage will be undertaken before development begins.

Implementation: technical implementation. Media assets are collected or created and assembled according to the details of the specification by a technologist.

Release: release for users to access. Before use, a second peer review stage will be held.

Evaluation: Collection of data to allow improvement of this or subsequent resources, or to better understand the use and impact of the resource itself.

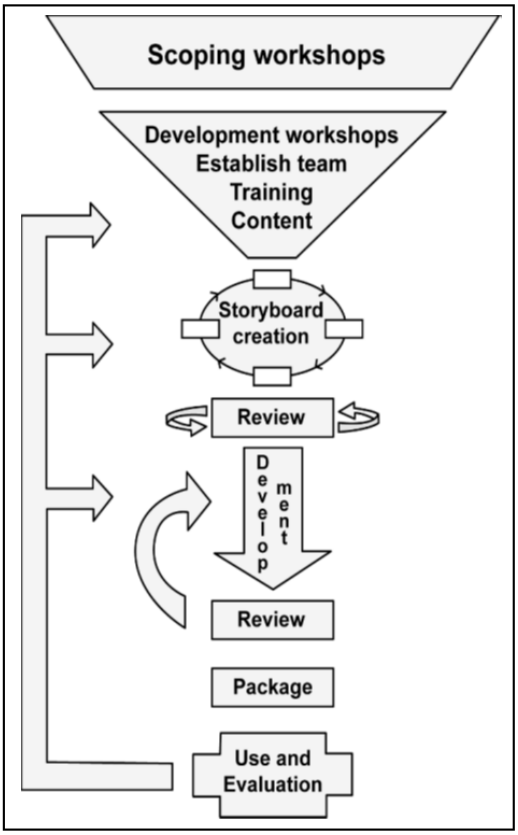


Figure 4 ASPIRE framework and the schematic diagram showing the developmental framework for the production and quality assurance of RLOs (Wharrad & Windle, 2010; Windle et al., 2010)

3.3.2 Pedagogical design underpinning the RLOs

The pedagogical attributes that RLOs display are valuable to consider usability and reusability of RLOs. Thus, the Learning Object Attribute Metric (LOAM) tool has been constructed and validated by the HELM team to review the pedagogical attributes of RLOs (Windle, Wharrad, Leeder et al., 2007). LOAM consists of twelve pedagogical attributes with the explicit intention of measuring their effect on the reuse of RLOs. These attributes are derived from the IMS (Instructional Management System–Global Learning Consortium) design framework (Cook, Wharrad, Windle et al., 2007). The IMS Learning

Design provides a framework for classifying any instance of learning (Wharrad and Windle, 2010, LOAM, 2007). IMS learning design describes a learning instantiation at its principal level under three main headings: the environment in which the learning occurs, the roles played by those participating in the learning process and the activities undertaken (IMS Global Consortium, 2003).

RLO designs ensure that the most suitable multimedia environment is established, consequently learners can take active roles within the learning process and are supported by help and feedback (Windle et al., 2007). Activities in the RLOs are aligned with the learning objective and are imperative because learners should be actively engaged in the process of learning and need feedback from self-assessments to gauge whether they have successfully understood the learning objective (Wharrad and Windle, 2010). Table 7 presents the twelve pedagogical LOAM attributes and a brief description of them.

IMS class	LOAM attribute	Description
Environment in which the learning takes place	objective	Describes the focus of the learning objective stated by the RLO and the extent to which it is explicit to the learner. The objective can range from small and highly focused to a broader, more diffuse goal.
	Context	Describes the degree of contextualisation of the materials for a particular group of learners.
	Media richness	Describes the standard and appropriateness of media elements used within an RLO.
	Integration	The extent to which the various media types (audio, videos, graphics, images etc) are successfully integrated into the RLO so that the whole is greater than the sum of the parts.
Activity undertaken	Interactivity	Describes the extent to which the learner can engage with the RLO.
	Navigation	Describes the extent to which navigation forms part of the learning design.
	Self-direction	Describes the level of self-direction provided to the learner through open navigation, optional interactivity, optional sections etc.
	Assessment	The extent to and ease of which the learner can perform an effective self-assessment.
	Alignment	Describes the extent to which the assessment elements measure attainment of the learning objective.
Roles played by those involved in the learning process	Pre-requisite	Describes the level of knowledge required by the learner prior to undertaking the RLO in order to successfully achieve the learning objective.
	Support	Describes the level of support provided to the learner by the content author within the RLO, including help menus, glossaries navigational support, on screen advice etc.
	Feedback	Describes the level of information provided to the learner in response to the learning tasks and assessments undertaken.

Table 7 Learning Object Attribute Metric (LOAM) tool adapted from Wharrad and Windle (2010) and LOAM (2007)

In this study, the attributes described by LOAM contributed in understanding the participants' views on RLOs in general, and with regard to specific features. Also, the data revealed how these attributes influenced the transferability and the acceptability of the

RLOs, as will be discussed in Chapters 6, 8 and 9. Attributes described by LOAM are mainly designed to evaluate the usability and reusability of RLOs.

Windle et al. (2010) in discussing their experiences in sharing and reusing open RLOs in health, suggested that focusing on developing materials for use, and getting this right, is central to stimulating reuse of RLOs. However, there has been much debate regarding the definition of RLOs reusability and reuse. Koper (2003, p. 48) defines reusability as 'the availability of learning objects for others to use'. Similarly, other authors in their definitions of the learning objects highlighted that they should have the potential to be reused in different contexts (Rahmani, 2016, Polsani, 2003, Wiley, 2000). The previous definitions of reuse of the learning objects simply means that resources are made available for sharing.

Another view by Windle and Wharrad (2010, p.247) is that reusable implies 'the content included within the resource is appropriate for learners outwith the immediate group that it was intended for'. This definition indicates an intention to support reuse where the content being covered in the RLOs must have meaning and importance for different groups of learners In this study, using the RLOs created by UoN UK in the context of nursing education in Saudi, is a reuse of the UoN RLOs, as defined by their name as 'reusable'. Thus, the

current study primarily aimed to explore the actual reuse of the UoN RLOs rather than focus on their potential for reuse. In other words, this study aimed to explore the transferability of the RLOs created by UoN UK comprehensively by exploring aspects such as: what makes RLOs reusable, how and why RLOs are reused and different influences on RLO transferability such as cultural, social and organisational factors that could determine the extent to which RLOs are effective and actually reused. Nevertheless, based on the broad definition of RLOs in general (section 3.2), the findings from this study could be applied to other RLOs or online resources that that have similar attributes to the UoN RLOs. The next section will provide a comprehensive overview of the literature about the transferability of RLOs.

3.4 Theoretical underpinning of the transferability of Reusable Learning Objects (RLOs)

Transferability, in general, is defined as that which can be used in a different situation, or for a different purpose. A review in health education by Cambon, Minary, Ridde et al. (2012), who analysed the concept of transferability in the health education field, and a systematic review conducted by Wang, Moss and Hiller (2006) which evaluates the transferability of public health intervention effectiveness to other localities, define transferability as the degree

to which the measured effectiveness of an appropriate intervention could be achieved in another setting. Burchett, Blanchard, Kneale et al. (2018), who assess the transferability of public health intervention evaluations from one setting to another, identified transferability as whether intervention would be as effective in the new setting as it was in the original study setting.

Many considerable factors determine the probability of effective transfer of an intervention from one context to another, and these are related to population, intervention, implementation process, stakeholders, environment, and specific health problems (Kocken, Vlasblom, de Lijster et al., 2019, Burchett et al., 2018, Schloemer and Schröder-Bäck, 2018, Wang et al., 2006). Schloemer and Schröder-Bäck (2018) conducted an intensive systematic review for the assessment of transferability of health interventions through identification and systematization of influencing criteria. They summarized the factors influencing transferability and developed a clear model (PIET-T) for the assessment of transferability of health interventions (Figure 5). This model involves:

- **Population characteristics (P)** such as sociodemographic characteristics, cultural/social characteristics, socio-educational characteristics. It also includes participants' attitudes toward the intervention (acceptability, motivation, and demand).

- **Intervention content (I)** which consider the conception of the intervention in the primary and target context. The intervention should have an evidence-based background such as the usefulness/utility of the primary evidence and its quality.

- **Environmental conditions (E)** that involves local and organizational settings such as organisational structure and practice, stakeholders' perception of the intervention, skills. It also involves coordination players such as the personal/professional interests of stakeholders. In addition, the policy and legislation and the healthcare system and services.

- **Transfer (T)** it includes adoption/implementation where some strategies, such as reaching the population, involving different stakeholders, addressing barriers and facilitators were achieved. Also, it includes sustainability of the outcome, practice change, key success factors and finance as well as existence of knowledge transfer. It can only be assessed after evaluation by measuring the effectiveness of the intervention through assessment of the process and outcomes, and the similarity of determination of effects on both contexts.

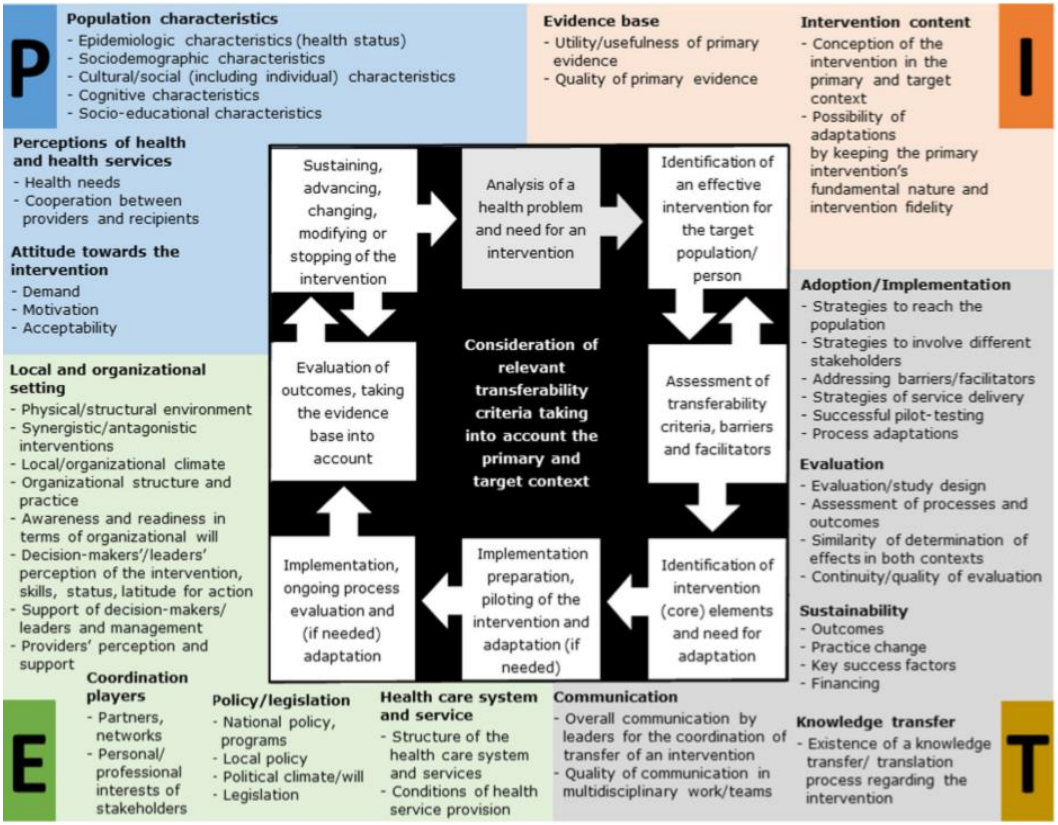


Figure 5 Process model for the assessment of transferability (PIET-T) model (Schloemer and Schröder-Bäck, 2018)

The centre of the transferability process shown involves eight steps. It starts with analysing a health issue to find the need for an intervention. Criteria that can be identified with the model help with understanding where process changes need to be made to improve transferability (Schloemer and Schröder-Bäck, 2018).

However, the PIET-T model is still a newly proposed model for assessing the transferability of health interventions, very few studies have adopted it or clarified to what extent it is useful. In other words, its success has not yet been proven in either health interventions or other contexts. Additionally, there were many methodological limitations in Schloemer and Schröder-Bäck (2018) systematic

review, such as some relevant studies published in different languages or grey literature were overlooked; synthesis limitations because of heterogeneity of the articles and the limited empirical support of criteria. Furthermore, they acknowledged that it is potentially possible that not all relevant transferability criteria are covered. Also, the descriptions of some factors are unclear and conceptually overlap with other factors.

Although the PIET-T model concerns health interventions, it could help to support, guide and identify some factors influencing the transferability of the RLOs into the Saudi nursing curriculum. The framework highlights many factors to consider in health intervention transferability, though not all of them perhaps related to transferability of educational resources. In this research, it is important to also consider the characteristics and attributes of the RLOs, transferability of the RLOs as OERs requires more understanding of the drivers to use it, such as acceptability of the RLOs, usefulness, usability, and engagement.

The PIET-T model shows that population acceptability and the usefulness and utility of the intervention are important factors to consider in transferability. RLOs are digital high-quality educational resources that can be reused and shared from a central online repository to support learning (Wharrad and Windle, 2010). Much

research has been done to evaluate the efficacy of RLOs in supporting learning in many subjects. However, few studies exist that explore whether these RLOs are transferable and to what extent they could support clinical skills learning in perhaps entirely different contexts. To make evidence-based determinations, it is therefore essential to evaluate whether the RLOs, whose impacts were established in another context, are transferable to another specific context. In other words, to what extent the impact of successful OERs created and evaluated in the UK context can be transferred to a Saudi context, in particular, the Saudi clinical skills nursing curriculum.

The ease with which educational material can be uploaded to the internet has led to the rapid spread of OERs and has led to an increase in educators' and students' dependence on it. RLOs are a specific form of OER, and the main focus of this study. The education system is a quick adaptor and open to innovation (Littlejohn and Pegler, 2015). Despite this, there have also been increasing challenges to the adoption and use of these online resources within practice, sometimes with unexpected results (Cheng, 2013). Nevertheless, the drivers and challenges of adopting OERs, particularly, the adoption in nursing CSE are little recognized, especially in contexts such a Saudi Arabia where adopting these educational resources in nursing education is relatively new.

Generally, institutions of higher education have gradually involved online learning world-wide to realise different educational benefits (Farahat, 2012). Examples for these benefits could be collaborative learning and enabling information exchange, improving access to information, flexibility for time and place, all with the labour market, to innovate the technology itself, preparing for self-paced and lifelong learning, and for the purpose of reducing costs and improving the overall cost-effectiveness of educational services (Arkorful and Abaidoo, 2015, Al-Adwan, Al-Adwan and Smedley, 2013, Farahat, 2012, Abbad, Morris and De Nahlik, 2009, Park, 2009, Ramayah and Lo, 2007, Saadé and Kira, 2006, Shen, Laffey, Lin et al., 2006, Liu, Liao and Peng, 2005, Keller and Cernerud, 2002). However, implementing a new technology that is then not accepted and used by users could exhaust resources and waste time and money (Farahat, 2012). The user acceptance of a new technology is considered the crucial aspect that indicates the success or failure of this system (Davis, 1993). Thus, adoption of clinical skills RLOs in another context might inhibited by students' and educators' unwillingness to accept new, or other context's educational resources.

3.4.1 Acceptance of UK RLOs

Generally, acceptance is defined as the positive decision to use an innovation, as opposed to a refusal (Taherdoost, 2018). Understanding the reasons why users accept technology helps to improve its design, evaluation and prediction of the user's response to new technologies (Taherdoost, 2018).

Many studies in the technology acceptance field have developed frameworks to evaluate the use of specific developed and implemented technology. Several frameworks and models describing technology acceptance have been developed to clarify user adoption of new technologies. For example, Theory of Reasoned Action (Fishbein, 1980), Social Cognitive Theory (Bandura, 1986), Theory of Planned Behavior (Ajzen, 1991), Technology Acceptance Model (TAM) (Davis, 1989), Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, Morris, Davis et al., 2003), and diffusion of innovation theory (Rogers, 2003).

Amongst all these acceptance models, TAM has been the most broadly used and is cited by many scholars, with more than 48,000 citations, as reported by Google Scholar citations in 2019. TAM is believed to be one of the most extensively applied frameworks to predict user acceptance of technology in different contexts, particularly in the healthcare area. Fundamentally, TAM proposes

that computer usage is determined by behavioural intention; an individual's acceptance of new technology to be determined by his or her intention to accept it (Davis, Bagozzi and Warshaw, 1989) (Figure 6). The two beliefs, perceived usefulness (PU) and perceived ease of use (PEOU), in TAM are the main drivers for explaining user acceptance of the particular type of system (Davis et al., 1989). PU is described as 'the degree to which a person believes that using a particular system would enhance his/her job performance', and PEOU is described as 'the degree to which a person believes that using a particular system would be free of physical and mental effort' (Davis, 1989, p.320). TAM suggests that actual technology usage is established by intention to use, which is influenced by the PU, PEOU and attitude toward it (Ladan, Wharrad and Windle, 2018). The external variables usually involve technology characteristics, user training, user participation in design and the implementation process nature (Ladan et al., 2018, Chuttur, 2009). Thus, exploring the students and educators' views on clinical skills UK RLOs perceived usefulness and perceived ease of use would indicate the acceptability of UK RLOs, and their transferability.

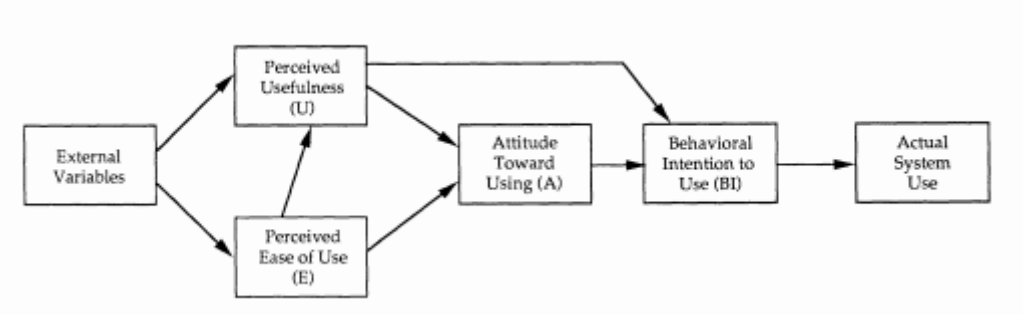


Figure 6 Technology Acceptance Model (TAM) (Davis et al., 1989)

TAM has been extensively adopted to understand technology acceptance in many fields such as in exploring ICT and e-health adoption (Ladan et al., 2018, Ahlan and Ahmad, 2014, Bennani and Oumlil, 2013, Kim and Park, 2012, Dongping and Lianjin, 2011), education (Sánchez-Mena, Martí-Parreño and Aldás-Manzano, 2017, Abdullah and Ward, 2016, Farahat, 2012), and business (Alalwan, Baabdullah, Rana et al., 2018, Boonsiritomachai and Pitchayadejanant, 2017). However, there have been few studies in health education and even fewer with regard to clinical nursing education (Scherer, Siddiq and Tondeur, 2019, Bennani and Oumlil, 2013, Cheng, 2013, Chen, Yang, Tang et al., 2008).

Abdullah and Ward (2016), who explored the determinants affecting behavioural intention to adopt mobile banking among generation Y, and Yousafzai, Foxall and Pallister (2010), who assessed the value of technology for users and the factors that determine this value to utilize IT resources, argue that the popularity of TAM is likely due to many aspects. According to them, TAM is designed to accurately

explain IT adoption within different organizations, cultural settings, technology contexts, and different expertise levels. Also, they argue that TAM has strong theoretical literacy and high scales for validity measurement. Furthermore, TAM has been a subject of many empirical studies, the findings of which support its overall explanatory power.

However, researchers have also identified some drawbacks from adopting TAM to understand technology adoption. While TAM ignored the social influence on adoption of technology, it has limitations in being applied beyond the workplace (Taherdoost, 2018, Ajzen, 1991). Many researchers have thus recommended that TAM should be extended to integrate additional variables and thus strengthen it (Boonsiritomachai and Pitchayadejanant, 2017, Legris, Ingham and Collerette, 2003). There has also been criticism that the TAM constructs do not provide adequate implications for practitioners (Boonsiritomachai and Pitchayadejanant, 2017, Benbasat and Barki, 2007). Although it is important to recognise the social factors that could affect the adoption of the RLOs, the main aim of this study, particularly the first phase, was to explore behavioural intention which would eventually lead to use of the RLOs in the nursing clinical skills curriculum.

TAM was used in this study as a guide to identify aspects of the clinical skills RLOs acceptance in Saudi nursing education through investigating their usefulness and usability, rather than as a theoretical underpinning, and consequently helped to determine the transferability of the RLOs. Beside this, TAM in this study also helped to determine an operational definition for the study in general, and for the code scheme and analysis of the first phase in particular, as will explain in chapter 4. From using TAM, it became apparent that in order to accept the RLOs, PU and PEUS are the main aspects that revealed participants' intentions to use the RLOs and lead to the actual use of it.

Thus, the usefulness of RLOs in this study is defined as the degree to which clinical skills tutors and students believe that using the RLOs as OERs would enhance their clinical skills education when integrated with their curriculum. This includes any comments related to the present and future educational outcomes that are expected from using RLOs, application, and integration of the RLOs with the nursing curriculum.

According to TAM, even if potential users believe that a given application could be useful, they might, simultaneously, believe that the application is too hard to use and that the benefits of usage are outweighed by the effort in using the application (Davis et al., 1989).

Thus, in addition to usefulness, usage is influenced by perceived ease of use. Accordingly, in this research, usability is defined as the degree to which clinical skills tutors and students believe that using RLOs as OERs would be free of effort and easy to navigate. Also, any positive or negative comments provided by the participants that were related to any content, media attributes, or technical issues which prevented them from navigating the RLO smoothly are considered under the usability category.

3.4.2 Engagement with UK RLOs

User perception and engagement with technology is a key aspect of a successful technological system, regardless of application (Cruz-Benito, Therón, García-Peñalvo et al., 2015, Attfield, Kazai, Lalmas et al., 2011). Another aspect of transferability of RLOs as OERs that this research was interested to explore. Because of the interactivity and multimedia nature of the RLOs, compared with other educational resources used in CSE such as YouTube or the clinical skills manual, it was important to understand how Saudi participants would engage with the clinical skills UK RLOs in addition to their perceived usefulness.

Tracing behaviour patterns and measuring engagement enables the researcher to determine user interest in specific features or content and whether these features are used properly (Cruz-Benito et al.,

2015). Information about engagement also enables platform managers, technology developers and designers to adapt, or modify the technology to improve user acceptability, interest, feedback or performance. Consequently, exploring participants' engagement with the clinical skills RLOs and OERs would provide deeper insights into their acceptance and understanding of the transferability of OERs and their use in other contexts.

O'Brien and Toms (2008), who critically deconstruct the term engagement as it applies to peoples' experiences with technology, claimed that boring web interfaces, or multimedia presentations that do not captivate users' attention are quickly dismissed with a simple mouse click. They argued that failing to engage users is akin to no information transmission from a web site; individuals go elsewhere to perform their tasks and communicate with experts and friends. Thus, the success of technology (RLOs in the current study) would not just be about its usefulness and usability, it should also engage users (Kim, Kim and Wachter, 2013, Attfield et al., 2011, O'Brien and Toms, 2008). In the past few decades, many human-computer interaction studies have highlighted the necessity to move beyond usability to understand and design for a more engaging experience (O'Brien and Toms, 2008, Hassenzahl and Tractinsky, 2006, Jacques, 1995). According to Banna, Grace Lin, Stewart et al. (2015), who explored strategies to promote engaged learning in an

online introductory nutrition course, if content played a key focus in the past, engagement plays an essential role in promoting online learning today.

Technology acceptance and technology engagement overlap conceptually, but they are different in their definitions, conceptual foundations, and application (Kim et al., 2013). Acceptance generally refers to the extent to which something is chosen for use by an individual or an organization, while engagement refers to the state of being involved in, retained by, and intrinsically interested in something (Pagani and Mirabello, 2011). Engagement is a state manifested by energy, involvement, and efficacy and is conceptually defined as a behavioural flow without any intentional mindset such as control, curiosity, attention, focus , and/or intrinsic interest (Kim et al., 2013, Chapman, Selvarajah and Webster, 1999).

Regardless of the need to engage users and create engaging technologies, there is no agreed upon definition of the concept. Chapman et al. (1999, p.3) suggest that 'something that engages us is something that draws us in, that attracts and holds our attention'. Quesenbery and Design (2003) proposed that engagement is an element of usability and is influenced by first impression of an application by users and the enjoyment they gain from using it, how pleasant, or interesting an interface is to use.

Newmann, Wehlage and Lamborn (1992, p.12) defined student engagement as 'the student's psychological investment in and effort directed toward learning, understanding, or mastering the knowledge, skills, or crafts that academic work is intended to promote'. According to Attfield et al. (2011), it refers to the quality of the user experience, which highlights the positive aspects of the interaction and, specifically, the phenomena associated with captivated technology. They defined the engagement as 'the emotional, cognitive and behavioural connection that exists, at any point in time and possibly over time, between a user and a resource'. On the other hand, O'Brien and Toms (2008) in their study indicated that disengagement occurred when participants made a decision to stop the activity.

Many studies of users' engagement have described it as corresponding with different characteristics, such as media presentation, perceived user control, challenge, feedback, and variety (Attfield et al., 2011, O'Brien and Toms, 2008, Said, 2004). Cumulatively, these features demonstrate the physical, cognitive, and affective components of user experiences (O'Brien and Toms, 2010). Attfield et al. (2011) reviewed the prior research on user engagement and associated measures to define a framework in which user engagement can be studied, measured, and explained, and summarised the characteristics associated with user

engagement: focused attention, positive affect, aesthetics, endurability, novelty, richness and control, reputation, trust and expectation, and user context (Table 8).

Characteristic	Definition	Measures
Focused Attention	Focusing attention to the exclusion of other things	Distorted perception of time, follow-on task performance, eye tracking
Positive Affect	Emotions experienced during interaction	Physiological sensors (e.g. face detection)
Aesthetics	Sensory and visual appeal of an interface	Online activity (curiosity-driven behaviour), Physiological sensors (e.g., eye tracking), perceived utility.
Endurability	Likelihood of remembering an experience and the willingness to repeat or recommend it.	Online activity (e.g. bookmarking, sending emails)
Novelty	Novel, surprising, unfamiliar or unexpected experiences	Physiological sensors (e.g., blood pressure)
Richness and Control	Levels of richness and control	Online activity (e.g., interaction with the site, time spent), Physiological sensors (e.g. mouse pressure)
Reputation, trust and expectation	Global trust users have on a given entity	Online activity (returning user, recommendation)
User Context	User's motivation, incentives, and benefits	Online activity (location, time, past history)

Table 8 Summary of engagement characteristics and its measures (Attfield et al., 2011)

In this research, engagement is defined as a category of user experience that includes all verbal and non-visual gestures. It is characterized by focused attention (e.g., what the participants were doing at a specific point; such as following the tasks, listening, reading or discussion), voice dynamics and intonation, and signposts

for excitement or frustration. This also involves participants' willingness to repeat the RLO, recommending the RLO to others, repeating the experiences, and making suggestions. Disengagement occurred when participants made an internal decision to stop using the RLOs, or when the participants began discussing something other than the RLOs. While engagement in this study was explored in-depth in the first exploratory phase (where a think-aloud method was utilized as the participants directly interacted with RLOs), few engagement aspects were evaluated by the students in the third phase, as will be shown in following chapters.

3.4.3 Summary of the theoretical underpinning of the transferability of RLOs

Identifying aspects of transferability and defining them helped in understanding to what extent clinical skills RLOs could be transferable to another context. No specific overall framework that suited the aim of this study of transferability of an online resource to another context was identified. In other words, each model used was specific to understanding a specific concept of the study. For example, the technology acceptance model (TAM) helps in understanding the barriers and facilities of how people accept the technology, while the PIET-T model concerns the transferability of health interventions. Thus, all mentioned theories were utilised to

guide in identifying all aspects of transferability and defining them helped in understanding to what extent clinical skills RLOs could be transferable to another context. Also, TAM guided the analysis of this study, especially in the think-aloud method, as will be explained in Chapter 5. Consequently, the identified frameworks, as well as the findings from each stage of this study, could contribute to creating a specific framework for transferability of the RLOs as OERs.

3.5 Summary

This chapter provided an overview of the RLOs context, including the development process, and the pedagogical underpinning of the RLOs design. Justifications for selecting the RLOs were presented. Furthermore, this chapter critically analysed the theoretical underpinnings of the transferability and acceptability of the RLOs that guided the design and analysis of this study. The following chapter will discuss the methodology that was chosen for this study.

Chapter 4: Research methodology and design

This chapter describes the methodology of the current research. Firstly, the research aim and objectives will be revisited. Then, the research design and the philosophical assumptions will be discussed. Following that, the study setting that guided this research will be presented. Finally, the chapter will briefly introduce the nature of each phase of the study.

4.1 The study aim and objectives revisited

The aim of this study was to explore the transferability of open reusable learning objects (RLOs) created in the UK to clinical skills education in Saudi nursing education. The specific objectives to achieve this aim were:

1- To establish the perspectives of nursing clinical skills multi-stakeholders - (students, decision makers, and educators) of the clinical skills UK RLOs.

2- To evaluate the educational value, usability and the impact of UK RLOs for clinical skills learning in Saudi nursing education.

4.2 Research design

The study utilised a Mixed Methods Research (MMR) approach that uses both qualitative and quantitative elements. MMR has been used

in social science research since the early 1990s and has shown its usefulness in providing a better understanding of research phenomena or impacts of an intervention by collecting both qualitative and quantitative data, which incorporate individuals' perspectives (Bryman, 2016). Studying the transferability of open RLOs requires a deep understanding of stakeholders' acceptance of, responses to, and engagement with the resources. As well as evaluating the RLOs value as evidence of the potential for transferability of RLOs to the clinical skills nursing education in the Saudi context. Therefore, both quantitative and qualitative methods used to gain an enhanced understanding of the need for, and impact of, RLOs. The research methodology for this study was the exploratory sequential mixed methods. In this design, the researcher starts with a qualitative exploration of data, develops an instrument, and then tests it quantitatively within a larger, different sample (Creswell and Clark, 2018) . Figure 7 presents the details of the research activities in this research. The figure shows each phase of the study, sample, procedures, and analysis.

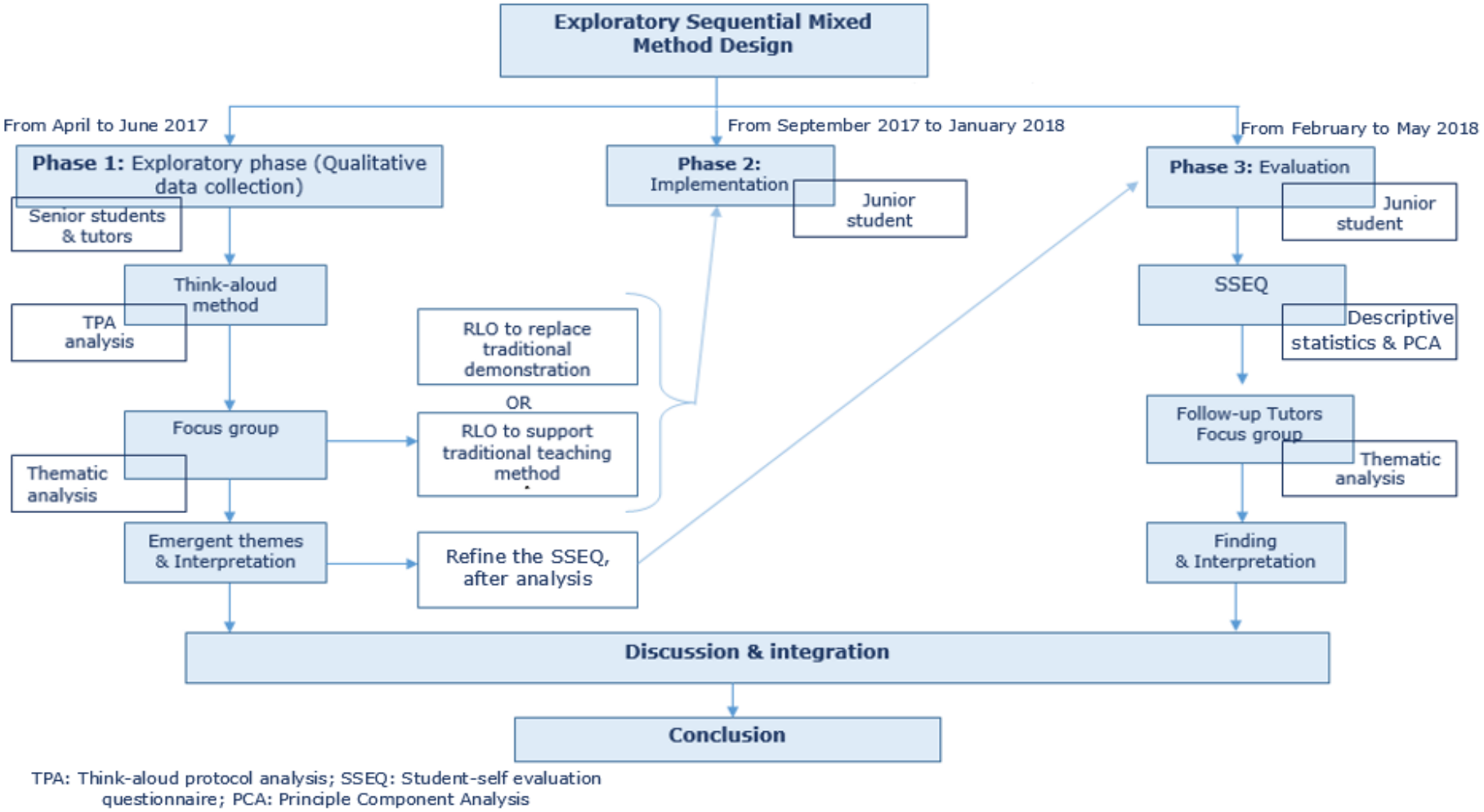


Figure 7 Summary of research design.

4.2.1 Justification for sequential exploratory mixed method design

Identifying the reasons for mixing qualitative and quantitative methods within a study is one of the key principles of mixed method design quality (Tashakkori and Teddlie, 2010). This allows the reader to understand the importance of employing an MMR approach to gain findings (Caracelli and Riggin, 1994). Cohen, Manion and Morrison (2018, p.78) argue that research design is governed by the notion of 'fitness for purpose and that there is no single blueprint for planning research'. The justification for MMR is highlighted by Morse (2005), who indicated that rationale behind MMR is to achieve different but complementary data on the same issue to best conceptualize and explore the research questions. All research methods have limitations and it is considered that using a design with more than one method tends to average errors associated with individual methods (Teddlie and Tashakkori, 2009).

The review of the literature, in the previous chapter, showed that most studies carried out into the impact of online/web resources on CSE utilize a single approach of inquiry. Particularly, there was little empirical research to explore the perspectives of both main stakeholders (students and tutors) in order to understand this aspect in-depth. Thus, this research aimed to employ MMR to

investigate the views of several different types of stakeholder to have a greater understanding of the topic under investigation.

Considering the MMR typology suggested by Creswell and Clark (2018) and Johnson and Onwuegbuzie (2004), MMR can demonstrate many different strategies for integrating data. For this study, after evaluating the feasibility of a mixed approach to data collection, a sequential exploratory mixed methods design was utilized. This followed the 'QUAL → Quant' design, which indicates a sequential study; qualitative followed by quantitative. The two approaches were given equal priority. In terms of the purpose of combining methods, methods were combined both for complementarity, in which each method presented a different aspect of the research aim, and for development, where the qualitative component enabled the quantitative component.

A particular justification for using sequential exploratory MMR for this study was that the first qualitative exploratory phase informed the subsequent phases of the research Since the RLOs were new to the Saudi nursing curriculum, it was important to understand the clinical skills tutors and students' views on the RLOs, whether they could add value to the curriculum if integrated and, if so, how they could be integrated into the nursing curriculum. Importantly, integrating qualitative methods at the beginning will elucidate any

new variables that could emerge to inform the content of the student self-evaluation questionnaire (SSEQ), that was used in the evaluation phase. From the literature review (Chapter 2) no existing specific questionnaire of clinical skills RLOs transferability (value of nursing clinical RLOs and its utility in different contexts) was identified that captured this concept. Only two questionnaires were identified, nevertheless, they were specifically developed to evaluate online resources that had been created by the same organisation. Therefore, the development of a new validated instrument was undertaken as a strand of the study. This was based on the elucidated variables that emerged from the first exploratory strand in addition to the adapted items from previous studies. Furthermore, the exploratory design enabled generalisation of the qualitative findings based on the participants from the first phase to the large sample collected during the second phase (Creswell and Clark, 2018).

4.3 Philosophical assumptions guiding this research

Philosophical perspectives indicate particular assumptions 'with respect to the nature of the world and how we come to know about it' (Spector, 2008). Philosophical assumptions are sets of beliefs that inform our research (Creswell, 2013). The term worldview or paradigm is defined as a basic set of beliefs that guide action

(Creswell and Clark, 2018, Guba and Lincoln, 1994). When designing and conducting research, researchers have to be conscious that their worldview or paradigm about the nature of being, beliefs, reality, and knowledge provide a foundation for their scientific inquiry (Doyle, Brady and Byrne, 2009, Morgan, 2007). Therefore, a researcher's worldview not only directs the nature of the research questions that will be asked but also influences the methodology, and the methods employed to answer them (Carter and Little, 2007).

Essential inquiries that deal with ontology (nature of reality), epistemology, and methodology must be answered in order to create fundamental assumptions that underpin a research paradigm (Denzin and Lincoln, 2005). The researcher's ontological assumptions about the nature of reality (whether it is singular and external or multiple and individually created) will inform epistemological questions, that is, 'how we gain knowledge of what we know' (Chalmers, 2013, Benton and Craib, 2011). This, in turn, directs the research methodologies that are 'accepted' to generate the required knowledge in a given research area (Benton and Craib, 2011).

Traditionally, researchers would have been required to choose between a postpositivist paradigm (viewing the reality as singular) with a quantitative approach or a constructivist paradigm (viewing the reality as multiple) with

qualitative methods, because the mixing of the two was not believed to be possible (Creswell and Clark, 2018). This study has been based on the ontological assumption that the phenomenon of transferability of RLOs is neither objective nor subjective, but contextual. The following will briefly describe how this research is positioned within philosophical assumptions that are related to the current study pragmatism and MMR.

Positivism emphasizes the rigorousness of the study findings, as these results will be interpreted in an objective manner and in a value-free environment (Crotty, 1998). The positivist paradigm holds the traditional notion of absolute knowledge reality. Postpositivism, nevertheless, argues that positivists face challenges to their traditional notions when they study human behaviours and act as positivists (Creswell and Clark, 2018). Therefore, as postpositivists seek to understand the relationship between causes, quantitative approaches are utilized. Ontologically, the postpositivist position is one of realism and believes that one reality exists, which can be discovered and understood (Mertens, 2014). The epistemological assumption of this paradigm is one of objectivism that assumes knowledge gained through the study of this reality which has been regarded as 'scientific' and involved the establishment of 'law' (Merriam, 2016). Postpositivists beliefs that in investigating genuine knowledge about objective reality, the researcher and the subject of the study should be independent; that

is they should not influence each other (Aliyu, Bello, Kasim et al., 2014).

However, postpositivism attracts many criticisms. For example, Scotland (2012) indicated that the individual actions are not fully understood as positivistic generalizations ignore the intentionality of individuals. For instance, different students who may seem to be doing the same thing could be doing different things. For example, for two students giving an answer to 2x7, one student could have memorized the answer while the other student added seven together twice. Thus, actions need to be understood from the participants' perspectives (Scotland, 2012).

This research could have utilised many objective experimental designs such as a comparison or longitudinal study as in the literature from the previous chapter which explored the online/web-based resources in CSE. However, the RLOs were a new concept to Saudi nursing education and were tailored specifically for another context. Thus, RLOs also need an in-depth understanding of the participants' perspective regarding the RLOs. As well as understanding the impact and value of the RLOs in an objective manner, the research needs an instrument that is suitable to the context and situation, in addition to considering the best way to implement RLOs.

Constructivism, however, emphasizes the ability of researchers to construct meaning (Creswell, 2013, Mack, 2010), and is most often located within qualitative research, working from different worldviews (Merriam, 2016). Participants' subjective views, which shape the understanding or meaning of phenomena, make up this worldview (Creswell and Clark, 2018). Constructivism emphasizes that research is a product of the values of researchers and cannot be independent of them (Mertens, 2014). One of the benefits of constructivism is that it allows for in-depth analysis and interpretation of participants' social actions. The epistemological position of constructivism is one of subjectivism, which is grounded in the phenomena of real world, where the world does not exist independently of our knowledge of it (Scotland, 2012). Nevertheless, constructivism also draws various criticisms. The most constructivism critique concerns the lack of objectivity; constructivism is criticized for being subjective, particular to the individuals studied, not transferable, and contextualized in a particular time and place. The outcomes are context dependent as the approach is seen as relativist (Benton and Craib, 2011).

Taking constructivism into consideration in this research and understanding students' and tutors' perspectives on the UK RLOs could be effective in exploring subjective meanings within a culture and understanding perceptions and attitudes. However, this would not provide enough data regarding the transferability of the RLOs.

The study also needs to evaluate the value and the impact of the RLOs on students after the RLO implementation to identify the reality and truth regarding the transferability of the RLOs.

Each one of these paradigms (postpositivism and constructivism) provides a limited view of understanding the world and restricts the exploration or enhancement of new knowledge (Biesta, 2010, Johnson and Onwuegbuzie, 2004). Disagreement between postpositivist and constructivist research paradigms and their underlying epistemologies is ongoing; nevertheless, there is now a growing consensus that they can be employed within a single study (Benton and Craib, 2011). Thus, MMR has arisen to bridge the gap between qualitative and quantitative stances into a workable solution together (Johnson and Onwuegbuzie, 2004). MMR is influenced by philosophical assumptions that enable the mixing of quantitative and qualitative approaches, to provide a better understanding of research issues (Tashakkori and Teddlie, 2003). Therefore, for this research, pragmatism serves as the foundation for adopting an MMR approach.

Pragmatism typically has been recognized as a common epistemology for MMR (Creswell and Clark, 2018, Johnson and Onwuegbuzie, 2004, Tashakkori and Teddlie, 2003). Because pragmatists are not committed to any one epistemology, but rather

value what works; they are able to draw from both postpositivist and constructivist paradigms (Creswell, 2013). Pragmatism also helps to shed light on how research approaches can be combined fruitfully (Johnson and Onwuegbuzie, 2004). It is important to consider that pragmatism does not combine postpositivist with constructivist but refutes both of them on the grounds that reality is neither necessarily absolute nor subjective, but 'truth is what works' (Dewey, 1974, p.198). In another word, knowledge in pragmatism is viewed as being both constructed and based on the reality of the world we live in and experience (Johnson and Onwuegbuzie, 2004).

Pragmatists believe that the research inquiry should determine the choice of research design, and not the method or paradigm (Muncey, 2009). Pragmatism, as a worldview, arises out of actions, situations, and consequences rather than antecedent conditions (Creswell, 2013). Instead of focusing on methods or paradigms, researchers emphasize the research problem and use any or all methods to understand the problem. This study aimed to explore the transferability of RLOs across different countries through exploring the stakeholders' perspectives and examining the value of RLOs in Saudi CSE. Thus, it is appropriate to the nature of this study to employ a pragmatist standpoint as a means to open the door to multiple methods, different worldviews, and different assumptions, as well as different forms of data collection and analysis.

Nevertheless, as with other paradigms, pragmatism is not without shortcomings. Pragmatists have been criticised for considering the question of research more important than either the method or the paradigm underlying it (Doyle et al., 2009). Nevertheless, it could be argued that there is strength in integrating existing research traditions with a pragmatic approach to addressing more complex practices (Nowell, 2015). Moreover, pragmatism may facilitate gradual change in society rather than more fundamental systemic or revolutionary change (Teddlie and Tashakkori, 2009, Johnson, Onwuegbuzie and Turner, 2007). However, it could be argued that these gradual changes could also result from both traditional postpositivist and constructivist paradigms. In other words, regardless of the resulting outcome, applying any new changes, in particular, introducing the RLOs and making a change to the Saudi nursing CSE might require much time. A further criticism of pragmatism is that researchers sometimes fail to present a satisfactory answer to the question 'for whom is a pragmatic solution useful?' (Mertens, 2010, Johnson and Onwuegbuzie, 2004). Nevertheless, in order to answer the first question within the current research study, the anticipated end and useful application is improving nursing CSE and in particular in the Saudi context. That is, the availability of high-quality OERs could contribute to improving nursing students' clinical skills knowledge, performance and

confidence. The practicality of the findings is strongly emphasised, and implementation testing allows a thorough evaluation of whether the RLOs are appropriate and acceptable to this population.

4.4 The nature of exploratory qualitative phase

This section introduces the method utilised in evaluation phase; Chapter 5 will provide further in-depth details. As discussed previously in Chapter 2, much of the published evidence investigating web-based/online learning in CSE was quantitative in nature. Thus, as concluded from the review of the literature, an initial qualitative study was needed to explore the experiences of web-based learning in CSE more deeply. The term qualitative research represents a variety of theoretical perspectives, including ethnography, constructionism, ethnomethodology, and phenomenology (Bryman, 2016). Unlike pragmatism, qualitative approaches embody different, often contradictory, theoretical positions which are beyond the scope of this research study. Nevertheless, within this research, it was the broad principles of qualitative inquiry that were adopted, namely the ability to discover social structures, views, opinions, and values related to experience rather than a rigid adherence to particular perspective. The choice of qualitative inquiry in this study enabled the researcher to explore Saudi participants' views on the UK RLOs in the context of their

clinical skills curriculum, rather than impose a pre-determined, inflexible understanding of the RLOs transferability and acceptability. The qualitative phase allowed the exploration of student and tutor interactions with UK RLOs through investigating usefulness, engagement with and usability of RLOs incorporated into the clinical skills component of the nursing course. Furthermore, the value of conducting an initial qualitative study was shown to be significant in retrospect, as the analysis of this phase established the basis for the subsequent implementation and evaluation phase.

4.5 The nature of the evaluation phase

This section provides an overview to the method used in evaluation phase; Chapter 7 will provide further details about this phase. The findings from the qualitative data, although rich in contextual and descriptive data, restricted the exploration of participants' views regarding the RLOs and their utility to a small sample of participants. Additionally, while the richness of the qualitative data was valuable in gaining a deep understanding of nursing clinical skills multi-stakeholders' perspectives (before implementation), it was necessary to reduce this data into manageable, concise items to explore the findings in a large population of participants (after RLO implementation). According to Dewey (1974), in explanation of pragmatism, individual's aspects can be known when considered not

only as qualitative, but as a statistical constant resulting from a series of operations. Thus, it was considered appropriate to transform aspects of the qualitative data into a questionnaire and utilize quantitative approaches of data collection and analysis. Moreover, this study hoped to contribute to the existing quantitative literature on the transferability of clinical skills OERs, where measures such as nursing students' evaluations on adopting web-based resources were prominent.

The experimental design, Randomised Control Trial (RCT) specifically, is commonly viewed as a gold standard, however, this choice of research design is not appropriate for investigations into human views and experiences of web-based learning. While a longitudinal study could have offered greater opportunity to explore the changes participants experienced over time and the resulting impact on beliefs about the value of RLOs on learning clinical skills, the practical limitations of time assisted in the decision of this research to conduct a cross-sectional questionnaire study.

The quantitative method's strength lies in its ability to measure and compare specifically the characteristics and concepts that this research had interpreted were issues of importance to participants. By exploring statistically their relationship to other issues of interest, including value of RLOs and their utility, it was possible to assess the

quality of the questionnaire and provide complementary data with which interpretation may be transferred to a wider population of participants.

Nonetheless, this quantitative research could not be conducted without considering issues of interpretation quality, or strategies for promoting the validity and reliability of the research conclusions.

4.6 The study population and setting

In this study, the population consists of undergraduate nursing students and clinical skills tutors in King Abdul Aziz University (KAU). The site has the advantages of being the first nursing faculty to provide a Bachelor's degree in nursing in KSA, and one of the nursing faculties where programs are accredited nationally[4] and internationally[5]. Therefore, many nursing faculties in KSA follow their teaching strategy and program. Moreover, the researcher was a student in this University and still has a working relationship with the administrator who facilitated access to participants, the available teaching and learning materials, and other facilities.

[4] National Commission for Academic Accreditation and Assessment (NCAAA)
[5] Accreditation Commission for Education in Nursing (ACEN)

4.7 Ethical approval process

Ethical approval for this study was obtained from the Faculty of Medicine and Health Sciences Research Ethics Committee at the University of Nottingham (UoN FMHS REC). The UoN FMHS REC offered favourable opinion in March 2017 without changes to the initial submission (Appendix 1). Additionally, an approval was received from the Nursing College Ethics committee at King Abdulaziz University (KAU) in April 2017. Upon receiving approval to conduct the study from both ethical committees, the researcher contacted the head of the nursing department about conducting the study Without permission from the Research Ethics Committees, no data collection was undertaken and no people were approached. All ethical considerations, including informed consent, anonymity, confidentiality, and data protection, were considered for each phase of the study as will be explained in sections 5.2.2 and 5.2.3 for the exploratory phase and sections 7.3.2.2 and 7.3.2.3 for the evaluation phase.

4.8 Summary

This chapter explained the chosen methodology of this research and the justification for selecting sequential MMR. Pragmatism, which provided the philosophical stance that guided this research, was explained. The nature of qualitative and quantitative studies were

also presented. The nursing college at KAU, KSA was the selected setting for the study. The next section will discuss the methods of data collection in the first exploratory phase and the method of analysis.

Chapter 5: Exploratory phase: design and method

This chapter will be divided into four sections. First, the method of conducting the first phase (both the think-aloud and focus-group) will be discussed. Secondly, the data collection procedures will be explained. Then, the methods used to analyse the data from think-aloud, and focus-group, will be presented. Finally, the last section will explain the actions taken to ensure the quality of the qualitative phase.

5.1 The aim and objectives of the exploratory phase

The first exploratory phase aimed to gain a deep understanding of nursing clinical skills multi-stakeholders' (students, decision makers, and educators) perspectives on the UK RLOs.

More specific objectives were identified to achieve this aim. First, exploring the participants' behavioural interactions with UK RLOs through investigating acceptability, response to, engagement with and usability of RLOs incorporated into the clinical skills component of the nursing course. As the think-aloud method is a very direct method for gaining insight into the way humans think and to understand more about cognitive processes (Jaspers et al., 2004), it was employed to collect the data in this phase.

Second, to gain more understanding from participants' feedback and thoughts and encourage them to discuss and share their feedback and thoughts. Thus, a focus-group discussion was conducted with the same participants.

Third, this phase also aimed to elucidate any new variables that could emerge to inform the content of the student self-evaluation questionnaire (SSEQ) for the second evaluation phase. This aim was modified in light of the rigorous and complex processes required for robust measurement development (Streiner, Norman and Cairney, 2015, Waltz, Strickland and Lenz, 2010), and acknowledgment that the student self-evaluation questionnaire (SSEQ) required additional development. Consequently, this phase of the research focused on the development of the questionnaire; a new measure for evaluating the impact of using RLOs on nursing students. In particular, it was intended to develop a practical tool that may help in evaluating the educational value and impact of OERs in nursing education; and provide a means by which the relevance of this area may be explored in a larger population of participants in different contexts.

5.2 Method

5.2.1 Participant sampling, selection, and recruitment

This stage used a purposive sampling or criterion-based approach, which is a common method in qualitative research. Purposive

sampling is used to produce rich and diverse data relevant to the research questions (Côté and Turgeon, 2005). Ritchie, Lewis, Nicholls et al. (2013) highlight that it is appropriate for studies which involve sample groups with specific features to enable comprehensive exploration of the main themes that will be examined.

The course coordinator (Foundation of Nursing course) was contacted for logistic arrangements and was the key person to facilitate access to participants and recruit volunteers from both staff and senior-student participants in this phase, taking into consideration their workload, experience, and willingness to participate.

Three weeks prior to the data collection, an advertisement inviting volunteers for the study was displayed on student noticeboards within the College of Nursing. The course coordinator also advertised for clinical skills tutors during the academic staff meeting. Moreover, the course coordinator coordinated a time for the researcher to meet the students after main lectures over two weeks and to meet the staff during the monthly academic meeting. The researcher provided a short presentation for staff and students explaining the research aim, their right to withdraw, and clarifying for the students that participation or lack of participation did not affect the way in which

they are taught or influence their progress on the course. Additionally, the researcher was available to answer any questions asked by the students. The researcher's e-mail and the local supervisor's email were given. The local researcher's supervisor helped to facilitate and organise the data collection. As the participation in research could not be the priority of the students over their curriculum, all students were informed that they would be provided with certificate for participation.

Senior-students in the third and fourth-year, bridging program students (the bridging program provides opportunities for diploma students to upgrade to bachelor level), and all tutors who were in contact with basic clinical skills teaching (Foundation of Nursing course) were invited by the course coordinator and the researcher to participate.

A minimum of 9 clinical skills tutors who teach the adapted procedures in the RLOs, and 9 senior-students who have experienced the procedure before were intended to be included in the think-aloud sessions and focus-group, with the purpose of taking advantage of their experience in the teaching and learning of the included clinical skills. A small number of participants provide a rich source of evidence related to cognitive and decision processes (Todhunter, 2015).

Inclusion criteria:

- Clinical skill tutors who are experienced in teaching the adopted procedures in the RLOs (basic clinical skills).

- Senior nursing students who experienced the procedures in the RLOs (basic clinical skills).

- Basic computer and internet literacy.

- Agree to participate during entire study duration.

- Provide contact details to facilitate communication if needed. For example, in case of not attending the think-aloud session.

Exclusion criteria:

- Junior-nursing student in the second year.

- Any discipline other than nursing.

The participants who were willing to participate from April 2017 to May 2017 contacted the researcher either in person in a private allocated office, or by email for the purposes of anonymity, confidentiality and privacy, especially for students who might feel embarrassed and hesitate when meeting any of the faculty

members. Figure 8 illustrates the participants' recruitment for the first phase.

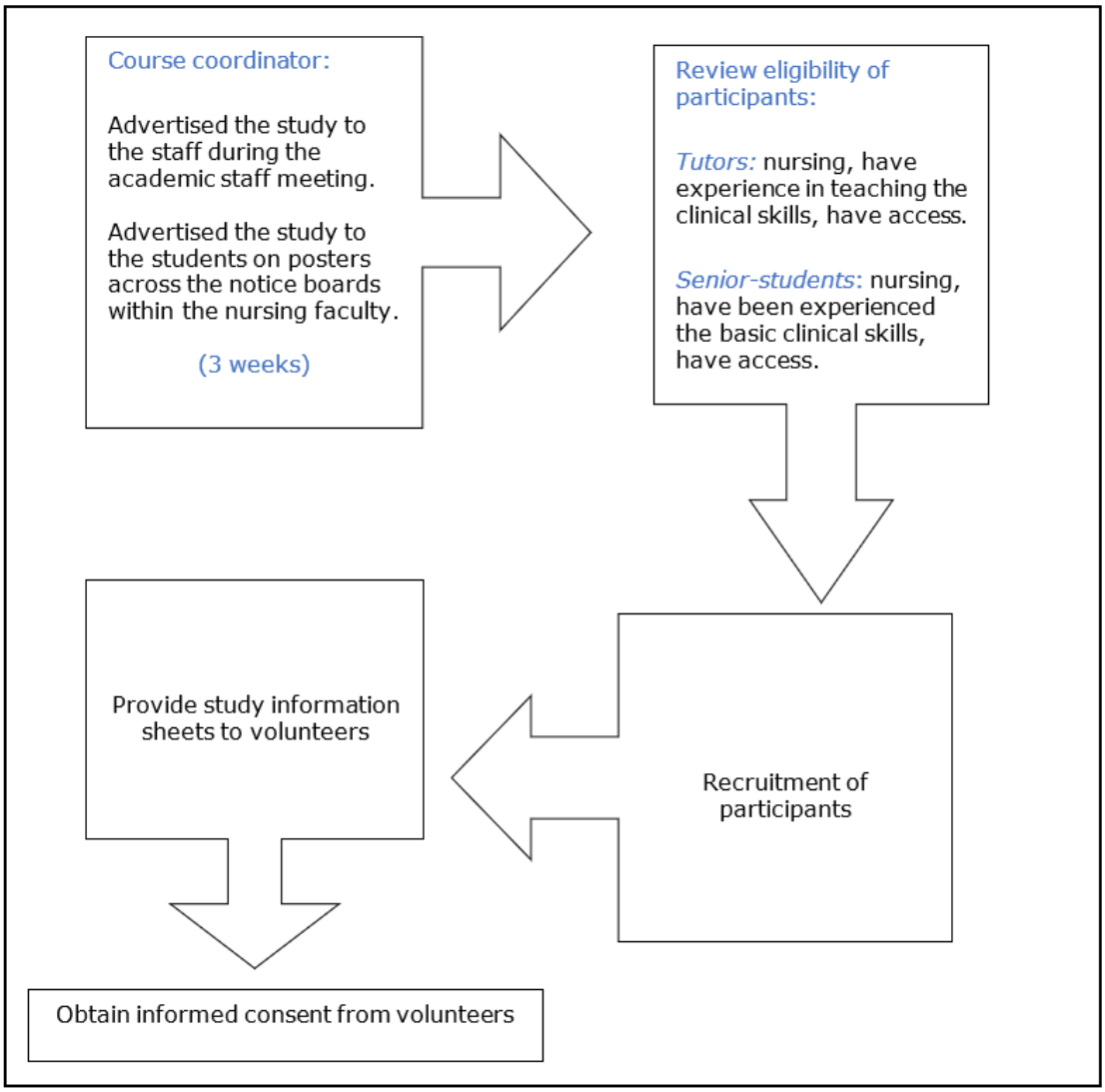


Figure 8 Recruitment strategy for the first phase

Participants who contacted the researcher were provided with an information sheet, ensuring that the participant had sufficient time to consider participating or not (Appendix 2). A consent form was given to those who were still willing to participate (Appendix 2). The participants signed the consent for audio/video recording and

confidentiality of the data was ensured. Participants were made aware (via the information sheet and consent form) that should they withdraw, the data collected to date could not be erased and may still be used in the final analysis. Withdrawn participants would be replaced with other volunteers matching the eligibility criteria. In the case that more than the intended number applied, the researcher would apologise politely that the number of participants was complete, but they would be informed that in case any of the participants withdrew they would be contacted to participate if still convenient for them. Informed consent was collected from each participant before they entered the study. One copy of this was kept by the participant, one kept by the researcher. Participants who took part in the think-aloud were asked to indicate their willingness to participate in the focus-group after the think-aloud sessions. Also, a short introductory video about the RLOs was given to them one day before the think-aloud session.

5.2.2 Research administration and management

The researcher was not one of the faculty members, which might have helped the staff to express their opinion freely. Additionally, it reassured the students regarding their grades and that there was no risk for them to participate, as well as avoiding hesitations and

embarrassment for them to express their views. The students and staff were allocated a convenient time to meet with the researcher.

After the data collection, the researcher was responsible for data entry. Each participant was assigned a study identity code (first and last name initials), other study documents and the electronic database. The administrative procedures relating to storage of information and confidentiality were applied. Study forms were treated as confidential documents and held securely in accordance with regulations. The researcher made a separate confidential record of the participant's name, to permit identification of all participants enrolled in the study, in case additional follow-up was required.

5.2.3 Ethical consideration

This project is considered as a low risk study, however, there might be a few issues of concern such as the following:

- Participants giving up one hour of their time or more during think-aloud session and focus-group.

- Participants may be sensitive to the discussion related to their experience or competence in using the technology or e-learning in their clinical skills curriculum.

- Participants may feel some coercion that they need to volunteer otherwise their progress on the course will be affected.

However, participants were made to understand that they have the right to withdraw from the study at any time they deem necessary. Anonymity, confidentiality and privacy of participants would be ensured. Moreover, they were made to understand that the researcher would select a convenient time for them, and refreshment would be provided.

5.3 Data collection

Qualitative data-collection techniques were used to gain a deep understanding of nursing clinical skills multi-stakeholders' (students, decision makers, and educators) perspectives on the UK RLOs. The think-aloud approach followed by a focus-group conducted with the same participants to gain deeper understanding from their feedback and thoughts was used as the qualitative data- collection method.

A review of a literature (Chapter 2) revealed that previous research has used a range of methods for evaluating online/web resources in CSE (resources within the institution of origin), such as questionnaires, and interviews about the perceived value of the resource. While findings are of potential interest and can provide data on students' views about the clinical skills online/web

resources, these methods also tend to generate rather generic information regarding participants' interaction with online/web resources.

Observation is a data source which researchers use to explore and understand a group or culture of social phenomena (Holloway and Galvin, 2017) and is commonly used in the exploratory phase (Robson and McCartan, 2016). It can include: participant observation, when the researcher is directly involved with participants in the study; unstructured observation, conducted to observe events or natural phenomena without guidelines; and structured observations, conducted to look at specific features of phenomena with guidelines (Robson and McCartan, 2016, Yin, 2014). Structured observation was the most preferable method for this study. The research aimed to explore a specific aspect of a phenomenon (RLOs), therefore, unstructured observation was rejected. In addition, as the RLOs (the phenomena of interest) at the time of first phase were not yet implemented and the participants were not yet familiar with the RLOs, participant observation was also rejected. Structured observation has been commonly utilized to understand how and why individuals interact and work together in groups, which can be a specified task or activity and a list of the behaviours (Todhunter, 2015). Thus, the decision

was made to employ a structural observational method with small groups of clinical skills tutors and nursing students.

5.3.1 Selection of the concurrent think-aloud and protocol analysis as a specific structured observational method

In selecting an observational method many issues needed to be considered. A method was required that allowed the participants to navigate the RLOs, as most of them might had only a little idea about RLOs, and helped the researcher to capture which areas of the RLOs made them respond and verbally comment on what they thought either negatively or positively. It was anticipated that this method would allow the researcher to gain a deep understanding of the complex phenomena of participants' interaction with the UK RLOs and explore usefulness, engagement and usability of incorporating RLOs into the clinical skills component of the nursing course. It also was considered a method that would reflect as near to possible real-life (Robson and McCartan, 2016). The information then could be categorized into themes that demonstrated the usefulness, usability and the participants' engagement with the UK RLOs.

Additionally, this study required a method that would let the participants illustrate their views openly without the interference of the researcher's opinion, though the researcher was not a known member of the faculty. It is argued that participants might act

differently in the presence of the researcher in direct observation, they tend to change their behaviour (Flick, 2014, Yin, 2014). The structured observation is a pre-defined organised task (Yin, 2014, Ericsson and Simon, 1993). Investigating how participants accessed and used the RLOs and a list of participants' behavioural interactions (verbal or non-verbal gestures) that might be presented as a reaction or response to the task were the components of the pre-defined task. These components would be then coded utilizing a shorthand structure which is the researcher's guideline (Todhunter, 2014). The researcher will refer to this guideline during the observation and add short comments or marks regarding each response as it occurs. Indeed this pre-defined task helps to maximise the accuracy of observational data as the researchers may not remember all details of the situation being observed (Flick, 2014). Also, it was important to introduce the concept of the RLOs to the tutors in order to support the implementation of the RLOs in the next phase of the study. Moreover, it was identified as a method that encouraged the participants to express their thoughts openly in order to elucidate any new variables that could emerge to inform the content of the student self-evaluation questionnaire (SSEQ). The method that met all of the study requirements was think-aloud and protocol analysis.

5.3.1.1 Brief background about concurrent think-aloud and protocol analysis

The concurrent think-aloud and protocol analysis (TPA) was employed in this study as it met the research requirements (Ericsson and Simon, 1993). The think-aloud approach as a qualitative data collection method has been commonly used in cognitive psychology as a way of collecting verbalizations about productive thinking and as an approach to understanding individual development of thought (Banning, 2008). Ericsson and Simon (1993) identified three methods to produce verbal reports: concurrent protocol (where the participants are thinking aloud whilst performing a task or activity), retrospective protocol (where comments describing the task are collected after performing the activity), and post-reflective protocol (where the participants are encouraged to give reasons for their actions). This method refers to the verbalized individual's mental process; specifically, the sequence of thought processes, or cognitive events, between the pre-defined task or problem to the final product. Verbalizations (think-aloud) are a subgroup of the cognitive processes that generate action or behavior (Simon and Newell, 1972).

The participants should be encouraged to verbalize while 'thinking aloud' their thoughts, actions, or feelings as much as possible as

they are conducting the task in order to understand their interactive behaviour, in the presence of a facilitator (Sharkey, Acton and Conboy, 2012). The verbal response can be captured with a tape or video recorder, or by note taking to collect think-aloud protocols (TAP) (Cotton and Gresty, 2006). These TAP are used as raw data and require substantial analysis and interpretation to gain deep insights into the way participants perform tasks (Li, 2011, Jaspers et al., 2004). Figure 9 presents the main stages of the think-aloud method.

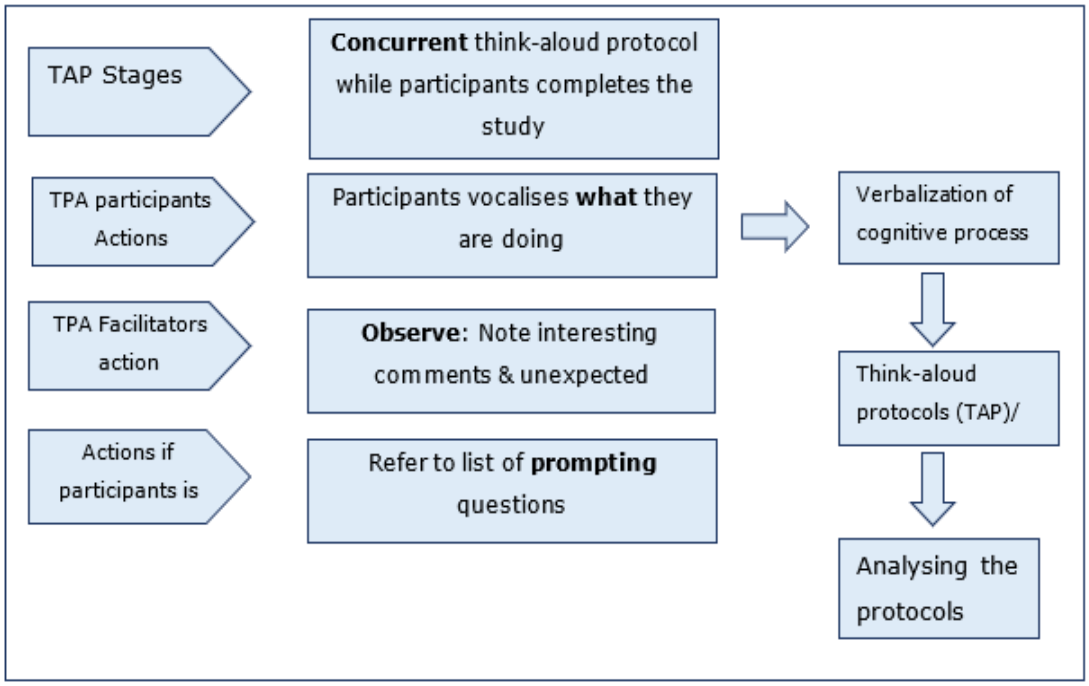


Figure 9 Summary of the main actions & stages of think-aloud method, adapted and modified from Sharkey et al. (2012).

A review of the literature showed the usefulness of think-aloud across a range of research domains. The think-aloud method are used to analyze in detail the way in which humans perform tasks,

mostly in interaction with a prototype computer system and technology (Sharkey et al., 2012, Jaspers et al., 2004, Yang, 2003), and often under the guise of 'usability testing' (Olmsted-Hawala, Murphy, Hawala et al., 2010, Adebesin, De Villiers and Ssemugabi, 2009, Crowther, Keller and Waddoups, 2004, Van Den Haak, De Jong and Jan Schellens, 2003). Think-aloud approaches have been extensively used in educational and health contexts (Abdel Latif, 2019, Leung, Mak and Leung, 2015, Todhunter, 2015, Armstrong, 2011, Li, 2011, Banning, 2008, Cotton and Gresty, 2007, Göransson, Ehrenberg, Ehnfors et al., 2007, Jaspers et al., 2004, Kuipers and Kassirer, 1984), in understanding how children make a decision (Twycross and Powls, 2006), to understand changes in cognition over a 16.1 km cycle ride (Whitehead, Jones, Williams et al., 2017). The evidence reveals slightly varied but important differences between concurrent verbalizations related to thoughts, reaction and feelings and the activities related with product reliability and usability testing.

5.3.1.2 Strengths of concurrent think-aloud method

Many advantages of think-aloud methods have been identified. Using the think-aloud method in an early phase can provide rapid, high-quality, qualitative user feedback (Cotton and Gresty, 2006). The wide application of think-aloud method shows its versatility as

a research method and as an assessment tool in product design, with transferable properties to natural and simulated environments (Todhunter, 2014).

This method, in many cases, is a unique source of information on cognitive processes as it generates direct data on the ongoing thought processes during task performance (Jaspers et al., 2004). Data, in this method, is available from a wide range of sources, such as direct observation of what the participants are doing and hearing what they want, or are trying, to do (as opposed to simply telling the researcher what they thought they wanted to hear) (Cotton and Gresty, 2006). The observer also has the chance to clarify the situation if participants get into difficulties. There is a degree of flexibility, and the presence of many people allows meaningful, direct dialogue (Olmsted-Hawala et al., 2010).

Other benefits include the collection of very detailed data about the resource (both positive and negative) in real-time use, such as views on colours or layouts, navigational issue, the ways in which participants felt the resource could enhance their learning, ways of using the resource, and other information which had not been anticipated by the researcher (Cotton and Gresty, 2006). A high face validity is related with a concurrent think-aloud as the resulting findings are objective because of the openness and accessibility of

the evidence (Todhunter, 2015). A small number of participants can provide a rich source of evidence associated with cognitive and decision processes (Shumway, Sentell, Chouljian et al., 2003) .

5.3.1.3 Limitations of concurrent think-aloud method

The think-aloud method is not without drawbacks, such as the internal thoughts of participants might not be verbalized as they are focusing on the completion of the task (Barkaoui, 2011). Moreover, the process of gathering, transcribing, coding, and analysing data from think-aloud method could be time-consuming and require more resources than other methods. The main criticism of concurrent think-aloud method concerns their veridicality (whether the TAP accurately reports and represents the participants' true and complete thinking and rating processes), and reactivity (whether the requirement to report the rating process alters the process being observed and/or its outcomes) (Ericsson and Simon, 1993).

Not everybody is appropriate for think-aloud even in a group situation, and concurrently thinking and verbalizing are unnatural, because thought tends to co-occur with a silent period after speech (Todhunter, 2015). Although the activity needs immediate recall there might be a space between cognition and verbalization. Asking the subjects to think-aloud while performing a task synchronously, always requires more time than asking them to work in silence would

(Abdel Latif, 2019, Van Den Haak et al., 2003). This issue needs to be considered in the research design. There seems to be subtle, but important differences between quantity and quality of verbal fluency (Todhunter, 2014). In a relatively recent study based on a meta-analysis of 94 studies, Fox, Ericsson and Best (2011) conclude that concurrent verbalization is an effective procedure and remains a nonreactive method. Moreover, a follow-up focus-group method used to minimise the drawbacks of the think-aloud method.

5.3.2 Focus-group method

As the think-aloud method primarily gives indications about participants' interactions with UK RLOs, through conducting the specific task of navigating the RLOs, focus-group methods were employed to give a more comprehensive picture. A combination of both think-aloud and focus-group methods, can best ensure that advantages and drawbacks of the methods complement each other. Supporters of the think-aloud method suggest that TAP generates the most valuable data when combined with other methods to assess the completeness and reactivity of the verbal protocols (Hoppmann, 2009, Nielsen, 1994, Van Someren, Barnard and Sandberg, 1994, Wilson, 1994) as most of them agree that the internal thoughts of participants might not be verbalized.

Therefore, the focus-group, held after think-aloud sessions, helped to better interpret the think-aloud protocols. It also provided further information and more specific answers about the participants' interaction with the UK RLOs. Moreover, the participants were asked to articulate their own recommendations, positive and negative aspects of the RLOs, their impressions of using the RLO as OERs in the nursing curriculum and the barriers that might prevent them from using the RLOs. Furthermore, because of the differences in background and experience, different perspectives could result, which would allow the researcher to gain more understanding from participants' feedback and thoughts. Thus, group interactions may highlight members' similarities and differences and give rich information about their range of perspectives and experiences. Advocates of the focus-group method identify that is an opportunity to investigate participants' reasons for holding a certain view, where participants may answer a question but, after listening to others, decide to modify their answers (Bryman, 2016, Stewart and Shamdasani, 2014, Barbour, 2008, Morgan, 1997). Participants may change their minds and agree with views they would not have considered had they not had the opportunity to hear the opinions of others (Stewart and Shamdasani, 2014). The purpose is to understand rather than infer, to determine the range rather than generalise, and to gain insight into how people in the groups

perceive situations rather than make statements about the population (Krueger, 2014, Onwuegbuzie, Dickinson, Leech et al., 2009).

Moreover, focus-group interviews give the researcher the opportunity to study the ways in which members of the group collectively make sense of a topic and construct meanings around it (Bryman, 2016). Using different methods may allow for an original contribution to the existing knowledge, through highlighting previously unexplored aspects of the issue at hand by, for example, unpicking the reasoning behind certain types of behaviour or beliefs (Barbour, 2007). Many researchers suggest that studies that use many qualitative methods should analyse and explicate the relationship between the data, rather than report the data separately (Wilkinson, 1998; Pollack, 2003).

At the completion of the think-aloud sessions, participants were asked if they wished to participate in a one-hour focus-group discussion. Most of the participants were willing to participate. The aim was to conduct two focus-groups, one for tutors and one for students. The intended size of the focus-group was six to nine participants from each of the student and tutor groups as suggested by Robson and McCartan (2016) and Morgan (1997), and at least one participant from each think-aloud group. This was because each

group had their own experience during the think-aloud sessions and the aim was to let them discuss their views.

5.3.3 Pilot study

5.3.3.1 Think-aloud pilot study

Three pilot activities were conducted, and these were important in selecting the participants, task, generating a coding scheme and the coding procedure for the think-aloud. To make the findings as relevant as possible for the normal situation, Van Someren et al. (1994), and Robson and McCartan (2016) suggest that the qualitative method should be piloted to test the practical conditions prior to the actual study. Thus, the aim of the of the pilot study was to prepare a clear platform to conduct the actual procedures of think-aloud and focus-groups. Moreover, the pilot studies help the researcher to prepare and be more confident for the actual study and to manage any unexpected situations.

Three think-aloud and three focus-group pilot sessions were conducted respectively, following all the ethical considerations similar to the actual study. The first (P1) and second (P2) sessions included six nursing tutors (three in each). The third (P3) session included two intern students. The study aims and their right to withdraw were explained to all volunteers. After each pilot activity amendments were made based on suggestions from the participants

and the final amended activity was piloted with P3. The following paragraphs reflected how the pilot contributed to preparing for the actual think-aloud method:

5.3.3.1.1 Number of the participants on each group:

The pilot study revealed that three participants in each group is appropriate. The small group in P1 and P2 appeared to show appropriate focusing during conducting the activity. Also, the students in P3 were active and showed evidence that two students might be enough. However, undergraduate students during the actual procedure might be less active as they would be less experienced than the intern students. It might be impractical to obtain data from more than 4 participants at the same time while they are navigating the RLOs because of the sound level, and to give the researcher the chance to observe and record as much as possible. Thus, three participants were considered as an appropriate group size for each session to enhance opportunities to think-aloud.

5.3.3.1.2 Setting:

The setting was convenient for the participants on all pilot studies, considering the comfortable chairs, weather, hospitality. However, as shown in Figure 10, the researcher could not follow the participants while they were navigating the RLOs and got confused

as to which part of the RLOs they were indicating. Also, from P2 it was identified that there was a need for participants to have two computer mouses, pens and papers, a list of RLOs included in the task, and a larger computer screen. Also, the researcher recognised that more than one audio-visual recorder was needed. Some RLOs had a low-voice volume as the three participants could not hear clearly, therefore, it was suggested a speaker to be connected.



Figure 10 Setting for pilot study

5.3.3.1.3 The task

The task was initially to let the participants select any of the clinical skills RLOs included in this study and to freely navigate them for around 45 to 60 minutes without a specific task to complete. The pilot with P1 and P2 revealed that the task needed to be modified. Although navigating the RLOs is the primary interest of this study, the tasks needed to have further steps rather than just navigating

the RLOs in order to provide a rich data set. Participants were discussing, for example, their preference of which RLOs they wanted to see and why. The final task was piloted with P3 before the actual data collection.

5.3.3.1.4 Instructions

The task instruction helped in explaining the task clearly. From P1 and P2 it was clear that the instructions required modification to be more appropriate for the task. Participants struggled to understand exactly what they needed to do and so kept asking the researcher. The font and its size of task instruction were small, using white and black colours was also confusing. Each RLO had an instruction card, and by the time the participants navigated the RLOs, all these cards were distributed on the table in a messy way, and the participants eventually became very confused with all the cards. Figure 11 shows the instructions used on the pilot studies, the modifications will be presented on the actual data collection section.

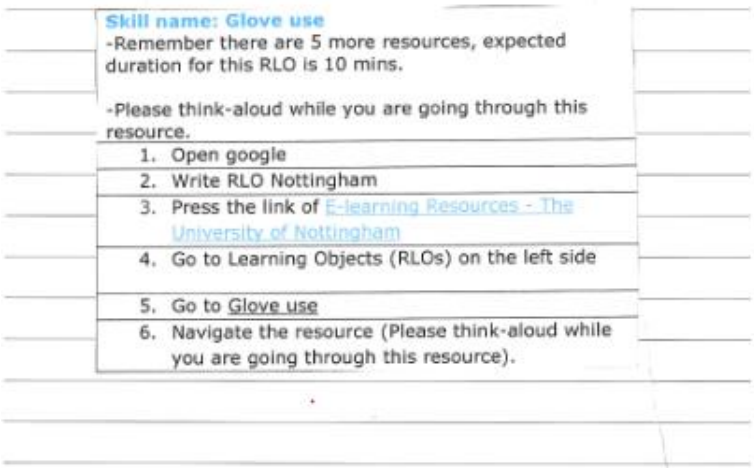


Figure 11 Task instruction for the Pilot study

5.3.3.1.5 Warm-up activity

The RLO used for the warm-up task was related to the research, not to the clinical skills. The pilot study P1 revealed that participants started to compare the clinical skills RLOs with the research related RLOs. Therefore, the decision was to select a clinical skill RLO for the warm-up activity which was similar to the RLOs included in this study. Van Someren et al. (1994) suggest looking for a task which is not too different from the target task.

5.3.3.1.6 Code scheme

One method of establishing code is developing a provisional start list of codes preceding the fieldwork (deductive coding) (Miles, Huberman and Saldaña, 2014). In the design process, a pilot activity was conducted to identify a list of codes, beginning with a master code to indicate data segments. Then, the list was modified and examined closely against the literature and expert opinions for

fitness and utility. The main consideration was to identified events that reflected participants' behavioural interaction (usefulness, usability, and engagement) with the UK RLOs.

After the pilot activity it was identified that it was difficult to involve the facial expression. This was due to several reasons. First, due to cultural issues it was impossible to video record the participants' expression while conducting the task as most participants asked for their faces not to be filmed. Second, the aim was to explore the participants' views rather than identify a specific facial expression that reflected their behavioural interaction. However, some non-verbal gestures that reflected their behavioural interactions were identified. These were characterized by focused attention (e.g., what the participants were doing at a specific point; such as following the tasks, listening, reading or discussion), voice dynamics and intonation, signposts for excitement, frustration, repeating the RLO, recommending the RLO to others, and repeating the experiences. Therefore, the verbalized behavioural interaction and the above-mentioned non-verbal gestures were the only considerations in this study.

It was important to expect and identify as many of these behaviour differences regarding participants views as possible and then assign each a name and a unique code. However, too many codes could

make for a complex scoring system (Todhunter, 2014). Figure 12 demonstrates the initial codes designed for the observations before the pilot activity. From the pilot activity, it was recognised how difficult it was to follow participants facial expressions; however, a list of expected verbal comments and non-verbal gestures were collected.

Segment	Categories	Comments	Examples from references	Description: examples of expected verbal and facial expression.
OERs	Engagement		Distorted perception of time	Look at their watch or clock or disoriented of time
			Follow-on task performance	Follow the instruction task
			Eye tracking	Eye tracking the screen display
			Concentration	Focusing with the sequence of task
			Difficulty, attention, fatigue, strong emotion	----------
			Curiosity	Participates want to see more RLOs
			Recommendation	Any oral recommendation about RLOs
			Willingness to repeat	If they want to repeat any RLOs orally
			Willingness to recommend an experience	If they said something about recommending the RLOs to their colleague.
			Trust and expectation	Any oral comments about trusting the OERs recourse
	Usefulness		Any comments related OERs 'how to use open education resource'	
	Usability		Difficulties in reaching the page, free recourse	
RLOs	Engagement			
	Usefulness		Good,	
	Usability		We can use it, we can't use it, easy, need changes, not clear	

Figure 12 Initial code scheme

The coding included three different categories of usefulness, usability and engagement based on their definitions as explained in Chapter 3. As the nature of this study was exploratory, the decision was made after the pilot activity to include three categories of coding on the code scheme and a few common adjectives revealed from the pilot study. Additionally, an empty space was also included to add any unexpected interactional behaviour from the participants which

needs to be emphasised and reviewed when transcribing the protocol.

5.3.3.2 Focus- group pilot study

The questions included in the focus-group discussion were reviewed and discussed with experts (supervisors) and piloted with the same group who volunteered to pilot the think-aloud (P1, P2, and P3). The researcher gained many advantages from the pilot-study. Firstly, modifying the questions and making them clearer and more understandable. It gave the researcher an opportunity to ask the questions in different ways and also gave an idea of how the participants might respond. Importantly, the researcher was able to practice how to facilitate and control the focus-group discussion, and manage the conflict between the participants respectfully. The researcher also practiced how to listen and ask without interfering with the participants views. This helped in developing an appropriate guide with prompts and props, and pretested them for suitability of wording and responses. Finally, the researcher gained a sense of confidence for conducting the actual focus-group. Table 9 summarized the changes made to the think-aloud and focus-group procedures based on the pilot study.

From first pilot study (P1)	From second pilot study (P2)	From third pilot study (P3)
- Instruction of think-aloud - Task - Code scheme - Number of participants - Modify the focus-group questions - Confidence	- Instruction of think-aloud - Task - Add pen and notecard - Use 2 mice - List for RLOs - Large screen - focus-group questions - Confidence	- Instruction and add the video - Add more than one task instruction copy - Add speaker - Staple all the tasks together - Use a stand for the RLO list - Add pen and notecard - Add more than 1 video recorder - Confidence

Table 9 Summary of pilot studies

5.3.4 Think-aloud procedure

5.3.4.1 Preparing for the data collection

5.3.4.1.1 Selecting participants

The general rule of thumb for the sample size seems to be to consider the aim and characteristics of the task and the setting in which it occurs (Todhunter, 2015). In the criteria of selecting the participants for the think-aloud method, most of the participants did not have a clear idea about the RLOs. They had only heard about them when the researcher presented the study to them, and from the short introductory video developed by the HELM team. The researcher sent the video to the participants one day before the think-aloud sessions. A review of a literature related to sample size in think-aloud revealed that sample size ranges from 100 to 8 participants (Abdel Latif, 2019, Todhunter, 2015, Adebesin et al., 2009, Schneider and Reichl, 2006, Edwards, Thomsen and Toroitich-

Ruto, 2005, Aitken and Mardegan, 2000, Lodge, Tripp and Harte, 2000). A small number of participants can provide a rich source of evidence related to cognitive and decision processes (Todhunter, 2015). Thus, the think-aloud method was an appropriate method to explore the participants view on the RLOs.

Nine clinical skills tutors with different degree levels and nine senior-students volunteered to participate in the study. The number of students recruited increased from nine to fourteen students. This was because of a Royal order to reduce the semester by three weeks due to weather issues and to avoid studying during Ramadan (a holy month where Muslims fast until sunset). Therefore, the researcher increased the number of students because many students were hesitating to participate as they became at that time panicked because of their theoretical and practical exams. Indeed, this was one of the challenges the researcher faced during the data collection. The time and venue were negotiated with all participants in advance to ensure that the time and setting were convenient for all participants.

5.3.4.1.2 Setting

It was important to ensure that the setting is such that the participants feels at ease and are settled as comfortably as possible in order to get them to think aloud (Van Someren et al., 1994). A

fully equipped and quiet meeting room was provided by the university to conduct the think-aloud sessions, free snacks and drinks were provided. Figure 13 shows the setup of the meeting room for the think-aloud discussion.

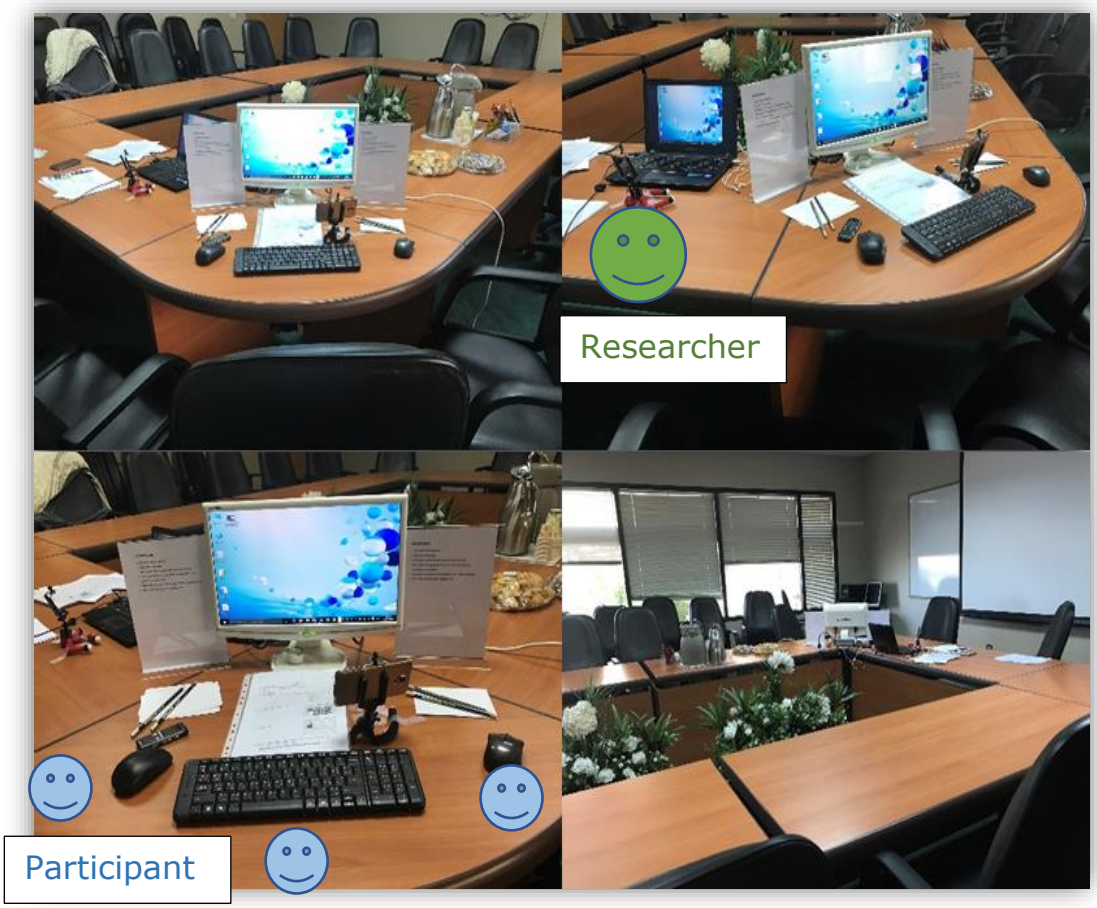


Figure 13 Setting for the think-aloud discussion

Based on the pilot studies' recommendations, a large screen which connected to the researcher's laptop was provided. This allowed the researcher to follow the participants while browsing the RLOs. Two computer mice were added to let the participants feel in control when any of them wanted to see something on the screen. The six

RLOs were listed with a number and displayed in front of them. Two audio-visual recorders were available to capture participants' actions on the computer screen, one in front of the participants and another one in front of the researcher's laptop screen, in case of any unexpected situations.

5.3.4.1.3 Selecting a task

The task was selected considering its difficulty and the cognitive abilities of the participants in mind. According to Ericsson and Simon (1993), the task should be at an intermediate level of difficulty for the participants in think-aloud research as it requires more than an automatic response but should not be cognitively overwhelming. Demanding tasks produce a high cognitive load associated with verbalization, and a simple task may also be inappropriate as activities come automatically (Charters, 2003, Van Someren et al., 1994). As the basic clinical skills RLOs were the main interest of this study, the task was browsing six basic clinical skills RLOs in this phase (Table 10). The duration of the RLOs ranges from 3-6 minutes and the total time would take around 40 minutes, therefore, each session will be 60 minutes long (including the warm-up activity) in order to consider language barriers and to give enough time for discussion.

RLOs number	Procedures	Approximate RLOs duration
1	Hand hygiene	6 min
2	Glove use	6 min
3	Intramuscular Injection sites for adults	5 min
4	Skin preparation prior to intramuscular and subcutaneous injections	3 min
5	Intramuscular injection by the Z-track technique	5 min
6	Subcutaneous injection sites	5.5 min

Table 10 Clinical skills RLOs selected for the think-aloud task

5.3.4.1.4 Instruction

There was instruction on the tables for each clinical RLO showing the names of the skills, and how to access them. Participants were able to select and decide which RLO to see first and how. Figure 14 shows the browsing RLOs task provided to the participants during the think-aloud discussion after the pilot study. The task instruction sheet was changed from a notecard form to colourful A4 size and included the skill name, a short simple sentence for instruction, pictures, and link to access the RLO. All instructions for the six RLOs were stapled together to prevent the confusion that happened in the pilot study.

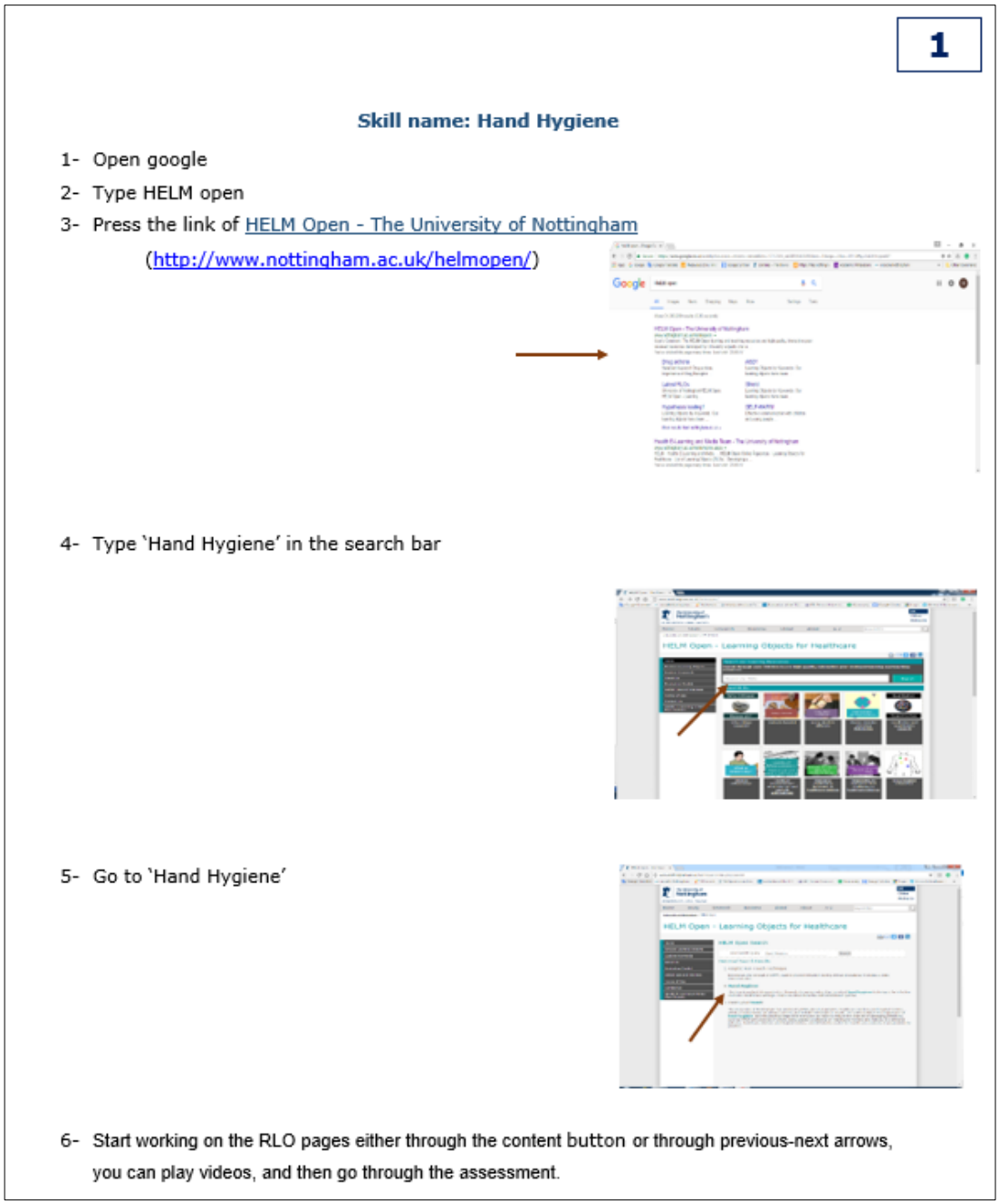


Figure 14 Browsing RLOs task instruction

The condition for the study was for nursing students and tutors to think aloud during browsing the RLOs, including accessing the RLOs. The researcher explained that they need to speak out their thoughts and feelings related their view on the UK RLOs, and in how if they use this resource on their clinical skills curriculum. This was without

clarifying any specific aspects such as the usefulness of the RLOs in supporting the clinical skills learning or the usability of the RLOs in order to avoid the researcher influencing their thoughts or feeling.

On the day allocated for the think-aloud session each participant filled in demographical data that included name, position, and computer experience to provide identification data. The researcher introduced herself again, outlined the purpose of the study, and gave them clear simple instructions. All factors that could contribute to make them nervous, were considered as this may hinder their speaking out loud (Van Someren et al., 1994). Figure 15 describes the instructions given to the participants. It might be embarrassing for the nursing students or tutors to talk while they are performing a task as they have been asked to bring out into the open the way they navigate the web or RLOs. For example, they might struggle to find the browser or spell a word to access the RLOs, or be slow in using the computer. Therefore, the instruction was piloted many times and reviewed by experts, and then designed clearly in a simple way with pictures. Moreover, Todhunter (2015) indicated that it is important to consider researcher proximity, being able to observe and operate the cameras, give minimum prompts to remind the participants to keep thinking aloud, but not have an overwhelming presence.

- Remind the participants regarding research purpose, the confidentiality, anonymity and their right to withdraw, and ask if they are willing to participate in the follow-up focus group
- Reassure the participants that there will be no right or wrong way to conduct the task. It is only about exploring their views in different aspects on RLOs and how it will support clinical skills learning
- Explain that the participants should all the time comment freely on their actions, intentions and thoughts.
- Explain that the researcher may give only minimum help and apologise in advance for this. Indeed, they should try to find their own way as much as possible.
- Remind the participants that refreshments will be available for them.
- Assure them that the camera will capture the screen only.
- Explain that the participants will be allowed to speak in their preferred language, Arabic or English (as the Arabic is their first language), in order to let them think-aloud spontaneously and express their thoughts and behaviour without barriers.

Figure 15 Think-aloud instructions

As the objective of the task was to explore participants' views on using UK RLOs in a clinical skills curriculum, it was suitable to allow them to progress as naturally as possible with occasional prompts. After the commentary was collected, transcribed and translated into protocols using the coding scheme, it was possible to carry out a thematic analysis.

5.3.4.1.5 Warm-up activity

To ensure that participants are confident in the use of the think-aloud method, one clinical skills RLO (not from the included six

RLOs) was used as a warm-up, as a rehearsal activity. This was in order to settle the group into the activity, as recommended by Ericsson and Simon (1993), who contend that participants take only a short length of time to get used to the researcher's presence and the audio-visual recorders. The think-aloud instruction for the warm-up was the same as for the main task. The think-aloud warm-up activity does not only provide the participants with an opportunity to familiarize themselves with thinking aloud, but it also gives the researcher a chance to train the participants to keep verbalizing their thoughts (Van Someren et al., 1994). If the participants failed to think-aloud or had any problems, the researcher had to correct them and explain anew what they were supposed to do. The actual think-aloud session would not start unless the researcher was confident that the participants were comfortable with the task of thinking aloud. Additionally, the warm-up activity enabled the researcher to check that the audio-visual recorder was recording properly, participants' verbalization during the practice was recorded but then immediately deleted.

5.3.4.1.6 Code scheme

The researcher had a pre-defined coding scheme that included categories to observe, and also prompts to help in collecting the data. Although, the structures in the mental state segment could be

at best during performing the main task, coding preceding the main activity could only estimate the types of behaviours that participants were predicted to display (Todhunter, 2014). Thus, a pilot activity was conducted before the actual data collection to identify the content of this coding scheme. This could be changed as recall improved and the procedures became more familiar. The final version of the code scheme used in the data collection is shown in Appendix 3.

The code scheme depended on two different sources of information; the protocol segments and the verbal protocols (Todhunter, 2015). The non-verbal gestures such as reading, laughing and, answering the question were included with the verbal protocol, as a sequence of actions and verbal commentary. According to Ericsson and Simon (1993) protocol analysis involves categorizing the verbalization according to the task that produced them. Thus, considerations on the coding scheme pinpointed the requirement for two different sources of information:

1- The first level of coding was protocol segments. Each segment reflected the participants' actions on the task while navigating the RLOs. For example, if participants were working on the demonstration page of the RLO, or on an activity. The camera captured the participants' actions on the computer screen.

2- The second level of coding was the verbal protocols. Protocol segments depended on the verbal comments (verbalization) made by the participants and the non-verbal gestures that reflected their behavioural interaction with the RLOs. The audio recording captured the participants' commentary on each part of the RLOs.

These two levels of coding were constructed to indicate the fit between the task and the behavioural interaction by the nursing students and tutors while browsing the RLOs. The task phases and the assigned codes were required to reflect the participants' behaviours which could be observed and analysed (Todhunter, 2015), in order to provide evidence regarding the usefulness, usability, and engagement with the UK RLOs. Therefore, a pen and paper exercise to refine the code set was conducted considering the research aim. It developed from a broad outline to thoroughly refined codes prior to performing any coding activity. Additionally, the developed coding scheme was reviewed and validated by three experts involved in the study. Figure 16 shows an example of how the protocol was developed using different levels of coding.

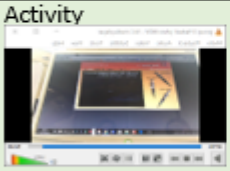
Video	T	Audio
Feedback page	44:57	I: ok, the feedback, do we have to fill it now D: this feedback maybe aaa// R: let's send a feedback and give them a feedback
RLO home page 	45:45	I: then, HELM open, then what do you want D: SC R: see it is here I: Z track D: what we did, we did the IM
Activity 	47:51	I: what is this! Drag 90 degree into aaaa this one, and then what I need to do with it R: insert it Laughing I: ok R: wow, this is nice, they clip for me I: this is about the Z track, not injection site
Activity 	48:03	I: reading D: I am disappointed, to be honest I: sorry this is a physics (!!!), different size syringe R: is trying to answer D: is this! Did you think! I have a question, are they using this for the students, there! And they are satisfied! Not for

Figure 16 Example of coding the protocol (Video is the protocol segments and audio is the verbal protocol)

5.3.4.2 Actual data collection

After recruiting the participants, seven similar think-aloud sessions were conducted separately on different days. Students' and tutors' think-aloud sessions were separated in order to minimise power and hierarchy problems. Three think-aloud sessions for the tutors (T1=3, T2=3, and T3=3) were held on one day based on a convenient time and their busy schedules, followed by a focus-group in the same week. In the next week, another four sessions for senior-students (S1=3, S2=3, S3=3, and S4=3) were conducted on two different days, followed by a focus-group discussion in the same week. A short gap between the think-aloud sessions and focus-group discussions was maintained. This was in order to avoid participants losing their

intention to participate and forgetting the discussion they had had during the think-aloud session. In grouping students in one session, many issues were considered such as their time, and their level. It was anticipated that if different levels of students were grouped together, students might feel embarrassed or reluctant to share their thoughts. Finding an appropriate time for students and tutors was one of the challenges in conducting the think-aloud method.

At the beginning, the researcher welcomed the participants, explained the aim of the study, reviewed the ethical considerations and introduced the instructions mentioned in Figure 15. The researcher encouraged the participants to verbalize their thoughts or feelings as they navigated the online resource in order to understand their interactive behaviour. They were allowed to speak in their preferred language, Arabic or English to let them think-aloud naturally and express their thoughts and behaviour without barriers. Each clinical skills RLOs had an A4 task instruction, the participants followed it and accessed the RLOs. The first instruction was to access Google as it is the most common browser used to search. The participants then needed to access the RLOs through searching for HELM Open - The University of Nottingham on Google. This will show them that the RLOs are open educational resources available on the web. After the ten-minute warm-up activity, the researcher enquired

about the participants' comfort and whether they have any questions or needed any refreshment.

Each group in the think-aloud session was provided with set of RLOs to navigate. The instruction was that each group of tutors should navigate two specific RLOs and if they have extra time, they can choose any other RLOs to navigate from the list displayed in front of them. For example, group T1 will navigate RLO 1 and 6, group T2 will navigate RLO 2 and 4, and group T3 will navigate RLO 3 and 5. Table 11 demonstrates the RLOs navigated by the participants and the duration. The duration expected to complete each RLO is about ten minutes, this appeared on the task instruction. They were allowed to have a break for three minutes for refreshments if they wanted between each RLOs, but the recording would not stop as they might have some discussion related to the study. However, none of the groups had a break in between the RLOs navigation.

Groups	N of participants	Time	N of RLOs	Skills
T1	3	60 min	3	Hand hygiene, SC injection site, Z track
T2	3	60 min	3	Glove use, skin preparation, IM injection site
T3	3	45 min	3	Hand hygiene, IM injection site, Z track
Groups	Number of participants	Time	N of RLOs	Skills
S1	3	60 min	3	Hand hygiene, SC injection site, Z track
S2	4	60 min	3	Glove use, skin preparation, hand hygiene, Z track
S3	3	60 min	3	Glove use, IM injection site, hand hygiene
S4	3	60 min	3	Glove use, hand hygiene, IM injection site

IM: Intramuscular; SC: Subcutaneous

Table 11 RLOs navigated by participants during think-aloud sessions

The researcher's role was to observe and write down any unexpected behaviour on the code scheme. Also, to prompt participants to 'please think-aloud' gently but not have an overwhelming presence (Todhunter, 2015). In the case of participants who were completely stuck, participants were given gentle prompts and help based on previous evidence (Banning, 2008, Ericsson and Simon, 1993). In addition to the researcher's notes, there was the audio-visual recording, the video-taping capturing the screen to catch what participants were navigating, and the audio to record their commentary for later analysis. After 60 minutes each group was reminded about the focus-group time and venue.

5.3.5 Focus-group procedures

Two focus-groups were conducted, one for tutors and another for students. The tutor focus-group was conducted five days after the think-aloud and the student focus-group was three days after the think-aloud sessions on. It was very difficult to meet the students directly after the think-aloud or with just one day gap between them due to their curriculum workload. Eight tutors and nine senior students volunteered to participate in the focus group.

The guideline for focus-group discussion (Appendix 4) offered adequate prompts to explore the key issues expected to be relevant, while also keeping the discussion adaptable and flexible to the participants' responses (Savin-Baden and Major, 2013). Additionally, the researcher gained a sense of security from this guide, as a relatively novice researcher and it proved to be useful during the activity. This guide contained many prompts to open the discussion, including research goals, timings, an introduction, questions and activities and ways of closing.

5.4 Analysis

5.4.1 Translation of the qualitative data

As the participants used both English and Arabic languages during the think-aloud task, it was important to ensure that the protocol

followed a thorough and systematic procedure in translation to the English language. This was to avoid loss of meaning in the translation process and to enhance the validity of cross-English qualitative research (Van Nes, Abma, Jonsson et al., 2010). The most common translation procedure in qualitative research is verbatim transcribing of the source language, analysis of content, translation of the emerging concepts and categories by two bilingual translators, back translation, and final agreement on the translation by an expert panel committee (Chen and Boore, 2010, Van Nes et al., 2010, Nikander, 2008, Cruz, Padilla and Agustin, 2000). Nevertheless, this was relatively difficult to conduct on all think-aloud protocols.

The protocol includes two sources of information, as indicated previously, for which following the process of translation would be time consuming and expensive. However, two protocols (one from tutors and one from students) were selected randomly to undergo the recommended translation process. The verbatim was transcribed by the researcher in the same source language, segmented into single thought, classified into the three main categories of usefulness, usability and engagement, and then reviewed by two independent bilingual translators. This process could contribute to enhancing the quality of the translating process and identify any inconsistencies that may require further clarification (Cruz et al.,

2000). However, this was not practical to apply to all the transcriptions in the academic study conducted in the second language as supervisory oversight is crucial. Therefore, after the researcher had become familiar with the kind of the data from the two protocols that underwent the translation process, the rest of the audio-visual recordings were verbatim transcribed and translated to English by the researcher.

Moreover, the participants used both languages which supported the translation process. Then they were assigned to a thematic analysis process and inserted as raw data into the Nvivo software program. Some random parts from each protocol were reviewed by bilingual experts to check the meaning. It is recommended that the researcher operates as a translation facilitator in collaboration with a translator, this would include clarifying to the translator the intended meaning and its context in the source language and discuss possible wordings (Van Nes et al., 2010). Moreover, the field notes (code scheme) did not involve any extra or different data than the audio-visual record. Thus, there was no extra information or data to include them to the protocol segment and the verbal protocol.

The data from the focus-group discussion was also transcribed verbatim to the source language, translated into English language, and random parts of the transcription were reviewed by bilingual

translators, then assigned to thematic analysis. It was also not practical to analyse them in the same source language for this academic purpose as supervisory oversight is essential. Additionally, random quotes from both methods were reviewed by bilingual translators in order to check the meaning.

In all original transcripts, each participant was identified by student (S) or tutor (T) followed by the initial letter of their name. The protocol/transcript considered each time a new speaker said something and presented this in a new line with the ident name to make the transcript visually clear and easy to analyse. Most of the transcription notation was adapted from Braun and Clarke (2013) such as (laughing), (reading), (listening), (coughing), pausing (…), overlapping speech (///), uncertainty (?), nonverbal utterances (mm, hm), and use of punctuation and were considered to obtain the best quality protocol/transcript possible.

5.4.2 Think-aloud analysis

After the verbal data was collected from the think-aloud, it was transformed through the transcription and translation processes into think-aloud protocols (TAP) for each group based on the identified code scheme, and assigned to thematic data analysis. All protocols were entered into Nvivo software for data management used to aid in data analysis, increase flexibility and speed in coding, retrieving,

and linking the data but not as an alternative for the researcher's intellectual role in analysis. The common guideline for thematic analysis by Braun and Clarke (2013) (Figure 17) was considered alongside the protocol analysis and adapted to develop an appropriate TAP analysis framework for this study that fitted both sources of information of the protocol. The guides on conducting thematic analysis usually focus on conducting research with an applied focus which could not fit the research aim and the data set. It was acknowledged that qualitative analysis guidelines are not rules, and, following the basic principles, will need to be applied with flexibility to fit the research questions and data (Braun and Clarke, 2006).

First stage involves the researcher immersing themselves within the data, listening to the audio repeatedly, and reading and re-reading the transcripts, exploring for, and make sense out of them through extracting significant statements.
Second stage includes the generation of codes for items within the data that are of interest, or relevance to the research.
In the third stage, the different codes will be combined and, arranged into potential themes.
Fourth stage involves reviewing and refining the themes.
Fifth stage includes defining and additional refining of the themes and determining the 'real meaning' of each theme.
Sixth stage involves the final analysis and the write the report, including data extracts to provide evidence of the themes within the data.

Figure 17 Thematic analysis guideline (Braun and Clarke, 2013)

Though there is a logical process to analysing the qualitative data, it often involves constant reviews and revision between the data set,

coded extracts and produced data. Figure 18 demonstrates the protocol analysis framework used in analysing the TAP.

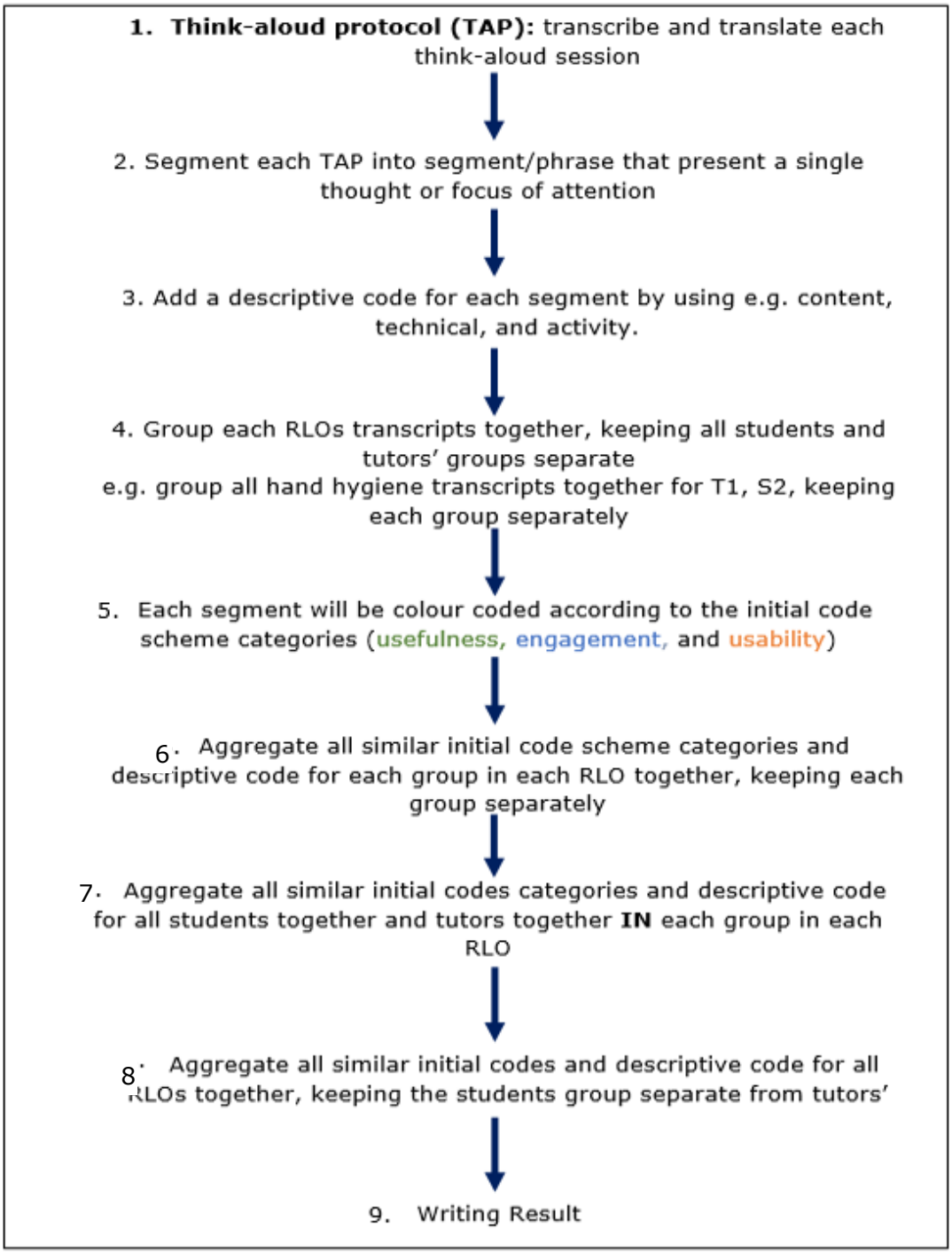
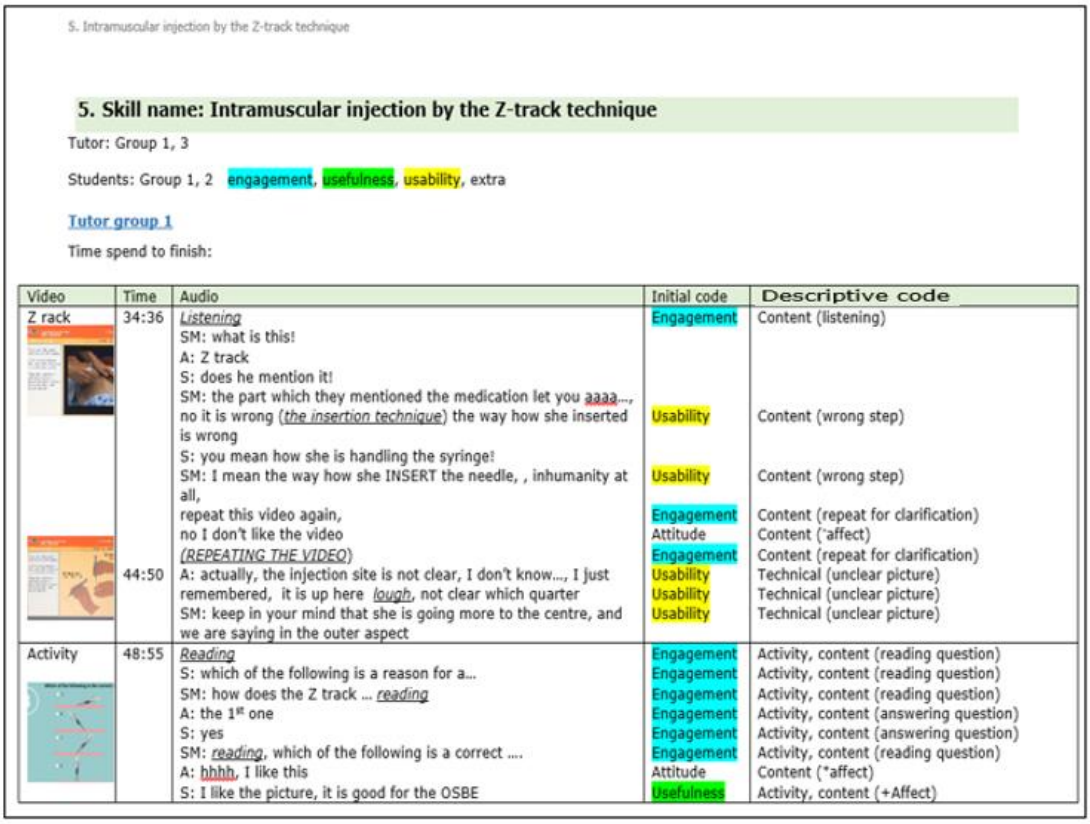


Figure 18 TPA analysis framework

The first step in the think-aloud analysis was preparing the TAP for analysis by transcribing and translating the data, as discussed in the previous section. Then, all TAPs were put through the flowing analysis process:

1- Every protocol (for each think-aloud session) was segmented into a segment or phrase that presented a single thought or focus of attention (Joseph and Patel, 1990).

2- Then, a descriptive code was given for each segment (Figure 19). This descriptive code included a very simple description from the segment itself, and indication of what the participants were talking about (protocol segment). For example, if they were commenting on the content or the information on the RLOs, or media attributes of the RLOs.



5. Intramuscular injection by the Z-track technique

5. Skill name: Intramuscular injection by the Z-track technique

Tutor: Group 1, 3

Students: Group 1, 2 engagement, usefulness, usability, extra

Tutor group 1

Time spend to finish:

Video	Time	Audio	Initial code	Descriptive code
Z rack	34:36	*Listening*	Engagement	Content (listening)
		SM: what is this!		
		A: Z track		
		S: does he mention it!		
		SM: the part which they mentioned the medication let you aaaa..., no it is wrong (*the insertion technique*) the way how she inserted is wrong	Usability	Content (wrong step)
		S: you mean how she is handling the syringe!		
		SM: I mean the way how she INSERT the needle, , inhumanity at all,	Usability	Content (wrong step)
		repeat this video again,	Engagement	Content (repeat for clarification)
		no I don't like the video	Attitude	Content (*affect)
		(REPEATING THE VIDEO)	Engagement	Content (repeat for clarification)
	44:50	A: actually, the injection site is not clear, I don't know..., I just remembered, it is up here *lough*, not clear which quarter	Usability Usability	Technical (unclear picture) Technical (unclear picture)
		SM: keep in your mind that she is going more to the centre, and we are saying in the outer aspect	Usability	Technical (unclear picture)
Activity	48:55	*Reading*	Engagement	Activity, content (reading question)
		S: which of the following is a reason for a...	Engagement	Activity, content (reading question)
		SM: how does the Z track ... *reading*	Engagement	Activity, content (reading question)
		A: the 1st one	Engagement	Activity, content (answering question)
		S: yes	Engagement	Activity, content (answering question)
		SM: *reading*, which of the following is a correct	Engagement	Activity, content (reading question)
		A: hhhh, I like this	Attitude	Content (*affect)
		S: I like the picture, it is good for the OSBE	Usefulness	Activity, content (+Affect)

Figure 19 Example of descriptive codes

3- Prior to categorising the codes, each RLO transcript was separated from the protocols and grouped together, keeping all student and tutor groups separated. For instance, all hand hygiene RLOs from each protocol were grouped together, keeping each group separate. This was because participants had different views across different RLOs, and this helped with understanding their view more clearly. So, the protocols after this stage were based on the name of the RLO rather than the group number of the think-aloud session.

4- Each segment of verbal protocol was then categorised by a colour code using the initial code scheme categories which included usefulness, usability, and engagement; and by using the protocol

segment (or descriptive code) of content, technical, and activity. At the initial stage of designing the code scheme, the first level of coding (protocol segments) was not clear enough as the task was navigating the RLOs. However, with the analysis process, the protocol segments appeared to be divided into descriptive codes such as content, media attributes, and activity. This code guide helped to shape the participants' interpretation of every part of the RLOs. Each colour coded segment was redefined and described according to the participants' verbal data to ensure that the definition of the initial code in the scheme was accurate (Fonteyn, Kuipers and Grobe, 1993). Moreover, to assist in establishing validity of the coding system, two experts involved in the study evaluated the accuracy of the colour coded segments in light of their definitions.

5- Following categorising of all protocol segments into the initial code scheme, all verbal codes and protocol segments (descriptive codes) from all TAPs were aggregated under the three categories of usefulness, usability, and engagement for each protocol, keeping the groups separated. Then all these categories were synthesised from all protocols, all the students together and tutors together. So, the protocol after this was based on the initial code scheme (usefulness, usability, and engagement) and no longer on the name of the RLO. One of the experts involved in the study analysed randomly selected portions of the TAP to determine

whether there was agreement on coding with the researcher and identify any concerns or differences.

6- Then, all the different codes were re-arranged into the potential themes deductively, keeping the tutors' themes separate from students' themes. Defining and additional refining of the themes and determining the 'real meaning' of each theme took place. Finally, data was extracted to provide evidence of the themes within the data. Using a hybrid approach in thematic analysis (Gale, Heath, Cameron et al., 2013, Fereday and Muir-Cochrane, 2006), all themes were derived deductively from the data but with the additional option of adding new codes inductively, as anticipated in advance in data analysis. Moreover, analysis is not a linear process that simply moves from one phase to the next. Instead, it is a more recursive process, with movement back and forth as needed, throughout the phases. It is also a process that develops over time (Ely et al., 1997), and should not be rushed.

The code scheme involved three identified codes (usefulness, usability, and engagement) based on existing theoretical concepts related to the acceptance of e-resources and their transferability as explained previously in Chapter 3. Thus, it was anticipated that the findings would result in themes, deductively, in relation to these three concepts. This was, in addition to other related themes, analysed inductively, related to the RLOs acceptability. Themes can

be identified in two ways: data-driven, otherwise known as inductively, (themes identified are strongly linked to the data themselves), or theoretically driven, otherwise known as deductively, where the researcher uses the data to explore particular theoretical ideas (Braun and Clarke, 2006).

5.4.3 Focus- group analysis

All focus-group transcriptions were analysed thematically following Braun and Clarke (2013) who provide a clear and useful guideline (Figure 17). Unlike the think-aloud analysis, this focus-group was analysed inductively seeking evidence to support the think-aloud findings. Thus, all themes were obtained inductively from the data. As will be shown in the next chapter, the focus-group resulted in almost similar themes to the think-aloud analysis. Table 12 explains the process of focus-group data analysis.

Stage	Process
Data familiarization	With the processes of transcribing and translating, the researcher became familiar with the raw data through listening and repeated readings. The researcher also immersed them self within the data by reading and re-reading the transcripts in each stage of categorizing and segmenting, exploring for, and making sense out of them through extracting significant statements. In this stage each transcript was segmented into a single thought or focus of attention.
Generating initial codes	In this stage, the code was identified from each data set, differently than in the previous think-aloud analysis. This was because it was anticipated that different themes might be merged from focus-group data. Each segment was coded by using descriptive words (one or two) from the participants' words, written on the right table of the transcript. Then, lists of codes were developed.
Searching for themes	All similar or conceptually related codes were grouped and categorised into potential themes.
Reviewing themes	As the key codes across all the data sets were developed, the initial categories, sub themes and themes started to be established which represented the relationship among codes across the data sets.
Generating definitions and names of the theme	After identifying the initial themes, the researcher developed and refined the themes. The themes were named and checked considering the coding, and category. The themes were further reviewed and refined until the researcher became satisfied with the meaning. Experts involved in this study discussed any issues in relation to the code extraction and in refining the specifics of each theme and gave definitions and a title for each theme.
Report producing	After the themes were defined, the findings were ready to report

Table 12 Process of analysing the focus-group

5.5 Trustworthiness in qualitative research

Trustworthiness assesses quality and rigour in qualitative research as reliability and validity do in quantitative research. A number of strategies have been proposed to ensure the trustworthiness of qualitative findings. Whilst not all are applicable, it is advised that at least two of these strategies should be used in any particular qualitative study (Bryman, 2016). Trustworthiness involves four criteria that provide equivalent criterion to quantitative research: credibility, transferability, dependability, and confirmability. These were applied as they demonstrate good protection for questioning uncertainty, challenge possible researcher bias and serve as reference points for assessing the consistency and credibility between the procedure and findings of the think-aloud and focus-group methods.

5.5.1 Credibility

Credibility is parallel to internal validity in the quantitative study. Lincoln and Guba (1985) suggested that the credibility of the research can be assessed through prolonged engagement, triangulation, peer debriefing, and participant feedback.

Prolonged engagement: this means investing enough time to know the participants, assessing for misinformation that occurs

through distortion either by the researcher or the participants, and building trust (Creswell and Poth, 2018, Hadi and Closs, 2016, Lincoln and Guba, 1985).

In this study, the researcher met the head of the department a period (around three months) before data collection to discuss the feasibility of conducting the study in the nursing college. From that time, until the study started, they maintained contact to complete the demonstrative works. The head of the department in her turn introduced the researcher to the staff, systems, schedules, curriculum, and exams times. Several informal visits were made, and the researcher participated in some activities, such as training on database searching, that were apart from the study. Thus, to some extent, the researcher could build some rapport with the staff and become more familiar with their culture and context. This, indeed, was helpful not only for the qualitative phase, but also for the subsequent phases where the researcher needed the tutors support to implement the RLOs into the nursing curriculum and evaluate them. In addition, this made the researcher sufficiently involved with the site for long enough to detect and consider distortions that could then influence to the data (Lincoln and Guba, 1985).

Furthermore, the researcher was available all the time during the recruitment process where there were opportunities to have discussions with staff in the coffee room, or even with students as she was involved as a volunteer on some extracurricular activities at that time. This helped create adequate relationships with most of the staff and build a kind of trust, though the process of building trust needs a longer time. However, there was evidence that trust and confidence had indeed been built. For instance, the researcher received an invitation to participate in teaching a short training course, and some staff asked the researcher to explain about the systematic reviews and keep this confidential. The researcher spent enough time to familiarize herself with the site and participants.

Triangulation: is seeking different information sources (multiple methods) or using different data collection techniques (documents, interviews, survey data, observation) to obtain evidence regarding the same phenomenon and establishing good quality data (Hadi and Closs, 2016, Morse, 2015, Treharne and Riggs, 2014). Many researchers argue that triangulation could be better viewed as a method of ensuring comprehensiveness and encouraging a more reflexive analysis of the data than as a test of validity (Treharne and Riggs, 2014, Mays et al., 2001, Long and Johnson, 2000).

This study employed a mixed method design in addition to using different data sources. For instance, in the first exploratory phase, both think-aloud and focus-groups were used. Although it is controversial to consider this as a validation process, using more than one method and the study's pragmatic nature enhanced the quality of this research. For example, the drawbacks from the think-aloud were addressed by the focus-group methods and eventually produced valid data regarding participants' views on UK RLOs. Establishing good research quality mostly refers to the use of two or more sets of data or methods to answer one question (Hadi and Closs, 2016).

Peer debriefing: is the process of seeking an external review by someone who is familiar with the study or the phenomena explored (Creswell and Poth, 2018). Lincoln and Guba (1985) indicate that the role of debriefing is to ask hard questions about method, meaning, and interpretation. It is of a similar nature to assessing the interrater reliability in a quantitative study and aims to avoid bias and aid conceptual development of the study (Morse, 2015).

In this study, the peer debriefing was carried out through experts in the field (supervisors) at each stage of the study starting from writing the proposal to the data interpretation. Particularly, they were involved in all analysis stages including translating,

segmenting, coding and identifying the themes. Their views helped to stimulate consideration and exploration of additional perspectives and explanations in different phases of the process of data collection and analysis. Moreover, the researcher had the chance to discuss different aspects of the study stage with other experts. For example, during the training courses and seminars the researcher discussed the method used in this study and received useful feedback to improve the coding and analysis methods. In addition, the researcher presented the study at many international conferences, to research teams that shared the same interest and university conferences. The critical questions after these presentations allowed the researcher to highlight specific aspects within the study to improve.

Participant feedback: refers to respondent validation as the researcher seeks participants views of the credibility of the findings and interoperations (Bryman, 2016). This involves reviewing the data, analysis, interpretations and conclusions with the participants to judge the accuracy of the data (Creswell and Poth, 2018). It was impossible to review all the data with the participants during the study because of the time limitations of both the study and the participants, as they were busy with their curriculum activity. However, part of the data was discussed verbally with two tutors and one student when the researcher implemented the second and

third phases. Also, the researcher received many inquiries regarding the RLOs and their desire to have more RLOs for clinical skills and other subjects.

5.5.2 Transferability

Transferability refers to the generalizability of inquiry, how well the findings inform contexts that differ from that in which the original research was undertaken (Nowell, Norris, White et al., 2017). It is maintained through providing a detailed and rich description, the researcher enables readers to transfer findings to another setting and to determine whether the data can be transferred to the new situation (Creswell and Poth, 2018, Lincoln and Guba, 1985). Therefore, this study strives to provide sufficient detailed description regarding the research environment, eligibility criteria, sample characteristics, design, results and analysis methods to allow the reader to judge the extent of its transferability to other settings and populations.

5.5.3 Dependability

Lincoln and Guba (1985) explained that dependability is parallel to the traditional criterion of reliability in quantitative study; however, the concern at the root of dependability is to ensure that data collection is carried out in a consistent manner free from excessive

variation which unintentionally exerts an effect on the nature of the data. In order to achieve dependability, researchers must ensure the research process is logical, traceable, and clearly documented (Nowell et al., 2017). When readers are able to assess the research process, they are better able to judge the research dependability. Many strategies have been suggested to demonstrate dependability, including overlapping methods (triangulation), stepwise replication (splitting data and duplicating the analysis) and use of an inquiry audit or audit trail.

In this study, triangulation was applied to different data sources and through using different methods as explained in the previous section. The final follow-up focus-group employed in third phase, after the implementation of the RLOs into the nursing curriculum, showed to some extent the extended tutors views on the UK RLOs after implementing the RLOs. The findings from this focus-group, as will be discussed in Chapter 8, show how the students views relatively approved the findings from the first phase.

5.5.4 Confirmability

While achieving complete objectivity is impossible in qualitative research, confirmability is concerned with ensuring it is achieved as far as possible (Bryman, 2016). It is concerned with establishing that the researcher's interpretations and findings obviously result

from the data, not from the researcher's 'biases, interests, motivations, or perspectives' (Nowell et al., 2017, Treharne and Riggs, 2014). It requires the researcher to show how conclusions and interpretations have been achieved, and it is largely an issue of presentation. Confirmability is established when credibility, transferability, and dependability are all achieved (Rolfe, 2006). Confirmability is achieved through a confirmability audit, triangulation, and reflexivity (Lincoln and Guba, 1985).

In this study, the researcher strived to achieve transferability and transparency, to demonstrate all the processes used in conducting the think-aloud and focus-groups clearly and to present many of the participants' direct quotations. All the proses, from the concurrent think-aloud and focus-groups to the protocol and thematic analysis were reviewed and validated by the experts involved in the study. A more transparent research process, analysis, and reporting of the findings (with signposted reflexivity) makes confirmability easier to evaluate (Nowell et al., 2017).

5.5.5 Reflexivity

Reflexivity refers to an understanding of the researcher's influence on the research process and its outcomes in terms of his/her actions, feelings and perceptions (Darawsheh and Stanley, 2014). I was aware that my interest and enthusiasm would influence my values,

position, conduct and outcomes. As a researcher working as a lecturer in nursing college with experience in teaching clinical skills, I had a range of assumptions based on my personal experiences and practice. For example, based on my personal background and knowledge of the cultural context of the research, I used a follow-up focus-group discussion after the think-aloud sessions to enrich the research data. The think-aloud method is not a common method so many participants are not familiar with the concept, and qualitative research methods in general are not as common or well-known as quantitative research in the Saudi nursing context. Also, most of the students did not know very much about research and had not participated previously in research. Thus, participants, especially students, might hesitate to express their feelings or opinions in a public arena such as a university. Therefore, using the focus-group was beneficial, especially if the think-aloud method failed to provide sufficient data.

I found a number of studies using think-aloud that have dealt with the challenges presented by reflexivity. Van Someren et al. (1994) provide rich details about code schemes. This provided me with a deep understanding of the importance of conducting a pilot study to develop a useful code scheme. Jaspers et al (2004) explain how the researcher's presence inhibits gathering of evidence. Their study provided me with valuable insights into minimizing the interaction

with participants. For instance, attention to position within the room and reducing any explanations are the best available solutions to minimize my influence.

Charters (2003) and Ericsson and Simon (1993) explained how the demanding task and instruction of the think-aloud produces a high cognitive load associated with verbalization. Their study guided me how to identify a suitable task that matched the aim of the current study. Cotton and Gresty (2007) used the think-aloud method to explore the ways in which students experienced and engaged with a biology online resource and to evaluate the ways and extent to which it might enhance their learning. Their study focused on the exploration of experience. Their study informed me that the think-aloud method can be used to explore participants' experiences rather cognitive processes. Such studies influenced my decisions to include any adjustments in this research that were made to show honestly how, where and why my influences as a researcher happened. My task was however to address all those aspects constructively. Reflexivity is a continuing process through every phase of the research. I believe that it is imperative that researchers become aware of their own values and interpretation throughout the whole process of the research.

5.6 Summary

This chapter presented the method of data collection selected in the first exploratory phase of the study. Seven think-aloud (three for tutors and four for students) were conducted followed by two focus-group discussions, one for tutors and one for students. Data analysis methods were presented, including the method of translating the protocols and transcripts resulting from data collection. Trustworthiness consideration obtained in this phase has been presented. Having outlined the method and analysis used in this phase, the following chapter will present the findings and the discussion from the think-aloud and focus-groups.

Chapter 6: Exploratory phase: findings and discussion

This chapter presents the findings and discussions from the first exploratory qualitative phase. This chapter reports on the results of the perceptions of Saudi lecturers and undergraduate students towards UK produced clinical skills RLOs. It reflects the researcher's interpretations of participants' views regarding clinical skills RLOs in a Saudi nursing clinical skills curriculum following the analysis of nine think-aloud and two focus-group sessions. Finally, it will discuss the developmental stage of the questionnaire and its translation.

6.1 Participant characteristics

The participants reflect a range of skills and experience from the KAU nursing school. Nine clinical skills tutors with different degree levels volunteered to participate in the study. In addition, thirteen senior students from different levels of study also participated. Table 13 illustrates the participants' characteristics; the assigned initials used in analysis, the think-aloud groupings, and a brief explanation of each participant's academic level of work/study.

Tutors		
Think-aloud groups	**Code**	**Explanation**
T1	TS	Lecturer
	TSM	Associate professor
	TAL	Lecturer
T2	THI	Associate professor
	TO	Lecturer
	TR	Lecturer
T3	TD	Associate professor, Nursing program coordinator
	TRA	Demonstrator
	TI	Demonstrator
Students		
Think-aloud group	**Code**	**Year**
S1	SSH	Fourth year
	SW	Fourth year
	SRS	Fourth year
S2	SRM	Third year
	SAA	Third year
	SGA	Third year
	SR	Third year
S3	SE	Bridging program
	SN	Bridging program
	SRA	Bridging program
S4	SM	Fourth year
	SRH	Fourth year
	SRF	Fourth year

Table 13 Participants in first phase

6.2 Exploratory qualitative findings in glance

The analysis of the qualitative data is demonstrated in four major themes from the think-aloud method and three major themes from the focus-groups. Some themes included categories and sub-categories as summarised in Table 14. Students and tutors' perceptions will be presented in the following sections for each theme.

Findings from think-aloud method	
Theme 1: Participants' perception of potential RLOs' usefulness in clinical skills education	
Category	Retaining the clinical skills information
	Unifying the information among different groups
	Implementation and use of RLOs in the clinical skills curriculum
Theme 2: Participants' perception of usability of RLOs	
Category 1: Usability of RLOs content	
Sub-category	Differences in practice
	Terms and abbreviations used in RLOs
	Content of the activity
Category 2: Usability of RLOs technical characteristics	
Sub-category	Images selection
	Multimedia attributes
	Browsing the RLOs
Theme 3: Participants' engagement with RLOs	
Category	Engagement with RLOs
Theme 4: Participants' attitudes towards RLOs	
Category	Positive and negative attitudes toward the RLOs
	Multimedia design
	Focused on single learning objective
	Activities on RLOs
	Trusted web/online resources
	Source of RLO information
	Accessibility of the RLOs
Findings from focus-group method	
Theme 1: RLOs compared with other online resources	
Theme 2: Potential educational value of RLOs	
Category	Portability and openness to clinical skills information
	Independent learning
Theme 3: Barriers to using RLOs	

Table 14 Summary of themes, categories, and sub-categories from qualitative data

6.3 Think-aloud findings

Each group of participants managed to navigate at least three basic clinical skills RLOs during the think-aloud activity (except S2, who managed to navigate four RLOs), two of these RLOs were chosen as compulsory by the researcher. All the groups spent 60 minutes on navigating the RLOs except one tutor group (T3), as they stopped

the think-aloud activity after 45 minutes as they had an urgent meeting. The data analyses of the think-aloud method revealed four themes:

6.3.1 Participants' perceptions on potential RLOs usefulness in clinical skills education

This section will present some evidence that indicates the extent of RLO usefulness among tutors and students in KAU which reflects their acceptance of the RLOs (see section 3.3.1 for usefulness definition). Many aspects that reflected potential RLO usefulness were highlighted by the participants during the think-aloud activity. These aspects were:

6.3.1.1 Retaining the clinical skills information

Tutors' narrative

Generally, most of the tutors in T1 and T2, seemed to think that using the UK RLOs in the clinical skills curriculum in KSA would useful and would help in retain the clinical skills knowledge. For example, TO pointed out, *'do you know that the students depend too much on videos currently, any procedure we are doing in the lab they go to review and watch the video, I love the RLOs video because it retains the knowledge*'.

Furthermore, TR suggested that the RLOs are not only a beneficial resource for the students, but also a good resource for the educational staff: *'this is very nice, short and works as a reinforcement, and very attractive, reinforces also for some staff members who are struggling, who have stayed in the same place with the same skills for 10 years'*.

Most of the tutors in groups T1 and T2 seemed to like the idea of including activities at the end of the RLOs and agreed that it could help students to retain the information. For example, TAL said, *'I feel it will retain the knowledge in the student's head'*. Tutor TS expressed that *'it is nice that there is an activity, to retain the information for the student'*. Other tutors in T2 agreed with the same opinion when TR said, '*this is very good to reinforce.. reinforce the important points in relation to the topic that has been shows by the film*'.

On other hand, T3 was not in favour with the activities in the RLOs as they thought these were not suitable for clinical skills procedures sessions. TD said, '*over assessment, this is a lab session, we need to focus on practice, anything they put it like questions, doesn't refer to us, it refer to the theories when they are examined on it, and this will put the students under stress, it means that the students will focus on the answer not on the skill itself'*. The other tutors in the

same group agreed with her, they felt that this would be too much for the students and will stress them.

Students' narrative

According to some students, the RLO would be useful and help them to retain the clinical skills information. Most of the students liked the song in the hand hygiene RLO and agreed that using the song in conducting the procedure is helpful, according to SR, '*lots of people create some song for their self to remember … I see it as enjoyable way*'. SGA said '*yes, when you sing it, you will know what you will do and never forget it*'. Another student SAA expressed that '*it really will retain the information in your mind, every time when I wash my hands, I will remember that I did a mistake in this video, I saw the video and that was wrong, a different way than when someone will explain to me during the lab session or when someone talks to each other*'.

Moreover, some students confirmed the tutors' opinion in T1 and T2 that the activity will help them to retain the information, SAA said, '*also, when we go to the hospital, we can remember*', and SM said, '*this is a nice activity, this activity will really help us to remember this information'*.

6.3.1.2 Unifying the information among students

Tutors' narrative

Two tutor groups, T1 and T2, agreed that the RLOs could unify the information among the students. Students usually have disagreements and differences in their knowledge about conducting clinical skills, even though they are following the same clinical skills guidelines. Tutors in T1 highlighted this during their discussion, as reported below:

> *TAL: students will see different videos, one sees a video and the other one sees a different video, one can say my resource did like this step, or the other student will say you said that, indeed this RLO will unify the information … TS: so, you will give them the same information … TSM: I think also when you will select a specific thing she can see, so you will prove the information in her mind … TAL: yes right, for the knowledge, you make sure that all students have the same information … TSM: exactly … TAL: to avoid disagreement later, especially in the clinical areas … TSM: when asking the students in the exam, they are saying Dr X said that I should conduct this step before, and Dr Y said this step before, always there is disagreement and differences.*

Lack of unified clinical skills information between students could be one of the major issues in CSE in KSA and probably everywhere. T2 claimed that the cause of clinical skills knowledge differences is not only because the students use different online resources, but also

because of different tutors' backgrounds. Students take the first theoretical part of the clinical lab session which has been prepared by an allocated tutor, then they will be divided into different clinical skills labs with different tutors for the demonstration and the practice of the clinical skills. The following discussion in T2 illustrates how the tutors' backgrounds affect the knowledge differences and how the RLOs can help:

> *TR: because we have different educational backgrounds, for myself I have a nursing degree but my Masters degree is in physiology, always I like just to integrate the physiology and nursing together just to emphasis the information … TO: so, by the time you are explaining too much … TR: yes, for example, in relation to the lumber puncture, I think it is very important to have a very good background in relation to the anatomy and physiology, we need to discuss about the exact location.*

The tutor in the previous quote, explains how her educational background could affect the lab session, according to her she usually emphasises the physiology aspects, and this leads to the time needed to practice skills being partially used up by the explanations, even though students have already covered this in the theory classes.

Students' narrative

One student SRF, highlighted that the RLOs were helpful in unifying the information among all nursing students at the same level, according to her, *'it will unify the information between different groups'*. However, compared with the tutors, only this one student thought about this advantage of RLOs in CSE.

6.3.1.3 Implementation and use of RLOs into clinical skills curriculum

Tutors' narrative

During the think-aloud activity, tutors also discussed the appropriate method of integrating the UK RLOs to the Saudi clinical skills curriculum and its implications.

Although T1 and T2 agreed that the RLOs could be useful in the clinical skills curriculum, they had different thoughts as to its integration in the nursing curriculum. At the beginning of the think-aloud discussion, T1 and T2 discussed ways of integrating the RLOs, and they were varied in their opinions as to whether they could replace the theoretical part prior to the clinical skills session with the RLOs or use them as a supportive resource, and if they used it in a supportive way, how and when they should let the students access them. TS said, '*the idea is, actually not to show them the RLOs in*

the lab, the idea is, they can take this, if they are at home, for example if one student is absent … or forget the procedure, I can go back and tell her, we were directing them to the YouTube'. Moreover, tutors in T2 agreed with T1 opinions regarding that RLOs could be good as a supportive teaching method especially for revision and during the practice in the hospital. TAL said, '*it is nice, they can open it and review*'. They also highlighted that integrating the RLOs would be useful especially with large numbers of students.

On other hand, T3 appeared to totally refuse the idea of integrating the RLOs with the Saudi nursing clinical curriculum, TD said '*we cannot use it as a pure teaching method*', and TE agreed with her and said '*I can't even use it as a supportive method'*.

Subsequently after a period of discussion, most tutors agreed to implement the RLOs as a supportive method, except TD and TE, and they gave some suggestions about appropriate ways of integrating the RLOs with the current clinical skills curriculum. T1 suggested posting the link on the blackboard online platform, according to TS '*we can see all the RLOs, and select the most applicable one, we can take the link, keeping the university right, and put it on the blackboard for the students as a reference for them*'. T2 agreed with same idea of posting the link on the Blackboard (LMS) for the students, they said,

THI: I love it, if we put this on the Blackboard for the students … TO: of course, it would be excellent … THI: I think this for the second year who is aaa … TO: yes, the joiner students in second year they need it, actually for all of them it will be very good for revision … THI: yes of course I totally agree … TO: yes, because the information will be confirmed when you repeat it … TR: also, especially when the procedure is considered to be long and with a lot of details, by means of text book sometimes aa … THI: so, they will have the resources, if they like, they can go back for it … this resource gives them the key points'.

Students' narrative

During the think-aloud activity, students brought to attention in their discussion the suitable method of RLOs integration into the nursing curriculum and its implications. As the tutors discussed the integration of the RLOs, the students also discussed some aspects of this and the reasons why the RLOs could be useful to them in learning the clinical skills. Initially, they highlighted some issues during their current clinical skill sessions such as too much unrelated information, the comprehensive details compared with the time limit of the lab sessions and the variation in how the tutors teach because of their different backgrounds, the same issue highlighted by a tutor previously. For example, the following quote reflects the students' opinions in S4 in learning the clinical skills and how the RLOs will help them:

> *SM: sometimes the lab sessions are not explained very well, sometimes the way of teaching with some tutors is so complicated and confuses you … SRF: yes … SRH: and some of them are confusing … SM: and sometimes she gives too much unrelated information, and it is so simple compared to what she said … M: yes these are the problems in general during the lab sessions, sometime the Drs broaden their discussion, and the main point will get lost with them, too much explanation, so this RLO is very good, a detailed objective and outline, you can follow and then practice in the lab.*

Some students suggested that the tutors can play the RLOs in the lab session prior to the practice, SR said, '*do you know, why we have to take a lecture prior to the clinical lab session, and stay for long with the tutor and PowerPoint slides, I feel that I really can't understand them*'. SGA added, ' *yes, I can't understand anything from this lecture, usually I wait 2 hours just to have* the *practice and then I can understand*'. However, SAA replied, '*I think if we will take a procedure, a new one, I think it will not be good to open the video and so on, so the tutor must explain to us but not in a long wordy way*'. SR clarified that integrating the RLOs is useful for them as a senior students as well as for the junior students in the second-year of nursing. According to her, '*I feel this fits for the new students in 2nd year, we are in 3rd year taking similar basic subjects, so we don't need to repeat the procedures, if we are competent in this procedure this resource will summarize it for you*'. SAA stated, '*I feel*

this is better, you are depending on yourself, you can open it, watch it, understand it'.

However, one student, SGA, claimed that if the students take the RLOs as self-study prior to the lab session, most of them will not see it, she claimed that none of the students will see the resource at home *'if you enter the house, no one will open it, when DR H sent us one time no one opened it'*, and most of the others agreed with her.

Other students suggested that if there is something to enforce them to use it at home or before the lab session they will open the link such as the attendance or marks, according SAA, *'no one will use it because it is something not applied yet, but when it became something that is essential, compulsory, from the module marks requirement to access the blackboard it will be different'*. During the think-aloud discussion most of the student groups repeated the same opinion about using marks to enforce them to use the RLOs.

Some students in S2 agreed that they need the RLOs as a supportive educational resource but not to replace the clinical skill session, some of them preferred to see the RLOs before the lab session and some of them after. According students in S2:

> *SR: learning the clinical skills will not work by using only video RLOs, it needs practice … SAA: that's ok, this is*

before, the practice … SGA: I think it would be after the practice, to maintain the information … SR: they can put it in the blackboard after the lab session, like this RLO it is a good resource, or for the quiz.

Indeed, SRM suggested that having the RLOs prior to the lab session will help them to be well prepared for it, she clearly explained this when she said,

'we can see the RLOs before the lab session to be prepared, so we will know it, and in the next day even if the tutor makes like a discussion, I mean she can take information from us, not all of us take the information from her only' (SRM, S1).

Furthermore, during the think-aloud discussion, the majority of students agreed that the RLOs are useful in many applications particularly as a revision tool. Student SSH said, '*you know this is nice during the practice in the hospital, when we have an evaluation, it is so fast like quick revision*'. Another groups S2, S3, and S4 agreed, student SR said, '*it is a good resource, especially for the quiz, or for example when we want to review something before we go to the hospital, while I am walking to the hospital*'.

6.3.2 Participants perceptions on usability of RLOs

This section will present some evidence that indicates the extent to which the content of the RLOs was appropriate (usability of content),

easy to use and whether the RLOs were technically usable. The usability definition in this study can be found in section 3.3.1.

6.3.2.1 Usability of RLOs content

Some aspects of the RLOs' content affected the usability of the RLOs and stopped the tutors navigating some of RLOs smoothly during the think-aloud activity as they were discussing these issues, such as:

6.3.2.1.1 Differences in practice

Tutors' narrative

Different practices in conducting some procedures in some RLOs stopped the tutors in most groups from understanding the demonstration of the clinical skills procedure. For example, they spent time commenting on some steps of the Z-track technique. Both of the two tutor groups (T1 and T2) who navigated the Z-track RLO were surprised by how the demonstrator inserted the needle forcibly in the video demonstration. Tutor TSM said '*the way how she inserts the needle, it is inhumane*'. The force used when inserting the needle in the demonstration video could be as a result of using a manikin as indicated by tutor TS, '*I feel this is a manikin, the manikin is hard and it will stop you by force*'. In fact, using the manikin in some RLOs created confusion in the understanding of some information and was another issue why many tutor groups

stopped the navigation of RLOs for a while as will be as discussed in the following section.

In the intramuscular injection site RLO, one of the tutor groups agreed that it should not explain how to select an appropriate needle depending on their colour, according to them students need to read the needle label and select the appropriate size. Another example of different practices step was in the hand-hygiene RLO. Both tutor groups (T1 and T3) who were exposed to the hand-hygiene RLO were against the step of splashing the water at the end of the procedure, TI said '*she is doing a wrong step over here, she splashes her hand several times in the sink, shouldn't do this*'.

Students' narrative

Some students also commented on the needle insertion technique in the Z-track RLO. According to SSH, '*she inserts the needle forcibly*'. Additionally, this S1 group took a long time to understand the demonstration of the hand hygiene RLO in a similar way to the tutors. Furthermore, according to them they found difference in practice in this RLO when the demonstrator touches the faucet after she cleans her hands. As they learnt during their lab session, they want the demonstrator to use clean tissue to close the faucet. Similar to the findings from the tutors, student spent a long time navigating some RLOs to understand the demonstration.

6.3.2.1.2 Terms and abbreviations in RLOs

Tutors' narrative

Some terms and abbreviations were not very easy to understand for the tutors in some RLOs and they took a long time to understand them. For example, in the hand-hygiene RLO is the use of the song 'hokey cokey'. Many of the tutors took time to realize that this is a song to teach the students about hand-hygiene in a simple way, TI said '*I thought hokey-cokey is a method, so I thought that we aren't understanding anything*'. Moreover, another area of confusion arose out of the use of nation-specific terms such as 'trust' rather than hospital as one tutor THI was asking '*what is trust*'.

Students' narrative

Many students were also looking for clear definitions for some terminology as they were struggling to understand them. SRS said while navigating Z-track RLO, '*as a beginner or someone who reads this for the first time, there are some terms that need to be clarified. Why do they call it in these terms, Z-track?*'. Another student, SW, commented that '*especially with the students in the 2nd year, we are in the 4th year, even though we know all these, there are some things we didn't understand such as Z-track and hokey cokey ... why does this have this name?*'.

All student groups navigated the hand-hygiene RLO during the think-aloud session and all groups were confused with some of its content. There were two similar video demonstrations for the same procedures with two different headings ('breaking the chain of cross infection' and 'the hand hygiene hokey cokey'). It was not clear from the titles for the students that both are video demonstrations, but one was created as a song, which made it difficult to understand. SSH said '*so what is the difference, one is singing the other one is not! This is not clear, it is confusing, and they supposed to write... differentiate… ., they supposed to write a comparison between them*', another student SGA said, '*the main disaster is that there was no comparison between the thorough hand hygiene and the hokey cokey, so what is the difference?'*.

Some of them thought it was the same procedure by a different method, and another thought there was a correct and a wrong method. SN, *'this is confusing, I did not understand what they meant, at least they can put a clear title'*. It took time for them to understand that the song was explaining how to conduct hand washing. However, despite these confusions, some students still liked the idea as explained in the previous usefulness section. Similar to the tutor groups, most of the students took too long to understand some terms which might affect the usability of the RLOs.

6.3.2.1.3 Content of the activities in the RLOs

Tutors' narrative

Some issues in the content of some RLOs activities caused difficulties in answering the questions and tutors took too long to answer. For instance, some information was not mentioned in the content of the hand hygiene RLO, tutor TD commented '*he didn't mention this before*'. In the activity of the Z-track RLO, they asked a question about the correct rate of injection which had not been mentioned previously in this RLO. T1 group, although they were considered experts compared with the students, took too long to answer the question. TS said, '*they didn't mention this actually, in the explanation before, how can I know?*'.

Students' narrative

Similarly, unclear terms in some RLO activities were an issue for RLO usability. For instance, in the skin preparation prior to injection RLO, some students took a very long time to answer because of the term 'maintain sepsis' which is not mentioned in the content of the RLO. Student SE said, '*I didn't understand anything from this, I don't know how to answer*'. Furthermore, three of the student groups (S2, S3 & S4) in the glove use RLO were struggling for some time to answer questions because information had not been mentioned in the content of the RLO. For example, according to student SAA; '*I*

don't know, did you understand it quickly, I just take time to understand it actually!', and SE said '*they did not mention this before, shall I guess the answer, I did not understand'*.

6.3.2.2 Usability of RLOs technical characteristics

Some RLO technical characteristics impacted the usability of the RLOs and stop the participants navigating some of RLOs easily, for instance:

6.3.2.2.1 Images selection

Tutors' narrative

Some unclear images in the video demonstration made the information in some RLOs confusing. For instance, all tutor groups took a very long time to answer one question in the hand hygiene RLO because of an unclear image of the medication cup. In another example, the injection site in the Z-track RLO was not clear for most groups. It was not clear where the demonstrator in this RLO inserted the needle, which led to the participants taking time to understand the demonstration. According to TAL, '*actually, the injection site is not clear, I don't know…, it is up here not clear which quarter… she is going more to the centre, and we are saying in the outer aspect*'. Another tutor TE commented that '*the style of drawing like this, I feel it is confusing'*.

Another example of the tutors' confusion resulting from the images in some RLOs, came to light when one of the T3 groups had a very long discussion, during the think-aloud activity, regarding some confusing terms such as droplet, ingestion and so on (route of the infection transmission in the hand-hygiene RLO). These terms stopped them working on the RLOs and lead them to explain to each other, eventually they agreed that the reason for this confusion was the animation and using one still image with the narrator. This led to the concern that, if this confusion happened to them as an educator, then how much more confusing it would be for the students. For instance, Tutor TE said, '*all these are medical terminology as we said not related to the images, the student will ask you how and what is the difference between droplet and airborne for example*'.

Other tutors would have preferred to have a real patient in the demonstration video, TD said about the injection RLOs, '*why it is not a real patient, because you can open lots of videos in YouTube and see similar things with a real patient, and the complete procedure, why is she putting here like cartoon images, we have a manikin in our skill labs and students can practice on them… we need real patient images in front of them*'. Indeed, using a manikin and cartoon images was not recommended by some tutors, they preferred to have real patients instead of using a manikin or images

as this made the RLOs more understandable. One distressed tutor TD questioned, '*I want to know, what is the barrier to make it with actors, working and doing, why images?*'. It was recommended by some tutors in T1 and T3 that using real patient images or videos in many RLOs would be better as it is a key part of CSE.

Students' narrative

Similar to the tutors, some unclear images in the video demonstration made the information in some RLOs confusing. For example, in the Z-track RLO, some students in S1 and S2 groups could not recognise that the image in this video is the buttock. SAA asked, '*where is this site, did she say! Is this the buttock?!*'. As with the tutors, it was not clear in which aspect the demonstrator had inserted the needle, which led to the students taking time to understand.

Also, some unclear images in some RLO activities caused difficulties in answering questions and took a long time for the student to complete. For instance, in the hand hygiene RLO the medication cup was not clear, and it seems like a water cup for some students, SSH said '*is this water! This bowl is not clear, I don't know if it is a bowl or what! It is not clear at all*'.

Other students were unsatisfied with the animation in some RLOs and the use of one still image with the narrator. For instance, in the hand hygiene RLOs, the demonstrator used one still image for patient rooms while they explained the route of infection transmission. During this RLO the students stopped for a while to understand some terminology such as droplet, airborne, ingestion and so on. SRH said, '*I just expected that there is something moving here and talking at the same time, even a drawn image, but not a still image'*. SAA said, *'maybe use images for ingestion, droplet ... put different images to explain what she is talking about, the same image for each route will maintain the information in our mind'*. SN, '*I can read this without accessing this RLOs, or video, what is the meaning of using one picture without animation?*'. This issue of confusion in this event was also of concern to tutors as explained in the previous section.

In contrast to some tutors' opinions about using real patients in video demonstrations, some students favoured using images with animation instead of real patients regardless of the fact that some images were unclear for them and made them confused. In S4 group's conversation, students found that using images and animation made the information easier to understand rather than using a real patient, especially for the injection site:

SM: it is nice as animation not in the real patient. SRF: yes, agree. SRH: why? I think it will be clearer if it is with the real patient and nicer. SM: no in here, I can see more details, I can see all the muscles.

6.3.2.2.2 Multimedia attribute

Tutors narrative

The multimedia feature in the RLO was one of the aspects that stopped the tutors at the beginning of RLOs navigation. THI became confused between reading the narrative part and listening to the video, she said '*I just got a little bit confused, between the video and what is written over here, so while I am looking at the video here I am looking at what is written over here at the same time*'. On other hand, other tutors, who liked the narrative feature, said they would prefer that the narrative part in some RLOs was arranged in bullet points instead of a chunk of paragraph, to make them easier for the eye to follow. TO said '*some people like to read, and visually they will remember what they read but it will be better if it is arranged it in points, so like 1 2 3 numerical rather than paragraphs'*.

Students' narrative

Although many students, in most RLOs, found that it is very useful to use the narrative part of the resource, some students, like the tutors, were confused with the way the narrative part was presented

at the beginning in some RLOs. In the hand hygiene RLO, SSH suggested, '*I think it would be better if they write it as a point to know what they are talking about, instead of this paragraph …. all is written above each other on one paragraph, confusing*'. This most probably related the organisation of the narrative part, rather than the language, as she suggested to use bullet points to make it easy to follow with the video demonstration. Another student, SM, regarding the intramuscular injection site RLO said, '*I feel the content is not organized, if they put it as points it will be clearer*'. Student SE indicated '*it would be clearer if they make the important things bold or highlighted in the narrative part, to draw my attention and make it easier*'.

6.3.2.2.3 Browsing the RLOs

Tutors narrative

Browsing between the pages in some RLOs was not easy for some participants. It was difficult for some groups of tutors to return to the previous page, especially in the injections RLOs. One section included many pages and it was difficult to return back to a specific page which meant that when participants wanted to go back to see a specific page, they needed to repeat the whole previous section to listen. Some groups took time to explore how they could return to a page without repeating the whole section.

Moreover, for most tutor groups T1 and T2, it was not easy to return back to the RLO homepage, especially in the injection RLOs. T2 group decided after a long period of exploring how to return to the RLOs home page: '*we don't know how to return to the home page, anyway, we will go back to Google*' (THI, T2), and '*no I will not repeat it again, it will be easier for me to return back and go to the university web page itself*' (TO, S2). Another tutor TAL suggested '*if there is something clearer as an icon to return to the RLO homepage, it would be better … it is impossible that every time I need to return back I press back, back, back'*. Browsing or returning to the RLO homepage are the technical characteristics where tutors took longer to navigate.

Students' narrative

As with the tutors, a few students struggled with returning to the RLOs homepage. It took time from them to get back to the homepage as there was no quick access to return them to it. One distressed student SE said, while navigating the RLO, '*no way, do we need to press back all the time to return to the RLOs' home page, it is difficult, and it make me nervous, wasting time*'. Student SRA added '*indeed it is very easy to navigate the RLOs, but this issue about returning to the home page is making it a bit complicated*'.

However, compared with the tutors, fewer students struggled with browsing the RLOs.

6.3.3 Participants' engagement with RLOs

This section will present some evidence from tutors and students that reflects the participants' engagement and their active interaction with clinical skills RLOs during the think-aloud activity. The engagement definition in this study can be found in section 3.3.2.

6.3.3.1 Tutors engagement

Most of the tutor groups showed their engagement with the RLOs through listening to the video demonstration with focused attention and commenting on it, reading the narrative part, discussing the RLOs, answering the questions in the activity, and completing the feedback. However, the level of engagement with the RLOs varied between the groups, as will be explained in the following paragraphs. All tutor groups managed to investigate most sections of the RLO resources, such as videos, activities, printable materials, the feedback, and resources, but not all of them completed the activities and/or the feedback.

Some tutors in T2 showed their curiosity when they went to the RLOs homepage and explored what other RLOs are available. During a

conversation in this group for example, while they were navigating the RLOs:

> *THI: sorry I didn't start the activity yet, but it is really interesting … there are different things they put outside in the homepage. TR: no take your time I also want to see what they have.*

This group also showed their curiosity when they wrote the names of clinical skills in the RLOs search inquiry. For example, when they wrote IM injection in the search bar, they could see all RLOs related to injections. Their discussion was as follows:

> *THI: if I just put the keyword, if the student doesn't know what she wants to see, for example, if she wants just IM, what will be shown, are there other things that will appear?'. TR: maybe. THI: I want to see. TR: or we can write only IM injections. TO: yes see, skin preparation. THI: technique, and sites, lots of things are coming… this is nice that there are many things under this title.*

The previous discussion reflects the group dynamics and their eagerness to identify other RLOs available related to the injection. Three of the tutors were curious as to what other RLOs would appear and show how this was interesting.

Some groups showed their engagement with the RLOs through their willingness to see more RLOs and repeat the experience in different clinical skills. Indeed, they were looking for more RLOs for more

critical clinical skills, not only for the fundamental nursing skills. Tutor TR said, '*I was thinking about aaa if we are going into more advanced procedures like lumber puncture, is the video the same quality, I mean the same level of easiness, clarity, what do you think if we have a look!*'.

Some tutors were curious to see more RLOs than just the two selected by the researcher during the think-aloud activity. For instance, a conversation that showed the group dynamics in deciding what other RLO to see during the think-aloud activity in T1 group was:

> *TAH: I can see that we can see one more. TS: ok, what do you want to see!, see the list. TAL: one more, wait, aaa, IM site, no it is similar to the SC, IM injection by Z track, Z track is nice.*

In the conversations, tutors asked each other if they wanted to see more RLOs from the list they had during the think-aloud activity, and they showed many evidences that they really curios to know how other RLOs will looked like.

On another hand, T3 also were curious to see more RLOs from the list during the think-aloud activity but this was because they did not understand the idea of RLOs. According to tutor TD, '*you know I am interested to see more resources because I didn't get the idea of this resource from the 1st one, that's why I need to discover more*'.

Moreover, TD was curious to see the hand hygiene RLO to see if they used a real patient or not, she said, *'I want to see if they have real patients, it will be a disaster if there is no real patient in the hand hygiene procedure'*.

Most of the tutors (T1 & T2) showed their engagement through their curiosity in answering the questions in the activities and discussing the answers to most RLOs they navigated. For instance, '*we want to see the answer'* (THI, T2), and *'try the other one, may be on the box,'* (TAL, T1).

On the other hand, T3 group did not complete most of the activities because they felt it was '*boring*' and refused the idea of including the activity with the RLO. For example, in the hand hygiene RLOs they stopped working on the RLOs from the first question, they felt it is a long question. According to TD '*too long, long sentence'*, and the other tutors TRA and TE agreed with her that the question was too long. They found this activity beneath the level of university students: '*this is a kid's level, for babies, for young people*' (TD, T3). This, indeed, reflected T3 disengagement with the RLOs during the think-aloud. Disengagement was also shown by T3 when they became off topic and discussed different things such as the aim of the research and other groups' opinions.

6.3.3.2 Student engagement

With regard to students' engagement with the UK RLOs, all student groups showed their engagement with the clinical skills RLOs through exploring all the sections in the RLOs with focused attention, listening to the video demonstrations, repeating parts sometimes, reading the narrative part, and answering the activity. The findings provide possible evidence to reflect the high level of student engagement with the RLOs, as will be discussed below. Most of the student groups expressed that they enjoyed their time during the think-aloud discussion, and they enjoyed answering the RLO activities. Student SSH said that *'we really enjoyed our time and learnt new things'.*

Some comments reflected the students' curiosity to navigate all sections of the RLOs during the think-aloud activity. For example, *'play the video, let us see what they did on it'* (SRH, S4), *'press the content, I want to see it please,'* (SRM, S2), *'let's see the glossary and resources'* (SN, S3), and *'ok press next, let's see what we will have*' (SSH, S1). Students clearly expressed their eagerness to see all the sections in the RLOs, more than the tutors expressed.

During the discussion, some students expressed their engagement through their curiosity to see more RLOs than they needed to do during the think-aloud activity. For instance, when student SRM sked

her friends *'please, let's do one more, actually this make you so excited to see what more they have'*. Student SW said, '*I really want to see more, but I think there's no time'*. Some students showed their willingness to repeat the experience again after the think-aloud discussion, according to student SM *'for sure when I go home, I will open it to see more'.* Another student, SSH, asked, '*what is the name of the website, I will write it down and access it from home*'.

Furthermore, some student groups showed their engagement with the RLOs through their willingness to see more RLOs for different clinical skills or subjects during the think-aloud discussion. For instance, when SSH said '*I want to see more advanced procedures like the CVP'*. Student SGA agreed with other students about having RLOs for more complicated clinical skills, she said, *'I hope if the procedures that we cannot practice will be like this such as lumber puncture … in all ways we cannot do it, and essentially this is for the physician, but it is for our knowledge, instead of attending 2 or 3 lectures'*. Also, other students showed their curiosity to see more RLOs in different subjects, according to SW '*we need more about the research, this is fabulous*'.

Most of the student groups presented their engagement with the RLOs through their curiosity in answering the questions in activities and discussing the answers of most RLOs they navigated. For

instance, S1 were insisting on answering the activity of the hand hygiene even when they were not sure of their answer. SSH asked, *'do I have to click or aaa nothing will happen'* and SRS answered, '*try, let's see'*. Another example, S3 was excited to answer all RLO activities, SE said '*it is too exciting, you feel that you want to complete all questions to see your understanding leve*l'. Indeed, all student groups appeared to be excited to answer the activities, even if some were quite long. These examples of quotes provide rich evidence of how students engaged with the RLO activities and were insistent to answer the questions.

6.3.4 Participants' attitudes towards RLOs

From the TAP analysis, it was anticipated that the findings would result in themes, deductively, in relation to three concepts of RLOs: usefulness, usability, and engagement. However, the findings revealed some other data different to these three themes. This data was related to participants' attitudes towards the RLOs in general and on other specific aspects of the RLOs. During the think-aloud task tutors and students clearly stated what they liked and disliked about the RLOs and the reasons behind their opinions. This information directly suggested their acceptance of the RLOs and their intention to use clinical skills RLOs. Nevertheless, some of these

aspects were highlighted only by the tutors as will be explained below.

6.3.4.1 Positive and negative attitudes toward the RLOs

Tutors' narrative

During the think-aloud activity the tutors provided direct expressions regarding positive and negative effects of the RLOs. Starting with negative opinions, tutor TD felt that the Z-track RLO '*is boring, very slow and mainly related to the theoretical part, I mean I can use it as theory because it has an exam*'. Tutor TD also said, '*it is not interesting … there is nothing to attract you, to attract your attention, there is no for example, there is some music, some for example real patient in front of me to see the action from his face or from aa… boring, in this way I lost my attention and I don't know how to answer the* questions'. The other tutors in the same group agreed with TD.

Indeed, unlike the other tutor groups T1 and T2, group T3 generally seemed not to accept the RLOs. A further aspect that they did not like, for example, was the level. They believed it not to be suitable for a student at university, although they might use it in the theory part as shown in the following quote:

> *TD: I don't like this … TE: for me the idea is / … TD: doesn't say anything, it's boring and it is not for university level … TRA: the lab session is about skills … TD: I agree to use it, if it is in theory, for fun, before the exam to try some MCQs, but not for practical … TE: I agree, honestly, I don't like it … TRA: and it is not beneficial for the student, as a student and if she just takes the injection lesson, she will not benefit.*

This T3 group, throughout the think-aloud discussion, clearly expressed that they did not like the RLOs, TD expressed: *'to be honest, I was expected stronger than this, I expected that I will see something very good and strong'*. TE said *'I don't like it'*, and TRA said, *'there are more interesting videos … there are better resources'*. However, the hand-hygiene RLO did seem to receive acceptance from T3. They liked the 'hokey cokey' song, according to TD, *'I like the hokey cokey method, it is a nice one'*, and TRA said, *'to make the skill easy'*.

On the other hand, T1 and T2 showed, during the think-aloud discussion, evidence that could reflect their acceptability of the RLOs, although they disliked some specifics aspects and features. While T3 felt the RLOs were descriptive and overly long resources, some tutors expressed otherwise:

> *'the good thing is that the RLOs are short, I like it because it is short' (THI, T1).*

'I liked the idea of it, starting from the explanation of the full procedures to assessment, answering the questions and the feedback, so it is excellent and complete' (TAL, T2).

'short and very clear to the point' (TR, T1).

TO clearly disagreed with T3 when she said, *'this is suitable for the students' level and I will tell you that some students are slow learners, so if she is using this by herself she will repeat and repeat'*. She claimed that, based on her teaching experience, the RLOs are suitable for the students' level and would fit their learning need.

Students' narrative

During the think-aloud activity, like the tutors, the students discussed several positive and negative attitudes towards the RLOs that suggested their acceptability. Some examples of positive opinions included:

'just put it in your ear and listen, very nice' (SW, S1).

'so beautiful' (SRM, S2).

'it is so interesting' (SR, S2).

'I like it, really excellent one' (SN, S3).

'I like the idea of the resource, clear and easy' (SM, S4).

However, many events in the think-aloud task showed a variety on RLOs acceptance level by the students. For example, some students found that the glove use RLO was the best one. Student SAA said, '*this is the best one*', another one SRD said, '*this nicer than the other*

RLOs'. Other students preferred the hand hygiene RLO, SRH said, '*yes, this so good, this is the strongest* one'. Indeed, in the hand hygiene RLO, the demonstrator used the hokey-cokey song to demonstrate the hand washing skill, it seems that it was the most favourable one to most of them, though most of the group spent too long to understand this RLO.

6.3.4.2 Multimedia design

Tutors' narrative

Although multimedia characteristics were one of the features that stopped some tutors during the RLO navigation (as explained in the usability section), it seems that it was also one of the most acceptable technical characteristics for some of them. Many tutors expressed that they liked the multimedia features of the RLOs:

> *'this is good for the visual people, some they spend one hour to read and then will not understand anything, but they can gain the whole information the whole correct technique by the means of 5 minutes of an educational resource' (TR, T2).*
>
> *'not like the pictures in the book … with the pictures they will not remember, but here when they press, they will remember' (TS, T1).*
>
> *'here when student presses by herself, she can select the site, it is more interactive, it is nice … they put a narrative part and videos, I like it especially for people who didn't attended the lab session' (TAL, T1).*

On other hand, T3 did not accept the multimedia characterises, according to TD *'I am using YouTube for example as I have in the 3rd year, complete procedure is conducted without narrative part ,.. even if you have poor English language, at least you see at the same time what he is doing.. I am not happy with this*'. Additionally, she commented negatively on the narrative part in the RLOs, that it was not favourable for her and made her compare the RLO resource with the books '*you know what, what we saw is a book for the fundamental of nursing …. We all agree that the narrative part on the site and the pictures they used we can find in the book*'.

Students' narrative

While the students were navigating the RLOs, they discussed the technical characteristics they liked most and least in the RLOs. Students varied in their opinions regarding the multimedia characteristics of the RLOs. Although it was confusing to them to understand the concept at the beginning of think-aloud task, it seems that many students liked it. For example one student SRF said, *'I like that it is so simple, and the way that they are talking, and everything is written here in the narrative part, because if you didn't understand you can directly read it'*, even though this same student had struggled with the narrative part (as explained previously in the usability section). Other examples of quotes from

students where they showed that they liked the multimedia features of the RLOs include:

> *'I like a lot this resources as they include pictures and narrative parts, it really helps to maintains the information in my mind, he is reading and there is a picture, but I can't focus on the videos where he is talking and there is nothing written' (SR, S2).*
>
> *'I liked the narrative part, they wrote everything, it will support me if I did not understand the language' (SRA. S3).*

Another student, SRM highlighted that the narrative part will help them to understand different accents in the English language when they said, '*also the thing I liked is aaa the different language, I mean now there is a British and American accent, it confused me and then when I realised that it is written on the side, I started to focus on what she is saying*'.

6.3.4.3 Focused on single learning objective

Tutors' narrative

Including one specific objective for each clinical skill RLO was one of the technical characteristics that many tutors commented on during the think-aloud activity. Most tutors were in favour of this idea. According to TO, '*you know why it is good! Because it is dividing the effort, means that the injection site is alone, the demonstration is alone, technique is alone, using a single objective for each RLO*

makes it very clear, and students can concentrate on point by point'. Another tutor suggested that the students will lose their focus if the RLO is long, THI said, *'it is a short video, if it is a long video they will lose their focus or their focus time will be short'*.

In contrast, some tutors in T3 did not seem to accept the idea of dividing the clinical skills procedure into many RLOs with one specific objective. For example, in the Z-track RLO, they were confused when the demonstrator presented the injection site. According to TD that she would have a complete procedure on YouTube, and possibly confirmed that some of them did not accept the RLO, she said, *'for me, in 3rd year, in advanced procedures such as liver biopsy, I never can demonstrate it to the students on manikins, but I am using very fantastic videos, complete procedure in front of me'*.

Students' narrative

Many students were in favour of the idea of one specific objective for each clinical skill RLO. For example, according to SGA, including one specific objective for each part of the procedure is very helpful for them, '*I really liked the idea that every video covers one specific objective, for example, I need to watch a 15 minute long video just to see the eye assessment*'. Student SAR said, '*the best thing is that they separated each objective, they did not put everything together'*. Another student SM said, '*actually this is good with a specific*

objective, the thing I was suffering from watching YouTube when I needed to find out for example, where is the part where they talked about the site'.

6.3.4.4 Activities on RLOs

Tutors' narrative

Most of the tutors in T1 and T2 liked the activity attribute on RLOs, they expressed many comments that reflected their acceptability of the activities in the RLOs, for example:

> *'I love that, the question after each video' (THI, T2).*
>
> *'it is very nice' (TO, T2).*
>
> *'they are providing these reinforcing questions in the form of a game … it is very interesting for the students' (TS, T1).*

On other hand, T3 did not accept the activities in the RLOs as they thought these were not suitable for clinical skills procedures sessions. TE said, '*it is not nice that students to feel they always have exams, no, honestly the bad thing in the lab session is if we change it from psychomotor to exam, all the enjoyment will go, and the students become under stress'*.

Students' narrative

Similar to most tutor groups, all student groups seemed in favour of the idea of including activities at the end of the RLOs. All the students found it very good, they expressed so many times:

> *'this is very nice, and enjoyable … this is awesome' (SRS, S1).*
>
> *'is enjoyable, it is very nice, I like this things too much' (SGA, S2).*
>
> *'this is perfect' (SE, S3).*
>
> *'I like the activity' (SM, S4).*

Unlike T3 who claimed that it was not at the students' level and boring, some students found the activities could enhance their learning. SAA said, '*nice to have activity, it activates my mind, and awakes me, and it looks so nice, organized and colourful'*, and SR said, '*it is really so good and nice, it makes you think'*. Furthermore, one student contradicted the T3 group who claimed that the RLOs are not attractive, SM said about the activity, '*this is so attractive'*.

It was not just the questions that the students liked, but also they liked the way the answer was explained: *'wow it is very nice, not only the question, but also explain the answer very well'* (SM, S4), and the types of questions, such as in the hand hygiene RLO, SRF said *'the type of this question is new for me, it is about the mistakes*

not about the real technique, ok we know it, but what are the mistakes we will pick! I like it'.

6.3.4.5 Trusted web/online resource for clinical skills education

Only the tutor groups instigated a discussion regarding 'trusted online resources' for CSE, during the think-aloud activity. Some tutors compared the RLOs with YouTube as a familiar educational resource in CSE. Group T3 seemed more in favour of YouTube, they said:

> *TRA: actually for me if I am a student, I will never waste my time and see something that I will not benefit from, as I can easily go to YouTube … TD: no, no, reading, you are reading from it and see just a picture … RRA: yes, not like YouTube, open it, something quickly … TD: this is like a book, something in front of me … TRA: yes, I mean something fast and beneficial at the same time … TD: means that there are a lot of resources on YouTube that you can find.*

On other hand, the other T1 and T2 groups seemed more in favour of the RLOs as an open online resource compared with YouTube, and they found it a reliable open resource. TS said, '*we sometimes direct the students and tell them go to YouTube, sometimes not all of them are correct*'. TSM added, '*you can trust these RLOs*'. TS said, '*when you have a resource, you video it, or you take it from YouTube and you put it for the student, at least you can trust it, could be this is*

the idea, instead of telling the student to go and search on YouTube, right hand washing and see'. Another tutor TO said *'also, our students they are using YouTube most of the time but without reference from unknown places and some videos are not really good'*.

6.3.4.6 Source of RLO information

Similarly, the sources of the RLOs were only discussed by the tutors. Many tutors liked the idea of the references included at the end of the RLOs. However, they commented that the resources were old and did not consider other international resources as T2 discussed:

> *THI: from where they got it! … all from UK …. TR: Nottingham, Nottingham, Nottingham, their own resources … THI: their own resources, no international resources … TR: no Australian, USA, Canadian resources … THI: yes, or any other international references.*

It seems that the references used in the RLOs for conducting clinical skills procedures considered only UK policies and procedures, they did not consider any different resources from other countries. Furthermore, both tutor groups T1 and T2 agreed that the resources used in the RLOs were old and needed to be updated, especially for the clinical skills. According to TS tutor, *'the thing we don't like, it is not updated clinical skills'*. Tutor TR said, *'all are old resources, 2004, 1999, 1996, 2000, very old'.*

6.3.4.7 Accessibility of the RLOs

Accessibility of the RLOs was also discussed by the tutors only. Some tutors brought to light the role of RLO accessibility in reusing the RLOs as OERs. Some tutors in T2 discussed accessing the RLOs and the reasons why they did not know about them before. They tried to search for clinical skills terms in Google, for example 'glove use', in order to explore whether these RLOs appeared in the primary results but they did not find them. THI said, '*even if I did the search on Google and you write for example 'glove use', you will not get it, I don't think you will have this resource*', and '*I just feel sorry about such a comprehensive resource and it doesn't appear on the screen… see it is not there*'. Tutor TR added '*unless someone recommended the site, otherwise we will not know about it at all*', and '*I am considering myself one of the teachers that goes through the educational films, always, … and I never honestly, in relation to my experience I didn't think before to provide an access toward any universities … even in local universities*'.

6.4 Focus-group findings

The findings from the focus-group interviews produced some different types of data, the participants did not talk explicitly only about their opinions about the RLOs but they also discussed the reasons behind their opinions and comments during the think-aloud.

The tutors' focus-group included seven out of the nine tutors who participated in the think-aloud activity. Two people withdrew for personal reasons. Additionally, only nine students out of the thirteen students who participated in the think-aloud activity participated in the focus-group as the others were busy with their curriculum. However, at least one student from each think-aloud group participated in the student focus-group. Thematic analysis of the focus-group revealed three main themes, as follow:

6.4.1 RLOs compared with other online resources

YouTube seems to be the most familiar open educational resource that both students and tutors use in teaching and learning nursing clinical skills. In response to the question of what kind of open educational resources they used currently for clinical skills, students indicated that they used YouTube besides the clinical skills checklist they had in their curriculum:

> '*I find YouTube very helpful, I usually use YouTube and found it very helpful' (*SSH, S1).
>
> *'for me, I feel aaa I can't apply the procedure by reading the guidelines only, I must see a video first and then I can apply it' (SAA, S2).*
>
> *'for me YouTube is helping me a lot*' (SE, S3).

> *'YouTube or sometimes my friend who does the practice and I will follow her step by step using the checklist'* (SRF, S4).

Additionally, another student, SW, indicated that she can refer to social media to find more different clinical skills resources *'sometimes there are some accounts on Facebook and Twitter you can find the procedure on it'*. Student SN said *'there is also an up to date website which we have access to in the hospital, so we can open it and read some resources on it'*. However, this website are not open resources, they are only for the hospital's use.

Correspondingly, most of the tutors indicated that they use YouTube as an essential resource for clinical skills as much as students do. According to tutor TSM *'usually I use YouTube as a support to my explanation and I use PowerPoint that includes some pictures'*. Also, most of the tutors indicated that they depend on the Clinical Key website. However, this website is not an open educational resource. Another tutor, THI, who graduated from Australia indicated that she sometimes uses clinical educational resources from some Australian universities.

From the findings, it seems that both students and tutors are looking for open educational resources that are available on the web for clinical skills. However, the students were curious to search for free ones such as on social media rather than for paid websites.

However, after experiencing the RLOs in the think-aloud task, the majority of participants agreed with the view of preferring the RLOs to YouTube. One student SSH pointed out that she can use the RLOs instead of YouTube as they are trusted resources '*because it is trusted and I know it is right, it is advantageous because I know that it is posted by good university and I can trust it without doubt about it, so I don't have to go to YouTube and look roughly for some videos that might be wrong or outdated*'. Another student SAA said, '*instead of looking for the procedures in YouTube, I can find it all in one place, for me, I might watch it because it is categorized into steps and each step lasts seconds despite the fact that in total it is over two minutes, so, in other cases, I may skip some scenes in a 5 or 10 minute video as an example until I find what I need, but for this it is already step by step it is nice*'.

Similarly, some tutors agreed that the RLOs are more preferable than YouTube. Some tutors pointed out that it is difficult to find trusted educational resources similar to the nursing curriculum or practice guidelines in the university, specifically on YouTube. For instance, tutor TSM expressed her experience of how it was difficult to find a suitable YouTube video for one fundamental clinical skill in nursing that was similar to their clinical skills curriculum. She said, *'so one day I was explaining how to do a physical assessment and I tried many times to find suitable and high-quality YouTube and in*

the end, after long time I found a doctor who explained very close material to the one I was trying to prepare … there were lots of other videos that are far from the curriculum'.

Moreover, tutor TR said, *'I can say that it is a good revised resource, we can depend on it instead of telling students to go to YouTube'*. According to tutor TALH *'if I want to compare the educational resources I am using with the content yesterday, I felt that the RLOs were good quality, more interactive and you can interact with it, but for the YouTube videos, it was only sitting and watching, it will not be helpful if the students are lazy and feel sleepy'*.

6.4.2 Potential educational value of RLOs

This section emphasizes the educational value discussions that participants took further in-depth in the focus-group but were not highlighted before during the think-aloud method.

6.4.2.1 Portability and openness to clinical skills information: just-in-time

Some participants liked that the RLOs are available all the time, portable, and accessible through any devices. Most of students liked the idea of the portability of the RLOs. According to student

SW '*it is something in my hand available online, even if I didn't understand something from my tutor I can go back home and refer to it'*, she also added '*rather than look at it or read about it in a book that will be more difficult and takes time as well, I believe having a video will ease the revision process, especially if it is trusted*'. Student SM pointed out '*I was going to say that it is also handy if I am in the hospital and need to remember certain procedures such as the injection site, I can go back to the video and review it in two or three minutes in the hospital through my tablet or my smartphone and when I watch it I can apply it*'. Another student SN said, '*even if I have studied it before and want to do a revision, a quick revision, I can go and use this resource again quickly*'.

Comparatively, most of the tutors liked the availability of the RLOs and suggested that they would be useful for the clinical skills curriculum. According to tutor THI '*these resources are open access, they are not just a video only, it includes many things like assessments, demonstration videos, and this is what I liked, the students might use it especially if they want to revise a specific part, or remember the picture … students can open it in their phone'*. Another tutor TR said, '*I like the availability of the RLOs, it means that students can refer to it at any time in the clinical placement, they can open it and take the information that they would like to review'*.

Interestingly, TRA and TE from group T3, who were not in favour of the RLOs, changed their opinions during the focus-group, though TE participated for 15 minutes only. For example, TRA said, *'I didn't see it as boring to the level that we felt yesterday, it was not entirely boring, but it was slow … indeed it is a good one'*. In comparing the RLOs with other OERs, she stated, *'I would not have to look for an instructor nor a big clinical skills book to carry around with me, I will only have a file in my smartphone and that's it, you don't need the big clinical skills book or manual with you'* and *'students can see it privately in a quiet place, or in the home instead of being in the lab, they can feel free'.*

Tutor TO, based on her experiences, highlighted that RLOs could help some students who feel shy to ask and practice during the clinical lab session, she commented, *'students sometimes feel embarrassed because their colleagues have done the procedure easily, so they might be very shy to ask any questions during the lab session, so they will not be embarrassed and feel laughed at, she can in a minute, if she feels that she is weak in this point, go back and see the resource and revise it'*.

6.4.2.2 Independent learning

Most of the students brought to light that the RLOs are helping them to be independent and confident learners. Student SM said about the RLOs:

> *'it is a nice resource for the 2nd year and for the 3rd year, who need everything explained in detail for them, they can freely watch it anytime, and it makes them more independent in the hospital and internship, in this way they can be more confident to apply procedures in the lab session or even in the hospital because I let them depend on themselves to find the information, they will be ready to be separated from the tutors and the spoon-feeding'.*

Student SSH and SE subsequently commented '*yes, we can take the responsibilities … not as spoon* learning'. Most of the students seemed to think that RLOs as OERs could contribute to making them independent learners. Although some students highlighted that they could not replace the clinical skills lab session with the RLOs, it seems that students would have a little degree of freedom and depend on themselves. According to student SW:

> *'when I see accredited and trusted resources, I can separate from my tutor and I can depend on myself, but not when I try to be independent and find my own resources, when I find an accredited video I can follow them and be an independent learner even in another procedure that the tutor did not explain very well'.*

Student SG said, *'abroad they have a higher level of perception on self-learning than ours, according to them they know they can depend on themselves, but for us we are always waiting for their guidance we must follow the same thing they said, or we learnt from them'*.

On other hand, tutors believe in students' proficient use of technology, according to tutor TO *'students are very smart, and they know how to get the information and they help each other and like to be after technology, they are very smart and using technology fantastically'*. Another tutor TS said, *'students really like and prefer technology more than books, available all the time, and the first question when you give them the reference is -is there an online source?'*.

6.4.3 Barriers to using RLOs

When participants were asked about the possible barriers to using the RLOs in the nursing clinical skills curriculum, most of the students believed that the administration would be the main resistance to their using the RLOs. Indeed, the students were aware that the integration of the RLOs is directly related to the higher authority in the university. Student SAA replied, *'the admin we have now'*, and student SN said, *'honestly, the management or as they said the big head … it is one way you need to follow, which is that*

you need to take a paper of checklist, study it, remember it and come to be examined on it without any mistakes, that is it, they don't want you to add any extra words or forget any words'. For the students, they believed that the administration plays a huge rule in integrating online resources to the clinical skills curriculum.

On other hand, tutors believed that the internet access and differences in practice may prevent the students or tutors from reusing the RLOs. Regarding the internet access, for example, TSM said, '*the internet access may prohibit students from accessing the RLOs*'. She added that they tried once to give them an assignment through Blackboard but some of the students said they did not have internet access at home. However, TS pointed out, '*there was a period that students always say we don't have access to the internet, now it is not, they are asking us to send everything by email'*. Moreover, most of the tutors agreed that there is a computer lab in the college and Wi-Fi is available at the university at all times. Thus, students can access RLOs and other materials on Blackboard at any time.

With regards to the differences in practice, most of the participants agreed that this might be the only barrier for using the RLOs. Indeed, many tutor groups discussed this issue during the think-aloud activity, but they took the discussion into more depth during

the focus-group. Most of them agreed that differences in practice should not prevent them from using the RLOs as they are a valuable educational resource. For example, interestingly, TE who was not in favour of the RLOs during the think-aloud method, changed her opinion and pointed out, '*the students need to see different practice in conducting the procedure and understand this is in fact healthy, students will know what is right and what is wrong, but in the end she will follow the organisation policies'*. Then, she added, '*this good, I don't mind giving it to the students, but I need to tell them there are differences in practice*'.

Furthermore, another tutor, THI brought to attention that all students and educators need to be aware about different practice guidelines all over the world and not to consider them as mistakes. She said:

> *'what we teach here is our clinical skills curriculum and of course it will be different than the international guidelines and it will be different to the UK guidelines, each place will have their own policy in conducting the clinical skills and I cannot say that it's wrong content and I will not use it'.*

Another tutor TO commented *'students might work afterwards in another university or different hospitals, so after that they might learn different policies in conducting the procedure'*.

Notably, some students were aware about the different policies and guidelines among different organizations. According to student SRH *'I might accept it but it might be different due to the policy we are adopting, but I can't say that it is wrong'*. Student SSH pointed out *'there should be something tailored to Saudi Arabian Universities and hospitals, for example we are in the KAU and practice in the KAUH and we see different policies between the university and its hospital'*.

6.5 Summary of exploratory phase findings

The data analyses of the think-aloud method revealed four themes. These themes collectively capture the various aspects that participants cover while working through the think-aloud activity. Participants took the think-aloud conversation to a more in-depth level in the focus-groups, discussing and exchanging their opinions more comprehensively. The previous sections presented the identified themes and provide evidence that reflects the overall extent of tutors' and students' in KAU acceptance of the RLOs.

The findings from qualitative methods provide evidence that RLOs would be a useful educational tool and shows students and tutors' acceptance towards integrating the RLOs into the clinical skills curriculum as a supportive method, but not as an alternative to clinical lab sessions. Findings revealed that most of the participants

preferred the concept of the RLOs compared with other available online resources, especially YouTube. According to some participants, it would be more trusted and good quality, and is interactive compared with YouTube.

Also, the findings revealed that most of the participant groups navigated the RLOs easily. However, some aspects related to the content of RLOs and technical characteristics prevented them from navigating the RLOs smoothly. Furthermore, the findings indicate many positive aspects of the engagement with the RLOs during the think-aloud task which provide some evidence that RLOs captured the participants attention. Nevertheless, one some tutors groups showed disengagement response with the RLOs.

6.6 Limitations of this phase

The participants used both Arabic and English languages during the think-aloud and focus-groups. Thus, a potential limitation could be that the analysis was conducted in English. Some meaning might be lost in the translation process, or misinterpreted by other readers (Van Nes et al., 2010). However, the researcher strove to follow thorough procedures to ensure the correct method of translation and that the data was interpreted and treated with caution.

The think-aloud data were accumulated from verbal protocol and segment protocol. Gathering these data together to formulate a conclusion about participants views' on RLOs was a complex and time-consuming task. Nevertheless, this study has shown unexpected results about participants' attitudes toward RLOs. The videotapes allowed different aspects to be studied and revisited as appropriate. This has resulted in rich evidence and provided substantially more insightful understanding than was expected regarding the usefulness, engagement, and usability of the RLOs.

The limited number of two focus-groups was one of the limitations in this phase. It might be that more depth and understanding of participants views could be gained with more focus-groups. However, the focus-group aim was to gain a deeper understanding of participants' experiences in the think-aloud method, therefore it was not possible to conduct more than two focus-groups.

Additionally, the participants might be influenced by the researcher's presence during the observational method and thus constrict their actions. Nevertheless, during the think-aloud method, the researcher did not interfere with their actions and thoughts which allowed them to verbalise their thoughts freely. Moreover, the researcher was not one of the faculty members which made the

students and tutors to some extent express their thoughts more easily.

Lifting protocol from sequence themes created isolated trajectories and did not fully reveal the rich dialogues between participants (Todhunter, 2014). Nonetheless, the findings provided a rich source of data and direct quotes and indicated some sequences and contrasts between different participants and among different groups.

6.7 Discussion

Considering the TAM framework, perceived usefulness, next to perceived ease of use, significantly predicted behavioural intentions to adopt technology (Scherer et al., 2019), and consequently helped to determine the transferability of the RLOs. It was important to understand how nursing students and tutors perceived the clinical skills RLOs in order to successfully implement them into the Saudi nursing curriculum. Student and tutor perceptions also were important to ascertain the items that needed to be included in the SSEQ to precisely evaluate the actual reuse of the RLOs in the Saudi curriculum in light of the findings of this phase. For educators and learners, reusability in practice might not simply be a matter of discoverability but would also strongly relate to practicalities and the quality of the RLOs for them to be used successfully in different

contexts. It would seem obvious that if academic expectations of value have a direct impact on the subsequent use of technology, a clearer understanding of these views might help explain the behaviour of adoption (Petit dit Dariel, Wharrad and Windle, 2013).

The RLOs were not yet implemented into the clinical skills curriculum at the time of qualitative data collection. Students and tutors were introduced to the RLOs for the first time through a short introductory video about the RLOs and then during the think-aloud activity. Thus, this discussion will briefly highlight the important findings of the exploratory phase to build a baseline of information for understanding the transferability of the RLOs. The discussion of the evaluation phase in the following chapters will explore these findings more in-depth to understand the transferability of the RLOs. This section will discuss the findings and then the following section will discuss the developmental stage of the questionnaire and its translation in light of the findings from this phase.

From the findings, it was evident that most tutors and students showed positive views towards the potential usefulness of the UK RLOs in a Saudi clinical skills nursing curriculum, as shown previously in Table 14. Nevertheless, one tutor group was not positive about the RLOs and the reasons for this will also be discussed in the following paragraphs. Interestingly, the majority of

tutors agreed that using the RLOs in the clinical skills curriculum could unify the information among different student groups. Lack of unified clinical skills information among different groups of students at the same level could be one of the major issues in CSE, even though they follow specific guidelines. A possible explanation for this, as the tutors indicated, might be related to the variation in tutors' experience and educational backgrounds. The policy and guidelines in conducting the clinical skills procedures are different across universities and hospitals within Saudi, as well as internationally, and tutors came from different schools from different countries (Saudi, Egypt, and Jordan); which could impact on the students and make the knowledge differences wider.

Besides the scholarly differences, tutors were varied in their experience as nurse educators or practitioners. Some of them were newly graduated and joined the nursing college directly after graduation, and the internship year was the only experience year they had. Other tutors had experience as nurse practitioners before becoming a nurse educator, while others had been nurse educators for more than twenty-years. It was not clear how this variance in experience influences their teaching of clinical skills. The newly graduated nurses, although they were new to the teaching field, had at least one-year of recent internship practice where they had real hands-on practice. However, the expert tutors who have many years

of experience in nursing education are unlikely to have had recent real hands-on practice. Consequently, what the nursing students learn could also be dependent on the lecturer/demonstrator's level of knowledge and skill (Hawker, 2019, Uysal, 2016, Jeffries et al., 2003, Melby, Canning, Coates et al., 1997). Thus, many researchers agree that to teach a clinical skill, educators should be competent at performing the skill themselves (Francis and O'Brien, 2019, McCutcheon et al., 2015, McNett, 2012).

Indeed, the role of the nurse educator in academia is one that by its nature is very complex. Bono-Neri (2019) attempted to introduce and define the concept of pedagogical nursing practice and illustrate how much of a beacon the academic nurse educator truly has to be, in order for the profession to perpetuate and prosper. He highlighted that nurse educators need not only to be effective educationalists, nurse researchers and active scholarly academics distributing new knowledge to improve the healthcare field, but the role also necessitates those skills that belong to that of an expert nurse. He argued that only direct 'hands-on' practice is viewed as practicing, leaving many nurse educators with a sense of incompetence in their credibility and capabilities as a nurse and educator. Thus, it could be argued that clinical skills nurse educators need to balance between their teaching abilities and experience and hands-on practice. Regardless of the tutors' views on the impact of differences in their

background and experiences during the think-aloud and focus-group discussions, they believed that RLOs could be useful in the issue of unifying information among the students.

The possible benefit of unifying information, and other educational values, may not necessarily relate specifically to RLOs, rather to using trusted OERs available on the web in general. Most participants indicated that RLOs would be a more trusted educational resource compared with other OERs, such as YouTube, as they are produced by a well-known university. This aligns with the conclusions of Pawlowski and Clements (2013) who explored teacher' views on quality, trust, and reuse of OERs. They concluded that one of the key aspects for trust in OERs sharing is the organizational reputation. They found that 85% of 146 participants trusted organizations with a good reputation.

Moreover, Masterman et al. (2011) investigated university lecturer and student use of OERs to inform the higher education community of the current impact of OERs from the perspective of use rather than production. They concluded that the quality and reputation of the producing institution plays an important role in the use of OERs by that institution; that is, resources provided by institutions of higher education have a certain quality stamp for their users. Furthermore, Belanche, Casaló and Flavián (2012), who analysed

the adoption of e-government services, proposed that trust and personal values contribute to a better understanding of adoption, and indicated that trust perception leads the user to a positive attitude toward use.

Furthermore, as some tutors indicated, other possible explanations of preferring the RLOs to other online resources are also related to the quality of the RLOs. Although YouTube seems to be the most common online resource used by participants, the majority of the tutors agreed that it is difficult to find suitable YouTube videos that are good quality. This is confirmed by a study by Duncan, Yarwood-Ross and Haigh (2013) who assessed the quality of 10 common clinical skills videos available on YouTube using a modification of the criteria outlined in the Evaluation of Video Media Guidelines (Feller, 1992). They reported overall that 69% of clinical skills videos found on YouTube were of poor quality, though the analysis suggests that different topics were often weak in different areas. They suggested that overall the 100 most easily accessible or watched clinical skills focused YouTube videos were not clinically robust or invested with high-quality production values.

Rössler, Lahner, Schebesta et al. (2012), who explored clinical skills YouTube videos for teaching aseptic technique, concluded that a higher number of videos were available, but the quality of video clips

was generally low and they were outnumbered by videos containing incomplete information. They suggested that a peer review system to increase the quality of medical videos on YouTube must be strongly encouraged. According to Bath-Hextall et al. (2011), with the plethora of OERs currently accessible to students, there is a new set of issues around 'discovery' and 'filtering' in order to find good quality, pedagogically specified learning materials. It can thus be suggested that RLOs would be a trusted, high quality resource that could be useful in a clinical skills curriculum for unifying clinical skills knowledge and retaining clinical skills information.

Turning to another potential area of the usefulness of RLOs in the clinical skills curriculum, there were suggestions from many of the students that RLOs would help them to be independent and confident learners. More specifically, they felt this with regards to practical placements such as in the clinical lab, or hospital, and that they could prepare for the lab session or review the clinical skills at any time. The data revealed that students were looking for a degree of freedom in clinical skills learning rather than 'spoon-fed learning', though all of them believed that the clinical skills lab sessions (both theoretical and practical parts) must not be replaced by any online/web resources. This finding supports older evidence from a study that aimed to investigate the potential for self-learning of psychomotor skills in nursing, and concluded that there is a role for

independent learning in the sphere of nursing psychomotor skills (Melby et al., 1997). Likewise, the explanation that students gave for their beliefs that RLOs would help them to be independent learners were that RLOs are trusted resources for them, interactive, and accessible at any time. From most of the tutors' points of view, they believed in students' willingness to use technology in all learning aspects. Nevertheless, it seems that the tutors did not give the students the chance to be independent learners in the clinical skills curriculum.

RLOs also, according to the students, could allow them to practice skills safely, confidently, and to see repeated demonstrations of a procedure; 'I watch it, I apply it', 'something in my hand'. Much of the student and tutor feedback highlighted that the openness and portability of the RLOs would allow the students to access trusted clinical skills information at any time and this would provide a degree of autonomy in practicing the clinical skills. Clay (2011) explained the usefulness of physical examination RLOs available on the web, as nursing students could watch a clip and then immediately perform the skill modelled, and this increased their confidence in performing the skills of a new-born infant physical examination. A review by O'Connor and Andrews (2015), which critically analysed the findings of studies that focus on how mobile technology is used in undergraduate clinical nursing education, highlighted that those

nursing students reported that educational resources available in mobile devices increased their confidence in their clinical skills ability and performance. Further discussion regarding how the RLOs could contribute to helping the students to be independent and confident learners will be discussed in Chapter 9.

Usually, individuals remember useful, enjoyable and engaging experiences and want to repeat them. As was pointed out in the findings section, throughout the think-aloud activity, most of the participants showed a good level of curiosity, aesthetics, willingness to see more RLOs either in clinical skills or other subjects, and even to repeat and see the same clinical skills RLOs again at home. In the context of the web, Attfield et al. (2011) argued that endurability as a characteristic associated with user engagement can be linked to the notion of 'sticky' content and the goal of attracting the attention of the users and motivating them to return. Also, endurability is an aspect of engagement that refers to the extent a user remembers an experience and shows a willingness to repeat it, and willingness to recommend the experience to others (O'Brien and Toms, 2010, Read, MacFarlane and Casey, 2002). Most of the participants showed positive engagement which might reflect their acceptance of the RLOs.

On the other hand, group T3 navigated three clinical skills RLOs, but they did not complete many of the activities, and they became off-topic and discussed different things. This group did not accept the RLOs and also did not show evidence of their engagement, rather they demonstrated disengaged behaviour. Meanwhile, other participants who seemed well engaged with the RLOs provided rich evidence that showed that most of them liked and accepted the RLOs. Thus, the findings, perhaps, confirm the links between engagement with the RLOs and participants' attitude towards the RLOs, although a participant may engage with an RLO, but still not accept it.

Students' and tutors' attitudes towards RLOs tend to have clear impacts on their acceptance of the RLOs, and their intention to use them on the clinical skills curriculum. Attitude is a hypothetical construct that indicates a person's degree of like or dislike for an item (Petit dit Dariel, 2011). In general, most students and tutors liked the clinical skills RLOs which suggests to a high extent their acceptability of the UK RLOs. In contrast, one group of tutors (T3), was not in favour of the RLOs and their statements reflected their negative attitude, such as 'boring', and 'I didn't like it'. Throughout the think-aloud activity, this group was indicating and comparing the RLOs with YouTube and with using a real patient instead of still pictures. Also, it appeared that their opinion was most likely related

to their refusal to use the interactive features of the RLOs. However, it would be impossible to provide a clear justification behind their opinion, because of the nature of the think-aloud method where the researcher could not interfere or discuss with the participants. One possible reason, nevertheless, could explain their opinions during the think-aloud activity. The participant who most guided the discussion was the head of the nursing department, and it seemed that she used her status to guide the discussion, and the other two tutors appeared to follow her opinions. However, in the focus-group, where the researcher was able to explore more in-depth the participants' views, the head of the nursing department did not attend and the other two tutors changed their opinions regarding the RLOs. Thus, discussing with other tutors in the focus-group allowed them to review and change their opinions. Importantly, however, one of the tutors revisited the RLOs again before the focus-group and she had more time navigate them more deeply. Thus, combining these two methods may be particularly fruitful in understanding participants' views and engagement with the RLOs.

The variety of media features used within the RLOs seems that the attribute most liked by most of the participants, especially the students. Compared with other educational resources that students used in the clinical skills curriculum such as the manual, books, or YouTube, RLOs appeared to be the most favourable and perhaps

most useful. This is most probably, as some students indicated, related to the language support that RLOs could provide. The language that students use in nursing education is English, while their first language is Arabic. Thus, a mix of media, especially the narrative parts, could help them to understand the procedures, and pronounce some terms, even though the narrative was one of the aspects that stopped some of them at the beginning of the think-aloud activity. This finding was also reported by Lymn et al. (2008), where they found that learners responded well to a resource that included a mix of media elements to support the learning process.

Ease of use will influence intended and actual use, and the acceptance of the RLOs by Saudi nursing students and tutors. This is because the benefits of RLO usage could be outweighed by the effort in actually using the RLOs. However, in terms of usability, the majority of students and tutors found that the RLOs were easy to use. Nevertheless, as previously stated in the findings section, some aspects related to content and technical characteristics of the RLOs stopped the participants or caused them to take longer than expected to continue the think-aloud activity. Although there was no specific time to complete any section of one RLO, it was estimated that each RLO in total should take from ten to thirteen minutes considering the language differences.

In relation to the content of the RLOs, different practices in conducting some basic nursing procedures in some RLOs stopped the participants in the think-aloud activity, especially the tutors, from understanding the demonstration of the clinical skills procedure. Thus, this could affect the acceptability and the transferability of the RLOs. However, after long discussions in both the think-aloud and the focus-groups regarding the issue of differences in practice, most participants agreed that differences in practice should not prevent them from using the RLOs as they are a valuable educational resource. Indeed, according to some tutors, it is not only about differences in practice and differences across different organisations or countries, rather the gap between nursing education and nursing practice in general. Matching textbook explanations of clinical situations with practical reality is an ongoing problem faced by members of the nursing profession and is commonly referred to as the theory-practice gap (Scully, 2011). Some tutors highlighted that exposing the students to different practices during their academic years could prepare them for real practice in the clinical area. Thus, different steps in some clinical skills RLOs, according to most of the tutors, should not be a source of concern as long as tutors inform the students about these differences and no major harmful steps are included.

Benner (2012) indicated that there is a substantial gap between nursing practice and nursing education. Internationally, students and educators have expressed concerns regarding this gap and newly graduated nurses' inadequate skills (Mahmoud, 2014, McNett, 2012, Borneuf and Haigh, 2010). In a qualitative study by Sharif and Masoumi (2005), which aimed to investigate student nurses' experience in clinical practice, all students clearly demonstrated that there is a gap between nursing education and practice. Another study by Mahmoud (2014), which aimed to explore the perception of nursing students related to their practical learning and theory-practice gap using a questionnaire, found that half of the nursing students (n=61) revealed that there was a gap between their theoretical knowledge and the actual clinical procedures in the wards. She revealed that students indicated that not all theoretical knowledge can be relevant to practical skills, such as aseptic technique, if not carried out in the real practice setting. She recommended that nursing education should re-assess the current methods of practical learning and seek methods to better prepare future nurses. It can therefore be assumed that different demonstrations of skills on the RLOs would not limit reusing the RLOs in the Saudi curriculum, rather they could help to narrow the nursing education and practice gap by exposing students to different practices.

Another aspect related to the content that caused participants to take a long time to continue the think-aloud activity, was the use of some of the terms and abbreviations in some RLOs. For instance, some students were confused with terms such as Z-track or hokey-cokey. This suggests that students might need more clarification on the RLOs of why the Z-track is called Z-track, for example. Although in practice the term Z-track is well known in relation to intramuscular injections procedures, for novice students it might be better to explain with pictures how the Z would be developed in the skin layers in order to link the name of the procedure with the step. Furthermore, using the 'hokey-cokey' seemed to be a vast source of confusion for all student groups and most tutor groups. This did not appear to be linked with the language, rather the lack of a clear and direct title for the section in the RLO. It was not clear for the participants from the titles that the two sections were the same video demonstration for hand hygiene, but one was created as a song while the other was the real demonstration. Another area of confusion emerged from the use of nation-specific terms such as 'trust' instead of hospital. This was confusing for some tutors and students as the term 'trust' in this usage is not well known internationally. Chapter 9 will further the discussion regarding the influences of the terms on the RLOs transferability.

Turning to some of the RLOs' technical characteristics that stopped the participants navigating smoothly and could impact the usability of the RLOs, several aspects were identified such as the multimedia attributes, image selection, and browsing the RLOs. While the following paragraphs will briefly discuss the participants' views on these aspects, they will be discussed more in-depth after the implementation of the RLOs.

Some participants struggled at the beginning of the think-aloud activity with the multimedia attributes of the RLOs. Many participants were confused by following the narrative part and listening to the video at the same time, although the majority of them liked the mix of media used on the RLOs. Nevertheless, the multimedia design of the RLOs is not as familiar a design compared with other OERs available on the web such as on YouTube. Thus, users at the beginning of the think-aloud discussion might have got confused with this new multimedia design. Importantly, as many of the participants indicated, the presentation of the narrative part in some RLOs was confusing, as it was fairly difficult for some participants to pick out the important points. Thus, some participants suggested that re-organising the narrative part as bullet points or highlighting the keywords would make it easier to follow.

Furthermore, while most participants expressed positive attitudes towards the integration of different media elements, some images on some RLOs confused many participants and lead them to some extent to struggle with the RLO navigation. For example, the picture of the medication cup in the hand hygiene RLO and the injection site (buttock) in the intramuscular injection site RLO. Furthermore, many of the tutors and students were not satisfied with some of the animation used and with use of a still picture with a narrator in some RLOs. Although the participants' views were varied and everyone has their own preferences in terms of the media elements, some clinical skills RLOs might need to consider using a variation of images and animation to make the procedure clear and easy to understand. The findings highlight that ease of RLO use has an important implication in the understanding of the acceptability and reuse of the RLOs.

Following the discussion of the most important aspects of the findings from the exploratory phase, the next section will present the important items highlighted by the findings and contribute to the developmental process of the SSEQ.

6.8 Developing the student self-evaluation questionnaire for evaluating the value of RLOs in clinical skills education in another context

The development of a high-quality psychometric tool has been described as a valuable approach to capturing human experiences (Widger, Tourangeau, Steele et al., 2015). Nevertheless, to develop a robust and valuable tool, consideration must be given to key influencing factors involving the item selection process, validity and reliability (Streiner et al., 2015). These aspects are included in Tashakkori and Teddlie (2010, p.40) 'within design consistency'. These aspects will be addressed within the following sections describing the development of the questionnaire and issues related to the validity and reliability of SSEQ.

In some of the identified studies from the literature review, instruments were used to measure students' and/or educators' experiences. Most of them were specific for evaluating the clinical skills web-based resources that had been created internally within the institution of origin. No existing specific measure of the pedagogical value of clinical skills RLOs as OERs or open web-based resources in general (the value of nursing clinical skills RLOs and their utility in different contexts) specifically, was identified that

captured this concept. Therefore, the development of a new instrument was undertaken as a strand of the study.

6.8.1 Selecting the items of the questionnaire

The findings gained from 7 think-aloud discussions and 2 focus-groups offer a rich source of qualitative data from which items were developed for the SSEQ. Guided by the themes resulting from the qualitative data, the common statements made by the participants were transformed into questionnaire items. Then, the items selection was guided further by adapting items from existing measures after permission was obtained from the authors (Appendix 5): Bath-Hextall et al. (2011) who utilized a questionnaire to evaluate RLOs for learning about meta-analysis and Sowan and Idhail (2014), who used a satisfaction and self-efficacy questionnaire to evaluate interactive streaming videos for medication administration. Furthermore, an RLO evaluation toolkit available online on the website of the RLOs was also used, which was expected to further enhance face, content, and construct validity. While utilizing an existing questionnaire might save time and resources (Boynton and Greenhalgh, 2004), a questionnaire that measured the students' views on adopting clinical skills RLOs was not readily available nor was one available in the Arabic language.

6.8.1.1 General information

Areas that were identified as important and common among participants views on clinical skills RLOs within the qualitative strand were included within general questions in the SSEQ. These variables included the number of RLOs that had been accessed by the students, site and time of accessing the RLOs.

Three general questions were included in the SSEQ as shown in Table 15. It was important to know how many RLOs were accessed by the students as this gives a picture of students' views on the UK RLOs because every RLO had a different layout and features (item 1). It was suggested from the evaluation tool kit that item 2 was one of the core questions that should be included to allow comparison between sites. From the inference of qualitative data, one of the common discussions among the participants was the best time to open the clinical skills RLOs, therefore, the third item was important to identify when was the most useful time to use the clinical skills RLOs, before, during, or after the clinical skills session or in clinical areas. All the general questions were followed by the extension of open questions and 'other, please specify' to ensure that all options are included. This open questions option is considered to be good practice in survey methodology (O'Cathain and Thomas, 2004).

Item number	Item
1	Which of the RLOs associated with the Fundamental of Nursing course in the first semester did you access
2	I have accessed the RLOs at: home, university, elsewhere
3	When did you access the RLOS

Table 15 General questions

6.8.1.2 Items for measuring usefulness

15 items were obtained for measuring the acceptability of UK RLOs (Table 16). 5 of them were identified from common statements from participants in the qualitative data, items from 1 to 5.

Items 6 to 11 were identified from the qualitative data and were related to educational values, learning support, and flexibility of the tools. These items were adapted from Bath-Hextall et al. (2011) who evaluated the educational and media attributes of RLOs with students on a postgraduate diploma in nursing course and a Master's in Public Health course in a blended learning setting.

Questions related specifically to clinical skills knowledge and practice were items 12 to 14. These items were commonly made statements within the think-aloud and focus-group discussions in the first phase. Also, these were adapted and modified from Sowan and Idhail (2014) who evaluated an interactive web-based nursing course with streaming videos for medication administration skills with undergraduate nursing students and assessed the levels of student self-efficacy in performing the procedures after using the virtual

learning course. Item 15 was the only one directly adopted from Sowan and Idhail (2014).

Table 16 Items for measuring usefulness

N	T	Example from qualitative strand	N of item	Question	Reference
1	RLOs usefulness in clinical skills education	Very helpful	2	The RLOs were helpful for learning the clinical skills	TA and FG
2		They can be more confident to apply procedures in the lab session or even in the hospital	8	Using the RLOs enhanced my confidence in my clinical nursing skills	TA and FG
3		I feel this is better, you are depending on yourself, you can open it, watch it, understand it	10	RLOs helped me to practice the clinical skills procedures independently	TA and FG
4		Watching it before to enrich your background about the topic to prepare yourself properly	11	RLOs prepared me for the lab session	TA and FG
5		RLO will unify the information	13	The RLOs ensured parity of clinical skills information across all classes	TA and FG
6		This will help me to understand the clinical skills	5	The activity in the RLOs aided my understanding of the clinical skills	TA and FG Bath-Hextall *et al.*, 2011
7		It helps when student miss something on the session	6	The RLOs helped me to address specific gaps in my knowledge	TA and FG Bath-Hextall *et al.*, 2011
8		it really will retain the information in your mind	7	Using the RLOs helped me to retain knowledge in clinical skills procedures	TA and FG Bath-Hextall *et al.*, 2011)
9		I can learn the skill on my own time, I like it	20	I enjoyed being able to learn the clinical skills procedures on my own pace	TA and FG Bath-Hextall *et al.*, 2011
10		I can open it at any time	21	I like being able to access the RLOs whenever I want to	TA and FG Bath-Hextall *et al.*, 2011
11		This will help the student to assess their information	34	The self-assessments at the end of the RLO helped me gauge how well I'd understood the material	TA and FG Bath-Hextall *et al.*, 2011
12		Good to understand the procedure	3	The RLOs were valuable in understanding the clinical skills procedures	TA and FG Sowan and Idhail, 2014
13		You can use it anywhere on smartphones, tablets, or laptops	9	Having the procedures available online at all times decreased my mistakes in performing the skills	TA and FG Sowan and Idhail, 2014
14		This will decrease my stress	12	RLOs decreased my anxiety in the lab session	TA and FG Sowan and Idhail, 2014
15		----	15	The RLOs helped me get a better mark on the clinical skills exam	Sowan and Idhail, 2014

T: Theme, TA: Think-aloud, FG: Focus group

6.8.1.3 Items for measuring usability

8 items were identified for measuring the usability of UK RLOs to use in the SSEQ (Table 17). Items from 1 to 4 were transformed from common statements from participants in the qualitative data to items in SSEQ. While the question 'I needed the help of a lecturer to understand the RLOs' was the only one adopted from Bath-Hextall et al. (2011). The other two items 7 and 8 resulted from both the qualitative data and adopted questionnaires; Bath-Hextall et al. (2011) and Sowan and Idhail (2014). It was important to ask the students about the usability in different way rather using a direct question, so if they needed the lecturer help, it means they had some difficulties on using the RLOs. The last question 'The steps of procedures in the RLOs were clear' was driven from both qualitative data and adapted from Sowan and Idhail (2014) where the clarity procedure steps could help the students struggling with RLOs

Table 17 Items for measuring usability

N	T	Example from qualitative strand	N of item	Question	Reference
1	Usability	Actually, this word is not clear	24	The RLOs introduced new concepts clearly	TA and FG
2		As a beginner or someone who read for first time, there is some terms need to be clarified why they call it in these terms	27	The terms used in the RLOs were easy to understand	TA and FG
3		Even me as a tutor, I have the language and I can't understand each word	28	The language was easy to understand	TA and FG
4		The good thing here, they mentioned the main objectives clearly, this is good	29	The RLOs were clear about their objectives	TA and FG
5		--	23	I needed the help of a lecturer to understand the RLOs	Bath-Hextall *et al.*, 2011
6		Nice and easy	36	The RLOs were difficult to use	TA and FG Bath-Hextall *et al.*, 2011
7		We don't know how to return	37	The RLO was easy to navigate	TA and FG Bath-Hextall *et al.*, 2011
8		This is not clear, it is confusing	26	The steps of procedures in the RLOs were clear	TA and FG Sowan and Idhail, 2014

T: Theme, TA: Think-aloud, FG: Focus group

6.8.1.4 Items measuring engagement

The engagement theme was explored in-depth during the think-aloud discussion while participants were actively interacting with the RLOs. For example, while participants were navigating the clinical skills UK RLOs, listening to the video demonstration with focused attention and commenting on it, reading the narrative part, and answering the questions in the activity. However, measuring the students' engagement with the RLOs would be difficult through a questionnaire. Thus, only engagement aspects in relation to curiosity and endurability were included in the SSEQ.

4 items were identified for measuring participants' engagement with the UK RLOs for use in the SSEQ (Table 18). Item 1 'I would like to see more RLOs in other clinical skills' was developed from common statements from participants in the qualitative data. The other three items resulted from both the qualitative data and the adopted questionnaire from Bath-Hextall et al. (2011).

Table 18 Items measuring engagement

N	T	Example from qualitative strand	N of item	Question	Reference
1	Engagement with the RLOs	Let's do one more, actually this make you so excited to see what more they have	18	I would like to see more RLOs in other clinical skills	TA and FG
2		This will help us on the hospital	17	I am confident that I will be able to use the knowledge gained from RLOs in future practice	TA and FG Bath-Hextall *et al.*, 2011
3		I will open it to see more	16	I intend to use the RLOs from this course again	TA and FG Bath-Hextall et al. (2011)
4		I will tell my friends about it	19	I would recommend these RLOs to another students	TA and FG Bath-Hextall *et al.*, 2011
T: Theme, TA: Think-aloud, FG: Focus group					

6.8.1.5 Items measuring attitude toward UK RLOs

12 items were obtained for measuring the students' attitude toward the UK RLOs (Table 19). 2 of them were developed only from common statements from participants in the qualitative data, items 1 and 2. Throughout the think-aloud and focus-group discussion, participants compared the RLOs with the other OERs available on the web. Thus, it was important to include these items in the SSEQ.

Items 3 to 11 were identified from the qualitative data and some items related to learning support of the tools were adapted from Bath-Hextall et al. (2011). Item 12 'Having the video with a narrator commenting on the steps aided me pronounce the terms correctly' was modified from Sowan and Idhail (2014). It was important to include this item in the SSEQ as English is not the students' first language.

Table 19 Items measuring the students' attitude towards RLOs

N	Theme	Example from qualitative strand	N of item	Question	Reference
1	Attitudes towards RLOs	This is clear, I can't find such thing in the YouTube	40	RLOs were superior to other online learning resources available on the web, for example from YouTube, Google, Wikipedia or other sites	TA and FG
2		Students really like and prefer technology more than books	14	I preferred learning from books or the clinical lab manual to learning from RLO	TA and FG
3		It is interesting resource	1	The RLOs were interesting and engaging	TA and FG (Bath-Hextall et al., 2011)
4		Just put it in your ear and listen, very nice	4	The content of the RLOs fitted my learning needs in clinical skills	TA and FG (Bath-Hextall et al., 2011)
5		Not in students' level	25	The information in RLOs were at the right level for me	TA and FG Bath-Hextall *et al.*, 2011
6		It is not clear at all	31	The images and animations were valuable components of the RLOs	TA and FG Bath-Hextall *et al.*, 2011
7		No need for this on-screen part, so confusing	32	The on-screen text was useful in helping me to understand the information	TA and FG Bath-Hextall *et al.*, 2011
8		Discussion regarding integration of the RLOs	35	The RLOs were well integrated with the foundation course and other teaching sessions	TA and FG Bath-Hextall *et al.*, 2011
9		I found it organised, easy and structured	38	The RLOs were well structured	TA and FG Bath-Hextall *et al.*, 2011
10		I like the different media	39	I liked the multimedia design of RLOs	TA and FG Bath-Hextall *et al.*, 2011
11		The narration confused me, shall I listen or read	33	The narration made the RLO more engaging	TA and FG Bath-Hextall *et al.*, 2011
12		This will help to say the word correctly	30	Having the video with a narrator commenting on the steps aided me pronounce the terms correctly	TA and FG Sowan and Idhail, 2014

TA: Think-aloud, FG: Focus group

6.8.2 Scale and level of measurement

The aim was to choose an effective scale for measuring students' views on the UK RLOs that could create accurate and broad responses to the questionnaire. The Likert scale is one of the most popular and reliable ways of measuring perceptions, attitudes, and opinions, it allows participants to express their attitude by selecting one of the provided answer options (Joshi, Kale, Chandel et al., 2015). Streiner et al. (2015) point out that Likert scales are similar to adjectival scales, with one exception, adjective scale is unipolar (descriptors range from little of the attribute at one end to a lot at the other) while the Likert scale is bipolar (descriptors most often tap agreement).

The decision was made to choose a 4-adjectival ordinal scale and to remove the neutral option as more degrees of agreement or disagreement could be offered. According to Nemoto and Beglar (2014), four points Likert scales are suitable for respondents with low motivation to complete the questionnaire as they are easy to understand, and they require less effort to answer. Students might be considered to have low motivation as, in their usual nature, they are busy with their curriculum and are giving it priority, so they might be less motivated to complete the questionnaire. Wakita, Ueshima and Noguchi (2012) suggested that sometimes a neutral

choice could be just an easy way of skipping the question without putting much thought into it, therefore, to exclude the neutral option might a good way to encourage deeper thinking and provide more valuable responses than if the neutral option was available. It was suggested that the neutral option might be inherently illogical in that it does not conform to the fundamental continuum of the scale (agree or disagree) (Tsugihashi, Kakudate, Yokoyama et al., 2013). Accumulatively, all these reasons support the choice of level of scale selected in this study and the removal of the 'neutral' option from the SSEQ.

6.8.3 Assessing the validity and reliability of the SSEQ

According to Field (2018), one way to make sure that the measurement error is kept to a minimum is to verify the properties of the measure that provide confidence that it is doing its job, the validity and reliability. Consideration must be given not only to the outcomes of the research but also to its rigour, which refers to the extent to which the researchers work out to enhance the quality of the research, and this can be attained through the measurement of the validity and reliability (Heale and Twycross, 2015). This section will explain the actions taken in this research to address validity and reliability.

6.8.3.1 Validity of the measure

Validity refers to the extent to which an instrument really measures the concept it set out to measure (Bryman, 2016). In this research, this means the extent to which the SSEQ captured appropriately aspects of students' views of the acceptability, usefulness, attitude, and usability of the clinical skills UK RLOs. Many types of validity were explored in this study:

Face validity: The extent to which a measurement method appears 'on its face' to measure the construct of interest (Drost, 2011). It is an essential initiative process (Bryman, 2016). The same item could be interpreted differently between people, and this is one of the challenges associated with the face cover that includes the instructions for questionnaire completion, and the questionnaire itself.

After the initial pool of questionnaire items were established in English, they were piloted by three qualified experts (supervisors), three intern students who were different to the students who participated in both Arabic and English versions, thirteen colleagues and friends who had experience in teaching and learning nursing clinical skills, or experience in research. Feedback was requested regarding items suitability, the questionnaire design usability, logical language, accuracy, innocence of item construction problems and

their understanding of the words used. Also, six students involved in the first phase of the study, and another four students who were not involved in the first phase were asked to provide feedback on the initial draft of questionnaire (English version), revealing how they would have answered as second-year students. As English is the second language for the researcher, an English language specialist was included to review the language used in the questionnaire to ensure the clarity of the questions and instructions. The aim was to keep the items clear, short and meaningful in both languages as far as possible.

The feedback identified many major issues and provided the researcher with important advice about items which were not related, ambiguous, complex, or repetitive. For example, the general questions were reduced from five to three questions as some questions were deemed unnecessary. For example, 'How would you rate your confidence in accessing online learning resources e.g., from YouTube, Google, or other sites', was not really relevant as confidence was not an interest of this study. Therefore, this general question was replaced with the following item on the main questionnaire 'RLOs were superior to other online learning resources available on the web, for example from YouTube, Google, Wikipedia or other sites', as this item is more related to the research and was

one of the common statements revealed in the findings of the first phase.

Moreover, another important suggestion related to using 'and' to link concepts in 6 items, which might eventually affect the analysis and interpretation negatively. For example, 'The content of the RLOs was appropriate **and** fitted my learning needs in clinical skills'. Some further advice such as adding a negative question to reduce the response bias, were considered. Indeed, adding the open-end question at the end will give the participants a chance to express their thoughts, comments or suggestions, especially as the 'neutral' option was excluded, this means it was possible to add a comment in case they did not want to respond to any item for any reason.

In light of the feedback and continuing reflection on the instrument, additional alterations were made to its layout, wording, and length. All items were revised and resolved and send back to most of the volunteers to review the final version of SSEQ.

Construct validity: Described as one of the most challenging missions in questionnaire development, this relates to what construct the instrument is actually measuring (Bryman, 2016). Streiner et al. (2015) pointed out that the primary concern of the construct validity is to assess the extent to which relationships between items incorporated in the measure are consistent with the

determine theory and definition of the concept. Principle component analysis (PCA) is one of the most established methods of analysing the construct validity, and this will be discussed in detailed in the next chapter.

Content validity: Described as the 'degree to which an instrument has an appropriate sample of items for the construct being measured' (Polit and Beck, 2004, p.423). Content validity is not usually assessed quantitatively, instead, it is assessed by carefully examining the measurement method against the conceptual definition of the construct (Price, Chiang and Jhangiani, 2018). It needs a rigorous and systematic process to establish whether the items sufficiently represent the concept under study using a Content Validity Index (CVI). While not conducted within the constraints of this research, additional developments would require CVI analysis and an examination of expert recommendations for future item selection and PCA.

6.8.3.2 Reliability of the measure

Reliability means that a measure should consistently reflect the construct that it is measuring (Tabachnick, Fidell and Ullman, 2007). The three common types of consistency are: test-retest reliability (stability), where scores of a measure are assumed to be consistent across time when completed by the same participant, then the

scores they obtain should also be consistent across time. Secondly the inter-rater reliability (equivalence) which relates to the degree to which separate observers are consistent in their judgments (Streiner et al., 2015). Within the constraint of this research, it was impossible to assess the stability of SSEQ, however it is acknowledged as an area for future development. Moreover, an equivalence test was not considered relevant at this time due to the measure's self-reported design. In this research the reliability was assessed formally by the third type of consistency, the internal consistency (across items).

Assessment of the reliability, statistically, commonly based on the concept sets of items (individual items) should provide results consistent with the overall questionnaire. Cronbach's alpha coefficient (α) is one of the most common indicators for internal consistency, a value of o.7 to o.8 is an acceptable value, and lower than that indicates an unreliable scale (Pallant, 2013).

One of the main issues that needs to be considered in the interpretation of the Cronbach's alpha is that it could vary depending on the number of items in the scale; thus, it is more likely to have a large alpha value not for the reason that the scale is reliable, rather that there are a lot of items on the scale (Field, 2018).

In the current study, Cronbach's alpha coefficient was carried out on the overall reliability of the SSEQ scale to determine the internal consistency of the questionnaire of the instrument. A Cronbach's alpha coefficient for all scale items involving the reverse code of the negatively worded item in SSEQ reported .935 which was highly acceptable and indicated that no single item needed to be removed in order to substantially improve the score of the Cronbach's alpha.

6.8.4 Translation process of the SSEQ from English to Arabic version

The following sections will discuss the process of translating the SSEQ to Arabic. The SSEQ was originally developed in the English language for this research, thus, it was essential to ensure that the SSEQ followed a rigorous and systematic process in translation to the Arabic language. This will help the items to be translated well linguistically, and cross-culturally to maintain the content validity of the instrument (Beaton, Bombardier, Guillemin et al., 2000). The main phases of translation process were included; forward translation, backward translation, synthesis of the translations, establishing expert committee, and the preliminary pilot testing before producing the final version of the questionnaire (Tsang, Royse and Terkawi, 2017).

6.8.4.1 Forward translation

Two independent translators (T1, and T2) were employed prior to the forward translation stage (initial translation). It is suggested to use at least two bilingual translators, whose mother language is the desired target language, but different in background, to translate the instrument from the original language to the target language (Sousa and Rojjanasrirat, 2011), to better reflect the nuances of the target language (Tsang et al., 2017).

The translators were asked to provide a report of the translation that they completed, including any comments they made to emphasize challenging phrases or uncertainties with the reasons of for their choices. All the questionnaire items, response options, layout, and the introduction and instructions were translated in this way.

T1, is an Arabian colleague who was aware of the concept that the SSEQ was intended to measure and was tasked to produce a translation that more reliable and similar to the original measurement perspective.

T2, is an Arabian translator with a linguistics background, who is unfamiliar with SSEQ objectives and created the second translation to detect any differences in meaning from the original SSEQ with the first translator T1. Beaton et al. (2000) point out that the second

translator, also called a naive translator, provides a translation that reflects the population language as they are less influenced by an academic goal, and may more regularly highlight unclear meanings in the original questionnaire.

6.8.4.2 Synthesis of the translations

Disagreements between the T1 and T2 were discussed and resolved with an additional bilingual translator who was not involved in the previous translations, as suggested by Sousa and Rojjanasrirat (2011). Working from the original SSEQ alongside the T1 and T2 versions, a synthesis of these translations produced the common translation (T1-2) with each of the issues addressed in a report. The next stage was completed with this T1-2 version of the questionnaire.

6.8.4.3 backword translation

The initial T1-2 version translation of the questionnaire was then independently back-translated from the Arabic language into the English language by two bilingual translators whose mother language is English. This ensures the accuracy of the translation, assures a consistent translation and that the translated version is reflecting the same item as the original version (Beaton et al., 2000). Ambiguous wordings in the T 1-2 were usually revealed in the back-

translation. It is preferable that back-translators not be aware of the intended concepts the questionnaire measures and from a different background to avoid formation bias and to elicit items with unexpected meanings in the translated questionnaire (T1-2), (Tsang et al., 2017).

At the time of developing the SSEQ, it was difficult to find trusted translators whose first language is English and are at the same time fluent in Arabic. Therefore, the translators for this stage were UK citizens who were originally from an Arabic background. The first translator (BT1) was a Lecturer at one of the UK university whose mother language is Arabic, but who has lived for more than 25 years in the UK and is a language teacher. The second translator (BT2) was who specialises in Architecture, his mother language is Arabic, and he has lived in the UK for more than 12 years. Working from the T1-2 version of the SSEQ and totally blind to the original version, the translators then translated the questionnaire back into the English language and produced BT1 and BT2 versions.

6.8.4.4 Expert committee

An expert committee was established by the researcher, both the forward and backward translators, one colleague in the university, two intern students, two PhD students, and two friends to produce the pre-final version of the translation. The expert committee

reviewed all translations versions (T1, T2, T1-2, BT1, and BT2) including the original SSEQ, collectively with the written reports that explained the justifications of each decision at prior stages, to achieve an agreement on any discrepancy. Any differences were resolved, and members of the expert committee achieved an agreement and the pre-final version of the questionnaire was produced.

6.8.4.5 Preliminary pilot testing

The pre-final version of the translated questionnaire should be pilot tested on a small sample (about 30–50) of the intended respondents to ensure that the adapted version still retains its equivalence in an applied situation (Tsang et al., 2017). This stage is an additional assessment for the retention of the psychometric properties of the questionnaire, and though this stage offers some valuable insight into how the participant interprets the questionnaire items, it does not address the construct validity, reliability, or item response patterns; however, it provides for some measure of quality in the content validity (Beaton et al., 2000).

At the time of research, it was difficult to obtain an appropriate sample size of students for piloting the pre-final version, and the RLOs were not yet implemented. Therefore, all senior students who participated in the think-aloud discussion were contacted to pilot the

pre-final version of the questionnaire, eight of them responded. Additionally, five students who did not have an idea about the research volunteered to check if they faced any difficulties in answering the pre-final version. After completing the questionnaire, the students were asked orally via an open-ended question to explain their thoughts about the questionnaire items. This method permits the researcher to ensure that the translated items retained the same meaning as the original items, and to ensure there is no confusion regarding the translated questionnaire (Beaton et al., 2000). Spelling mistakes and other minor differences were corrected prior to finalizing the final translated version of the questionnaire.

6.9 Summary and intention to use RLOs

The main aim of the exploratory first phase was to gain a deep understanding of nursing clinical skills multi-stakeholders' (students and educators) perspectives on the UK RLOs. The objectives of this phase set out to:

- Investigate the usefulness, usability and engagement of incorporating RLOs into the skills components of a nursing course.

- Gain more understanding from participants' feedback and thoughts and encourage them to discuss and share their views

- Elucidate any new variables that could emerge to inform the content of the student self-evaluation questionnaire (SSEQ) for the third evaluation phase.

The resulting themes have achieved the objectives of this phase and reached the following conclusions; regardless of the many limitations of the RLOs usability related to the content of RLOs and technical characteristics, most students and tutors exhibited positive views towards the potential usefulness, attitude and engagement of the RLOs in teaching and learning clinical skills. This, in turn, is reflected in the tendency and readiness of participants to adopt and experience RLOs in their clinical skills curriculum.

Prior to the third evaluation phase, a student self- evaluation questionnaire (SSEQ) was developed. The development of this new instrument was undertaken as a strand of the study and was based on the incorporation of key themes from exploratory data, in addition to adapted items from previous studies. The reliability of the SSEQ was assessed by Cronbach's alpha analysis. Then, the SSEQ was translated to the Arabic language following a rigorous method of translation.

Following identifying the tutors and students' views on RLOs and their positive intentions to use them in the nursing curriculum, and development of SSEQ, the next chapter describes the procedures

and methods of implementation and the evaluation of the clinical skills RLOs.

Chapter 7: Implementation and evaluation phases: design and method

Inferences from the first exploratory phase in Chapter 6 informed the implementation and evaluation phases of the study. This chapter will be divided into four parts. The first part will discuss the second implementation phase of the RLOs into a Saudi nursing curriculum. Then, a recap of the research objectives of the evaluation phase will be presented. The third part discusses the data collection methods utilized in the third phase of the research (both the questionnaire and the follow-up focus-group). The fourth part will explain the methods of data analysis used, including PCA, descriptive statistics, and the focus-group.

7.1 The implementation phase

The RLOs were implemented as a supportive tool in the clinical skills curriculum of the 'Fundamentals of Nursing' course for the second-year nursing program which included both theoretical and practical parts. The theoretical parts of the course are focused on basic patients care needs (physiological, psychological, cultural, and developmental needs) and delivered as face-to-face lectures. The practical part focuses on basic nursing skills such as hand hygiene, medication administration, wound care, and oxygenation. Students practice nursing procedures and skills in a supervised nursing clinical

skills laboratory (CSL), where the students have the opportunity to practice in an environment that is designed to simulate a real ward with authentic materials and equipment. The traditional methods of teaching clinical skills depend on the demonstration of the procedures by the nursing tutor followed by the students being assigned to different CSLs to practice these skills. There are many limitations of this traditional method in teaching, as discussed previously in chapter 1. For example, limited time to practice the skills by each individual student; students do not have alternative resources to learn from if they have missed a lab session; and the low number of tutors compared with students. Thus, the open RLOs and their attributes such as availability, accessibility, multimedia format, and interactivity could contribute to address some of these issues.

The implementation took place in the first semester of the academic year, from September 2017 to January 2018. The implementation method of the RLOs was informed by the findings related to RLO integration with the clinical skills from the first exploratory phase of this study. Additionally, it was based on agreements with the head of the nursing department, the course coordinator, and some of the clinical skills tutors, also taking into consideration the ethical committee and KAU rules and regulations. The researcher met all the stakeholders (decision makers) to discuss the most convenient

method of RLO implementation and the findings from the first phase regarding the RLOs.

Most students and tutors during the think-aloud activity and the focus-groups believed that RLOs should be accessed before the lab sessions, even though some students might not do so. In the meeting, the course coordinators and clinical skills tutors agreed that the RLOs should be available for students before lab sessions on the Blackboard (Online Learning Management system). The researcher conducted two workshops (one month before the implementation) for all educators who were expected to teach the course, this includes the course coordinators and the tutors, to explain how they could access and browse the clinical skills RLOs created by UoN. The two course coordinators and most of the clinical skills tutors had participated in the first exploratory phase and knew about the RLOs. Each workshop ran for two hours in the nursing college computer lab. Furthermore, the researcher informed the educators that in case of any technical problems they could refer to local supervisors or contact the researcher directly. Six basic nursing clinical skills RLOs were agreed on for implementation as they were the most relevant to the Saudi nursing curriculum, as mentioned previously in Chapter 3.

The course coordinators were responsible for the implementation process. Prior to the 'Fundamentals of Nursing' course, they reintroduced the RLOs to all the tutors involved in the course and provided them with all the information related to the research and the RLOs. Also, at the beginning of the semester, they introduced the RLOs to the students during the course induction. Additionally, they instructed all students on how to access the RLOs and how they could browse them at the beginning of the clinical lab sessions for the two consecutive weeks. They also explained that the RLO implementation is a part of a research project, and that there would be an evaluation phase at the end of the semester. The course coordinators also would provide support for the students in case of any technical problems.

At the end of the theoretical lecture relevant to the clinical skills RLO topic, and before the lab session, the course coordinators uploaded the RLO link to the Blackboard. In other words, the course coordinators uploaded the different RLOs in line with the clinical skills schedule. For example, in the week of the hand hygiene lab session, the course coordinators uploaded the hand hygiene RLO to the Blackboard. The lecturers and tutors' roles were to remind the students about the RLOs and to distribute written instructions for each RLO topic for all students about how to access them and including contact information for any technical support needed. Also,

at the end of each lab session, the tutor who was assigned to each group reminded the students to review the RLO related to the lab session subject. Additionally, during the revision period and the practical practice in the hospital, students were also reminded by the course coordinators and tutors about the RLOs.

7.2 The objectives of the third evaluation phase

The main aim of this phase was to evaluate the educational value, usability and the impact of UK RLOs for clinical skills learning in Saudi nursing education. More specific objectives were identified in this phase, as follow:

First, to validate the questionnaire (SSEQ), a new measure of evaluating the value of nursing clinical skills RLOs and their utility in different contexts.

Second, to gain a deep understanding of tutors' experiences of the implementation of RLOs. Thus, a focus-group discussion was conducted with clinical skills tutors.

7.3 Methods of evaluation phase

7.3.1 Quantitative method

7.3.1.1 Participants sampling, selection, and recruitment

This study was carried out in one nursing collage at KAU, more details on which are provided in Chapter 4. The data collection of the third phase of the evaluation phase was conducted in the second academic semester, after the students had their scheduled OSCE, between February 2018 and March 2018 as it was a good opportunity to see whether RLOs made any impact on the students, such as building confidence in conducting the procedure, knowledge or even the use of RLOs.

Two weeks prior to the data collection the course coordinators advertised the study for the students at the end of clinical skills sessions, in addition to a study advertisement displayed on student noticeboards within the College of Nursing inviting volunteers.

A total of 140 students were invited by the course coordinator (Foundation of Nursing course) who coordinated a time for the researcher to meet the students after main lectures over two weeks. The researcher provided a short presentation explaining the research aim, their rights to opt out of the study, and clarifying that the participation or lack of participation did not affect the way in which

students are taught and or influence their progress on the course. Also, in this short presentation the researcher provided the time scale for questionnaire returning and clarified the location of the researcher's office in case they needed an extra copy. Students were also told that they could find copies with the student representative, and who to contact if they had any further inquiries. The researcher emphasised that they needed to return the completed questionnaire to the researcher in her office. The researcher's e-mail and the local supervisor's email were given. The local researcher's supervisor helped to facilitate and organise the data collection. Additionally, the researcher was available to answer any questions asked by the students.

Since the number of the student was relatively low, it was intended to recruit all the second-year students. A convenient sampling with voluntary participation for questionnaires was used in this phase in order to avoid coercion. All students who were included in the implementation phase were invited to take part in this phase. There was no formal sample size calculation due to the exploratory nature of the study, while strenuous efforts were made to recruit the largest sample possible (Polit and Beck, 2004). The voluntary nature of the sample and potential for participant bias are acknowledged and considered when interpreting the results.

Inclusion criteria:

- Nursing students in the second year of their nursing studies
- Students who are included in the RLOs implementation phase
- Accessed the RLOs at least once throughout the Foundation of Nursing course

Exclusion criteria:

- Senior students from third, and fourth levels
- Any students who did not participate in the implementation phase
- Student who did not access the RLOs
- Any other discipline rather than nursing

Students who were willing to participate indicated this by returning the questionnaire, which had an explanation about the study at the beginning, to the researcher who was based in a specific office in the college. If, after three weeks from the questionnaire distribution, any were not returned, the subject teacher facilitated some time for the researcher to remind them orally after the clinical skills lectures. A

summary of the recruitment strategy for the quantitative phase is illustrated in Figure 20.

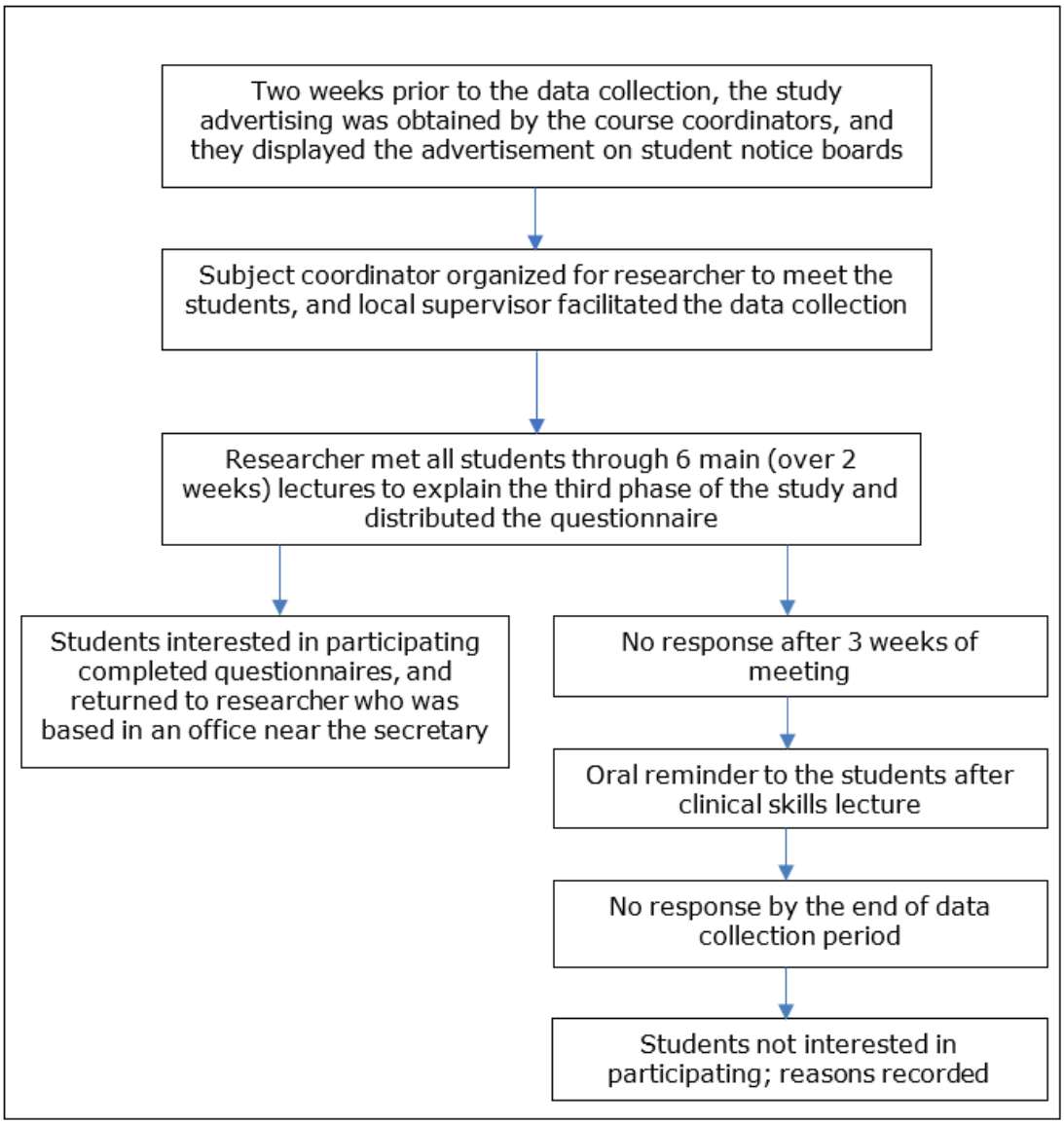


Figure 20 Recruitment strategy for the SSEQ

7.3.1.2 Research administration and management

The researcher was not one of the faculty members, which might have helped the students feel safer regarding their grades, assured them there was low risk and no coercion to take part and to avoid

embarrassment and hesitations for students when meeting any of the faculty members. To ensure the anonymity, and confidentiality, questionnaire was not returned to any faculty member. The questionnaire was returned to the researcher in person and placed in an office alone or in a secured post box near the door to which only the researcher held the keys during the time of collecting the data. After the data collection, all questionnaires were coded by the researcher without names. Then, every coded anonymous questionnaire was ready for data inputting.

7.3.1.3 Ethical consideration

During the presentation prior to the data collection, students were informed by the researcher that the anonymity, confidentiality and privacy of participants was ensured, thus, there will be a low risk of harm to participants and no coercion to take part. Their data was held securely, in a locked cabinet. Students had been made to understand that their participation would have no effect on their grades in the regular nursing courses and all volunteer participants can withdraw from the study at any time they deem necessary. Thus, there was a low risk of harm to participants and no coercion to take part. Completion and subsequent return of questionnaires will be taken as informed consent and separate written informed consent will not be sought.

7.3.2 Qualitative method

7.3.2.1 Participants sampling, recruitment and research administration

Based on the previous phases of this study, participants were selected purposively for the follow-up focus-group, for the pragmatic reasons of fitting in the data collection. As revealed previously, purposive sampling includes selecting and identifying participants that are especially experienced with a phenomenon of interest (Creswell and Clark, 2018).

After the primary results were revealed from the SSEQ, the course coordinator was contacted to advertise the focus-group for clinical skills tutors during the academic staff meeting and the researcher asked if they were willing to participate from April 2018 to May 2018. The researcher invited all clinical skills tutors who were involved in teaching the 'Fundamentals of Nursing' course as they had experienced the implementation phase of the RLOs. Also, the same tutors who had participated in the first phase (whether they were involved in teaching the course or not) were invited as they had an idea about the study and it was possible that they had exchanged opinions with tutors involved in the implementation phase as they were from the same team. The decision-makers such as Vice-Dean

and the Head of Adult Nursing department were also invited. Figure 21 illustrates the tutors' recruitment for the focus-group.

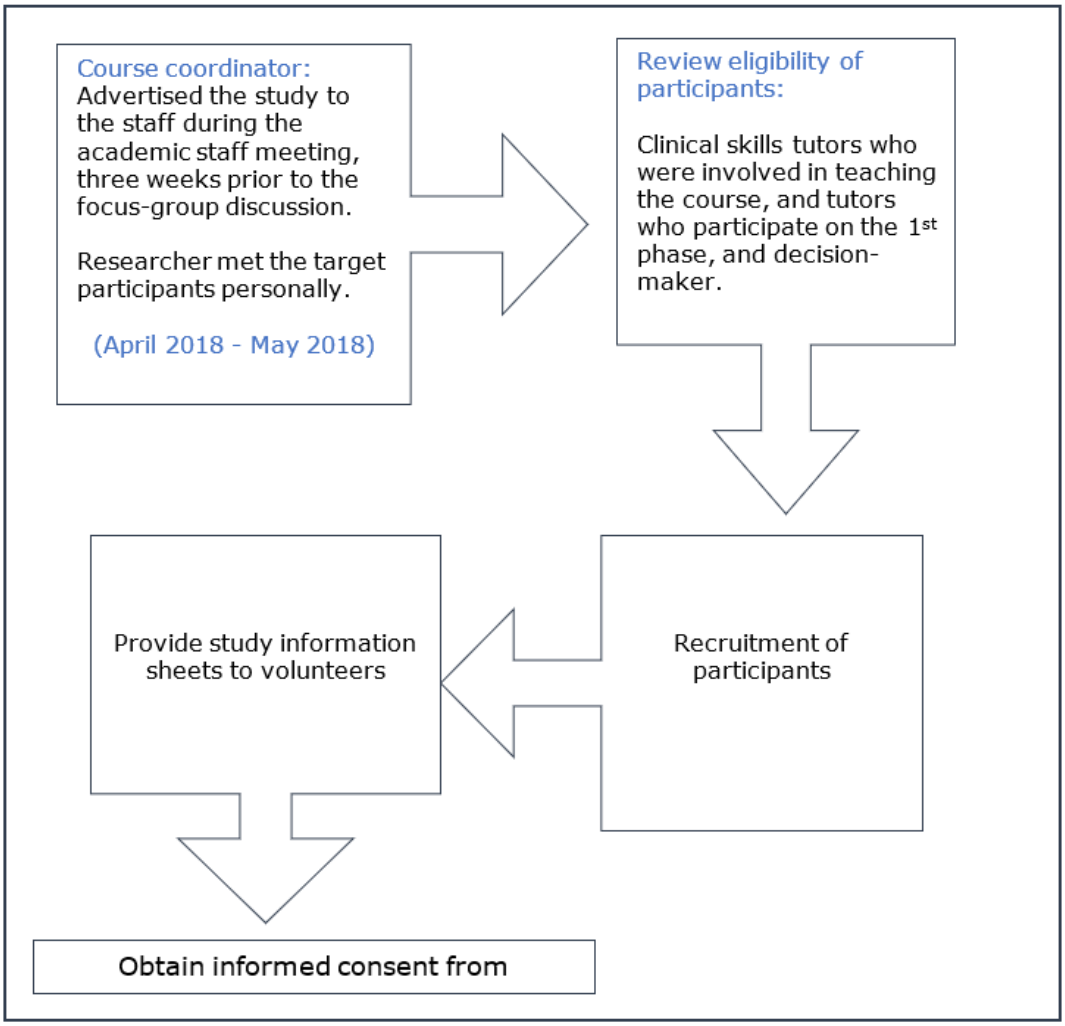


Figure 21 Recruitment strategy for the focus-group

Response were relatively low, only four tutors participated in the focus-group out of sixteen targeted participants (and two of them were Saudi and the other two from different Arabic countries). Two of them had participated in the first study and one of them was the course coordinator, and the other two were involved in the course teaching. At the time of conducting the focus-group, the final clinical

exams had started, and most of the participants were busy and excused from volunteering. The Vice-Dean and the Head of Adult Nursing department were also excused as they were too busy to participate.

In the same way as in the first phase data collection, the administrative procedures relating to storage of information and confidentiality were applied. The time and venue were negotiated with all tutors in advance to ensure that participants had a convenient setting to describe their experience easily, and then the focus-group was conducted on 15 May 2018.

7.3.2.2 Ethical consideration

Once the researcher or nursing programme coordinator had been contacted by the volunteers, the participant information sheet and consent form were provided for them. Participants were aware that their participation was entirely voluntary and that they could withdraw at any time during the study. In the event of their withdrawal it would be explained that their data collected so far cannot be erased and we would seek consent to use the data in the final analyses where appropriate.

7.4 Data collection

Following the recruitment of the students and tutors, data collection began. This section will discuss the quantitative and qualitative data collection methods.

7.4.1 Quantitative data collection

Quantitative data were collected through questionnaires to evaluate the value of the RLOs such as student nurses' self-perception of their knowledge and ability to conduct the procedures based on level two of the Kirkpatrick framework. In addition, students' satisfaction in use and utility, and flexibility of adopted RLOs evaluated, also based on level one of the Kirkpatrick framework. This choice was informed by the literature and the need for more quality research in different contexts to be added to the existing knowledge.

7.4.1.1 Instrument decision

A return to the literature highlighted the efficacy of web-based/online resources for the teaching of undergraduate clinical skills (Chapter 2), most of the literature indicated that questionnaires are an appropriate method to evaluate nursing student self-perception of the value of web-based/online resources in clinical skills education (Williams et al., 2015, Sowan and Idhail, 2014, Holland et al., 2013, Lehmann et al., 2013, Arroyo-Morales et

al., 2012, Benino, Girardi and Czarniak, 2011, Gerdprasert et al., 2011, Gormley et al., 2009). Although questionnaires have some weaknesses, such as low response rate, potentially not reflecting the participants' response accurately, and misunderstanding of the questions (Robson and McCartan, 2016), they have many advantages that make them suitable for this research study. They can provide a broad survey of student views and a simple and straightforward approach to the study of values, beliefs, attitudes, and motives, with a high level of standardization (Robson and McCartan, 2016).

Questionnaires can be administered in numerous ways, involving self-administration, post, telephone or via email. Initially, in this research, administering the questionnaire via the Internet was considered. However, in the end the decision was made to administer through self-administered paper questionnaires without the presence of the researcher for many reasons as outlined below.

As the questionnaire was designed to be in two languages (English and Arabic), it was difficult to set it clearly and in an understandable way in the Internet survey format, as this might affect the appearance of the online questionnaire as well as being affected by other factors such as screen size, the browser used, and loading speed. Although the teaching language in all nursing colleges in KSA

is English, sometimes it is difficult to understand some concepts, therefore translating the questionnaire might help the student to accurately understand the meaning of the question, especially with students who have a weaker grasp of the English language. Thus, a paper-based questionnaire seemed to be more appropriate for students than online.

Interestingly, tutors and course coordinators, in the first phase of the study, suggested using a paper-based questionnaire instead of an online one. According to them, from their experience, it was expected to have weak responses from the students because, at the data collection time, the 'blackboard' was a new platform for students, and they had not fully interacted with it. Also, the official university email was not a common way of communication with the students. On the other hand, the common communication methods between the tutors and the students was via general smart phone applications such as WhatsApp. Therefore, it was preferable to use paper-based questionnaire.

Moreover, regardless of the rapid growth of Internet use, access remains limited (Robson and McCartan, 2016), particularly when the students have training in the clinical areas (hospital), as well as the fact that students usually are prohibited from using smart devices during practice in the hospital.

Response bias is also a possible concern, with people who are more experienced in using technology more likely to respond (Cohen et al., 2018). Additionally, a self-administered questionnaire could help in having a high response rate (Streiner et al., 2015). Moreover, Dommeyer, Baum, Chapman et al. (2002) suggested that the self-administered-survey is much more likely to make students feel that their response to the survey is anonymous, which lends itself to the belief that respondents may be more honest on paper questionnaires.

7.4.1.2 Questionnaire structure

The development of SSEQ content used in this research was informed by the qualitative findings and adapted items from existing measures, as presented in section 6.8. The items from the adapted questionnaire were compared against the common items from the qualitative phase findings and eventually resulted in the final version of the questionnaire. The questionnaire consisted of four main parts: the questionnaire introductory section, three nominal general information questions, 40 ordinal items for usefulness, usability, engagement and attitude towards integrating RLOs into nursing clinical skills curriculum, and one open question (Appendix 6). Additionally, the questionnaire included one negatively worded item in order to reduce response bias (Tsang et al., 2017).

At the end of the final SSEQ, an open-ended question 'Please add any comments or suggestions' was included to give the students a chance to add any additional views or thoughts, or any concerns or queries. This was also In order to offer respondents an opportunity to voice their opinion (O'Cathain and Thomas, 2004).

7.4.2 Qualitative data collection

After evaluating the RLO with the students, and in order to discuss the tutors' views, an audio-recorded focus-group was conducted with the tutors. This focus-group would provide rich information and important insights into tutors' views of the main issues, benefits and problems of implementation of the RLOS into a nursing clinical skills curriculum, and of the students' responses to some of the questions in SSEQ. Due to the limitation of the low number of participants, only one 45 minutes focus-group discussion was conducted. After the discussion started, three of the participants were rushed as they had another commitment. It would have been unethical to enforce them to stay for the complete intended 60 minutes. As the researcher's and participants' first language is Arabic, this data was collected on Arabic language, similar to the first phase. Braun, Guiraud and Frankenberger (2016) suggested that the focus-group represent 'real life' where people are talking to each other rather to the

researcher, therefore it is preferable to conduct the focus-group in the participants' first language.

The questions included in the focus-group discussion had been reviewed and discussed with experts (supervisors) and piloted with colleagues. This provided the researcher with an idea of how participants might respond, allowed for the questions and the way of questioning to be modified, and gave the researcher a sense of confidence.

The guideline for focus-group discussion (Appendix 7) offered adequate prompts to explore the key issues expected to be relevant, while also keeping the discussion adaptable and flexible to the participants' responses. Also, as a relatively novice researcher the researcher gained a sense of security from this guide. This guide contained many prompts to open the discussion with the participants, and selectively included some of the students' responses to the SSEQ to draw out the discussion and perhaps shed more light on some of the responses. Many of the students' responses to the SSEQ were discussed with the tutors, especially questions that scored a high response of 'disagree' or ''agree'.

7.5 Data analysis

This section will present the quantitative data analysis including the principle component analysis (PCA), and the descriptive statistic of frequencies of the SSEQ. Following that, it will explain the analysis method of the qualitative data from the focus-group.

7.5.1 Quantitative data analysis

Quantitative data was analysed by utilizing the Statistical Package for Social Sciences (SPSS Version 24.0), and descriptive statistics for frequencies carried out to the data of SSEQ. Following the screening and the inspection of the data, analysis was centred on principle component analysis (PCA) and reliability analysis of SSEQ.

7.5.1.1 Scoring and coding

In order to start entering the data in SPSS, all responses should be converted to a numerical code. Therefore, all variables were assigned a specific label and code. The researcher selected a number of computerised data randomly to ensure the accuracy of the data file (Tabachnick et al., 2007).

The coding of the main questions (1-40) on SSEQ were straightforward, all questions had a unique variable name (abbreviation) that reflected its number on the questionnaire, for

example, the value name of question number one was Q1, question number two was Q2, and so on. Then each of the responses of these questions were coded 1-4 respectively for Strongly Disagree, Disagree, Agree and Strongly Agree.

In the general information, all three categorical questions had an open-ended question such as 'Others, please specify' where students can provide their own answers which made the coding slightly complicated. Therefore, many interpretation methods of labels and number assignation to each of the possible responses were examined. To code these kind of responses, Pallant (2013) suggested scanning through the questionnaire and looking at the common themes, then list the respondent obtained. Thus, the major groups of responses under the variable name were listed on the codebook, and each of them assigned a number.

For example, in question number 1 on the general information,

'Which of the RLOs associated with the Fundamental of Nursing course in the first semester did you access (select as many options as appropriate)'

a- Hand hygiene ○
b- Glove use ○
c- Injections: ○
- Skin preparation prior to intramuscular and subcutaneous injections ○
- Subcutaneous injection sites ○
- Intramuscular Injection sites for adults ○
- Intramuscular injection by the Z-track technique ○

d- Other RLOs ○
If other RLOs, please specify:
_____

In this question, the variables were named on the SPSS as 'RLOAccessed', and as the main aim of this question was to know how many RLOs students had accessed through the course, the responses were coded as '1= Only 1, 2= Only 2, 3= Only 3, 4= Only 4, 5= Only 5, 6= All of them'. The option of 'other' was handled as a separate question because it would be impossible to integrate the responses from the open question to codes of the previous options. Therefore, after scanning the questionnaire, very few respondents were identified for the option 'Other' which had been coded as '1= Yes Not Specify, 2= No, 3= Yes Physical Assessment, 4= Yes Physical Assessment and Sterile Field.

It was the same for the second general question, for example, it was not possible to integrate the coding of the item 'Other' to the coding of other items. The question was:

I have accessed the RLOs (select as many options as appropriate):

- At home ○
- At university ○
- Elsewhere ○

If "Elsewhere", please specify:

_____

In this question, again the student can respond to more than one item, and after scanning the questionnaire, very few respondents were identified for the option 'Other' and it was not possible to select two responses for one student. Therefore, the option of 'other' was

handled as a separate item and specific numbers were assigned for each response as '1= Yes Not Specify , 2= No, 3= With my friend, 4= Hospital'.

In the question number 3, each item on the questions was handled as separate question:

In the question number 3, each item on the questions was handled as separate question:

When did you access the RLOS (select as many options as appropriate):

- Before the clinical skills lab session ○
- During the clinical skills lab session ○
- After the clinical skill lab session ○
- End of the foundation course/ revision ○
- For clinical area training ○
- Others ○

If "Others", please specify:

_____

Each item was given a number, labelled, and coded for 'yes' or 'no'. For example, the first item was named 'GQ1A' (General Question 1 A), labelled as 'I had accessed the RLO before the clinical skills lab session', and the responses were assigned as '1= Yes, 2=No'. Then, after applying this method to all items in this question, in the SPSS they were grouped on the multiple response analysis option for descriptive frequencies.

The open-ended question 'other' was also treated as a single question, after scanning the questionnaire for responses for this question, only two responses were identified. Therefore, it was given a name and labelled in the same method as the other items, but the responses were coded in a different way '1= Yes Not Specify, 2= No, 3= Second Term'.

7.5.1.2 Participants and response rate

The decision was made to create a sample from the population studying a bachelor's degree in nursing since the research interest was in undergraduate nursing students. The second-year joiner student who just started their nursing education was selected as the six basics clinical skills RLOs selected for this study were suitable for their curriculum. There were 140 students in the second year during the period of data collection. Since the number the second-year student was low, it was intended to recruit every student in order to adequately describe the characteristics of this population and examine the value of RLOs in nursing CSE with a population of interest.

The students' population age ranged was between 18 and 22 years which is the average age of university students in Saudi Arabia. Students population were all female as in the KAU did not have a male nursing student. Additionally, it was prohibited to had access

to male section, in case of selecting another university, due to the ministry of higher education rules at the time of collecting the data.

A total of 138 students out of 140 second-year nursing students volunteered to participate in the research. The response rate was 98% of the volunteer participants. These 2 (2%) students, who did not return the questionnaire, they did not give a reason for declining to take part. According to the course coordinators, they did not have any reported case for medical situation for any students at the data collection time.

7.5.1.3 Management of missing data

Missing data on the SSEQ was assessed and judge to be missing at random through the data. Because of the sample size it was important to retain as much as possible for data analysis, thus available case analysis was implemented.

7.5.2 Principle component analysis

Prior to statistically describing the results that explored the students' views on the implemented RLOs and their value in learning the nursing clinical skills and usefulness, samples were analysed for instrument validity using PCA. This method is particularly useful because the items or questions could impact the student's responses. It was assumed from the existing literature and

qualitative data in the first phase that the questionnaire would present specific aspects of transferability as explained previously. Developing the questionnaire could not be conducted nonetheless without considering issues of interpretation quality, or strength for promoting the validity and reliability. Therefore, the PCA will assess the construct validity of the instrument related to what construct the instrument is actually measuring, through exploring the internal relationship and its consistency objectively, and this will result in identifying main specific components that reflect the main aspects of the instrument. Consequently, it might be more logical to present the participants' responses in relation to the resulting components, using the descriptive statistic.

PCA is mainly a technique, using a smaller set of components, for summarizing patterns of correlations between variables by offering insight into the interrelationships among variables and the underlying structure of the data (Tabachnick et al., 2007). PCA attempts to explain the maximum amount of total variance in a correlation matrix by transforming the original variables into linear components. The major use of PCA is to understand the structure of a set of variables, and to construct a questionnaire to measure an underlying variable, and to decrease a data set to a more manageable size while retaining as much of the original information as possible (Field, 2018). In the data summarizing aspect, PCA

provides the researcher with a clear understanding of which variables may act in concert and how many variables may actually be expected to have an impact on analysis (Hair, Black, Babin et al., 2010).

In the case of this study, the primary concern of the PCA is to assess the extent to which the relationship among items included in the instrument are consistent with the results from the qualitative data and literature. PCA is considered as the only well-established method of analyzing construct validity. Components are viewed to reflect underlying processes that have established correlations among variables and the order of their significance, thus allowing an investigation of the underlying construct and its relationship with existing qualitative data and literature. The main assumption of the PCA is that the component represents real-world dimensions, the nature of which must be 'guessed at' by inspecting which variables have high statistical loading (termed eigenvalue) on the same component (Field, 2018). Consequently, components may be produced for variables that correlate with each other and largely independent of (do not correlate with) other subcategory of variables. In this study, this involved identifying processes or dimensions underlying Saudi participants' views regarding the incorporation of RLOs into the clinical skills component of the nursing course (the value of RLOs and their usefulness).

The literature review and the inference of the qualitative strand indicates that there may be several different but possibly related subdimensions of concerns regarding transferability of RLOs. Through this inference and the knowledge from the theoretical literature, a large set of items were identified, which might or might not reflect the dimensions of concerns related to the transferability of RLOs. The intention was to introduce these items to a group of potential recipients of RLOs, to obtain their view about the value of these RLOs to them and their utility, and to simplify the instrument into a comprehensible structure that could be used in future research.

Another reason for selecting the PCA is that each student had unique experiences, though students might have a common similarity as learners. In the research it was essential to reflect these differences, and this required an analysis that would explore the variance or the estimate of the data spread. Moreover, this analysis and its result reveals any adjustments that might need to happen if any items in the instrument need to be removed for any reason. Also, it is an excellent starting point for many other multivariant techniques in the future (Hair et al., 2010).

7.5.2.1 Principle component analysis procedures

The general processes for conducting the PCA including three main steps. This starts with the data screen; then the main analysis considering the number of factors for extraction and rotation; and finally following up with a reliability analysis. Field (2018) interestingly summarised the general procedures of PCA as illustrated in Figure 22. These are the procedures which will be followed in this research to describe the PCA.

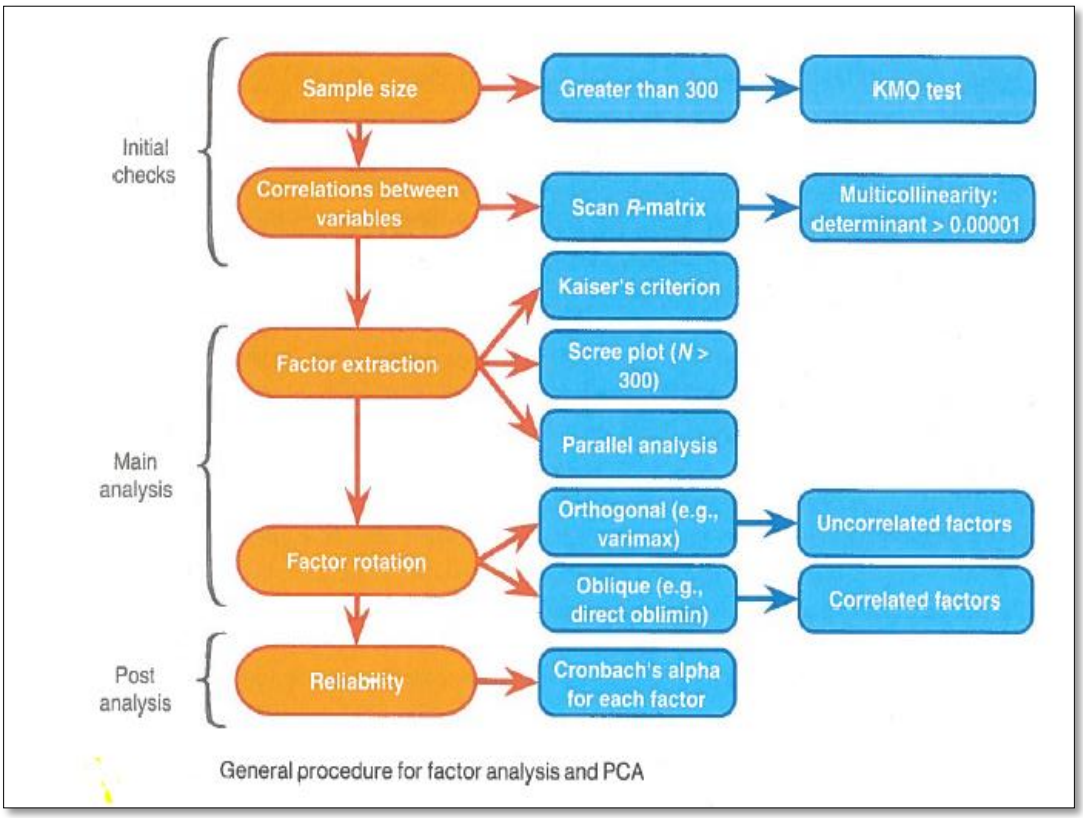


Figure 22 general procedure for PCA (Field, 2018)

7.5.2.1.1 Suitability of the data assessment:

PCA as an independent technique is often more affected by not meeting its underlying conceptual assumptions than by the statistical assumptions (Hair et al., 2010). There are two main aspects that need to be considered to determine whether the data set is suitable for PCA: sample size and the strength of the relationship among the variables (or items).

7.5.2.1.1.1 Sample size

While various rules regarding the sample size have been suggested with some agreement among authors on how large it should be, mostly the recommendation is the larger the sample, the more reliable the factors. Several rules exist for the ratio of the cases to variables, ranging from 2 cases per item to 20 cases per item (Field, 2018, Stevens, 2012, Tabachnick et al., 2007).

On other hand, Guadagnoli and Velicer (1988) indicated that, contrary to the popular rules, the most important factors are the absolute magnitude of the loadings and absolute sample size. Additionally, the number of variables per component is to some extent important. Likewise, Field (2018) suggested that the key aspects are the overall sample size, factor loading and

communalities. Regarding factor loading, the recommendations were:

- Components with four or more loading greater than .6, it is reliable regardless of sample size
- Components with 10 or more loading greater than .40 are reliable as long as sample size is greater than 150
- Components with only a few low loadings should not be interpreted unless the sample size is 300 or more

An additional conclusion drawn by Stevens (2012) is that any component with at least three loadings above .80 will be reliable.

With respect to communalities, as they become lesser the importance of sample size increases, and it has been suggested that with all communalities above .6, a somewhat small sample less than 100 might be perfectly adequate; with communalities in the .5 range, a sample between 100 and 200 could be good enough; and in low communalities below .5, a sample size above 500 is recommended (Field, 2018).

Kaiser-Meyer-Olkin (KMO) is one of the measures that evaluates the sampling adequacy. It varies from 0 (indicating diffusion in correlation pattern) where the PCA is inappropriate and 1 (the

pattern of correlation is relatively compact) where the PCA is likely to be appropriate (Field, 2018). Table 20 shows the guidelines provided by Kaiser-Meyer-Olkin (KMO) (1947):

Marvellous	Values in the 0.90
Meritorious	Values in the 0.80
Middling	Values in the 0.70
Mediocre	Values in the 0.60
Miserable	Values in the 0.50
Merde/ unacceptable	Values in the 0.05

Table 20 KMO guideline (1947) (Field, 2018)

The Anti-image Matrices include measures of sampling adequacy for each variable along the diagonal and the negatives of partial correlations on the off-diagonals. If the sample is adequate, all values should be above.5 at a bare minimum for a given pair of variables (Tabachnick et al., 2007).

In this research, a sample of students who had the clinical skills RLOs in their curriculum were recruited from the second-year nursing students. The sample size was considered adequate where 138 students out of 140 students completed the clinical skills SSEQ. All the retained components had four or more loading greater than .6 which might make the sample size appropriate for PCA.

Moreover, missing data is an issue that can affect the sample size and eventually the PCA. Listwise and pairwise deletion are the most common techniques in managing missing data. Listwise deletion

removes all data for a case from analysis as it has one or more missing values of the specified variables (Field, 2018). Not surprisingly, this method could cause a potentially dramatic missing decrease in the sample size (Peugh and Enders, 2004). In contrast, pairwise deletion attempts to minimize the loss that appears in listwise deletion. Pairwise deletion attempts to use all variable data with missing values on one or more variables (Tabachnick et al., 2007). A strength of this method is that it could increase the power of the analyses (Peugh and Enders, 2004). In this research, and after running the PCA with both options (Appendix 8), the option of 'exclude cases pairwise' was selected because the sample size was clearly influenced by the listwise option which had removed valuable data. With the 'exclude cases listwise' option the sample size decreased from 138 to 127, thus, this option was excluded.

7.5.2.1.1.2 Correlation between variables (factorability)

The second matter to be addressed in conducting the PCA concerns the strength of the intercorrelations among the variables (Pallant, 2013). A correlation matrix ***R*** that is factorable should include a number of sizable correlations. The overall correlation matrix has been used on the PCA because the interest is not in comparing groups of scores (Field, 2018). Note that the correlation that is lower than .3 will not fit and more than .9 is collinear. The anticipated size,

somewhat, relies on *N* (large sample sizes tend to produce smaller correlations), but if no correlations exceed .3, the use of PCA should be reconsidered since there is possibly nothing to factor analyse (Tabachnick et al., 2007).

Scanning the correlation matrix is a useful initial step to investigate the correlations between variables. However, there are two essential concerns:

1) Correlation that is not high enough:

Inspect visually correlation matrix ***R*** for correlations in excess of .3 and if none are found, using the PCA is uncertain, if ***R*** is factorable, numerous pairs are significant. If any variables have a lot of low correlations fewer than .3 then consider removing the variable (Field, 2018).

2) Correlation that is too high

Another concern is when variables correlate too highly. According to Field (2018) mild multicollinearity is not a problem in factor analysis (FA), however, it is important to avoid extreme multicollinearity where the variables are very highly correlated, and singularity where the variables are very perfectly correlated . As with linear models, with a factor of highly correlated variables, multicollinearity creates

problems in FA as it becomes impossible to determine the unique contribution to a factor. However, contrary to the FA, multicollinearity does not cause a problem for PCA because there is no need to invert a matrix (Field, 2018, Tabachnick et al., 2007). Multicollinearity can be identified by looking at the 'determinant' of the ***R*** Matrix which should be greater than 0.00001.

Inspection of the ***R***-matrix correlation of this research revealed the presence of many coefficients of .3 and more. Moreover, ***R***-matrix correlation showed several coefficients less than .3. The decision was to continue the PCA without removing these variables for several reasons. Firstly, many of the coefficient correlations met Field (2018) measures of correlation more than .3. Secondly, the PCA was rerun without the low coefficients values, and the results showed a very minor difference of coefficients values in the ***R***-matrix correlation. Thirdly, while the aim of conducting the PCA in this research was to summarize patterns of correlations among observed variables and measure the strength of its underlying dimensions; it might be counter-productive to remove these variables as they are important to the research; and their development was based on the first phase findings, and the related exciting literature. Fourthly, in order to avoid a subjective approach in conducting PCA (Field, 2018). Also, these low coefficients do not resemble an identity matrix (Tabachnick et al., 2007).

Bartlett's Test of Sphericity measures is another sophisticated test of the factorability of ***R*** which identifies whether the correlation matrix is significantly different from the identity matrix. If it is significant then it indicates that the corrolations between variables (overall) are siginficantly different from zero. Usually this test will almost certainly be significant ($p < 0.00001$), as the significance depends on sample size, and usually the PCA includes a large sample size (Tabachnick et al., 2007). However, this significant value gives an indication that there are no massive problems, if the Bartlett's Test reached the statistical significance, it will support the factorability of the correlation matrix ***R*** (Field, 2018). Moreover, Tabachnick et al. (2007) and Stevens (2012) recommend this test only if there are fewer than five cases per variable.

Overall, for the informants in this study, the sample size (138) was adequate for conducting the PCA, the Kaiser-Meyer-Olkin (KMO) value and Bartlett test of sphericity reached statistical result which were in the normal range, supporting the factorability of the corrolation matrix as will be discussed in Chapter 8. Therefore, the PCA appeared to be appropriate.

7.5.2.1.2 Main analysis

Since the variables are specified and the correlation matrix is prepared, the second step is applying the main analysis of PCA to

identify the underlying structure of relationships (Figure 22). Factor extraction and factor rotation are the main two aspects of the PCA. The following sections will describe the procedures of PCA, explaining the decisions followed concerning component extraction and rotation.

7.5.2.1.2.1 Factor extraction

Data reduction is the main purpose of PCA, aiming for the minimum number of factors needed for consideration for the maximum part of the total variance represented in the set of variables (Hair et al., 2010). In PCA not all components are retained, extraction is the process of deciding how many components to keep. The researcher can determine the number of components that could best describe the variables considering two main conflicting issues: to get a simple solution including as few components as possible, and the necessity to describe the variance in the original data set as much as possible (Field, 2018, Pallant, 2013, Stevens, 2012, Hair et al., 2010). Tabachnick et al. (2007) indicated that the researcher applies an exploratory approach, assessing with various number of components until a satisfactory solution is achieved. There are many approaches used to assist in the decision concerning the number of components to be extracted:

1- Kaiser's criterion

Kaiser (1960) or the eigenvalue rule is the most widely utilized criterion to determine how many components to extract (Stevens, 2012). The eigenvalue demonstrates the amount of variation explained by a component (Field, 2018). In this rule, only components that represent a substantial amount of variation with eigenvalue above the criterion are retained.

Though using this rule commonly will result in retention of only the highly important factors, there is a certain drawback associated with the use of Kaiser's criterion, random use might retain components that could have no practical significance (Tabachnick et al., 2007). Therefore, researchers need to consider numerous alternative solutions (one more and one less component than the initial solution) to make sure the best satisfactory structure is found (Hair et al., 2010). Simulation work is useful in providing insights towards deciding the number of factors that should be retained (Norris and Lecavalier, 2010).

In this research, many simulation work were carried out, initially, based on the Kaiser's criterion of the eigenvalue set at more than 1, followed by other experiments where the value increased to a value more than 2, with both missing deletion technique (listwise and pairwise) (Appendix 8). Many reasons support the decision of setting

the eigenvalue at more than 2. The rotated component matrix failed to rotate when the PCA ran in the third and fourth run with an eigenvalue more than 1 with both rotations (direct oblimin and varimax). After factors were extracted, in some experiment, with an eigenvalue 1, which is the common default eigenvalue, the result showed nine general components that did not make sense. Additionally, where the aim of the factor extraction step in the PCA includes determining the lowest number of components that can be used to best represent the interrelationships among the set of variables (Pallant, 2013, Tabachnick et al., 2007), the nine components did not reflect substantial meaning and reasonable relationships among variables. Therefore, the decision was to change the eigenvalue to > 2 and rerun the experiment again which resulted in extracting three satisfactory components.

2- Scree test

In utilizing Kaiser's criterion, generally many components will be extracted, thus it is important to similarly consider the Scree test. This is a graphical approach proposed by Cattel (1966) where the eigenvalue (y-axis) is plotted against their components (x-axis) (Pallant, 2013). The relative importance of each component becomes obvious by graphing the eigenvalue (Field, 2018). The scree plot has a very characteristic shape; there will be a few factors with quite

high eigenvalues, the first component usually involves the highest eigenvalues, then decreasing for the next few components before reaching last competent with relatively low eigenvalue.

In the scree plot graph, there is a sharp descent in the curve followed by a tailing off, the inflexion point is where the slope of the line changes dramatically, and this inflexion point is used as the cut-off for components retaining the factors (Field, 2018). The recommendation is to retain all eigenvalues, and consequently components, in the sharp descent prior to the first component on the line where they start to level off (Stevens, 2012). The plots are properly utilised with PCA in the primary and last run to identify the number of components (Tabachnick et al., 2007). As a general rule, the Scree test results in at least one and occasionally two or three more factors being considered for inclusion than does Kaiser's criterion.

3- Parallel analysis

Another method gaining popularity is Horn's (1965) parallel analysis. This includes comparing the eigenvalues' size with other data sets of the same size which are randomly generated (Tabachnick et al., 2007). In this procedure, the initial eigenvalues from this study will be compared with a random data set of the same size from a different statistical program called 'Monte Carlo PCA for Parallel

Analysis', and only components from the real data set in which eigenvalues exceed the values from the random data set will be retained.

A main advantage to this method is to remind the user that even randomly generated data can have interrelationships (sometimes substantially so) based on chance that produces components with an eigenvalue larger than 1 (Tabachnick et al., 2007).

4- Communalities

Communalities are the estimated value of variance in the extracted components. As is often the case in statistics, the three criterions might provide various solutions, in this situation the communalities could be considered (Field, 2018). If values are more than 1 then all common variance is accounted for, and if the value is 0 then no common variance is accounted for, thus if communalities are valued as equal to or exceeding 1, it indicates that there is a problem with the solution (Hair et al., 2010). For this research, the questionnaire was based on the qualitative findings from the first phase and the literature, thus, the communality values were important. PCA assumes that all variance that the items and components share are common, therefore, all communality values are initially estimated as 1. Then, after extraction a more realistic value of common variance

can be obtained. It was important to identify whether there were any shared underlying aspects or latent phenomena.

5- Component matrix

This matrix includes the loadings of each variable onto each component. In this research, the small coefficient was suppressed below .3 in the SPSS, thus the factor loadings less than .3 have not been displayed. Also, they have been sorted by size, thus, the variables are listed in the order of their factor loading size. The component matrix is helpful in assessing how much rotation improves interpretation in the component solution, it is interesting to note that before rotation most variables load highly onto the first component (Field, 2018).

6- Reproduced matrix

Reproduced matrix produces a correlation matrix based on the model instead of the original data (Field, 2018). To assess this, the footnote of the matrix where it states how many residuals have an absolute value >0.05 were scanned. According to Field (2018), although there are no 'hard-and-fast' rules to determine the proportion, it should not exceed 50%.

7.5.2.1.2 Factor rotation

Once the components have been extracted, it was possible to calculate the loading for each variable on each component. The different distribution of the loading among variables made interpretation difficult. Factor rotation does not interfere with the underlying solution, but instead presents the pattern of loading in a simple interpretable manner (Tabachnick et al., 2007).

Rotation involves two main methods; orthogonal or oblique factor solution. The oblique rotation (direct Oblimin is the most common one) permits for the factors to be correlated (Stevens, 2012). According to Tabachnick et al. (2007) the oblique rotation appears to be the most reasonable rotation because it seems more probable that factors are correlated than they are not. It is the best fitted to the goal of finding several theoretically meaningful constructs, because, realistically, few constructs in the real world are uncorrelated (Stevens, 2012, Hair et al., 2010).

The orthogonal rotation involves rotating the factors while keeping the uncorrelated (independent) factors. Varimax is the most popular orthogonal rotation, designed by Kaiser (1960) to clean up the factors, it tries to maximize the spread of loading within components (Stevens, 2012). Therefore, in the varimax rotation, each component attempts to load high on a smaller number of variables

and low-very low on other variables (Field, 2018). The varimax is a preferred rotation when the research aims for data reduction to a small variables number (Hair et al., 2010). In the varimax rotation, the maximum variance property of the real component is destroyed, the rotation mainly accounts for maximum amount of variance (Stevens, 2012). Therefore, the first rotated factor was not essentially account for the maximum total of variance. In the varimax rotation, various high loading (-1 or +1) are expected, in addition to some loading near 0 in each column of the matrix. The interpretation is simplest when the correlation between variable-component is close to either +1 or -1, thus indicating a clear positive or negative association between them; or if it is close to 0, indicating a clear lack of association (Hair et al., 2010).

The recommendation is to run the analysis using both methods of rotation, if the oblique rotation produced nonsensible correlations between the extracted components then it is realistic to use the orthogonally rotated solution (Field, 2018). If the oblique rotation shows a correlated factor structure, consequently the orthogonal rotated solution must be removed. Additionally, in deciding which rotation should be used, a good theoretical reason needs to be considered to support whether the factors should correlate or not (Stevens, 2012).

In this research, The PCA was run with both rotations, starting with direct oblimin and followed by varimax rotation (Appendix 8). Initially, once the correlated factor structure appeared, the varimax rotation was discarded and the decision was made to use the direct oblimin rotation (oblique). Furthermore, in the development process of the questionnaire, many items reflected the usefulness, usability, engagement and attitude toward clinical skills RLOs. So many of the items were related to each other that it was not anticipated that, for example, the usability items would be completely independent from usefulness and other items. Therefore, on theoretical grounds, the decision was made to choose oblique rotation.

However, the structure matrix, which is one of criterion to assess the adequacy of the rotation, revealed the presence of simple structure (Thurstone, 1947) with many variables located on the rows loaded substantially on more than one component. Also, many variables values were relatively close, though the three components which were placed on the columns showed a number of high and low loadings (Appendix 9Appendix 8). Therefore, if more than one high correlation corresponds to variables, they are complex as they reflect the influence of more than one factor, and it has been suggested by Tabachnick et al. (2007) to avoid them because they make the component interpretation more ambiguous. Therefore, the result did not support the oblique rotation and orthogonal rotation (varimax)

was selected in this research. The rotation output resulted in the rotated component matrix:

1- Rotated component matrix

The rotated component matrix is a matrix of the component loading for each variable. According to Field (2018), in the case that a variable loads highly in two components, the higher loading will be selected as it is making a bigger contribution to the component, considering that every variable has a loading in each component (but the option to supress the loading of less than .3 was selected).

Furthermore, Pett, Lackey and Sullivan (2003) suggested that with items that have weak loadings on all components, two factors should be considered; low communality (the proportion of explained variance in the item by the components is low), or its contribution to the overall scale is of little importance (its meaning relative to the other items is unclear). According to them, the item should be excluded and then a new component solution without these items would subsequently be undertaken and the results revaluated. With items with strong loadings on multiple components, they suggest placing the item with the component that it is very closely conceptually related to. Thus, the Cronbach's alphas can be used to assess the component's internal consistency and to decide where to best place an item with strong loadings on several components.

In this research, in cases where there are items with multiple strong loadings (>.3) on two or more components in the rotated component matrix, the decision was to select the higher loading (for example, if the items loaded .626 and .373 on two components). However, in cases where there are items which are loaded with relatively close values (for example, if items loaded .43.7 and .314) on two or more components, the decision was to assess the higher loading and if it was very closely conceptually related to the component, then it will be selected. If the item is not conceptually related to the component, the lower loading will be assessed in the same way, and if it is more conceptually related to the component than the highest loading, then it would be selected and consequently the item would be added to that component because it will add more meaning to the component. Then the internal consistency will be assessed to decide the best place of an item on a component.

7.5.2.1.3 Factor interpretations

When a component structure has been obtained, it needs to be interpreted. Every variable will have a loading on every component; thus variables loading highly on the component should be looked for (Field, 2018). The loading is not a correlation, rather a measure of the unique relationship between the component and variable (Tabachnick et al., 2007). As a rule of thumb, only variables with

loading of .3 and more should be interpreted, the larger the loading, the more the variable is a pure measure of the component (Tabachnick et al., 2007). Comrey and Lee (1992) provide guidelines for variable-to-factor loadings to help identfy if an item should be included among those defining the factor:

- .45 (20% shared variance): fair
- .55 (30% shared variance): good
- .63 (40% shared variance): very good
- .71 (50% shared variance): excellent

Researchers should identify the cut-off for loading size to interpret (Tabachnick et al., 2007). Table 21 provides a guideline for identifying significant component loading based on sample size.

Factor loading	Sample size needed for significance
.30	350
.35	250
.40	200
.45	150
.50	120
.55	100
.60	85
.65	70
.70	60
.75	50

Table 21 Guideline for identifying significant component loading based on sample size

7.5.2.1.4 Component Correlation matrix

The component correlation matrix demonstrates the strength of the correlation coefficient between the components, it is useful to assess how reasonable it is to assume the independence factor (Field, 2018). In other words, the latent constructs represented by the components are related. It provides information to decide whether it was reasonable to assume that the components were not related (the varimax rotation assumption) or whether it is necessary to use the Obliman rotation solution (Pallant, 2013).

7.5.2.1.5 Post analysis: reliability analysis

The last step in the PCA procedure was the reliability analysis. Reliability means that a measure (or questionnaire) should consistently reflect the construct that it is measuring (Tabachnick et al., 2007). In this research, Cronbach's alpha showed some possible problems with the consistency. The negative phrase items are important for decreasing response bias, but they will affect the alpha. However, in Cronbach's alpha were reversed, it is not the same case in PCA where the reversed phrases do not matter; all that occurs is having a negative factor loading for any reversed item (Hair et al., 2010).

Cronbach (1951) suggested that if several components exist then the measure should be applied independently to items relating to different components as alpha does not measure the 'unidimensionality' (Field, 2018). Although the total Cronbach's alpha coefficient had been calculated to the total scale to determine the stability of the scale, according to Field (2018), the alpha should applied separately to the questionnaire which has a subscale.

7.5.3 Data analysis for focus-group

A focus-group is an open, supportive environment where the participants can talk in depth and it can result in elaborated and detailed accounts (Silverman, 2017). In this study, being limited to the number of the focus-group conducted with small sample size, the focus-group lacked in producing sufficient themes. The sample size suggested for sufficient data for a small study is two to four focus-groups with sampling facilitating generating themes in small sample size groups (generally, smaller groups, more groups) (Braun and Clarke, 2013). Accordingly, applying the thematic analysis, similar to the first phase, seemed to not be suitable.

However, the thematic analysis framework employed in the first phase was adapted to generate groups of categories involving the same meaning. Firstly, qualitative data from the focus-group was transcribed verbatim by the researcher to make the researcher more

familiar with the content and then, translated to English (utilising the same method as in Chapter 5). Some of the statements were difficult to literally translate or the researcher was not sure if they had the same meaning in English. In that case, colleagues were consulted to advise on the meaning or accuracy of the translation without knowing the purpose of the researcher's question. Then, the transcript was segmented to present a single thought or focus of attention or comments on students' responses from the SSEQ.

Finally, the findings were written in a report. Interpretations were made while being aware that the focus-group data could not necessarily be regarded as a factual explanation and description of a person's behaviour or long-lasting beliefs. Rather, the interview data provided contextual, situated stories which were influenced by the experiences and expectations of proper interview behaviour by both participants and researcher (Silverman, 2017). Regardless, there is a limitation to this method in this study, as the focus-group provided only a sense or flavour of the tutors' views on the UK RLOs implementation, including underlying thoughts, explanation and motives in which students responded to the responses to the SSEQ, rather than a deep understanding.

7.6 Summary

This chapter has presented the implementation of six clinical skills RLOs into an undergraduate Saudi nursing curriculum. It also presented the method of data collection selected in the third evaluation phase of the study. The SSEQ was administered to 140 second-year nursing students as a paper-based questionnaire. Then, a Principle Component Analysis (PCA) was used for the construct validity. Many crucial decisions were required for the PCA related to the number of extracted components, rotation, and missing data. Following the PCA, descriptive statistics and frequencies were utilised to analyse the data.

Following the quantitative part of the evaluation phase, tutors expressed their views on the RLO implementation during the focus-group discussion. Thematic analysis was adopted to analyse the findings.

Having outlined the methods and analyses used in this phase, the following chapter will present the findings and the discussion from the PCA and focus-group.

Chapter 8: Evaluation phase: findings and discussion

This chapter will present the results from the quantitative and qualitative data analysis of the third evaluation phase. The quantitative part will start with the presentation of the descriptive statistic results of the general information regarding the student participants, and the PCA results. Then, the descriptive statistics of frequencies in light of the resulting components from the PCA will be reported. Following that, the findings of the follow-up focus-group will be reported. Finally, the findings from this phase will be discussed.

8.1 General information data

This section presents the results from the three-general information questions about the students who responded to the Self-Evaluation Students Questionnaire (SSEQ).

8.1.1. Number of RLOs accessed

Of the 138 respondents, all of the students accessed the clinical skills RLOs involved in the implementation phase but the number of RLOs accessed varied among students.

Figure 23 illustrates the grouping of the RLOs accessed by the students. 23% of the students accessed all 6 RLOs included in the

nursing Foundation course, while 18% of the students accessed only one RLO. The remaining students varied from accessing 2 RLOs to 5 RLOs.

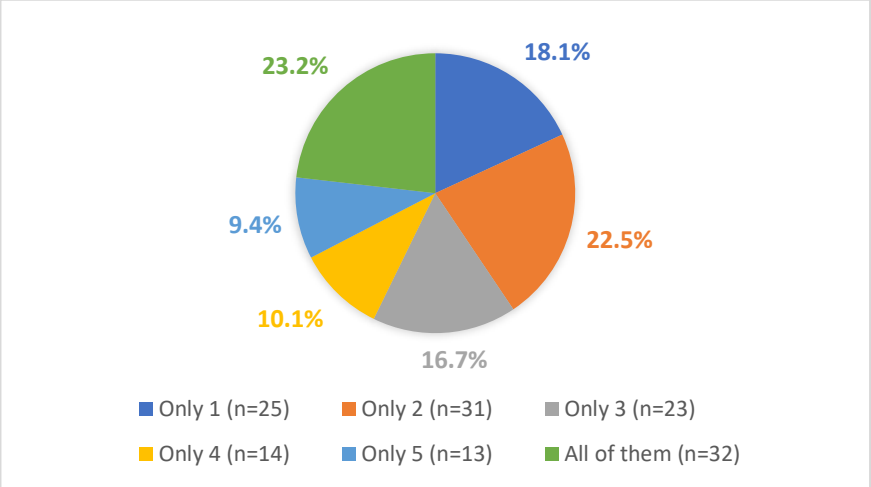


Figure 23

The students were asked if they accessed any other RLOs in addition to the RLOs included in the study. Figure 24 shows that the majority of the students (87.7%) did not access any other RLOs. 12% of the students accessed other RLOs. 8.7% of them did not specify the name of the other RLOs, while 2.9% accessed the physical assessment RLO, and 0.7% of the students accessed both the physical assessment and sterile field RLO.

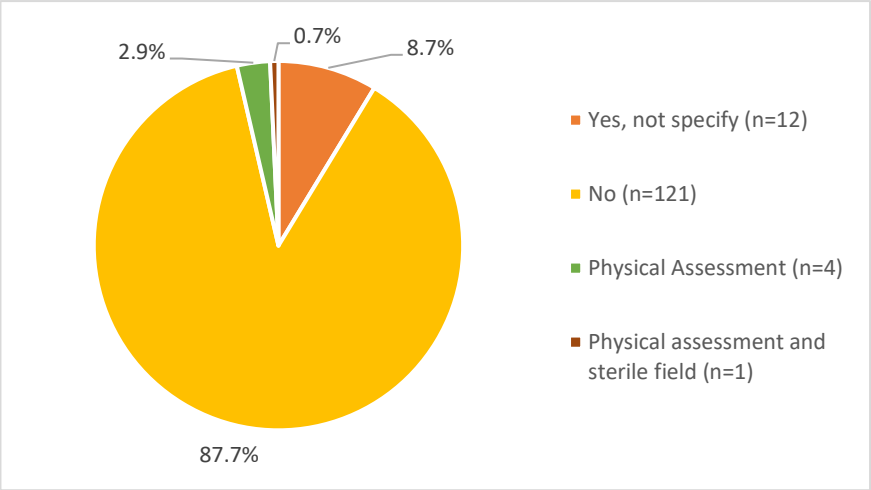


Figure 24

8.1.2. Where the students accessed the RLOs

Figure 25 shows that the majority of the students (96.6%) accessed the RLOs from home, while 12% accessed the RLOs from the university, and 18% accessed the RLOs from both home and university.

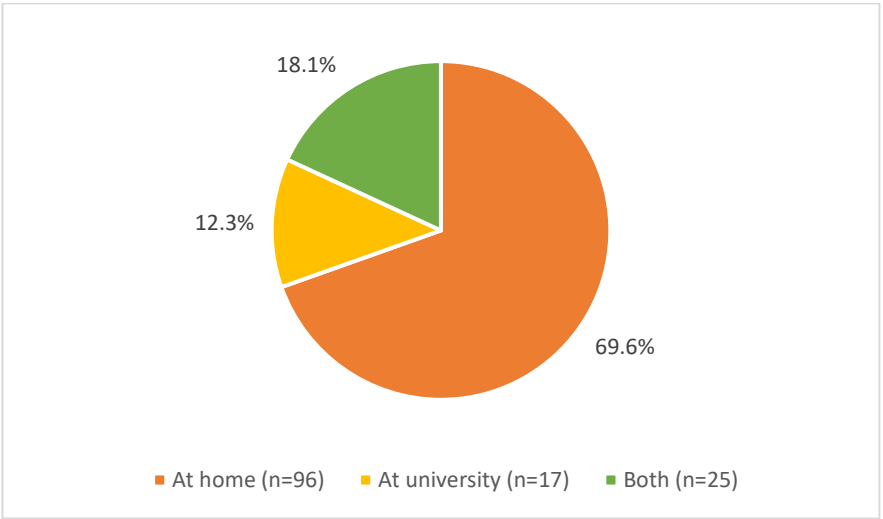


Figure 25

Data revealed that all students accessed the RLOs during the implementation phase from home, university, or both and some of

the students indicated some additional places where they accessed the RLOs. Figure 26 illustrates that only 2.8% of the students accessed the RLOs from different places, 1.4% did not specify from where; 0.7% from the hospital; and 0.7% with their friends without identifying a specific place.

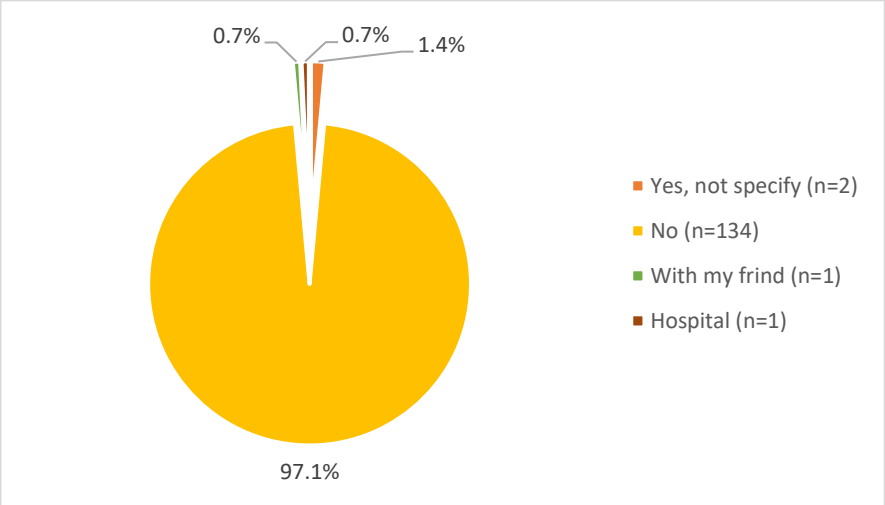


Figure 26

8.1.3. When the RLOs were accessed

Figure 27 illustrates when the students accessed the RLOs during the implementation phase. 27.4% of the students accessed the RLOs before the lab session. 25% of the students indicated that they accessed the RLOs at the end of the course or during revision time. The lowest score (8.7%) was the number of students who accessed the RLOs during the lab session.

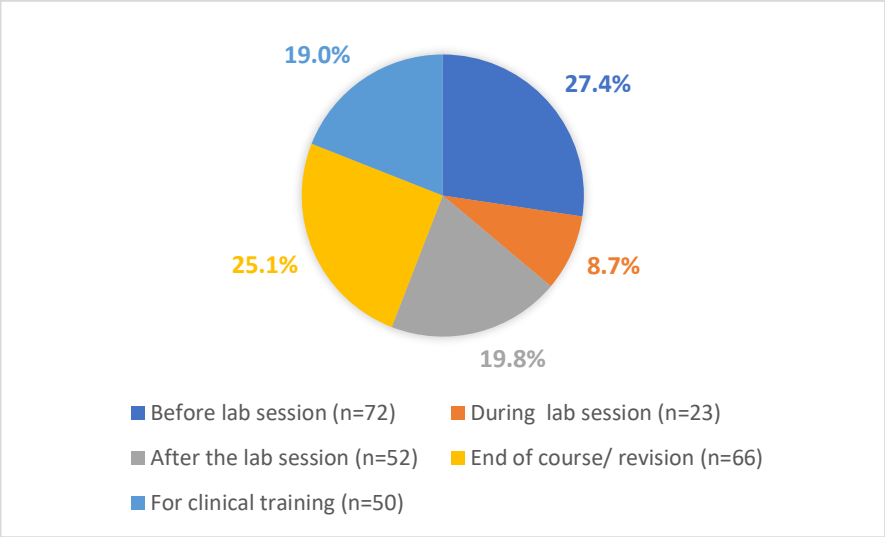


Figure 27

Data showed that some students accessed the RLOs at 'other' times in addition to the options given in the question. Figure 28 indicates that two students accessed the RLOs during other times, 0.7% of the students accessed the RLOs in the second term, and 0.7% did not specify when.

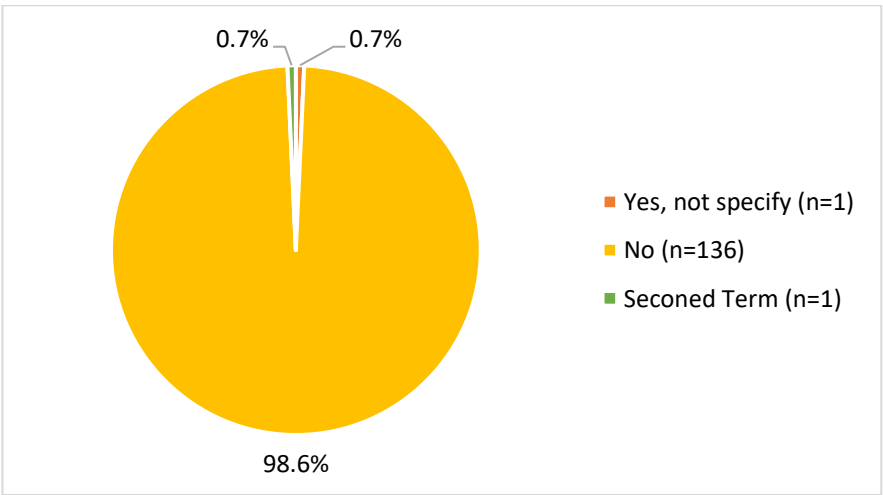


Figure 28

8.2 Result of the PCA

8.2.1 Data assessment

Output 1 shows that the Kaiser-Meyer-Olkin (KMO) statistic is .891, which is well above the criterion of 0.5 and falls into the range of 'meritorious' which indicates that the sample size is adequate for the PCA. Additionally, the KMO values for individual variables were well above 0.5 as shown in the Anti-image Matrices.

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.891
Bartlett's Test of Sphericity	Approx. Chi-Square	2729.930
	df	780
	Sig.	.000

Output 1 KMO and Bartlett's Test

Furthermore, Bartlett's Test of Sphericity (Output 1) reached statistical significance, though the small coefficient values did not remove from ***R***, supporting the factorability of the correlation matrix. Although the Bartlett's Test of Sphericity is often an issue because of the large sample size in PCA (Field, 2018), in this research, it was significant as there are fewer than five cases per variable as Tabachnick et al. (2007) and Stevens (2012) recommend and the sample size was adequate compared with other literature on PCA. Examination of the correlation ***R***-matrix has shown significant evidence, though not perfect, that support the factorability of *R*-matrix, which eventually confirms the suitability of the PCA.

Overall, these results indicate that the sample size (138) was adequate enough for conducting the PCA, the Kaiser-Meyer-Olkin (KMO) value was .89; exceeding the recommended value of .6 . The Bartlett test of sphericity reached statistical significance, supporting the factorability of the corrolation matrix as will be discussed in the following sections. Therefore, PCA appeared to be appropriate.

8.2.2 Components extraction

PCA revealed the percentage of three components with eigenvalues larger than two, explaining 33.62 %, 6% and 5%of the variance respectively. Inspection of the scree plot illustrated a clear cut-off point after the third component. This was further supported by the result of the parallel analysis which showed three components with eigenvalues higher than the randomly generated data set of the same size. Additionally, the data revealed that the commonalities were within the acceptable range. Accumulatively, all these criterions provided a strong supportive evidence of the three extracted components. The following sections will present the results through using different techniques. Many methods were used to support the decision regarding the number of components extracted:

8.2.2.1 Kaiser's criterion

40 factors were identified before rotation (Output 2). The first three factors describe a relatively large amount of variance with eigenvalues exceeding 2 accounting for 44.742% of the total information in the initial data, whereas subsequent factors described only a small amount. Component 1 explained 33.587% of the variance. The data revealed a sharp decrease for components 2 and 3 explaining 6% and 5% of the variance respectively. The components and their eigenvalues from 4 to 40 explained a small amount of variance, though there was relatively high loading in some of them. This reflects that an extremely large proportion of unique variance would be involved; therefore, these components would not be appropriate.

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	13.435	33.587	33.587	13.435	33.587	33.587	8.086	20.214	20.214
2	2.442	6.105	39.692	2.442	6.105	39.692	4.984	12.460	32.674
3	2.020	5.050	44.742	2.020	5.050	44.742	4.827	12.068	44.742
4	1.575	3.938	48.680						
5	1.430	3.574	52.254						
6	1.258	3.144	55.398						
7	1.132	2.830	58.228						
8	1.105	2.763	60.991						
9	1.037	2.593	63.583						
10	.981	2.453	66.036						
11	.922	2.304	68.340						
12	.911	2.277	70.617						
13	.880	2.199	72.816						
14	.765	1.913	74.729						
15	.744	1.861	76.591						
16	.688	1.720	78.311						
17	.670	1.675	79.985						
18	.640	1.600	81.585						
19	.626	1.565	83.150						
20	.582	1.454	84.604						
21	.546	1.366	85.970						
22	.519	1.297	87.267						
23	.481	1.203	88.470						
24	.446	1.114	89.584						
25	.399	.997	90.581						
26	.391	.978	91.559						
27	.372	.929	92.488						
28	.347	.867	93.355						
29	.337	.843	94.198						
30	.310	.776	94.974						
31	.279	.696	95.670						
32	.266	.664	96.334						
33	.239	.598	96.932						
34	.226	.566	97.498						
35	.213	.533	98.031						
36	.196	.490	98.522						
37	.173	.432	98.953						
38	.155	.387	99.340						
39	.147	.367	99.707						
40	.117	.293	100.000						
Extraction Method: Principal Component Analysis									

Output 2 Total variance explain

8.2.2.2 Scree test result

After running the PCA many times with different eigenvalues and comparing them with the result of the scree test, given that the research had an acceptable adequate sample size (although the scree plot affords a relatively reliable criterion with sample size of 200) and given that there is some consistency between Kaiser's criterion and the scree plot, it could be acceptable to extract three components.

An inspection of the scree plot revealed a clear break after the third component, using Cattles's (1966) scree test, and it was decided to retain 3 components for further investigation (Figure 29). Component 1 captures much more of the variance than the remaining components. The point at which the curve first starts to straighten out is deemed to reveal the maximum number of components to extract. Beyond the third component, too large a proportion of unique variance would be included; so, these factors would not be acceptable.

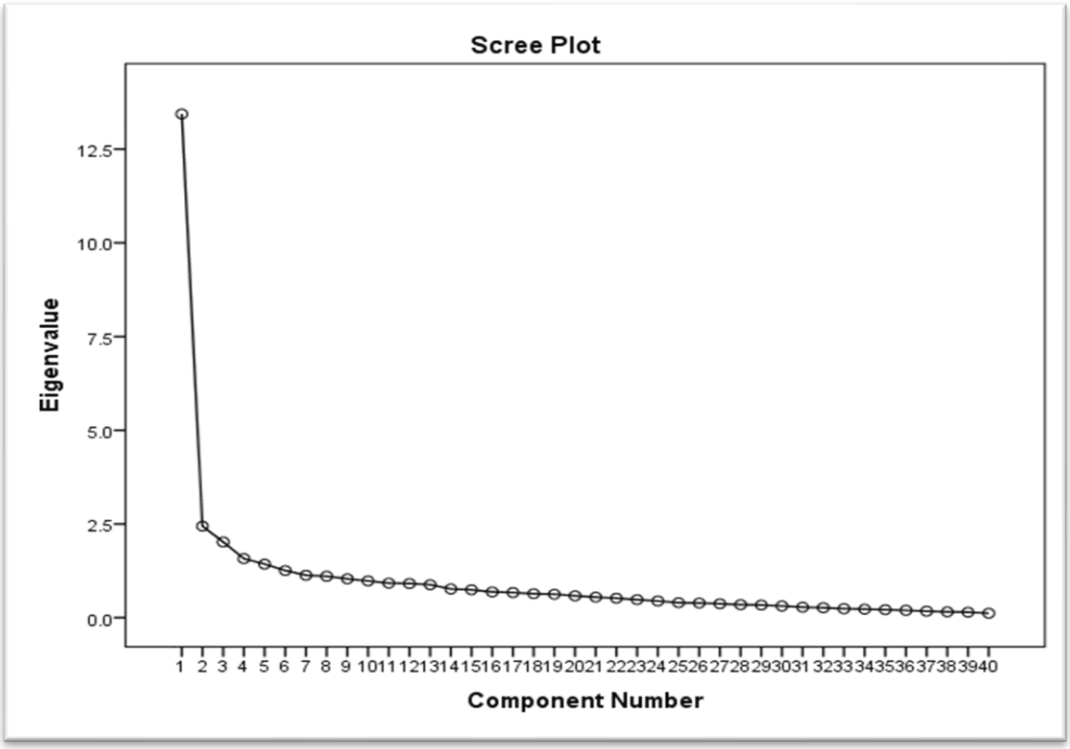


Figure 29 Scree plot

8.2.2.3 Result of parallel analysis

The results from parallel analysis are an additional support to the decision from the Kaiser's criterion and scree plot. The results showed only three components with eigenvalues above the corresponding criterion values from a data matrix of the same size (40 variables x 138 respondent) that were randomly generated (Output 3). The number of extracted components in the first run of PCA with eigenvalues of more than 1 resulted in nine components. This result disagreed with the parallel analysis which supposed its eigenvalue to be greater than 1. However, when the eigenvalue changed and was based on values of more than 2 in the second run of PCA, the number of extracted components resulted in three which

matched the result from the parallel analysis (three components). Thus, the parallel analysis supported the decision of retaining these three components.

Component	Initial eigenvalue from PCA	Random eigenvalue from parallel analysis	Decision
1	13.435	2.2236	Accept
2	2.442	2.0622	Accept
3	2.020	1.9447	Accept
4	1.575	1.8463	Reject
5	1.430	1.7567	Reject
6	1.258	1.6823	Reject
7	1.132	1.6107	Reject
8	1.105	1.5482	Reject
9	1.037	1.4817	Reject
10	.981	1.4188	Reject
11	.922	1.3661	Reject
12	.911	1.3071	Reject
13	.880	1.2502	Reject
14	.765	1.1959	Reject
15	.744	1.1464	Reject
16	.688	1.1013	Reject
17	.670	1.0563	Reject
18	.640	1.0102	Reject
19	.626	0.9655	Reject
20	.582	0.9264	Reject
21	.546	0.8842	Reject
22	.519	0.8460	Reject
23	.481	0.8072	Reject
24	.446	0.7728	Reject
25	.399	0.7362	Reject
26	.391	0.6970	Reject
27	.372	0.6613	Reject
28	.347	0.6270	Reject
29	.337	0.5927	Reject
30	.310	0.5608	Reject
31	.279	0.5321	Reject
32	.266	0.5029	Reject
33	.239	0.4707	Reject
34	.226	0.4397	Reject
35	.213	0.4085	Reject
36	.196	0.3787	Reject
37	.173	0.3463	Reject
38	.155	0.3128	Reject
39	.147	0.2825	Reject
40	.117	0.2403	Reject

Output 3 Monte Carlo Parallel analysis

8.2.2.4 Communalities

The average of communalities was calculated:

24.919/40 = 0.623

The average was in the normal range between 0 and 1. The data showed that the variance associated with the components explained the original data (Output 4).

Communalities		
	Initial	Extraction
1	1.000	.383
2	1.000	.533
3	1.000	.416
4	1.000	.413
5	1.000	.401
6	1.000	.534
7	1.000	.452
8	1.000	.480
9	1.000	.429
10	1.000	.482
11	1.000	.518
12	1.000	.389
13	1.000	.407
14	1.000	.281
15	1.000	.538
16	1.000	.523
17	1.000	.445
18	1.000	.393
19	1.000	.526
20	1.000	.415
21	1.000	.405
22	1.000	.408
23	1.000	.197
24	1.000	.393
25	1.000	.364
26	1.000	.466
27	1.000	.545
28	1.000	.513
29	1.000	.360
30	1.000	.628
31	1.000	.584
32	1.000	.524
33	1.000	.416
34	1.000	.417
35	1.000	.489
36	1.000	.161
37	1.000	.467
38	1.000	.639
39	1.000	.569
40	1.000	.395

traction Method: Principal Component Analysis.

Output 4 Communalities

8.2.2.5 Component matrix

Interestingly, most variables were loaded highly on the first component before rotation compared with the remaining components which revealed a very low loading (Output 5). To aid in the interpretation of these three components, varimax rotation was performed, and the rotation output result is shown in the following rotated components matrix.

Component Matrix[a]			
	Component		
	1	2	3
2	.701		
38	.701	.384	
11	.690		
6	.668		
35	.661		
26	.660		
16	.650		
10	.643		
4	.639		
15	.633		.336
39	.632	.409	
19	.624	-.369	
5	.623		
8	.617		
24	.614		
17	.614		
7	.614		
3	.611		
1	.611		
25	.602		
29	.599		
9	.599		
28	.596	.329	
30	.585	.342	-.412
31	.563		-.482
12	.560		
37	.558	.393	
34	.554	.329	
13	.544		
21	.539		-.327
27	.536	.409	.301
33	.533		
32	.517		-.421
20	.515	-.371	
18	.512	-.347	
22	.472		-.429
40	.450	.310	.310
36	-.328		
14		.323	.414
23			

Extraction Method: Principal Component Analysis.
a. 3 components extracted

Output 5 Component Matrix

8.2.2.6 Reproduced matrix

The data in this research reveals that there are 43% (340) nonredundant residuals with absolute value >0.05. 43% is most probably nothing to worry about as it does not reach 50%.

8.2.3 Factor rotation results

Factor rotation includes turning the reference axes of the components about on their origin to attain a simpler and theoretically more meaningful components solution than is generated by the unrotated component solution. The PCA was run with both the oblimin rotation, followed by varimax rotation as explained previously. The results from the direct oblimin rotation suggested that correlating the components did not add measurably to the simplicity of the rotated component solution. However, the orthogonal rotation generated the greatest number of highest and lowest component loading. Therefore, the decision was to use the varimax rotation (orthogonal). The rotation output resulted in the rotated component matrix.

8.2.3.1 Rotated component matrix

As soon as the decision is made between orthogonal and oblique rotation, Tabachnick et al. (2007) suggested several techniques to assess the adequacy of rotation, the most common way is to

compare the pattern of correlation in the rotated component matrix with the components. Before rotation (Output 6), most items loaded highly on the first component compared with the second and third components. Scanning the rotated component matrix revealed that all variables loaded substantially on only one component, though some variables values are relatively close, there was no similar loading on two or more components. Therefore, this supported the varimax rotation.

Rotated Component Matrix[a]			
	Component		
	1	2	3
19	.690		
6	.683		
16	.681		
8	.647		
11	.636		
15	.633	.371	
7	.627		
17	.622		
9	.614		
20	.589		
18	.574		
12	.564		
10	.543	.422	
5	.525		
24	.519		
4	.505		
1	.502		
3	.498		.391
25	.453		.302
29	.437	.314	
27		.705	
28		.639	
39		.626	.373
38		.620	.438
40		.598	
37		.535	.404
13	.356	.526	
34		.525	.325
35	.322	.481	.393
14		.474	
26	.385	.473	.308
31			.726
30		.318	.719
32			.677
22			.598
33			.560
21	.374		.514
2	.494		.495
36			-.324
23			-.305

Extraction Method: Principal Component Analysis
Rotation Method: varimax with Kaiser Normalization

Output 6 Rotated component matrix

8.2.3.2 Component correlation matrix

The data in the component correlation matrix (Output 7) shows that each relationship between components had a unique value (three distinct components). Thus, independency would be assumed and therefore the solution of varimax rotation is reasonable.

Component Correlation Matrix			
Component	1	2	3
1	.718	.491	.493
2	-.660	.705	.258
3	.221	.511	-.831

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization

Output 7 component correlation matrix

In summary, three components seem to have emerged from the rotated component matrix, with variables loading strongly to fairly poor on each component. The three components will be described in detail in section (8.2.6). Component 1 seems to represent students' views on the educational values of clinical skills RLOs for the nursing students. Component 2 represents the students' views on the utility and usability of the RLOs. Component 3 represents students' views on the impact of the RLOs media attribute in supporting clinical skills learning. There were many significant correlations among the three components, with some negative loading into components, indicating a negative relationship. The loading for the initial items on the three components >.690, corroborated the appropriateness of a varimax rotation.

8.2.4 Geometric representation of the components before and after rotation

Figure 30 and Figure 31 are the graphical representations (not to scale) of the first three components utilizing an orthogonal rotation displaying the relationship between each component and its variables. The graphs illustrate the loading plot among the three extracted components before rotation and after rotation. The *y* axis is supposed to range from -1 to +1 which is the outer limit of a correlation coefficient, and the x axis represents the three components. The plots represent the loadings for each variable which are arranged in descending order, the highest loading at the top and the lowest loading at the bottom; and the positive loading above 0 and the negative loading under 0. The clusters demonstrate the closeness of the variables and the shared variance between them before and after rotation. The orthogonal rotation keeps the correlation between components independence from each other. The variables failed to correlate across the three components. It seems that the loading of each variable in each component supported the varimax rotation.

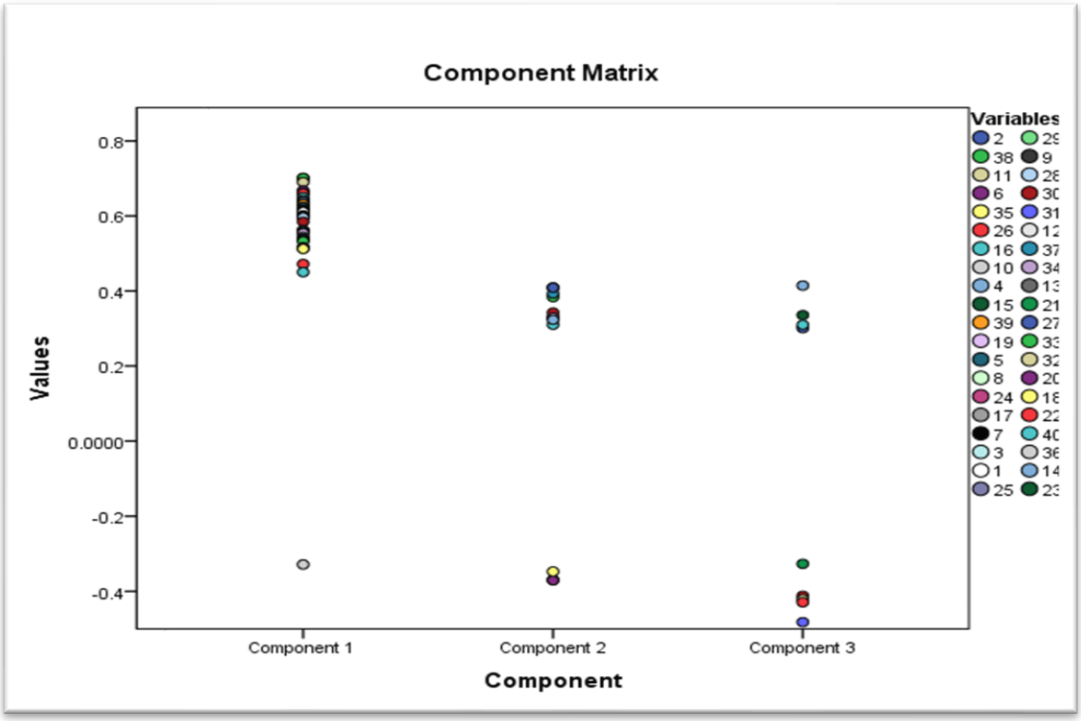


Figure 30 Loading plot graph of the component matrix before rotation

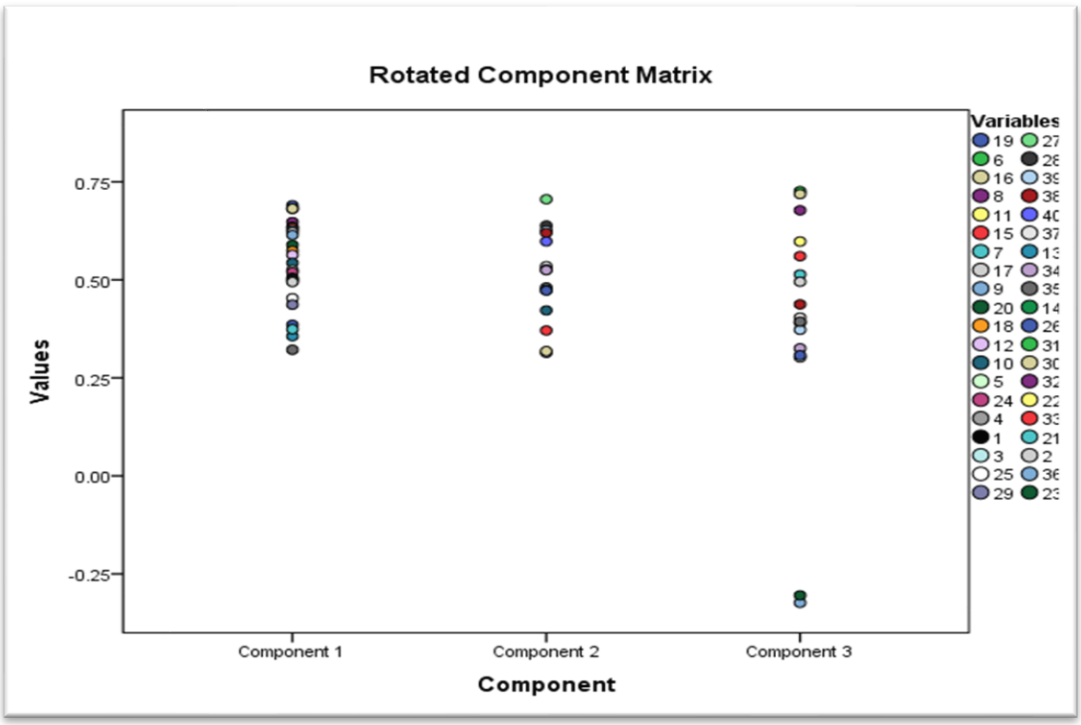


Figure 31 Loading plot graph of the component matrix after rotation

8.2.5 Reliability analysis result

The results from Cronbach's alpha discovered a high internal consistency in the three components. One low value of 'corrected item-total correlation' was identified in the item-total statistics matrix of both second and third components. The following sections will present more details regarding the internal consistency of each component.

8.2.6 Components features

Based on convergence of the Kaiser's criterion, the scree plot criterion, communalities, and the parallel analysis, three components with combinations which explained 44% of the variance were retained. Although the SSEQ was designed to involve the four components of usefulness, usability, engagement and attitude towards the RLOs, the PCA revealed three reasonable components instead of four where their items were more consistent and related in their meaning. The following sections will present the characteristics of these three components and their loading after rotation, communalities, and the Cronbach's alpha coefficient for each of the three-retained components.

8.2.6.1 Component 1: Students' views on the educational values of clinical skills RLOs for Saudi nursing students

Variables related the educational value of the RLOs to learning clinical skills, students' willingness to use different RLOs in the future, and the clarity of the RLOs are loaded into the first component (Table 22). Communalities varied in their values, but all were >.3 indicating a reasonable amount of shared variance. The loading value represents the correlation between an original variable and component. The first component involved 20 items with loading ranging from .690 to .437, from excellent to fair providing evidence that the component describes the original data.

Item 2 was added to component 1 because it loaded on both components 1 and 3 with relatively close values .494 and 495 respectively and the item is conceptually related to the first component as it expressed an educational value of RLOs instead of value of media attribute. Therefore, item 2 was placed on the first component instead of the third component. Additionally, item 29 loaded in both first and second components with close relative values (.437 and 314 respectively) and after assessing the item conceptually it revealed that it is conceptually related to the second component (usability of RLOs). Thus, was placed on the second component instead of the first component.

The first component showed a very good internal consistency with a Cronbach alpha in all cases when all the highest loading was assumed, when item 2 was added, and item 29 removed. Therefore, adding the conceptually related item (2) was possibly a good decision as it did not impact the internal consistency negatively.

Item N	Items	Component loading	Communality
19	I would recommend these RLOs to other students	.690	.526
6	The RLOs helped me to address specific gaps in my knowledge	.681	.534
16	I intend to use the RLOs from this course again	.681	.523
8	The RLOs enhanced my confidence in my clinical skills	.647	.480
11	The RLOs prepared me for the lab sessions	.636	.518
15	The RLOs helped me get a better mark on the clinical skills exam	.633	.538
7	The RLOs helped me to retain knowledge in clinical skills procedures	.627	.452
17	I am confident that I will be able to use the knowledge gained from RLOs in future practice	.622	.445
9	Having the procedures available online at all times decreased my mistakes in performing the skills	.614	.429
20	I enjoyed being able to study procedures at my own pace	.589	.415
18	I would like to see more RLOs in other clinical skills	.574	.393
12	The RLOs decreased my anxiety in the lab sessions	.564	.389
10	The RLOs helped me to practise the clinical skills procedures independently	.543	.482
5	The activity in the RLOs aided my understanding of the clinical skills	.525	.401
24	The RLOs introduced new concepts clearly	.519	.393
4	The content of the RLOs fitted my learning needs in clinical skills	.505	.413
1	The RLOs were interesting and engaging	.502	.383
3	The RLOs were valuable in understanding the clinical skills procedures	.498	.416
25	The information in RLOs were at the right level for me	.453	.364
2	The RLOs were helpful for learning the clinical skills	.495	.533
29	The RLOs were clear about their objectives	.437	.360
Eigenvalue Total of % if variance explained		33.587%	
Coronach's alpha	Component 1 with all loading	.926	
	Component 1 with item 2	.929	
	Component 1 with item 2 and without 29	.926	

Table 22 Students' views on the educational values of clinical skills RLOs for the Saudi nursing students

8.2.6.2 Component 2: students' view on the utility and usability of the RLOs

The second component presented variables related to the usability of the RLOs, integration of the RLOs, and other unrelated items which were related to the other learning resources (Table 23). The commonalities were low in some items, which could reflect that a few common variances are accounted for in this component. Loading value ranged from .705 to .473, indicating excellent to fair loading. Item 29 had been added to the second component as it is conceptually related to this component rather than the first component, with nearly relative values (.437 and 314 respectively).

The overall Cronbach alpha is .851, and .857, after adding item 29, reflecting a good internal consistency of the scale. However, item number 14 showed a very low value of 'corrected item-total correlation' = .165 < .3 which suggested that the item is measuring something different from the scale as a whole. Thus, the Cronbach alpha was reassessed without item 14 resulting in a value of .874, and a value of .878 when item 29 was added. This is considerably higher than the original value and reflects a better internal consistency after adding item 29 and remove item 14. Thus, adding the conceptually related item (29) and removing item 14 did not appear to negatively affect the internal consistency.

Item N	Items	Component loading	Communality
27	The terms used in the RLOs were easy to understand	.705	.545
28	The language was easy to understand in the RLOs	.639	.513
39	I liked the multimedia design of RLOs	.626	.569
38	The RLOs were well structured	.620	.639
40	RLOs were superior to other online learning resources available on the web, for example from YouTube, Google, Wikipedia or other sites	.598	.395
37	The RLOs were easy to navigate	.535	.467
13	The RLOs ensured parity of clinical skills information across all classes	.526	.407
34	The self-assessments at the end of the RLO helped me gauge how well I had understood the material	.525	.417
35	The RLOs were well integrated with the foundation course and other teaching sessions	.481	.489
14	I preferred learning from books or the clinical lab manual to learning from RLOs	.474	.281
26	The steps of procedures in the RLOs were clear	.473	.466
29	The RLOs were clear about their objectives	.437	.360
Eigenvalue Total of % if variance explained		6%	
Coronach's alpha	Component 1 with all loading	.851	
	After adding item 29	.857	
	After removing item 14	.874	
	After adding item 29 and removing item 14	.878	

Table 23 students' view on the utility and usability of the RLOs

8.2.6.3 Component 3: Students' view on the impact of the RLOs media attribute in supporting clinical skills learning

The third component determined many high loadings for the value of multimedia features of RLOs and their effect on supporting the clinical skills learning (Table 24). Communalities were all >.4 which explains a substantial amount of the original data, except for variable number 36 which was very low. The loading ranges from very good to poor (.726 to -.324). Item 2 was removed from the third component as explained previously.

This component revealed an acceptable internal consistency with a Cronbach alpha of .797, and .771 after removing item 2. However, item number 36 revealed a very low value .23 of 'corrected item-total correlation', which is lower than .3 and indicated that the item is measuring something different from the scale as a whole. Thus, the internal consistency was reconsidered after removing item 36, resulting in a value of .830, and .812 after removing both items 36 and 2, which reflected a higher internal consistency of the scale. Consequently, removing item 36 and the conceptually unrelated item (2) appears not to impact the internal consistency negatively.

Item N	Items	Component loading	Communality
31	The images and animations were valuable components of the RLOs	.726	.584
30	Having the video with a narrator commenting on the steps helped me to pronounce the terms correctly	.719	.628
32	The on-screen text was useful in helping me to understand the information	.677	.524
22	The RLOs enabled faster and better access to clinical skills information	.598	.408
33	The narration made the RLO more engaging	.560	.416
21	I like being able to access the RLOs whenever I want to	.514	.405
2	The RLOs were helpful for learning the clinical skills	.495	.533
36	The RLOs were difficult to use	-.324	.161
23	I needed the help of a lecturer to understand the RLOs	-.305	.197
Eigenvalue Total of % if variance explained		5%	
Coronach's alpha	Component 3 with all loading	.797	
	After removing item 2	.771	
	After removing item 36	.830	
	After removing items 2 and 36	.812	

Table 24 Students' view on the impact of the RLOs media attribute in supporting clinical skills learning

8.2.7 Summary of the PCA results

To sum up, a PCA was conducted on 40 items on transferability of the RLOs with orthogonal rotation (varimax). The KMO= .891 confirmed the sampling adequacy for the analysis, and all KMO values for individual items were greater than .55, which is well within the acceptable level. The initial analysis was run to obtain the

eigenvalues for each component in the data. Three components had eigenvalues over Kaiser's criterion of 2 and the combination explained 44% of the variance. The scree plot was clear and revealed inflexion that would justify retaining three components. Three components were retained because of the adequate sample size and the agreement of the scree plot and Kaiser's criterion: students' views on the educational values of clinical skills RLOs for the nursing students, students' views on the utility and usability of the RLOs, and students' views on the impact of the RLOs' media attributes in supporting clinical skills learning. Having outlined a number of key issues related to the development of the SSEQ resulted from the PCA, the following section presents a brief overview of the descriptive statistics in light of the resulted components.

8.3 Descriptive statistics for the SEEQ

Three components were identified from the PCA. The students' responses to the SSEQ in evaluating their views on integrating the RLOs were statistically analysed. The following section will demonstrate the descriptive statistics and frequency results for each item on the SSEQ using the components identified from the PCA to show how the students' data can be used to evaluate the value of the RLOs in another context.

The scale used in the SSEQ was a 4-likret ordinal scale. Thus, a bar chart is used to present the data (Cohen et al., 2018, Field, 2018, Pallant, 2013). The choice of bar chart was based on the belief that Likert scales fall within the ordinal level of measurement (Munro, 2005, Jamieson, 2004). There is an ongoing controversy over whether Likert scales should be treated as ordinal or as interval. This is because the response categories have a rank order, but the intervals between values cannot be presumed equal, though as Norman and Blaikie (2003) argued, researchers frequently assume that they are. Nevertheless, Cohen et al. (2018) argue that it is illegitimate to assume that the intensity of feeling between disagree and strongly disagree is equivalent to the intensity of feeling between other consecutive categories on the Likert scale. The legitimacy of assuming an interval scale for Likert nature categories is an important issue, because the appropriate descriptive and inferential statistics differ for ordinal and interval variables (Jamieson, 2004). Consequently, if the wrong statistical technique is used, the researcher increases the chance of coming to the wrong conclusion from the research.

8.3.1 Descriptive statistics of items of the first component

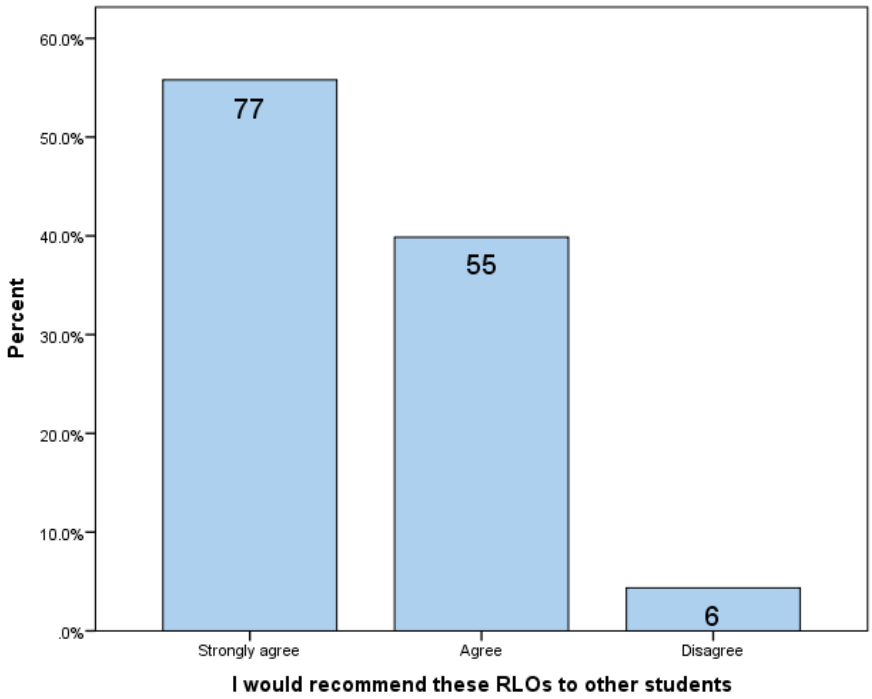


Figure 32

Figure 32 illustrates the frequency of distribution for the students' views on recommending the RLOs to other students. The highest score is 55.8% (n=77) who strongly agreed to recommend the RLOs to other students. The lowest score is 4.3% (n=6) who disagreed

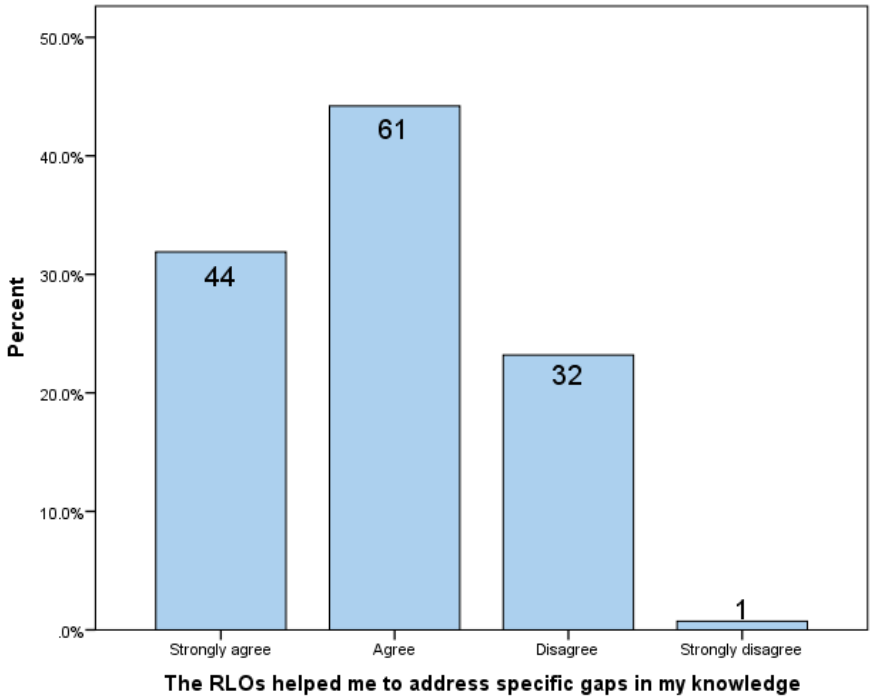


Figure 33

Figure 33 illustrates the frequency of distribution for the students' views on whether the RLOs helped them to address any gaps in their knowledge. The highest score is 44.2% (n=61) who agreed. Contrarily, only one student (0.7%) strongly disagreed.

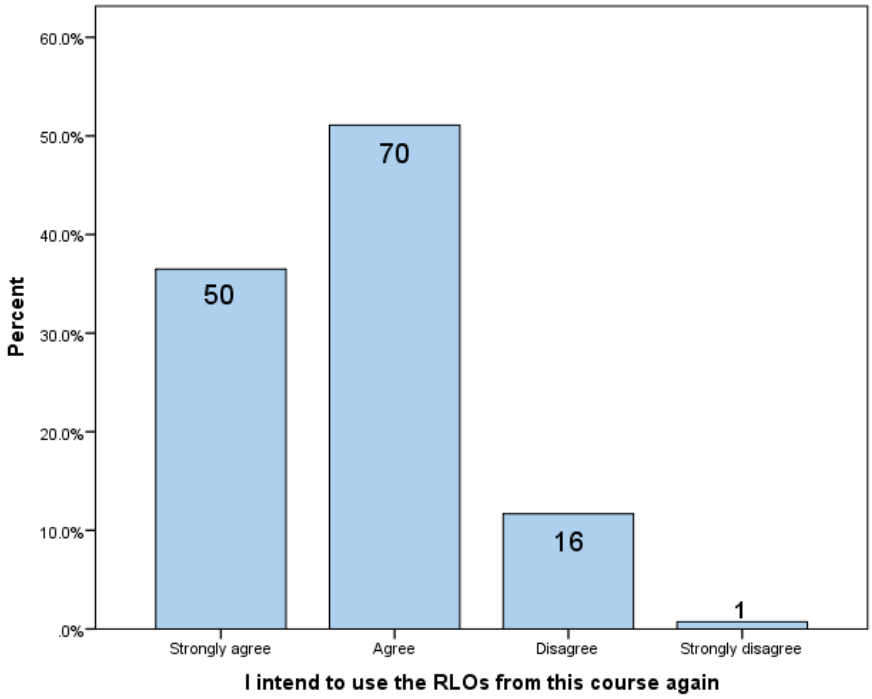


Figure 34

Figure 34 shows the frequency of distribution for the students' opinions on their intentions to use the RLOs again. The highest score was 50.7% (70) who agreed. In contrast, the lowest score was 0.7% (one student) who disagreed that they would reuse the RLOs again. This question reported one missing data.

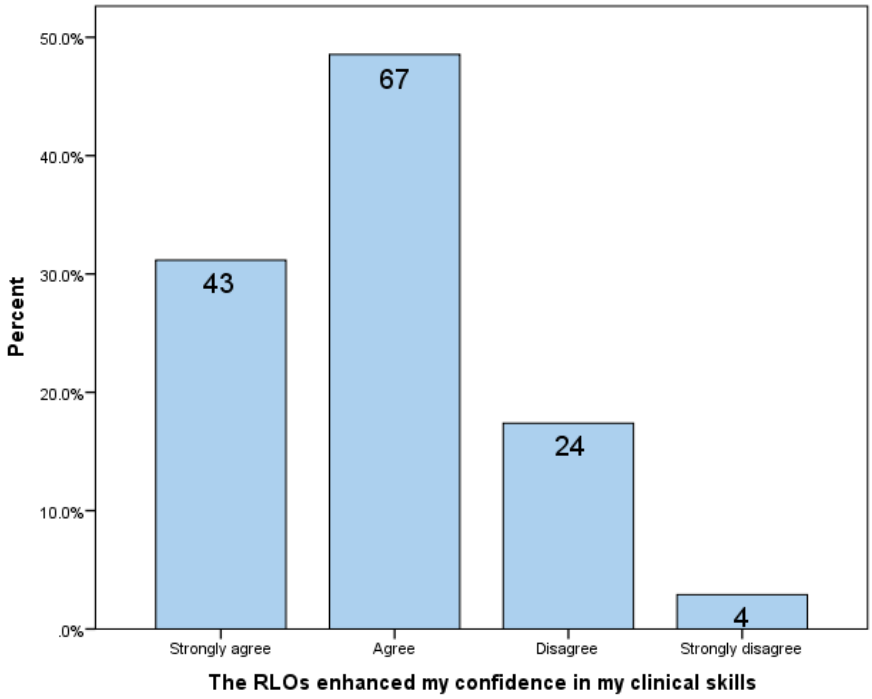


Figure 35

Figure 35 shows the frequency of distribution for the students' opinions on whether the RLOs enhanced their confidence in their clinical skills. 48.6% of the students agreed and 31% strongly agreed that the RLOs enhanced their confidence in the clinical skills, while 17% and 2.9% respectively disagreed and strongly disagreed.

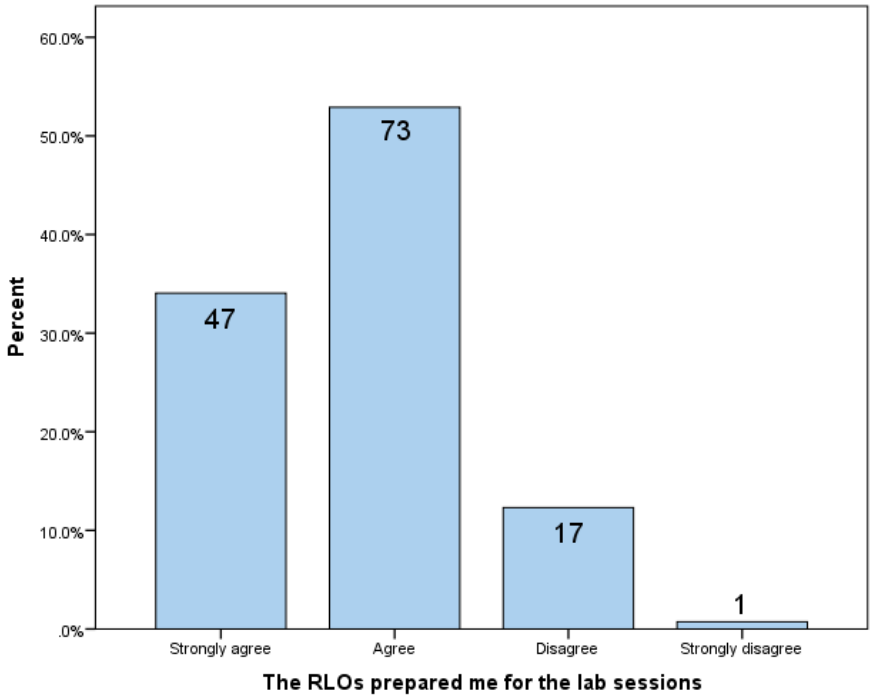


Figure 36

Figure 36 illustrates the frequency of distribution for the students' views on whether the RLOs helped them to prepare for the lab sessions. The majority of the students (n=73) agreed with the statement. The lowest score was 0.7% (n=1) who strongly disagreed.

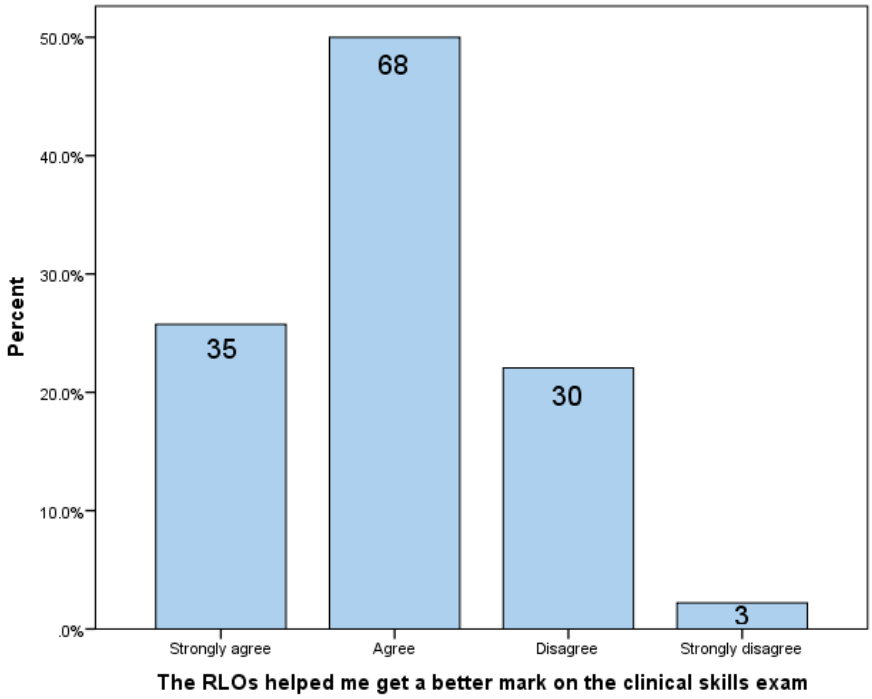


Figure 37

Figure 37 shows the frequency of distribution for the students' opinions on whether the RLOs helped them to improve their exam marks. Nearly half of the students, 49.3% (n=68), agreed. The lowest score was 2.2% (n=3) who strongly disagreed. This question reported two missing data (1.4%).

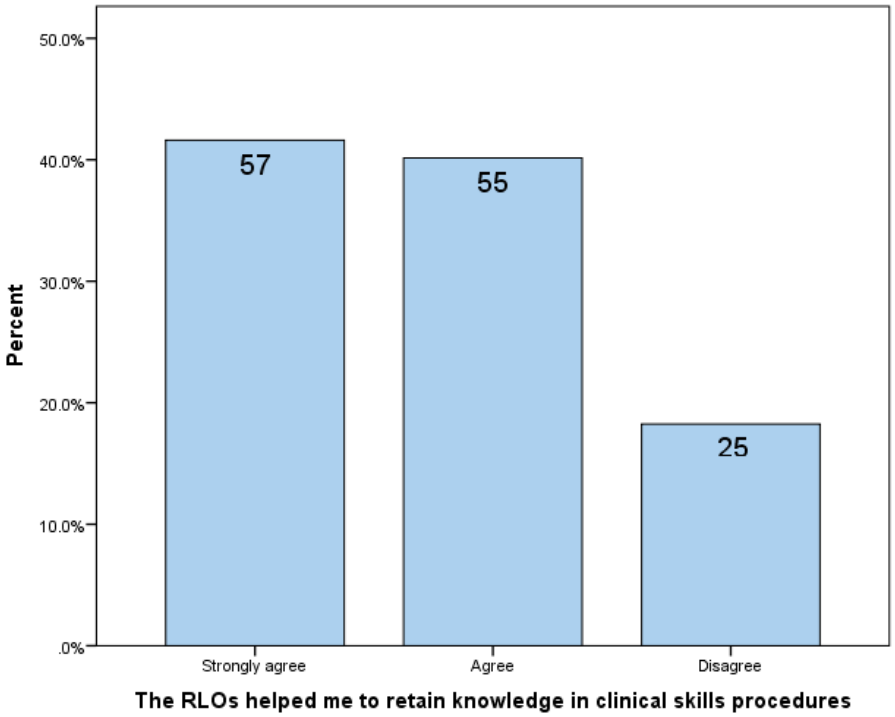


Figure 38

Figure 38 demonstrates the frequency of distribution for the students' views on whether the RLOs helped in retaining clinical skills knowledge. This question reported one missing data. The highest scores were 41.3% (57 students) strongly agreed and 39.9% (55 students) agreed. In contrast, nearly one-third of the students (18.1%) disagreed. One missing data was reported.

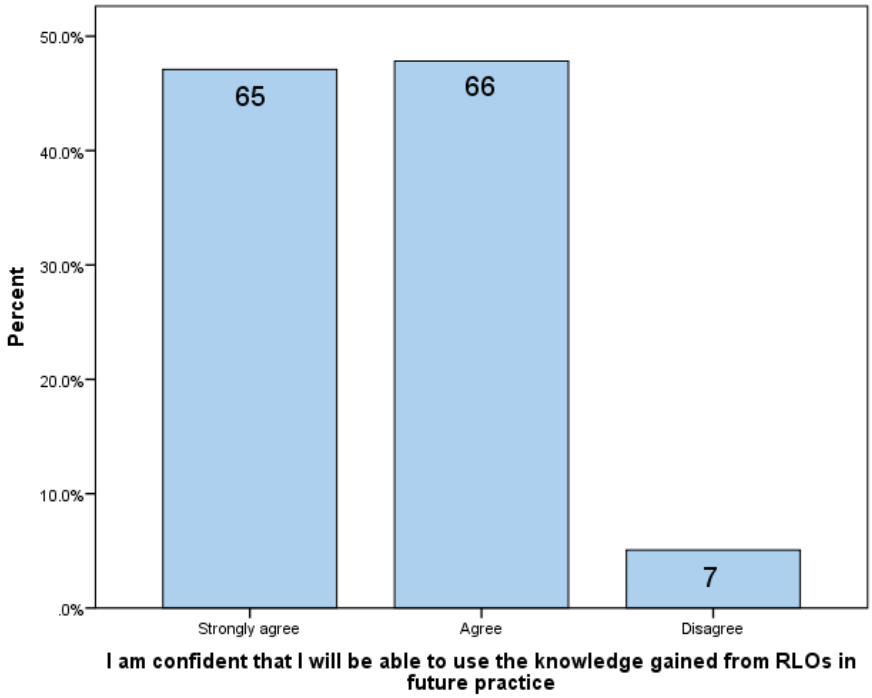


Figure 39

Figure 39 shows the frequency of distribution for the students' opinions on whether they will reuse the information from the RLOs in practice. Interestingly, there is a high similarity between scores of strongly agree 47.1% (n=65) and agree 47.8% (n=66), while only 5% (n=7) disagreed.

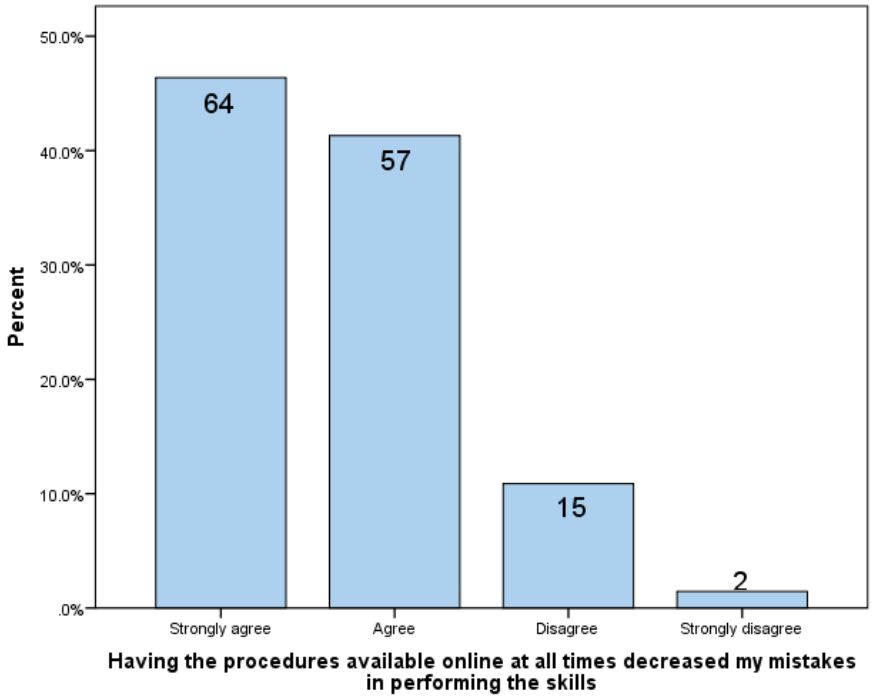


Figure 40

Figure 40 illustrates the frequency of distribution for the students' opinions on whether the availability of the RLOs helped in decreasing their mistakes in performing the skills. The highest score was 46.4% (n=64) who strongly agreed. The lowest score was 1.4% (n=2) who disagreed.

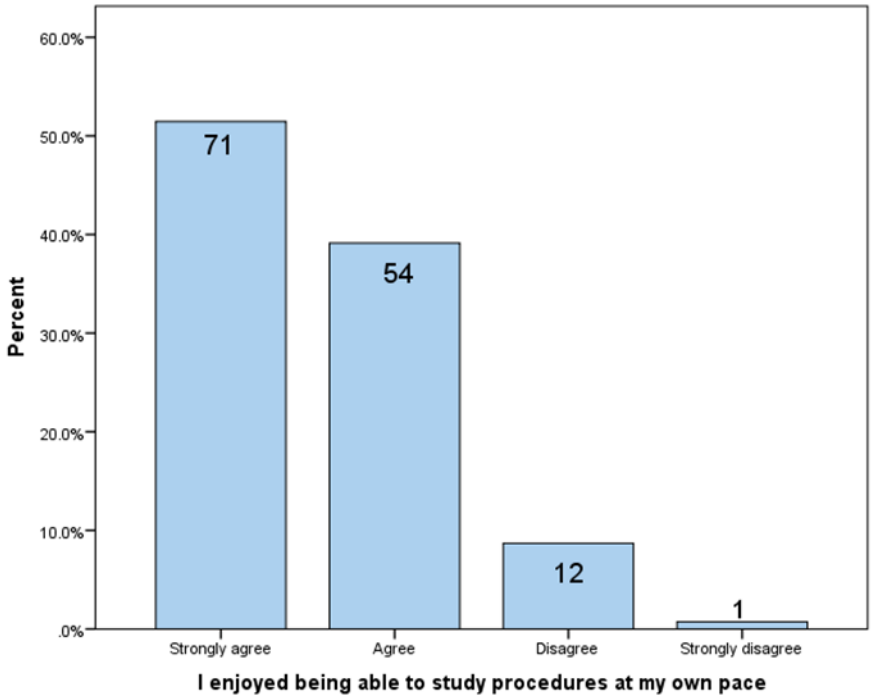


Figure 41

Figure 41 shows the frequency of distribution for the students' opinions on whether they enjoyed studying clinical skills at their own pace. The majority of the students, 51.4% (n=71) and 39% (n=45) respectively, strongly agreed and agreed to the statement. The lowest score was 0.7% (n=1) who strongly disagreed.

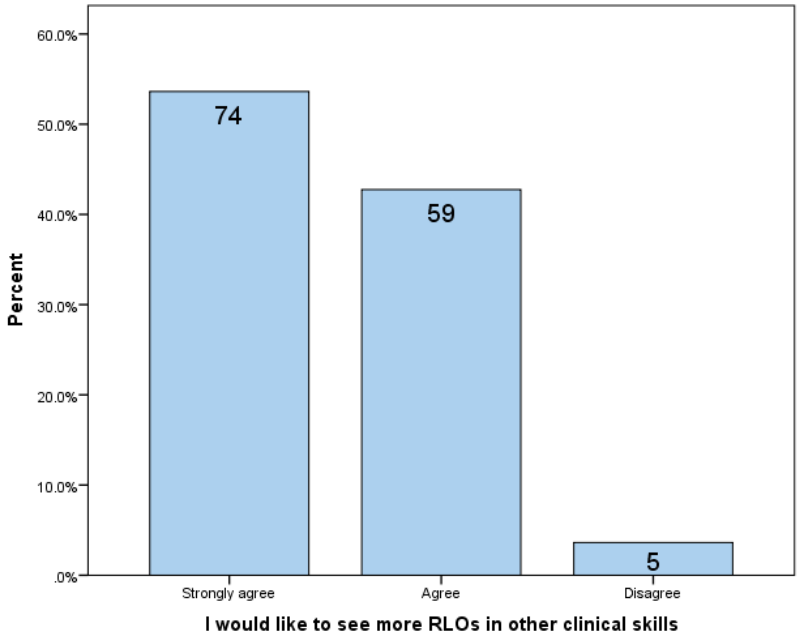


Figure 42

Figure 42 illustrates the frequency of distribution for the students' opinions on the students' intention to use more clinical skills RLOs. The highest score was 53.6% (n=74) who agreed. The lowest score was 3.6% (n=5) who disagreed.

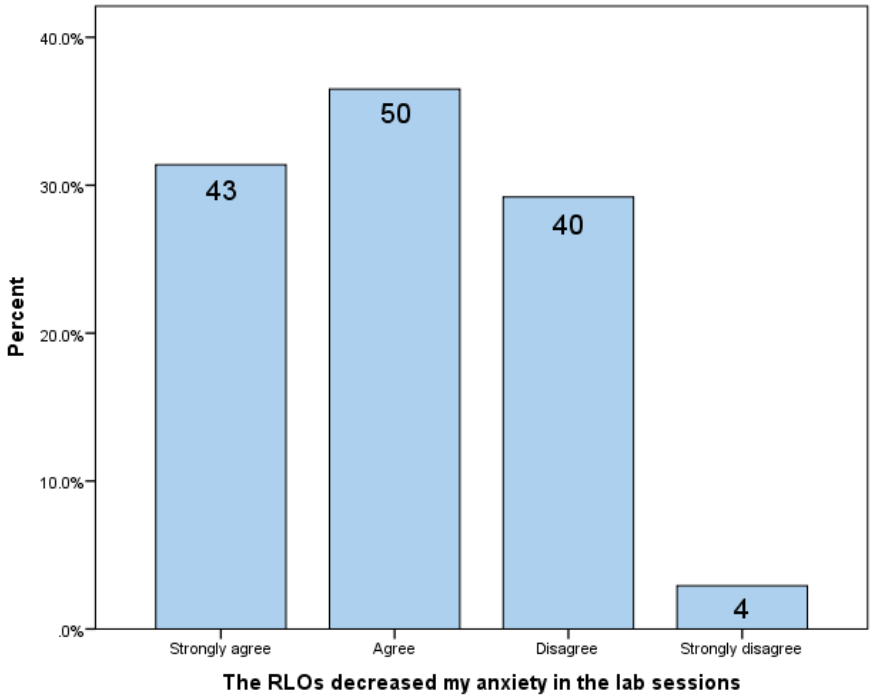


Figure 43

Figure 43 illustrates the frequency of distribution for the students' views on whether the RLOs helped them to decrease their anxiety in the lab sessions. The highest score was 36.3% (n=50) agreed and the lowest was 2.9% (n=4) strongly disagreed. One missing data was reported.

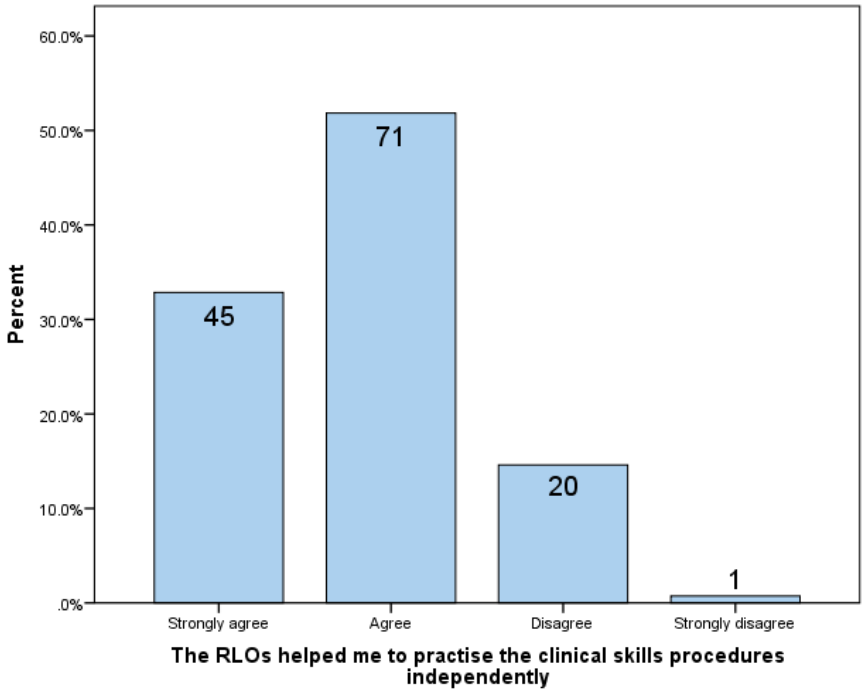


Figure 44

Figure 44 shows the frequency of distribution for the students' opinions on whether the RLOs helped them to practise the skills independently. The majority of the students agreed, 51.4% (n=71), or strongly agreed 32.6% (n=45) that the RLOs helped them to practise the procedures independently. Contrarily, only one student (0.7%) strongly disagreed with the statement. One missing data is reported.

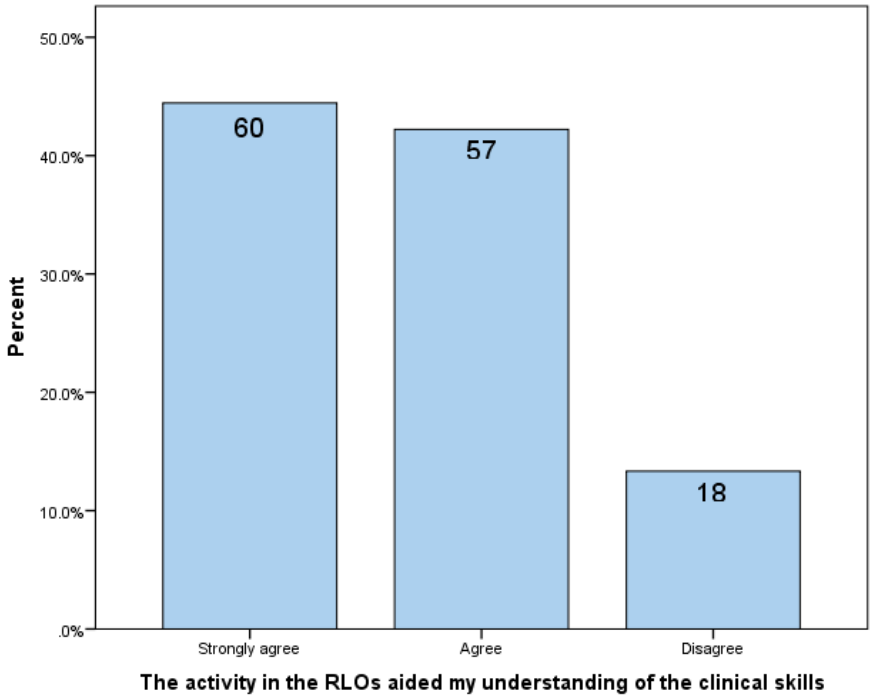


Figure 45

Figure 45 illustrates the frequency of distribution for the students' opinions on whether the activities aided clinical skills understanding. The highest score was 43.5% (n=60) who strongly agreed. The lowest score was for disagree, 13% (n=18). Three missing data 2.2% (n=3) were reported.

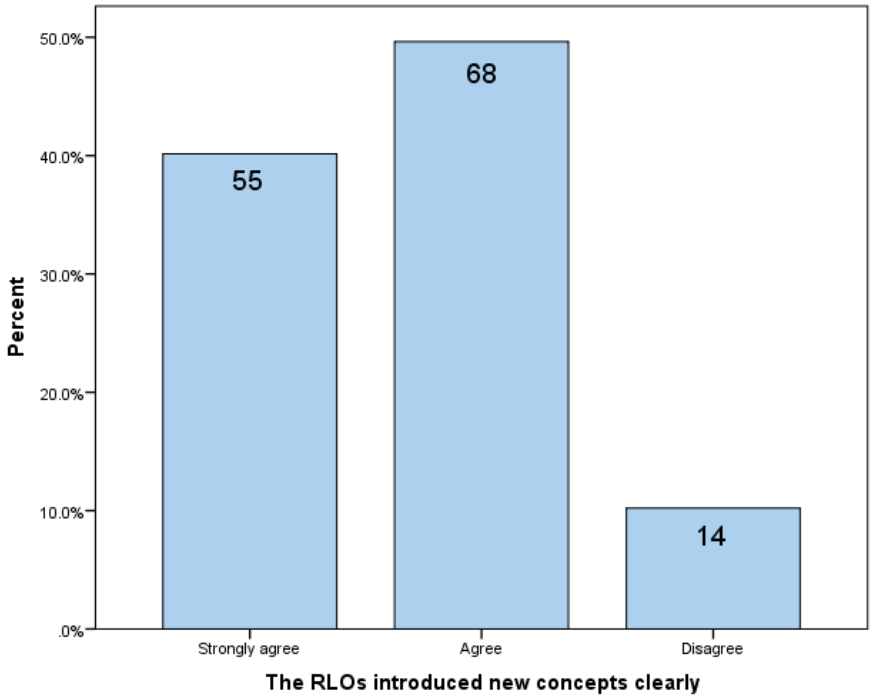


Figure 46

Figure 46 shows the frequency of distribution for the students' opinions on whether the new concepts in the RLOs were introduced clearly. The highest score was 49% (n=68) who agreed. The lowest score was 10 % (n=14) who disagreed. One missing data 0.7% (n=1) were reported.

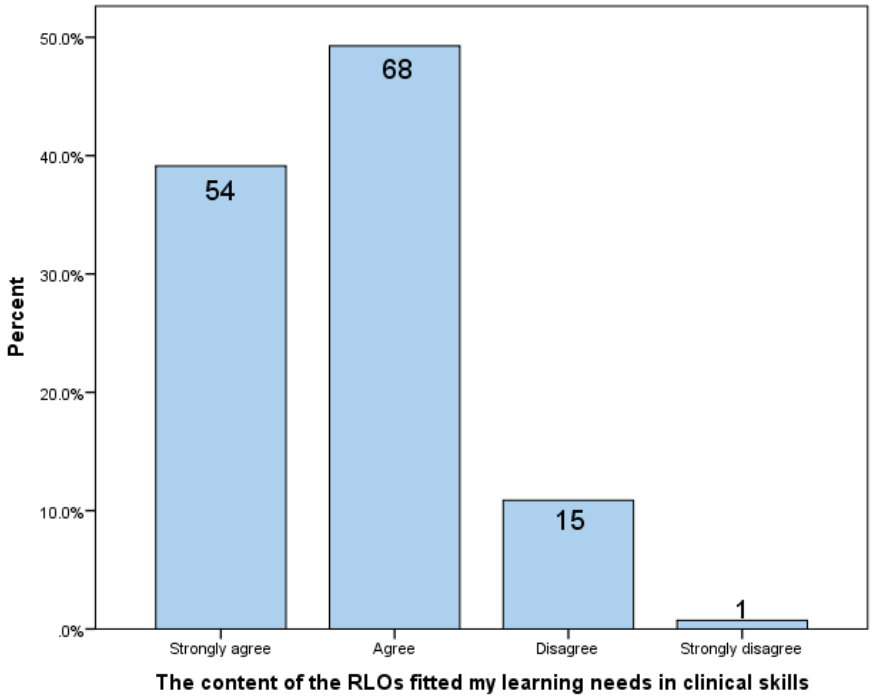


Figure 47

Figure 47 illustrates the frequency of distribution for the students' opinions on whether the RLO content fitted their learning needs. The majority of the students, 39% (n=54) and 49% (n=68) respectively, strongly agreed and agreed that the content fitted their learning needs. In contrast, 0.7% (n=1) and 10.9% and (n=15) respectively, strongly disagreed and disagreed with the statement.

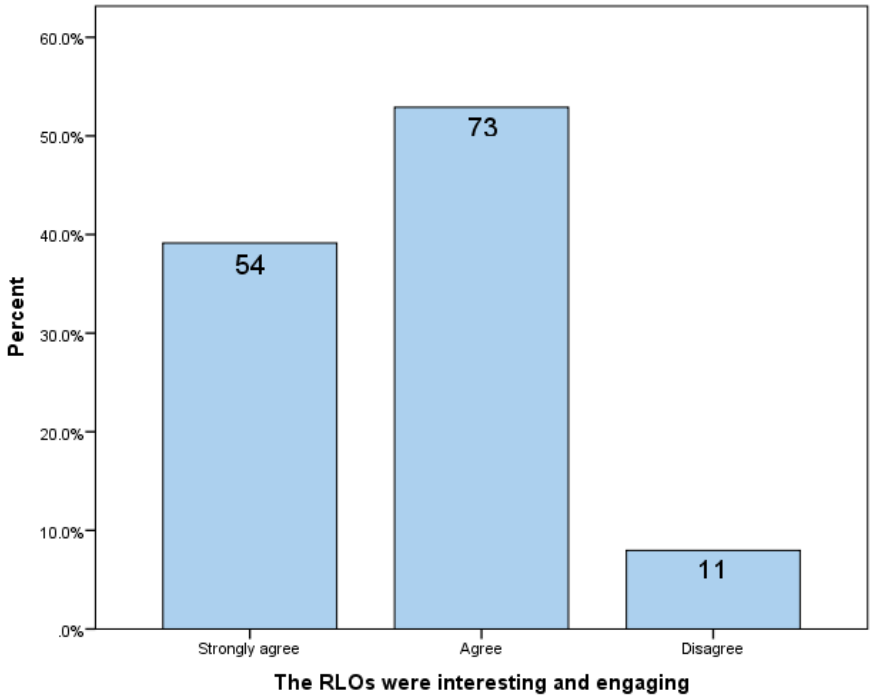


Figure 48

Figure 48 shows the frequency of distribution for students' opinions on how interesting and engaging they found the RLOs. The highest score was 52.9% (n=73) agreed, and the lowest was 8% (n=11) disagreed.

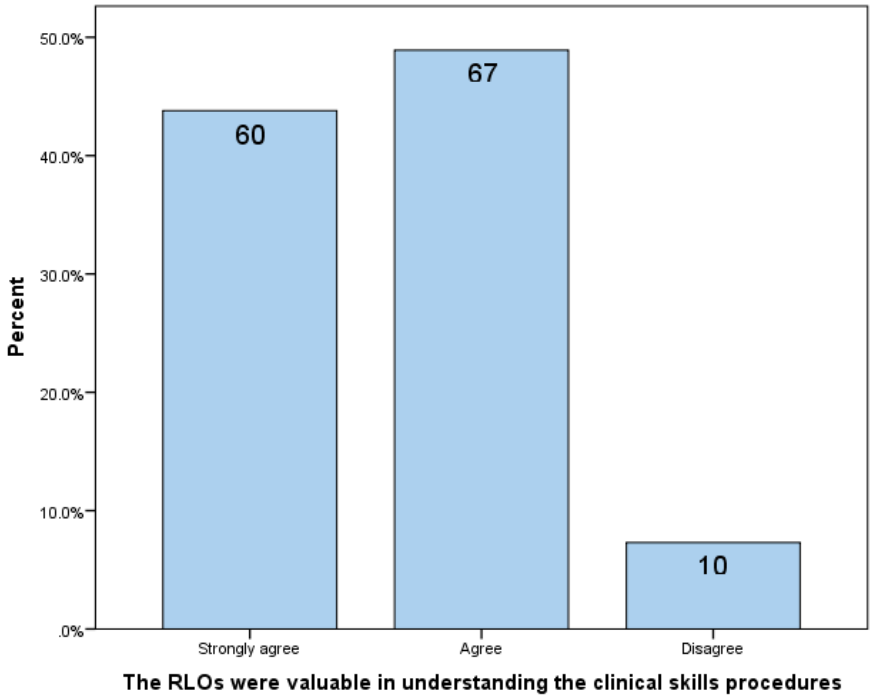


Figure 49

Figure 49 illustrates the frequency of distribution for the students' opinions on whether the RLOs were valuable in understanding the clinical skills procedures. The highest score was 48.6% (n=67) agree which is similar to the second-highest score of 43.5% (n=60) who strongly agreed. The lowest score was 7% (n=10) disagreed. One (0.7%) missing data was reported.

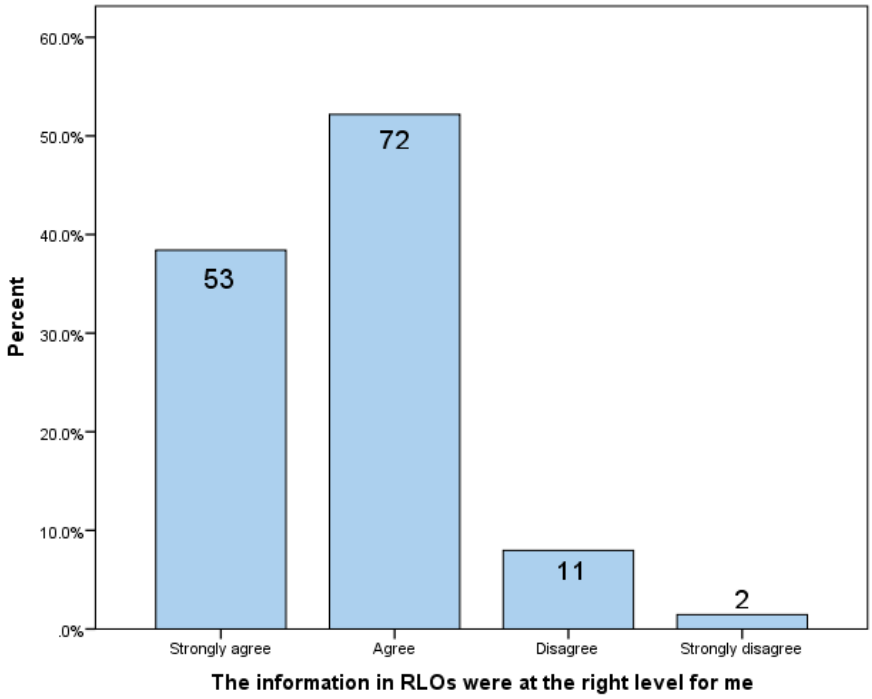


Figure 50

Figure 50 shows the frequency of distribution for the students' opinions on the RLOs information being at the right level for them. 38.4% (n=53) and 52.2 (n=72) respectively strongly agreed and agreed. The lowest score was 1.4% (n=2) who strongly disagreed.

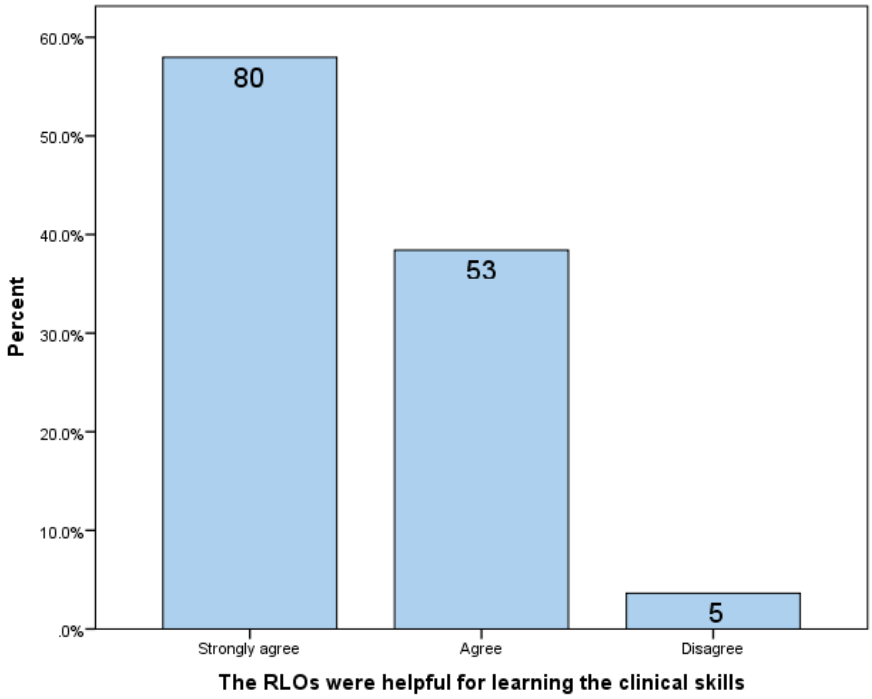


Figure 51

Figure 51 illustrates the frequency of distribution for the students' opinions on whether the RLOs were helpful for learning the clinical skills. The majority of the students strongly agreed, 58% (n=80), and agreed, 38.4% (n=53), that the RLOs were helpful. Contrarily, only 3.8% (n=5) disagreed. This question reported two missing data.

8.3.2 Descriptive statistics of items of the second component

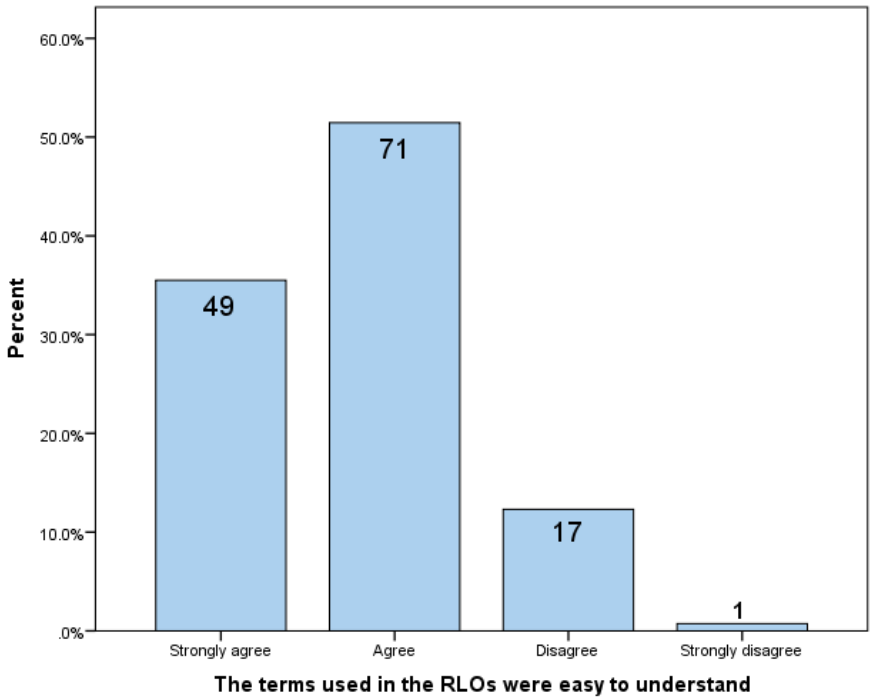


Figure 52

Figure 52 shows the frequency of distribution for the students' opinions on the terms used in the RLOs being easy to understand. The highest scores were 51.4% (n=71) agreed and 35.5% (n=49) strongly agreed. The lowest score was 0.7% (n=1) who strongly disagreed.

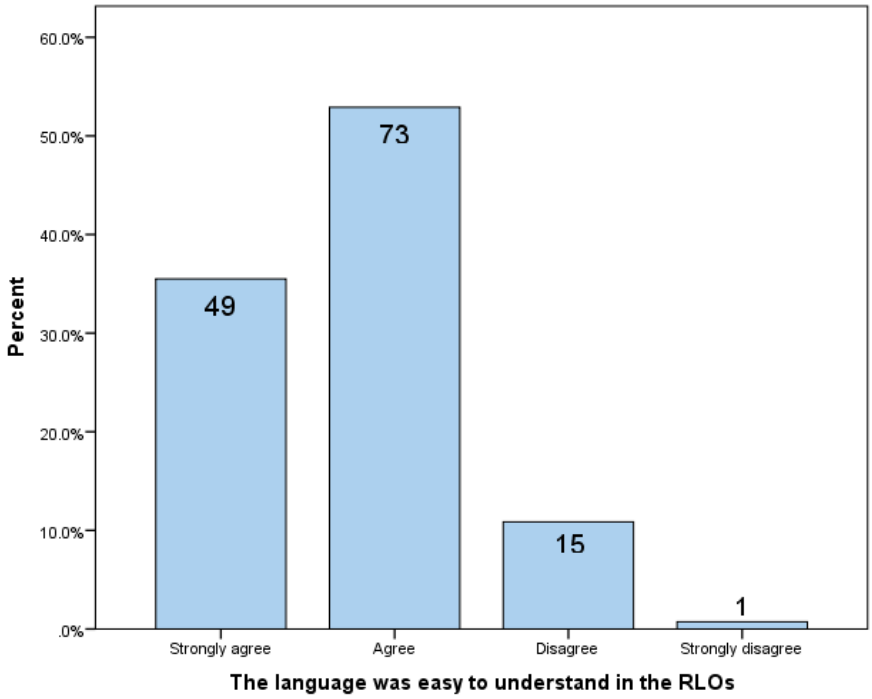


Figure 53

Figure 53 shows the frequency of distribution for the students' opinions on the easiness of the language in the RLOs. The highest score was 52.9% (n=73) agreed, and lowest 0.7% (n=1) strongly disagreed.

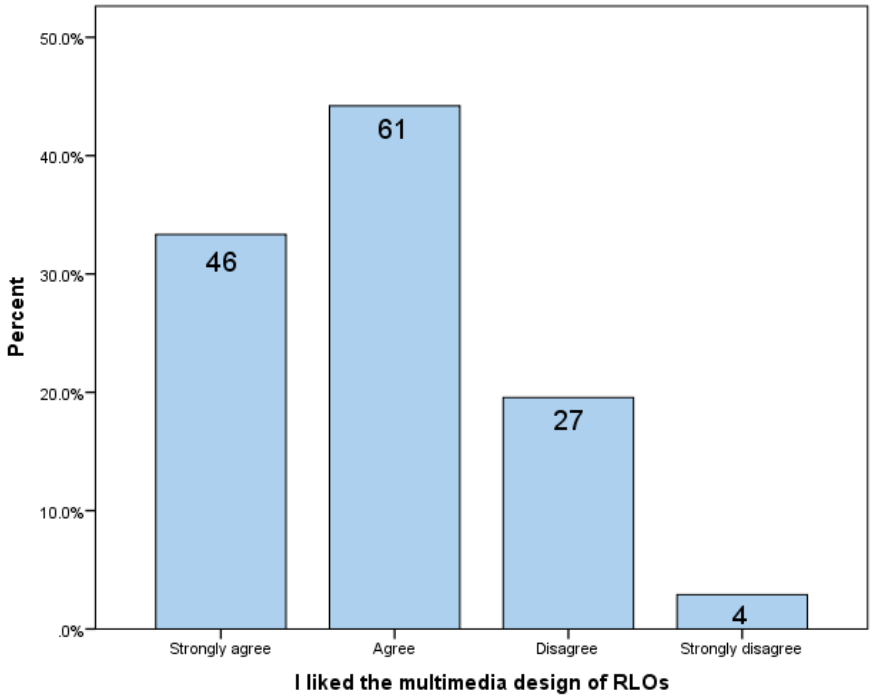


Figure 54

Figure 54 illustrates the frequency of distribution for the students' opinions on the multimedia design of the RLOs. The highest score was 44.2% (n=61) agreed. The lowest score was 2.9% (n=4) strongly disagreed.

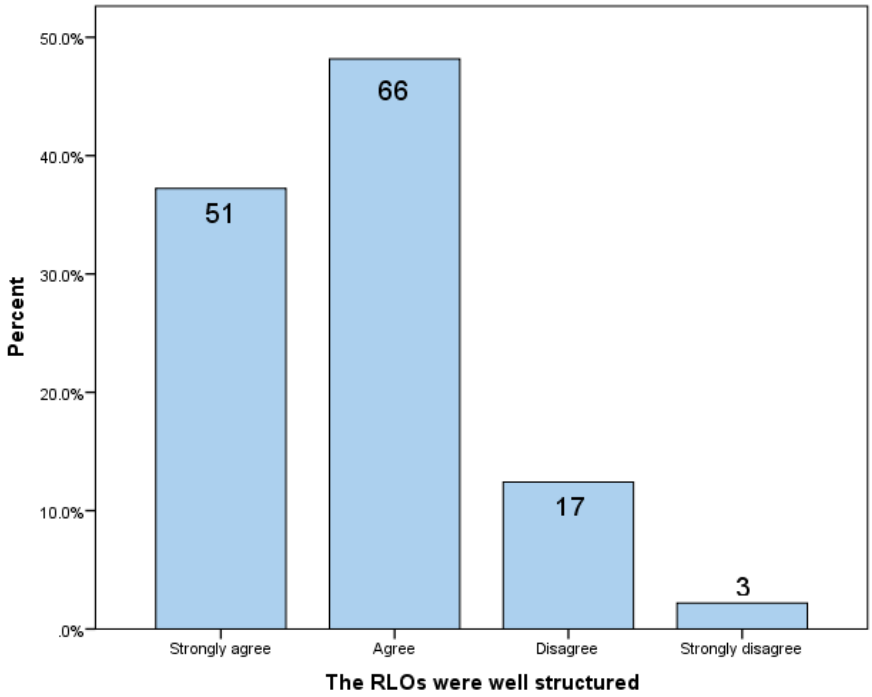


Figure 55

Figure 55 shows the frequency of distribution for the students' opinions on the RLO structure. The highest score was 47.8% (n=66) who agreed. The lowest score was 2.2% (n=3) who strongly disagreed. One data was reported as missing data.

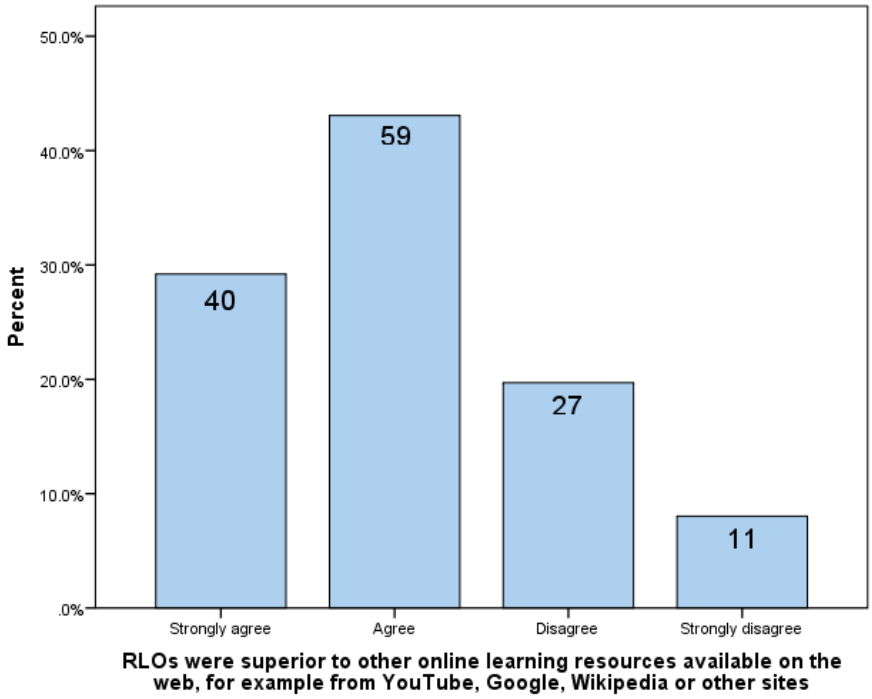


Figure 56

Figure 56 shows the frequency of distribution for the students' views on whether RLOs were superior to other nursing clinical skills online resources. The highest score was 42.8% (n=59) agree. The lowest score was 8% (n=11) strongly disagree. One data was reported as missing data.

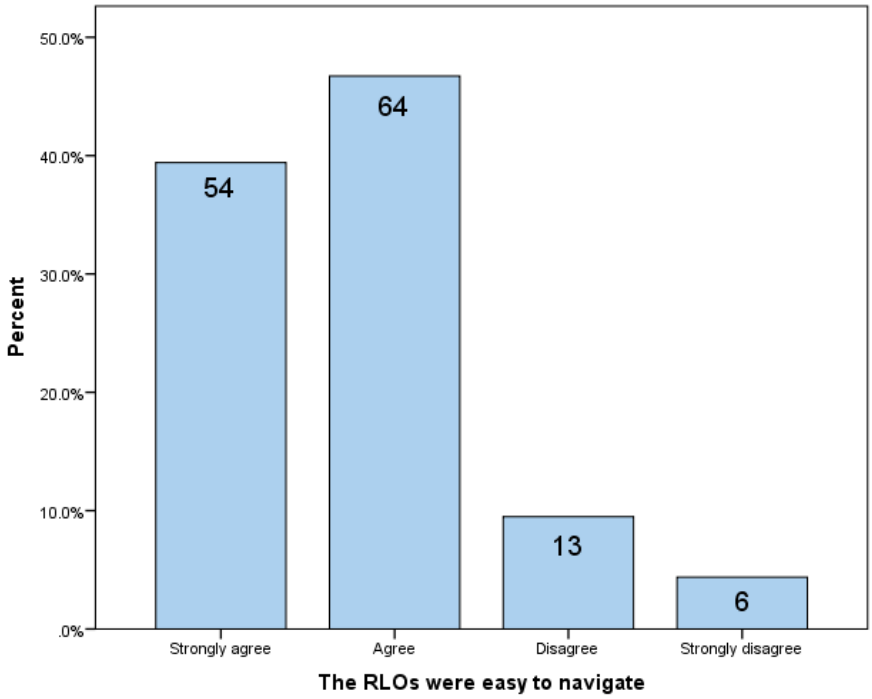


Figure 57

Figure 57 illustrates the frequency of distribution for the students' views on the easiness of RLO navigation. The highest score was 46.4% (n=64) agree and the lowest was 4.3% (n=6) strongly disagree. This question reported one missing data.

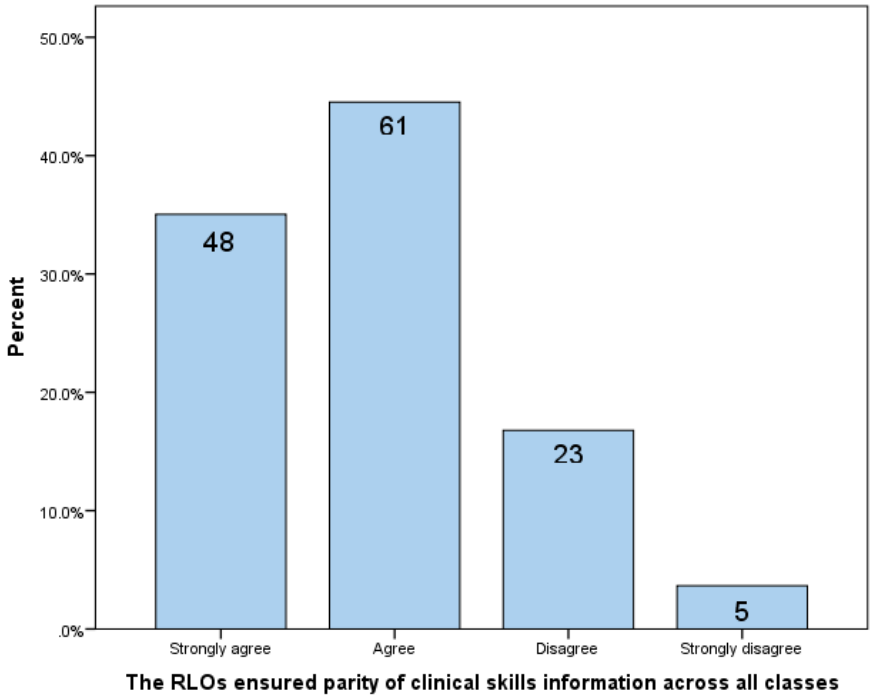


Figure 58

Figure 58 shows the frequency of distribution for the students' opinions on whether the RLOs could unify clinical skills information across the different student groups. The highest score was 44.2% (n=61) agree. The lowest score was 3.6% (n=5) strongly disagree. This question reported one missing data.

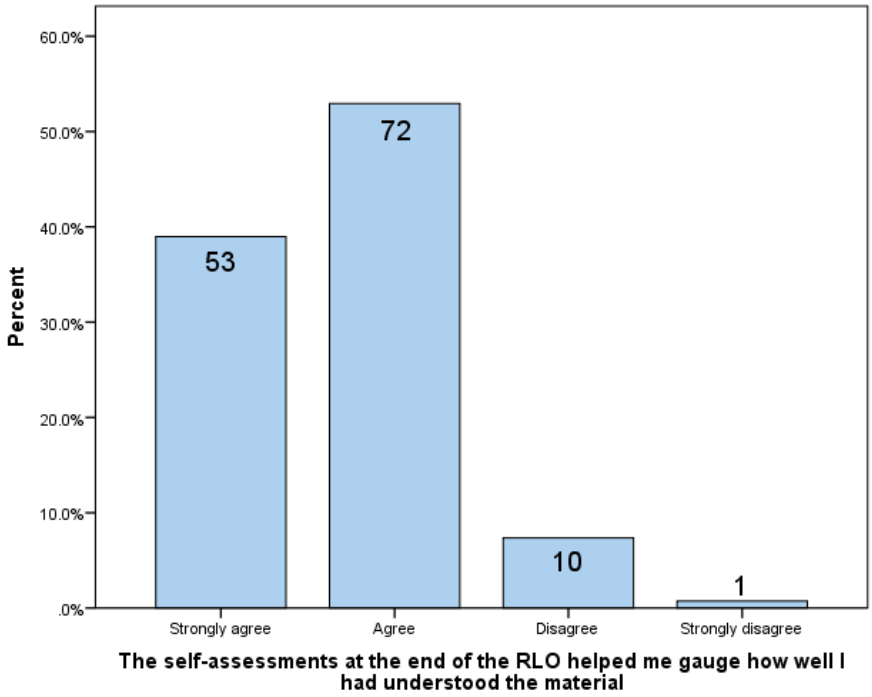


Figure 59

Figure 59 shows the frequency of distribution for the students' opinions on whether the self-assessment on the RLOs helped them to evaluate their understanding of the material. The highest scores were 52.2% (n=72) agree, then, 38.4% (n=53) strongly agree. The lowest score was 0.7% (n=1) strongly disagree. This question reported two missing data.

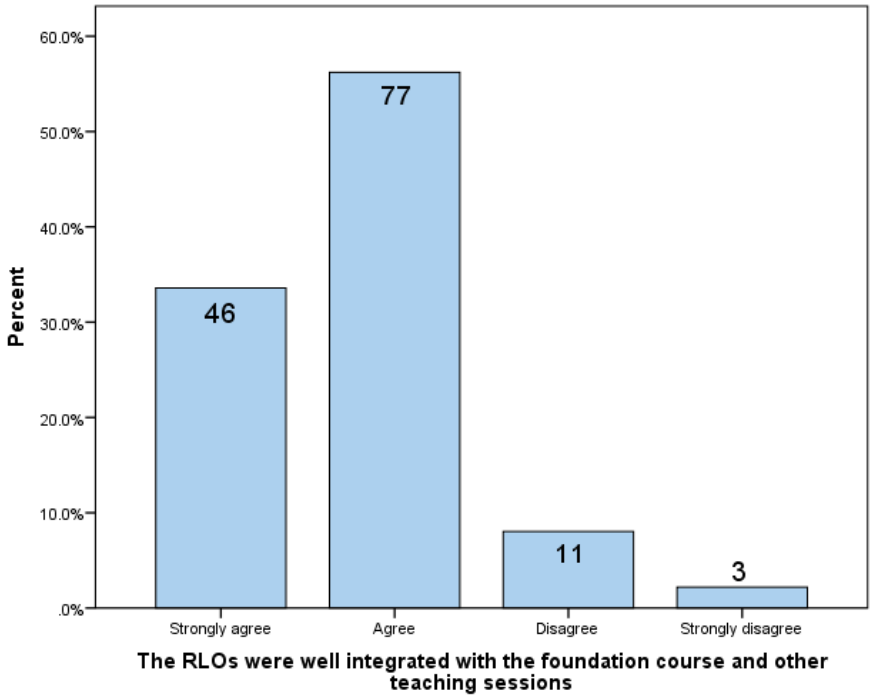


Figure 60

Figure 60 shows the frequency of distribution for the students' opinions regarding how well the RLOs were integrated into the curriculum. The highest score was 55.5% (n=72) who agreed. The lowest score was 2.2 % (n=3) who strongly disagreed. This question reported one missing data.

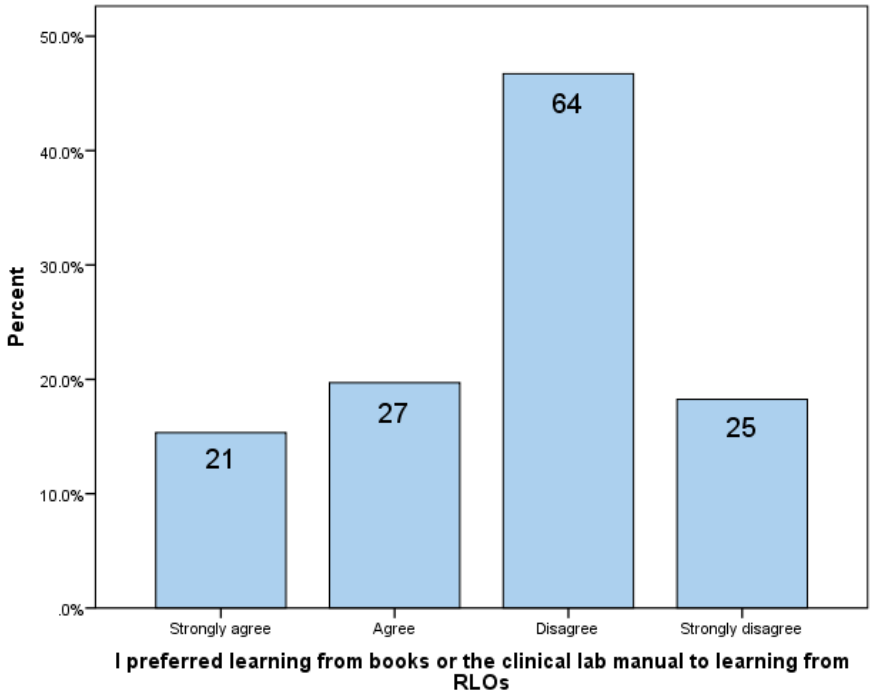


Figure 61

Figure 61 shows the frequency of distribution for the students' opinions on their preferred learning source. Most of the students, 46 % (n=64) and 18% (n=25), disagreed and strongly disagreed respectively that they preferred printed sources. The lowest score was 15.2% (n=21) who strongly agreed. This question reported one missing data.

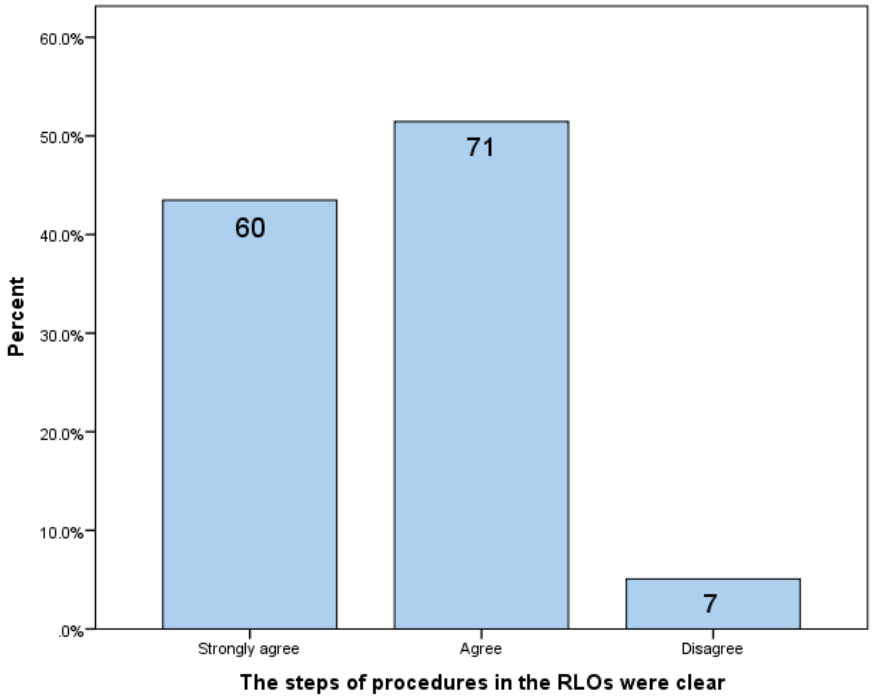


Figure 62

Figure 62 shows the frequency of distribution for the students' opinions on the clarity of the procedures in RLOs. The majority of the scores 51.4% (n=71) agreed and 43% (n=60) that the procedure steps were clear. The lowest score was 5.1% (n=7) disagree.

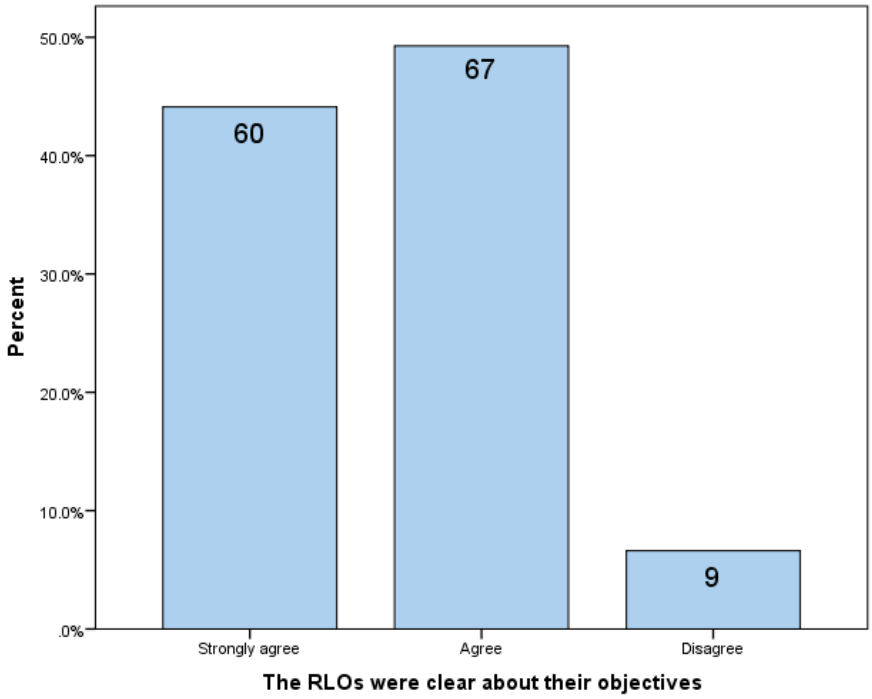


Figure 63

Figure 63 shows the frequency of distribution for the students' opinions on how clear the objectives of the RLOs were. The highest score was 48.6% (67 students) and 43% (60 students) who agreed that the RLOs were clear about their objectives. On the other hand, 6.5% (9 students) disagreed. There were 1.4% (2 students) missing data.

8.3.3 Descriptive statistics of items of the third component

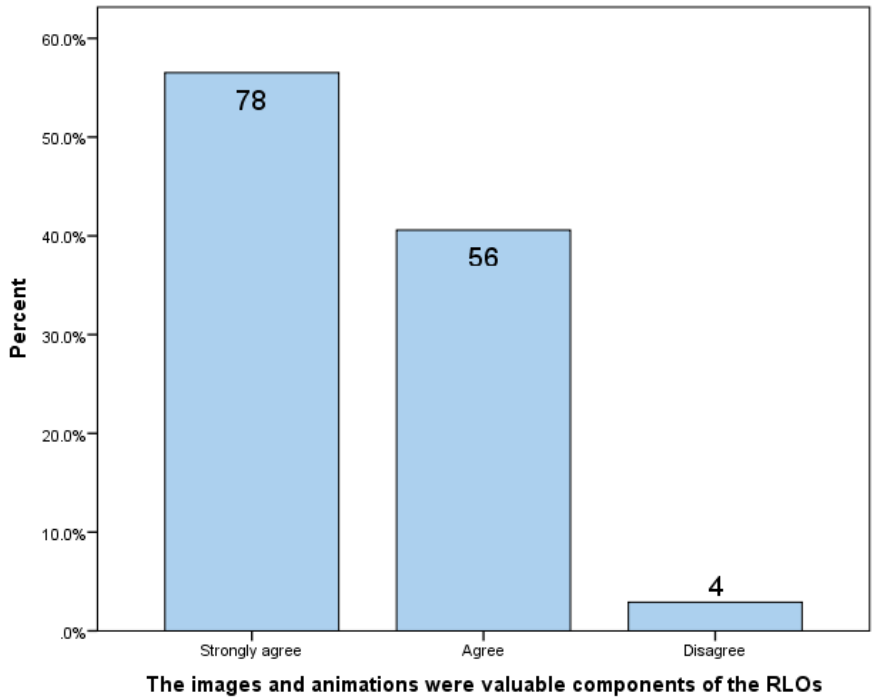


Figure 64

Figure 64 shows the frequency of distribution for the students' opinions on how valuable the images and animations were on the RLOs. The highest score was 56.5% (n=78) strongly agree. The lowest score was 2.9% (n=4) disagree.

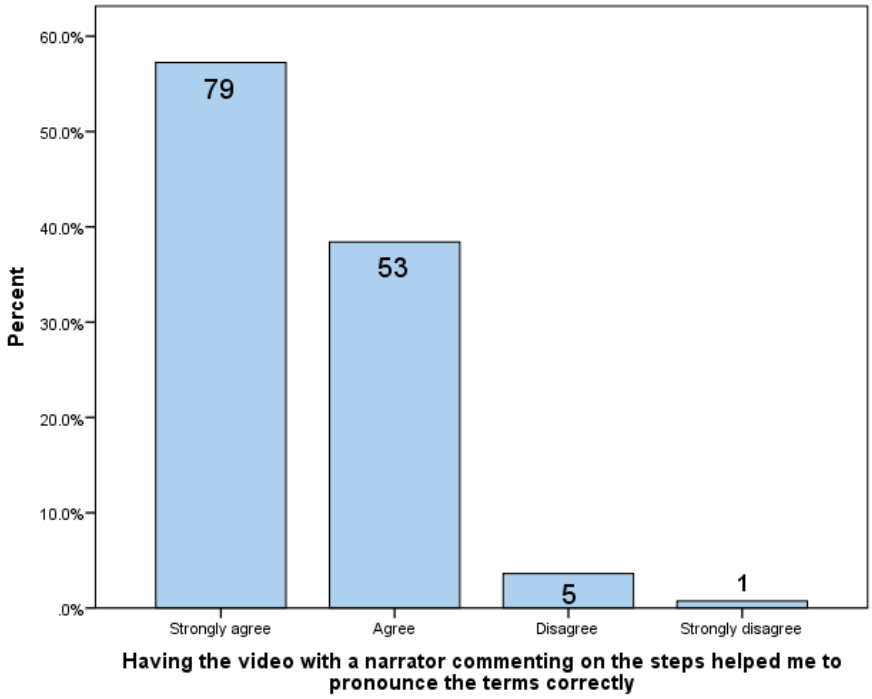


Figure 65

Figure 65 illustrates the frequency of distribution for the students' opinions on the presence of the narrator in helping them to pronounce the terms correctly. The highest score was 57% (n=79) strongly agree. The lowest was 0.7% (n=1) who disagreed.

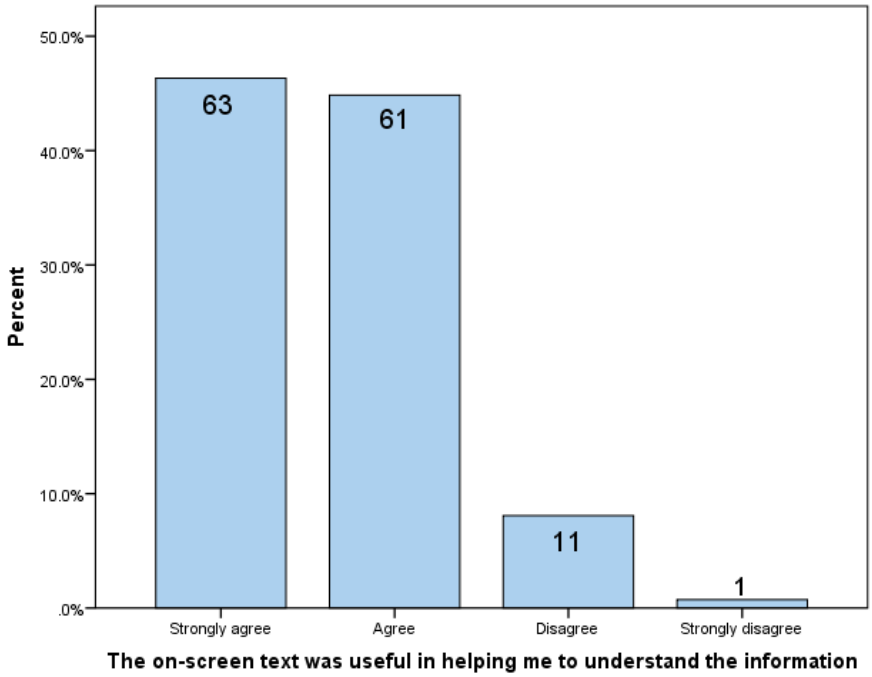


Figure 66

Figure 66 shows the frequency of distribution for the students' opinions on the usefulness of the on-screen text in understanding the information. The majority of the students' scores are 45.7% (n=63) strongly agree and 44.2% (n=61) agree. The lowest scores are 0.7% (n=1) disagreed. This question reported two missing data.

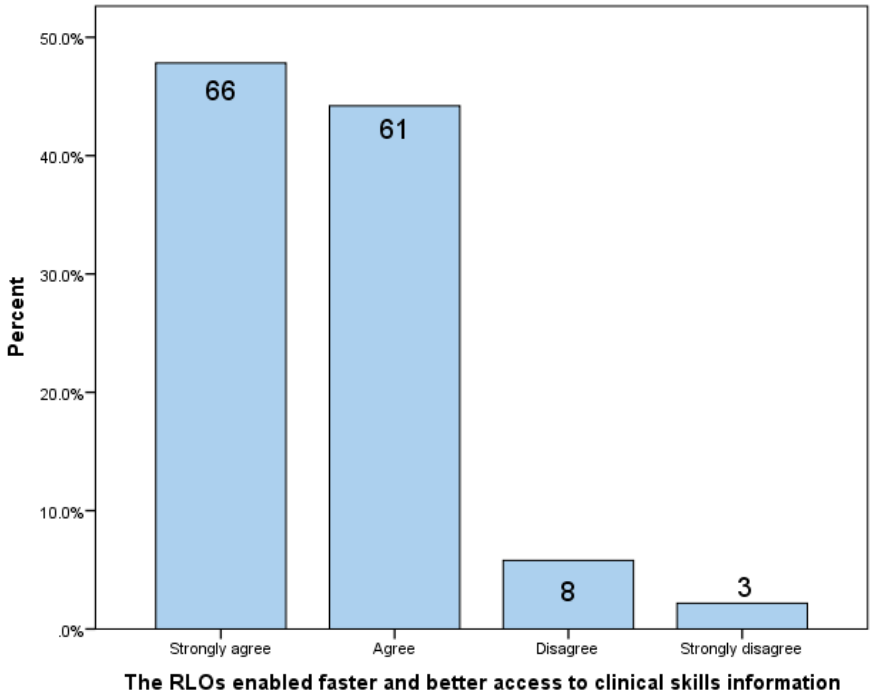


Figure 67

Figure 67 shows the frequency of distribution for the students' opinions on whether the RLOs enabled faster and better access to clinical skills information. The majority of the students strongly agreed (47.8%, n=66) or agreed (44%, n=61). The lowest score was 2.2% (n=3) who disagreed.

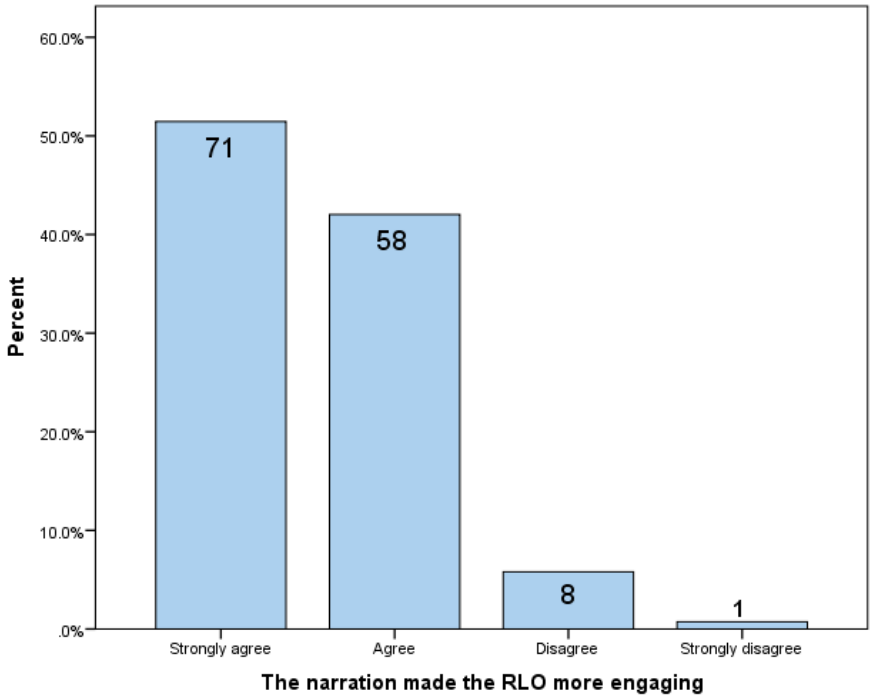


Figure 68

Figure 68 shows the frequency of distribution for the students' opinions on whether the narration made the RLOs more engaging. The highest score was 51.4% (n=71) strongly agree. The lowest score was 0.7% (n=1) strongly disagree.

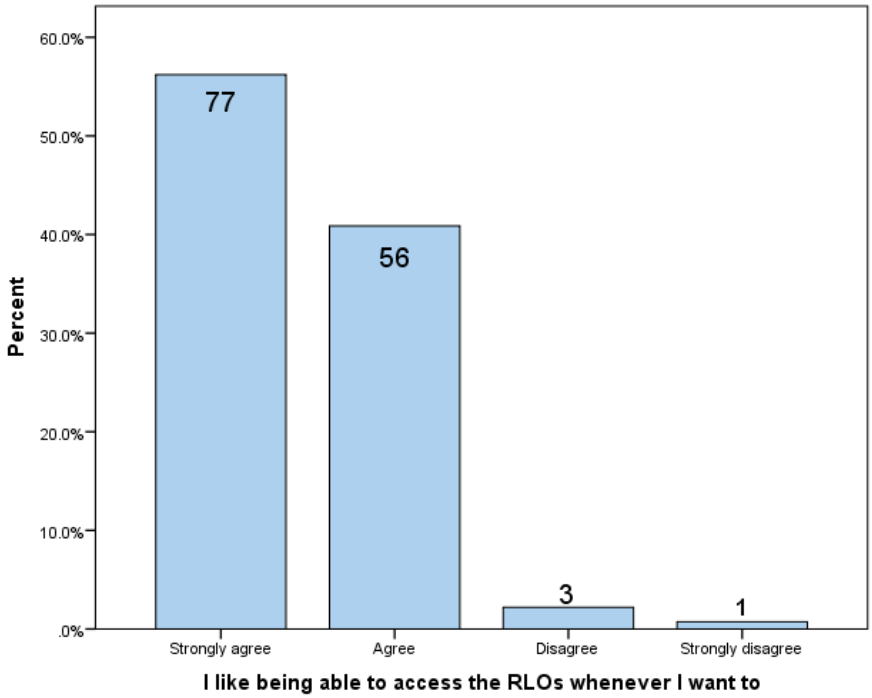


Figure 69

Figure 69 shows the frequency of distribution for the students' opinions on the accessibility of the RLOs. More than half of the students strongly agreed (55.8%, n=77) and 40.6% (n=56) agreed. The lowest score was 0.7% (n=1) who strongly disagreed. This question reported one missing data.

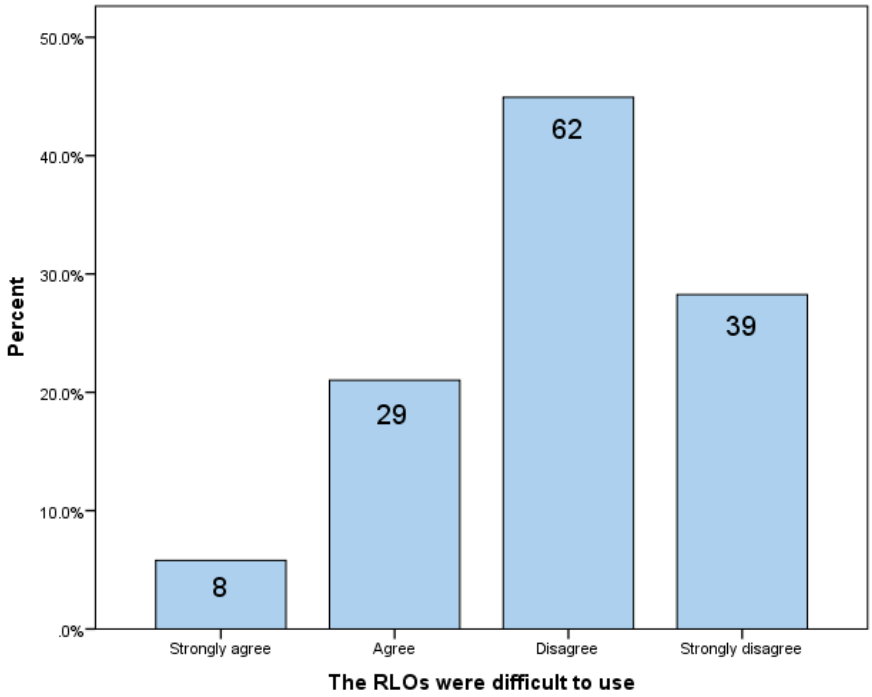


Figure 70

Figure 70 shows the frequency of distribution for the students' opinions on the RLOs being difficult to use. The highest score was 44.9% (n=62) disagree and lowest score was 5.8% (n=8) strongly agree.

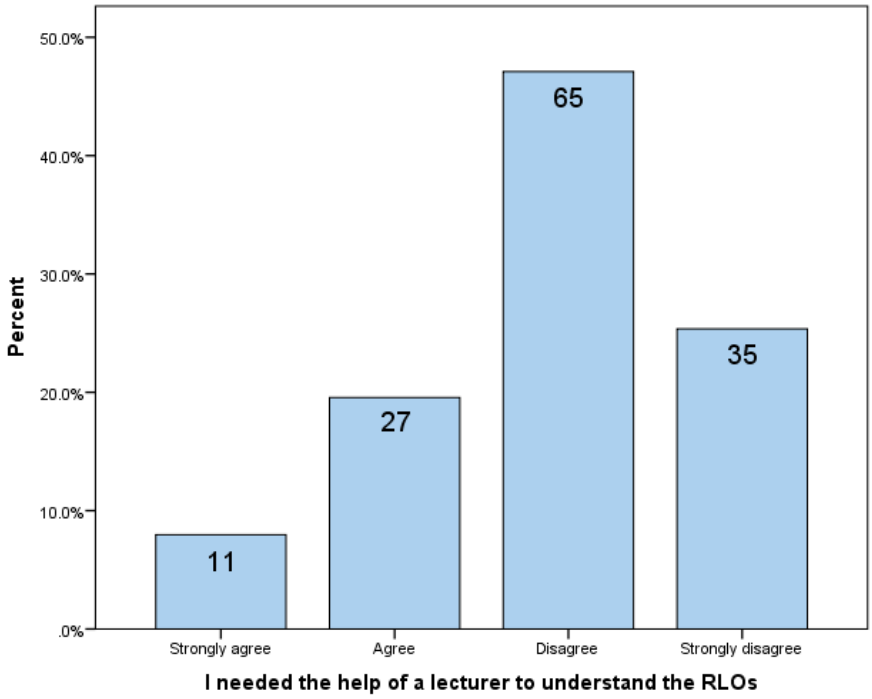


Figure 71

Figure 71 shows the frequency of distribution if the students' needed tutors help to understand the RLOs. The highest score was 47% (n=65) disagree and lowest score was 8% (n=11) strongly agree.

8.4 Results from open-ended question

The students' responses (n=26) to the open-ended question 'Please add any comments or suggestions' were categorized into three emergent components (Appendix 10). All responses were transcribed on a table and grouped under a relative theme. The responses were considered in the same way as the general open questions to be qualitative data (O'Cathain and Thomas, 2004). They were categorized into the resulting components from the PCA because of the few responses to these questions. They were later

selected and used beside the literature as evidence to illustrate the key issues.

The most frequent open-ended comments recorded by the students related to component 1. Table 25 shows the number of students' responses to each component and provides examples of their responses to the open-end question. Some of the students expressed their eagerness to see more clinical skills RLOs, followed by a few indications of how the RLOs helped them during the course. The second most reported category were about component 2. Some students indicated that they preferred to have subtitles on the demonstration video. While some of them preferred to have similar steps for conducting the procedures to those in their curriculum, another student wanted more explanation to understand the RLOs. With regard to component 3, most of the students commented on their difficulty in accessing the RLOs, and others indicated that it was difficult to use.

Component 1: Students' views on the educational values of clinical skills RLOs for the Saudi nursing students		
Items	Responses	Example responses
See more RLOs in other clinical skills	9	I wish you add other clinical skills even for the students in the 4th and 3rd years in nursing college
The RLOs were helpful for clinical skills learning	3	these resources had a huge role in my learning the clinical skills in the 1st term, thank you for this
The RLOs enhanced the clinical skills confidence	1	I wish that all tutors can allowed us use this on all subjects to add more information to what we had and increase our confidence in practice
The activity aided the understanding of the clinical skills	1	I liked the activities after each demonstration video to maintain the information
The RLOs were valuable in understanding the procedures	1	Great resources, easier the understanding of the clinical skill for students
Component 2: students' view on the utility and usability of the RLOs		
The language was easy to understand	4	Add Arabic subtitles for different language to clarify the information when it is difficult to understand the language
		adding a subtitle under the videos will make it easier to understand and more helpful
The steps of procedures in were clear	3	This procedures steps should be compatible with/ agreed with our curriculum
The terms were easy to understand	1	simplify the concept
RLOs were superior to other online learning resources	1	it is trustful compering with lots of videos and resources on google and YouTube that make me confused which one I ned to trust.
The RLOs were easy to navigate	1	To have more explanation how we can use it
Component 3: Students' view on the impact of the RLOs media attribute in supporting clinical skills learning		
Accessing the RLOs	5	Make the home page more easier to browse and access the RLOs easily
Ease of RLOs use	3	Very difficult to use
Usefulness of the on-screen text in understand the information	1	I wish that this resource design to be more clear, attractive, and decrease the words and narrative part

Table 25 Categorisation of the students' responses to the open-ended question

8.5 Focus-group findings

Four of sixteen of the tutors who were involved in teaching the clinical skills curriculum in the second year agreed to participate in the follow-up focus group. Two of them (TR and TSM) were involved in the implementation of the RLOs and in the first phase of the study. However, the other two tutors (TFM and TF) were not fully aware of the implementation of the RLOs and the research, as they joined the nursing college at KAU mid- semester. Therefore, most of their feedback was based on assumptions regarding what they thought or felt rather than their experiences during the implementation of the RLOs. Although focus-groups are not aimed at obtaining correct or incorrect responses and instead focus on exploring the experiences of participants (Silverman, 2017), in this phase, it was not possible to draw themes from this small size of participants (one focus group). Therefore, this section will only report the tutors' comments on the students' responses to each item of the SSEQ.

At the beginning of the discussion, the tutors were asked about their views and experiences surrounding RLO implementation in the nursing clinical curriculum in the UK. Although the researcher repeated the questions regarding the challenges of the RLOs, all the responses were about the advantages of the RLOs, which had been already explored in the first phase of the research. For example, TR

said, '*I consider these resources very good, rich and updated resources for the students, and even for myself as a tutor, so I like to see these RLOs*'. TF said, '*They are amazing, simple and to the point, and all students at different levels will need them as a reminder, so they are helpful for the students to watch before or after a procedure. Doing so helps them retain information and the techniques they need to conduct a procedure*'.

The students were asked about their responses to the SSEQ, and the primary descriptive statistics obtained were used to enhance the discussion. For instance, when one of the tutors mentioned that the RLOs help students retain knowledge, the researcher used the following statistic as a prop: 'In total, 18% of the students disagreed that the RLOs helped them to retain knowledge of clinical procedures'. TFM's opinion regarding these students' response was that the nursing education system was new to these students. According to her, '*Students just entering nursing college don't know exactly what they need to focus on and don't have enough background in learning clinical skills'*. Interestingly, TFM believed that the RLOs did not help the students retain the knowledge because of the different policies used to conduct the procedures. According to her, '*This 18% of the students started their clinical practice in hospitals. Many students feel confused when they come to the lab after clinical practice because of the different policies used*

to conduct the procedures between here and the hospital. They might know this RLO, but the procedure is different from the way they do it in the hospital. We always say to this group that that are not wrong and that we are not wrong but that they need to know the ideal way of conducting the procedure'.

In response to the around 20% of students' agreement that YouTube, Google, Wikipedia and alternative web sources are better than the RLOs, TFM commented that '*this might be because of the access to the RLOs. Students can directly open YouTube, type whatever in the search and get 700 videos, but the RLOs require many steps to access*'. TF agreed with this opinion when she said, '*The amount or the variety of the videos available on the YouTube is higher. I mean, for one procedure, you can find 100 videos, so if one is not clear, you can find another one'*. Moreover, tutors thought the reason that around 22% of the students did not like the multimedia design of the RLOs. According to TSM, '*Maybe students want to see a real demonstration*'. TFM said, '*Maybe the students see it takes time, or maybe the language is inaccessible*'.

In total, 20% of the students disagreed with the following statement: 'the RLOs enhanced my confidence in my clinical skills'. TF stated, '*I remember, when we divided them into subgroups in the lab session, some students were more confident providing an injection. It could*

be that some groups saw the injection RLOs because they were practicing the procedure very well'. TR replied, '*Yes, I agree. The injection RLOs might have played a role. Most of us were very happy with that session*'. Regarding knowledge, 23% of students disagreed that the RLOs helped them address a specific gap in their knowledge. TFM stated, '*We usually face a problem with English. It might be that they found it difficult to understand and stopped using the RLOs'*.

The tutors believed that most of the students preferred to learn from online resources to books or clinical skills manuals. TR said, '*I think the trend of this generation is that they don't prefer a theoretical lecture*'. TFM said, '*One of the students surprised me in one lab session during the practice. She is always carrying her iPad. I am there to guide them, but she opened YouTube and followed the steps there. I think they are addicted to technology*'. TSM emphasised, '*I think it is not just students but this whole generation. They trust the information from technology more than they trust us. Even if you tell them something, they will check the web after*'.

Some tutors identified possible barriers to using the RLOs, such as the Internet. Other tutors agreed that using the RLOs must be mandatory at college. According to TFM, '*I think it must be a mandatory; otherwise, nobody will use the RLOs*'. TF confirmed this as one of the tutors who was not fully informed about RLO

implementation. She said, '*It doesn't matter if the tutor knows about the RLOs or not. You can tell the students, but they will not see them. The administration must make them mandatory'*. The course coordinator, who was one of the participants in this focus group, commented on her experience implementing the RLOs as follows: '*The Educational Clinical Affairs Department makes it mandatory for everyone to use the RLOs'*. TMF said, '*I wish that I knew about them. I might have used them instead of YouTube, as they are a trustful resource for educational purposes that targets students, unlike YouTube'*. She also stated, *'In fact, the links should be sent to the staff before the lab session, as they are to the students*'.

8.6 Limitations of the third phase

Although the high response rate (89%) met the PCA criteria and increased from validity, reliability and significance of conclusion drawn, reported findings should be considered and treated with caution. This is because of the voluntary response bias and other limitations represented by cross-sectional questionnaire.

This was a moderate scale evaluation study (level one and two of the Kirkpatrick framework) established on a single site and with a convenience sample where the generalisation of results is limited. The study depends on students' self-reporting their levels of knowledge, confidence, and ability. However, objective measures to

assess their knowledge and ability were not possible to collect as students agreed to participate on the basis that their responses were anonymous. A more rigorous and robust comparison study could have been made through measuring long-term retention with progression during the course. However, due to the limited time period of the study this was not possible.

Furthermore, second-year students had newly entered the nursing course. Thus, they might not have been fully aware of the teaching system and the importance of taking advantage of educational resources to support their study as they were more focused on understanding the surrounding systems of the nursing school. Therefore, there were a number of students (more than 50%) who reported that they had accessed the RLOs later on the semester. With regard to some content of the SSEQ, one categorical variable of the place of accessing the RLOs was removed as it did not contribute to the study.

Although PCA summarizes the variance in the constructs of educational value, usability and utility, and the RLOs' attributes, it could not be a definite measure of these constructs. The same data could be provided by several variables, and some that seem to be of importance do not provide any useful information. Some of the

variables loaded were highlighted on the components but they were conceptually unrelated.

Although it is suggested that orthogonal rotation is 'complete nonsense' for naturalistic data, and definitely data including humans (Field, 2018), the choice of rotation was orthogonal. However, the decision was based on the many simulations where the oblique rotation failed to provide a satisfactory result. Furthermore, the relationship between the components and the individual items is empirical. There is no underlying theory regarding which items should load onto which components. Thus, another group of students or even this group (at another time) would perhaps provide responses which would provide different loadings.

Moreover, due to the limitation of the low number of tutors, only one 45-minute tutor focus-group discussion was conducted. Therefore, the analysis did not produce clear themes. Additionally, similar to the limitation in the first phase, the participants used both Arabic and English during the focus-group discussion. Some meaning might be lost in the translation process or misinterpreted by other readers. Nevertheless, the researcher strove to follow comprehensive procedures to ensure the correct method of translation and that the data was interpreted and treated with caution.

8.7 Discussion

This phase aimed to evaluate the value and the impact of UK RLOs on clinical skills learning in Saudi nursing education through a student-self-evaluation questionnaire (SSEQ). It also aimed to gain a deep understanding of tutors' experiences of the implementation of RLOs using a focus-group method. The SSEQ was developed from a selection of issues that arose from the data gathered during the qualitative phase of the study related to the usefulness, usability, engagement, and attitudes towards the RLOs for clinical skills education in the Saudi context. The items selection was guided further by adapting items from existing measures (two of them related to the UoN RLOs and one for the clinical skills). The questionnaires for the UoN RLOs were for evaluation of the educational value, accessibility, media attributes and usability of the RLOs. Thus, they were adapted to clinical aspects to measure the value and usability of the RLOs for clinical learning.

The face validity of the SSEQ was supported by integration of the previous qualitative data and piloting of the questionnaire by an expert group of intern students and colleagues. A subsequent review of the SSEQ construct validity was carried out using exploratory PCA, where the items of the SSEQ were judged to be capturing three themes or 'real world dimensions' (Field, 2018) instead of four

components (usefulness, usability, engagement, attitude). These themes were influenced by the conceptual definition of the construct and the variables strength that loaded onto the components:

1. Students' views on the educational values of clinical skills RLOs for the nursing students. The intended questionnaire included only 'usefulness of the RLOs' items. However, the PCA showed other items that were substantially loaded and incorporated engagement, attitude, and the integration of the RLOs in clinical skills learning.
2. Students' views on the usability and utility of the RLOs. The intended questionnaire included only a usability item. However, the PCA revealed other items that were substantially loaded and incorporated the utility of the RLOs into the wider aspect of integration of the RLOs into the clinical skills curriculum.
3. Students' views on the impact of the RLOs media attributes in supporting clinical skills learning. This theme included items that measured student perspectives on how the media attributes of the RLOs supported clinical skills learning.

This section will discuss the key findings and their relationship to the existing literature. It will focus predominantly on the three themes that emerged from the PCA and the bar charts to give visual information on the data distribution, and the tutor focus-group discussion.

Prior to discussing the resulting themes, it is important to highlight the reuse matter of the open RLOs in the Saudi context in light of the results. Many studies, as indicated in section 3.2, found that the UoN RLOs were valued by the intended users (nursing and/or other healthcare students) (Williams et al., 2015, Bath-Hextall et al., 2011, Windle et al., 2011, Blake, 2010). This study, as data revealed, suggested that the open RLOs created by UoN were also valued by nursing students (re-users), who reused the RLOs in a different context in Saudi nursing education, regardless of some limitations (which will be discussed in the following sections). RLOs are defined by their name as 'reusable' and using the RLOs in different contexts is a re-using of the resources, even though the RLOs were being newly used as an educational intervention in Saudi nursing education.

Moreover, even though the SSEQ in this study focused primarily on the evaluation of the the value and impact of nursing clinical skills RLOs and their utility in different contexts, some items in the SSEQ showed that the students used them again, after their initial use during the course. For example, the data revealed that 25% of students accessed the RLOs at the end of the course for revision purposes, and 19% of the students accessed the RLOs for clinical training in the second semester (after the first semester of implementation). Moreover, most of the students, as data revealed

in section 8.7.1, were positive in their response to reuse and recommend the RLOs to others such as 'I would like to see more clinical skills RLOs', 'I intend to use the RLOs from this course again', and 'I would recommend theses RLOs to other students'. All these examples provide evidence that Saudi nursing students (RLOs re-users) reused the RLOs during and/or after their course.

8.7.1 Theme 1: Educational values of clinical skills RLOs for Saudi nursing students

This theme explores the educational values of the RLOs to Saudi nurses in learning clinical skills. It represents the variables loading on component 1 and twenty bar charts which reflect the educational value of the RLOs to the students, and eventually indicate the acceptability of the RLOs in the Saudi context. The findings support the educational value of RLOs to Saudi students including the usefulness, engagement, and impact. As the bar-charts, illustrated in section 8.3.1, show, the results support that the majority of students found the introduction of the clinical skills RLOs to be a positive intervention that supported their clinical skills learning. Most of the bar charts reveal that the students strongly agreed or agreed with the positive statements regarding the RLOs' educational values, as will be explained in this section. This supports the findings from

the first phase of this study where the participants identified the potential usefulness of the RLOs for the nursing curriculum.

Although only 23% of the students accessed all the clinical skills RLOs, the data revealed that all students had accessed at least one clinical skills RLO during the implementation phase. The majority of the students reported that the RLOs were helpful and valuable in learning the clinical skills. This finding is further supported by three students' comments on the open-ended questions that indicates that the RLOs were helpful in learning the clinical skills. This reflects the results from Sowan and Idhail (2014) who evaluated an interactive web-based nursing course with streaming videos for medication administration skills and concluded that the use of multimedia within an interactive online learning environment is a valuable teaching strategy in CSE. This finding is also consistent with that of Windle et al. (2011) who evaluated a series of RLOs covering basic aspects of chemistry within pre-registration nursing students. They found that around 96% (n=78) of students who participated in their study reported that the RLOs had been helpful or very helpful for their learning. While these studies measured the students' responses to a web-based learning resource tailored to their students' needs, this study adopted open online resources (RLOs) for clinical skills created in the UK for different contexts and this result suggests that RLOs as OERs are transferable to another context.

The findings show that the majority of students claimed that the use of RLOs decreased student's anxiety and prepared them for the upcoming lab session and improved their achievements in the exams. This result agreed Sowan and Idhail (2014) with findings in a study which evaluated online resources created especially for their organisation. Thus, it seems that the OERs are valuable in teaching clinical skills as much as the online resources invented for a specific organisation.

From the results, it seems that students perceived that RLOs impacted their clinical skill knowledge positively. Although this was self-reported rather than an objective examination for knowledge, as it is an exploratory study, the majority of the students agreed that the RLOs helped them to address a specific gap and retain the clinical skills knowledge. This is also evident from the number of the students who accessed the RLOs after the clinical lab session either to understand the skills (19.8%), or for revision (25%), or even for those who opened the RLOs after the OSCEs for the clinical training (27.4%). However, one of the tutors during the focus-group discussion suggested that 23% of the students who participated in the current study might have face difficulties in understanding the English language in the RLOs and so stopped using it, therefore, they disagreed that the RLOs helped them to address a specific gap in their knowledge. Interestingly, some tutors suggested that the

reason that around 18% of the students disagreed with the fact that the RLOs help them with addressing or retain the clinical skills knowledge could be because of the different policies used to conduct the procedures. This finding may help to understand that different policies in conducting the procedures may impact the reuse of OERs in clinical education in another context.

The results of the present study correlate with those of previous studies which utilized a questionnaire to assess the impact of online intervention (RLOs) and demonstrated that the online intervention had a positive impact on student knowledge and on knowledge retention (Redmond et al., 2018, Williams et al., 2015, Keefe and Wharrad, 2012). Other studies by Makhdoom, Khoshhal, Algaidi et al. (2013) and Salyers (2007) reported positive changes in exam scores (MCQs) in CSE in medicine and nursing respectively. Their findings revealed highly significant results that indicated a higher level of knowledge following intervention of web-based learning. However, other studies reported no significant difference in the students' level of knowledge between online and traditional learning methods (Redmond et al., 2018, Arroyo-Morales et al., 2012). Other results from two systematic reviews, which reviewed the efficacy of web-based distance education for healthcare students, supported that web-based education has encouraging effects in improving

students' knowledge and is no less effective than traditional means (Coyne et al., 2018, Cant and Cooper, 2014, Lu et al., 2009).

The results of this study indicate that the majority of the student thought that the RLOs had positive impacts on their skills performance. The novelty of using the RLOs in this study gained a high rank in the SSEQ. It was considered a valuable learning resource that enhanced student levels of confidence in performing the clinical skills procedures. It also helped them to practice the clinical skills independently and to decrease their mistakes in performing the skills. Furthermore, one of the students commented on the open-ended question: '*I wish that all tutors can allowed us use this on all subjects to add more information to what we had and increase our confidence in practice*'. Moreover, tutors during the focus-group discussion brought to attention that they noticed during the injection lab session some of the students were more confident in practicing the procedures. Most of the tutors at the time of that session were happy with the students' performance on injection skills. According to them, the RLOs might be a reason behind this.

Additionally, these results seem to be consistent with other research which found that web-based learning is an effective educational approach and significantly contributes to a higher or similar level of clinical skill performance in the clinical examination among different

health specialities (Sowan and Idhail, 2014, Makhdoom et al., 2013, Rowe et al., 2012, Gormley et al., 2009). The findings in this research might be limited by the evaluation method employed through using a questionnaire instead of objective measure such as a clinical examination, because of research exploratory nature. However, these studies evaluated the impact of the online resource that tailored to the organisation's needs on the clinical skills performance, while the clinical skills RLOs in this study were adopted and evaluated in another context. In general, therefore, it seems that UK RLOs were of value to the students in performing the clinical skills, but further experimental research should be undertaken to investigate the impact of RLOs as OERs on the clinical skills performance in an objective manner.

The current study highlights that majority of the students found that RLOs were interesting and engaging. On the perceived flexibility of the clinical skills RLOs, the majority of students reported positively on all ratings. The majority of the students enjoyed being able to study procedures at their own pace, they felt that the RLOs were at the right level for them and fitted their learning needs in clinical skills and introduced new concepts clearly. This was indeed in contrast to some tutors' opinions from the first phase who claimed that the RLOs were not at university students' level, and not useful to the students. These results seem to be consistent with other research which found

positive ratings on the usefulness, and flexibility of the RLOs in in wound care education, injection skills teaching, and physical examination (Redmond et al., 2018, Williams et al., 2015, Clay, 2011).

The data from this phase revealed few aspects of engagement with the UK RLOs, though it was explored deeply in the first phase while participants directly interacted with the RLOs (Chapter 5). The intended questionnaire separated the engagement and the usefulness items. However, the PCA showed that the engagement items were substantially loaded in Component 1. The majority of the students reported positively (when strongly agree and agree are combined) on all engagement items: they would use the RLOs again in the future, they would see more RLOs in other clinical skills, and they would recommend these RLOs to other students. This result further supported by nine students who commented on the open-ended question (Appendix 10). For example, according to some students, '*I wish you would add other clinical skills even for students in the 4th and 3rd years*'. This result is in agreement with those obtained by Redmond et al. (2018) and Williams et al. (2015), where the majority of the students showed a positive rating regarding repeating the experience of using the RLOs, whether in clinical skills or other subjects.

In summary, this theme shows students' views on different aspects of the value of the adopted UK RLOs in learning the nursing clinical skills. The findings support that the introduction of clinical skills RLOs was a positive intervention that supported students' clinical skills learning. All the recruited students accessed at least one RLO during the study period. However, the findings also raised some issues that could prohibit the students and tutors from using the adopted clinical skills RLOs, which eventually would contribute to the transferability of the RLOs as an OERs.

8.7.2 Theme 2: Students' view on the usability and utility of the RLOs

The second theme is about the ease of use of the RLOs and the extent to which the clinical skills RLOs fitted the clinical skills curriculum. This theme represents component 2 which consisted of twelve items varying from excellent to fair loading and the reflected usability and utility of RLOs. In terms of the usability, the bar charts in section 8.3.2 indicate that the majority of students either strongly agreed or agreed with statements relating to the ease of use of the RLOs in relation to the terms, language, and the navigation, as well as that they were well structured. However, six of the students commented negatively on easiness aspects. Four of these comments were about whether the language was easy to understand, and they

suggested translating the RLOs (Appendix 10). One student suggested that to '*add a Arabic subtitle under the videos will make it easier to understand and more helpful*'. While another said, '*add subtitles for different language to clarify the information when it is difficult to understand the language*'. Nevertheless, the students are all being taught on their nursing courses in English. Therefore, translating the RLOs to the Arabic language or adding Arabic subtitles perhaps will not contribute to making the RLOs easier. This is, indeed, could be proved by the number of the students, 94% (when strongly agree and agree combined), who agreed that the steps of procedures in the RLOs were clear. If the Arabic subtitles or the translation were difficult for the students, most probably they would find that the procedures in the RLOs would not be clear for them. Furthermore, 86% agreed that the clinical skills RLOs were clear about their objective.

However, interestingly, all of the students' feedback (n=3) in the open-ended question regarding the clarity of the procedures were about following the same guidelines that they follow in the curriculum. For example, according to one student, '*this procedures steps should be compatible with/ agreed with our curriculum*'. Therefore, differences in the policies and practices in conducting the clinical skills procedures may prohibit the students from using open

RLOs available on the web as it could be a source of confusion for them.

Interestingly, similar results were found in both the current study, which evaluated the student's perceptions of a package of seven clinical skills UK RLOs including an injections RLO, and another UK study that involved the same injection RLO (Williams et al., 2015). In both studies the majority of students found that the RLOs were clear in their objectives and easy to navigate. This was true even though this study had two extra clinical skills RLOs rather than just injection. To emphasise the degree of positive opinions on how the RLOs were clear about their objectives, the clarity of the procedures, and easiness to navigate, 91.9% of students agreed (when strongly agree and agree was combined) that the self-assessments on the RLOs helped them gauge how well they had understood the material. Although this item was intended to be an educational value item during the questionnaire development as it appeared in Bath-Hextall et al. (2011) questionnaire, the PCA revealed a substantial fair loading of this item on component 2.

Moreover, regardless of the fact that the majority of the students liked the multimedia design of the RLOs, around 20% of the students disagreed (when strongly disagreed and disagreed are combined) with this idea. Thus, even though the RLOs were easy to navigate

for the majority of them (86%), the easiness of using the RLOs does not reflect they like the design of the RLOs. This eventually perhaps could be a reason for not reusing OERs available online and confirms the TAM concept that ease of use does necessarily not reflect the acceptance of the resource (Ladan et al., 2018).

In regards to the utility of the RLOs to the wider aspect of implementing the RLOs into Saudi nursing clinical skills curriculum, the bar charts (section 8.3.2) showed that the majority of the students, 79.6% (strongly agree and agree combined), agreed that the RLOs ensured parity of clinical skills information across all classes. Indeed, one of the issues in teaching clinical skills is unifying the information among different classes in the same level, as indicated in Chapter 6. This is perhaps due to the differences between the tutors' experiences and backgrounds that affect the way they demonstrate the procedures to the students, even though they follow the same manual or guideline to teach the students. This was in fact confirmed in the focus-group discussion, when one of the tutors commented on the previous section and said '*Many students feel confused when they come to the lab after clinical practice because of the different policies used to conduct the procedures between here and the hospital*'. Therefore, implementation of the RLOs unified the information across all classes rather than using different online resources such as YouTube.

Furthermore, the majority (89.8%) of the students agreed that the RLOs were well integrated with the 'Fundamentals of Nursing' course and other teaching sessions. This supported the implementation method of the RLOs in this study as a supplement to CSE and not replacements for the traditional face-to-face clinical skills teaching and learning. This result seems to be consistent with other previous research which found that web/online resources, in general, should be used as a supplementary teaching method (Sowan and Idhail, 2014, Arroyo-Morales et al., 2012, Gerdprasert et al., 2011), and RLOs in particular (Redmond et al., 2018, Williams et al., 2015, Bath-Hextall et al., 2011).

Moreover, the results show that 72% found that the RLOs were superior to other online learning resources available on the web, for example from YouTube, Google, Wikipedia or other sites. This could be due to many reasons, such as the multimedia design of the RLOs (as 77% responded), or to the interactive attribute as mentioned previously in the first phase, or because students felt that the RLOs are more trustworthy than other resources on the web. One of the student's feedback in response to the open-ended question was '*it is trustful compering with lots of videos and resources on google and YouTube that make me confused which one I ned to trust*'. Trusting the OERs seems to play a huge rule in willingness to adopt them to learn and teach nursing clinical skills.

On another hand, tutors during the focus-group discussion suggested that the reason that around 30% of the students disagreed (strongly disagree and disagree combined) that the RLOs were superior to other online resources available on the web was that accessing YouTube, for example, is much easier than accessing the RLOs as this required many steps. Another reason could be the amount of variety, for example on YouTube, available on the web for one procedure. According to one tutor, '*The amount or the variety of the videos available on the YouTube is higher. I mean, for one procedure, you can find 100 videos, so if one is not clear, you can find another one'*. Nevertheless, the availability of a wide variety of online resources could be a disadvantage, as it can be difficult to select a trusted and good quality resource. Therefore, the accessibility and variety of RLOs are important drivers in using them. Thousands of digital resources are produced collaboratively and published online on a daily basis, and their quality control, assurance and evaluation are of vital importance for potential users (Clements et al., 2015, Palavitsinis, Manouselis and Sanchez-Alonso, 2014).

Furthermore, 81% of the students preferred learning from the RLOs to learning from books or the clinical lab manual. Tutors indicated during the focus-group discussion that they believe that this is related to this generation of students. one tutor said, '*I think the trend of this generation is that they don't prefer a theoretical*

lecture'. According to another tutor that even though she is available at the practice time to guide them, some students prefer to watch YouTube videos during practice time, she expressed that '*I think they are addicted to technology*'. According to the tutors, students trust the technology more than tutors as they refer always to the web even after they have got the information from the tutor themselves.

These results seem to be in accordance with the literature on the impact of attitudinal and generational characteristics on approaches to computer-assisted learning (Gibson and Sodeman, 2014, Petit dit Dariel et al., 2013, Mangold, 2007). Students born between 1981 and 2000 (the age of students recruited in this study) have been described as 'millennial' students as they have non- linear learning habits and dynamically utilise technologies (Gibson and Sodeman, 2014). This generation are greatly influenced by the technological innovations present during their lifetime. Millennials were raised during the growth of dot.com, YouTube, and smartphones and the influence of technology is present in all aspects of their lives from healthcare and transportation to communication (Gibson and Sodeman, 2014). Thus, this finding further supports the idea of displaying how computer-assisted learning catalyses generational and attitudinal differences that influence its use. Mangold (2007), Petit dit Dariel et al. (2013), and Williams et al. (2015) findings, show how computer-assisted learning lead to differences in

generation and attitude, in addition to influencing its meaningful evaluation.

To sum up, this theme demonstrates students' views on the usability of the RLOs and its utility in the wider aspect of the nursing course. The findings show that the clinical skills RLOs were considered easy in terms of the language, terms, and navigations, and also support that the utility of RLOs in the 'Fundamentals of Nursing' course is a positive intervention. Some concerns were emphasised that could lead to nursing students and tutors avoiding use of UK RLOs, which ultimately would contribute to the transferability of the RLOs as OERs.

8.7.3 Theme 3: Students' view on the impact of the RLOs attribute in supporting clinical skills learning

This theme explores the RLOs media attribute and the extent to which this contributes to clinical skills learning. The loading in the component 3 (many positive excellent loadings), and the individual bar charts (section 8.3.3) confirmed that students benefitted from the media attributes of RLOs. The media attribute of the RLOs that the students found most important were the interactive features, including accessibility of the RLOs at any time they wanted. More than 90% agreed (strongly disagree and disagree combined) on the: value of the images and animations, the narration which made the

RLO more engaging and helped them to pronounce the term correctly, and the on-screen text that help them to understand the information. This result reflects earlier observations on the previous theme, which showed that the majority of the students liked the RLOs design. However, one of the students seemed not to like the on-screen text, according to her '*I wish that this resource design to be more clear, attractive, and decrease the words on the on-screen text*'.

The importance of these media attributes has also been reported by nursing students in other studies (Keefe and Wharrad, 2012, Bath-Hextall et al., 2011, Lymn et al., 2008) and with regard to nursing clinical skills in particular (Redmond et al., 2018, Lehmann et al., 2015, Williams et al., 2015, Preston et al., 2012, Gormley et al., 2009). Considering different learning styles is important in web-based e-learning, thus, the visual, audio and interactive nature of the RLOs indicates that they have an influence for visual, auditory and kinaesthetic learners (Windle and Wharrad, 2010).

However, since different people prefer to learn visually, aurally, or kinesthetically, in teaching, many academics believes that learning situations and learning materials should be tailored to those preferences (Kirschner, 2017). However, despite the fact that many studies have indicated that the learning style theory is accepted by

more than 90% of teachers worldwide, learning styles have also received wide criticism from academics and researchers (Husmann and O'Loughlin, 2019, Barry and Egan, 2018, Papadatou-Pastou, Gritzali and Barrable, 2018, Macdonald, Germine, Anderson et al., 2017, Riener and Willingham, 2010). Kirschner (2017) study gives academics, administrators, and researcher a plea that they avoid propagating the idea of learning style. It has been argued that there are a number of major problems with the notion of learning styles for many reasons, a preference for how an individual studies is not a learning style; there is quite a difference between the way that individuals prefer to learn and that which actually leads to effective and efficient learning; the poor theoretical justification of the learning style theory, their problematical measurement, and few objective studies supporting them (Kirschner, 2017, Riener and Willingham, 2010).

However, the fundamental concept behind the universal learning design is to introduce flexibility into the teaching materials and methods (Redmond et al., 2018). As such RLOs optimise opportunities for today’s student cohorts (Rose, 2000) , especially in this research. In the case of this research, although English is the teaching language for these students in nursing education, their first language is Arabic and there is variety in their fluency in English. Although considering the students' preferred learning styles

associated with the RLO media attributes was not the primary concern of this research, having the choice of all these different media (visual, audio and interactive) in the RLOs not only deepens students understanding of the clinical skills, but also supports their language as English is not their first language.

On the perceived attribute of accessibility of clinical skills RLOs, the bar charts (section 8.3.3) showed that the majority of students reported positively on all ratings. 92% liked being able to access the RLOs whenever they wanted to and 97% of them found that they enabled faster and better access to clinical skills information. These results compare with other studies conducted, particularly for nursing clinical skills (Redmond et al., 2018, Williams et al., 2015, Preston et al., 2012), and generally in nursing studies (Keefe and Wharrad, 2012, Bath-Hextall et al., 2011).

However, some students (n=5) respondent negatively to the RLOs accessibility or found they could not open some RLOs in the open-ended question (Appendix 10). For example, '*make the access to this more easer, some of them didn't open sometimes*', '*simplify the access way to RLOs*'. These students' opinions were supported by one of the tutors during the focus-group discussion when she said, '*Students can directly open YouTube, type whatever in the search and get 700 videos, but the RLOs require many steps to access*'.

Therefore, although the results revealed that the majority of the students liked being able to access the RLOs whenever they wanted and it enabled them to reach the clinical information quickly, the lack of ease of access can prohibit the students from using them and from accepting them as an OERs.

Moreover, this theme additionally included negative fair loading. Although these two items (36: the RLOs were difficult to use and 23: I needed the help of a lecturer to understand the RLOs), were more related to the usability aspect, the PCA placed them into component 3. They loaded poorly on the other components, especially in component 2 (.003 and .186 respectively). It seems that they are not conceptually related to the third theme, but they are perhaps indirectly related to it. Indeed, these negative loadings regarding the difficulty of the RLOs and students needing the lecturer's assistance to understand the RLOs were affirmation of the positive loadings for supporting students' views on the impact of the media attributes on their learning. The bar charts of items 36 and 23 show the majority, 71% and 74.6% respectively, of students disagreed (strongly disagreed and disagreed combined) with these statements. This shows that the RLOs were not difficult and students did not need support to understand them. Thus, the media attribute could impact the usability of the RLOs and prohibit the students from reusing the RLOs. Furthermore, during the focus-group discussion one of the

tutors indicated that the students will stop using the RLOs if they feel it is difficult. This theme reflects previous studies where the majority of students either agreed or strongly agreed with statements involving the RLOs ease of use and the value of the media attributes which reinforces their importance in enhancing learning and understanding (Redmond et al., 2018, Williams et al., 2015).

To summarise, this theme displays students' views on the RLOs attributes, including media and accessibility attributes, which contribute to their clinical skills learning. This theme also included negative fair loadings which are related to the usability aspect. The findings corroborated that students benefit from the RLO attributes and ease of use. Concerns were highlighted that could prevent Saudi nursing students and tutors from using the adopted UK RLOs, which would inhibit the transferability of the RLOs as an OERs.

8.8 Summary

All these themes resulted from the underpinning latent characteristics from the PCA and corresponded with many previous studies. Some items loaded highly in the components, but some of them were indirectly conceptually related to the component. No single categorization could be applied to some items; thus, some items could be found in two components. In other words, one aspect of a component could be involved in another component. For

example, usability items are mentioned in both the second and third themes. This explained the presence of different variables/items for educational values, usability, utility and RLOs attributes in the components and perhaps reflected the various experiences that students had when they used the clinical skills RLOs. To sum up this chapter, the objectives of this phase set out to:

- Validate the questionnaire, a new measure of evaluating the value of using others' clinical skills OER on nursing students

- To evaluate the value of UK RLOs for clinical skills learning in Saudi nursing education.

- To gain a deep understanding of tutors' experiences of the implementation of RLOs.

The PCA revealed three main components on the SSEQ with high internal consistency. The resulting themes have achieved the objectives of this phase and reached the following conclusions; the RLOs were effective in supporting the students understanding of basic clinical skills, contributing to perceived support in performance, knowledge and confidence in basic clinical skills competency outcomes. The adopted UK RLOs were evaluated positively by the students on most of the aspects. They were accepted for their educational value, usability and utility, media and accessibility

attributes, before, during and after the clinical lab session, and even for the clinical practice.

After presenting and discussing the findings from the third evaluation phase of the study, this chapter concludes that UK RLOs were evaluated positively by the students and in most of the aspects were accepted to support their clinical skills education. In the following chapter, all findings from this and the first phase will be drawn together and discussed.

Chapter 9: Final discussion and conclusion

The aim of this research was to explore the transferability of open reusable learning objects (RLOs) created in the UK to a clinical skills education context in Saudi nursing education.

The first chapter highlighted that in light of the ongoing international 'fitness to practise' debate, it is important to have effective clinical skills education (CSE) that is flexible and adapts to different learning needs. The challenge in nursing education now is to make programmes suitable, accessible, available and smart for a larger student cohort. Web-based/online learning technology has gained popularity in supporting nursing education, in the era of rapid expansion of technology. Recent years have seen a rapid increase in the development and use of OERs in Higher Education Institutions globally. Nevertheless, the spread of OERs to many countries is delayed by reasons such as the lack of OER implementation policy, the low awareness and availability of OERs, and cultural issues.

This chapter also highlighted the challenges in clinical teaching in KSA, and the need to move forward to more advanced and modern web-based learning to meet the generational needs in using technology. The introduction chapter also highlighted that the research conducted in KSA to explore rudimentary e-learning in

nursing is limited. Thus, further research exploring the transferability and adoption of RLOs in the form of OERs was required.

A systematic scoping review of the literature revealed that web-based learning is valuable to CSE. Nevertheless, producing this type of resource needs time and resources. While there is potential to use existing resources of this kind in the form of OERs, there is no evidence as to how these may transfer to another setting in CSE, especially in nursing. Reusable learning objects (RLOs) are one form of OERs; they are high-quality open resources based on empirically derived evidence and the focus of this study. The PIET-T model was used as a contextual framework for considering transferability holistically with this study. Contributing to specific factors within the PIET model (Figure 5), TAM was used to explore the concepts of usability and usefulness and attitude towards the UK RLOs.

Mixed-method research (MMR) was used to collect and synthesise qualitative data (through direct observation using concurrent think-aloud and follow-up focus-group discussion), and quantitative data (through a questionnaire, followed by focus-group discussion). This research, overall, included 164 participants: 26 for the qualitative aspects of the study and 138 for the quantitative study. For the think-aloud method, 22 participants were recruited, and 18 of them participated in the follow-up focus group in the first phase. For the

SSEQ in the evaluation phase, 138 students' responses were analysed, and 4 tutors participated in the follow-up focus group. Data from the first exploratory phase informed the following implementation and evaluation phase. Common statements from the findings of the qualitive data were used to adapt and develop a new quantitative measure, the student self-evaluation questionnaire (SSEQ). The SSEQ was a new validated tool to evaluate the value of nursing clinical skills RLOs created in the UK and their utility in different contexts (Saudi context).

The findings from the first phase revealed that most students and tutors exhibited positive views about the potential usefulness, usability, and attitude and engagement with the RLOs in teaching and learning clinical skills. Regardless that there were some limitations on its usability. Furthermore, the pedagogical designs of the RLOs appeared to be aligned with teaching and learning needs of clinical skills in the Saudi context. Sequentially, this is reflected in the tendency and readiness of participants to adopt and experience RLOs in their clinical skills curriculum. The analysis and the PCA of the questionnaire, in the evaluation phase, confirmed these initial findings. A discussion of the findings pertinent to each phase has already been reported in Chapters 6 and 8, including a number of recommendations for individuals and research for nursing education and practice.

As a distinct contribution to these discussions, this chapter provides a synthesised discussion of all findings. The integration of think-aloud (protocol analysis) and PCA, including the follow-up focus-group in both phases, have not been used before to explore this area. The methodology discussion adds to the emerging understanding and body of research in this field. It could be attributed to the current OER revolution which suggests that learners should have more opportunities to try and reuse web-based resources produced by others in the clinical skills context.

This chapter will discuss the synthesis and integration of the findings from all phases. This will be followed by the strengths and limitations of this research, and the implications will be discussed. Finally, the overall research conclusion will be presented.

9.1 Synthesis of all findings

This section will present a synthesis of how the findings of all three phases of this study informed the transferability of the RLOs.

9.1.1 Transferability of the clinical skills RLOs

The Population-Intervention-Environment-Transfer (PIET-T) Model of Transferability aims to assess the transferability of health interventions, as discussed in Chapter 3 (Schloemer and Schröder-Bäck, 2018). The theoretical foundation of the PIET-T models

suggests that most of the information on all four themes is important for a transferability assessment. Nevertheless, what criteria are relevant can differ with regard the particular intervention and comparative contexts (Schloemer and Schröder-Bäck, 2018). As this model is limited to healthcare interventions and its success has not yet been proven in either health interventions or other contexts, there are limitations in adopting it to underpin this research study. A review of the literature regarding the transferability of an intervention indicated that many factors could influence its transferability (Chapter 3) (Kocken et al., 2019, Musch, 2019, Fleuren, Paulussen, Van Dommelen et al., 2014, Cambon et al., 2012, Damschroder, Aron, Keith et al., 2009). Accordingly, in most of this literature these factors are similar but slightly conceptually different based on the nature of the intervention and the study.

The finding from each phase of this study shows that the UK RLOs were accepted by the students and tutors in Saudi CSE. Thus, the synthesis of findings associated to adapt this PIET-T model and produce a new adapted model of transferability of the clinical skills RLOs to another context. The discussion of the synthesised findings (meta-inference) will be guided by the factors included in this model. As is shown in Figure 72, the transferability of the RLOs is at the centre of four main aspects: population, environment, intervention, and implementation process. Each of these factors influence the

transferability of the RLOs and the transfer of the RLOs impacts on each aspect, reflecting the facilitating and impeding factors of transferability. The following sections will discuss all these factors based on the findings of this research.

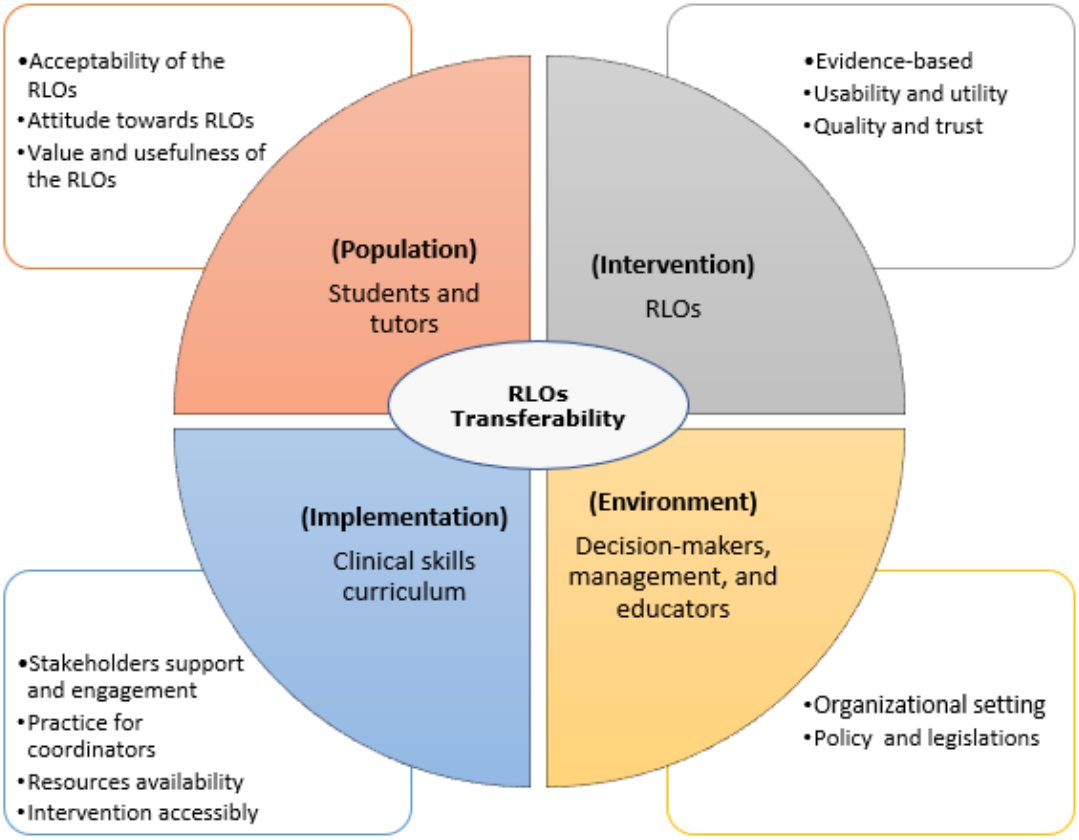


Figure 72 Transferability of the UK RLOs to Saudi clinical skills education based on the Synthesis of Shared Findings

9.1.1.1 Population: students and tutors

Population means the people that are targeted by the intervention (Musch, 2019). In much of the literature of intervention transferability, factors related to the population are represented by the characteristics of the target group, perception and attitude towards the intervention, acceptability, and the degree to which the

use of the innovation has benefits or drawbacks for users themselves (Schloemer and Schröder-Bäck, 2018, Fleuren et al., 2014, Cambon et al., 2012, Damschroder et al., 2009). The previous discussions of the exploratory and evaluation phases in Chapters 6 and 8 emphasised on interpreting the findings of each phase regarding the students and tutors' views on the educational value and usefulness of the RLOs, usability and their attitudes towards the RLOs. This section will briefly revisit the students and tutors' attitudes and go on to highlight further educational values or usefulness that emerged from the exploratory and evaluation phases. This will explain how participant attitudes and the value of the RLOs played a crucial role in the transferability of the RLOs.

The students in this research were millennial students, as indicated previously. Thus, technology is clearly socially and culturally acceptable to this group and they use technologies dynamically (Redmond et al., 2018, Elf et al., 2015). Additionally, students and tutors in this study held mostly positive views towards the RLOs. These views in turn reflect an aspect of the RLOs acceptability according to the TAM framework. Despite positive attitudes towards RLOs, these students viewed the RLOs as supplementary learning materials to complement traditional teaching and learning of the nursing clinical skills. RLOs appeared to be an interesting and new online resource for participants that included interactive and

multimedia features and focused on one single objective. These features were the most liked attributes by the students, especially the mix of media features, which could support the students' understanding of the procedures and terms in the English language. However, some of these features could impact on the RLOs usability as will be discussed in the next section about the intervention. Also, some tutors held a negative attitude towards the RLOs' features compared with other clinical skills resources available on the web, especially YouTube.

This study suggested that RLOs, overall, would be useful for enhancing the clinical skills knowledge and performance, regardless of the fact that participants perceived some limitations in using them in the clinical skills curriculum. With regards to knowledge, most of the participants in the first phase, during the think-aloud and focus-group, believed that RLOs would help the students to remember the clinical skills information. This indeed, was confirmed by 80% of the students who evaluated the RLOs in the third phase. Furthermore, RLOs in both phases were valuable for understanding the clinical skills. With regard to clinical skills performance, data from both phases revealed several advantages from the RLOs. For example, RLOs, according to most students, helped them to enhance their confidence in their clinical skills performance and help them to decrease their anxiety prior to the lab session.

Importantly, as shown from the findings in both phases, many of the students suggested that the RLOs would help them to be more independent and confident learners. As the data indicated that, although most students agreed that RLOs should be integrated as a supportive method to the clinical skills curriculum, most of the students were looking for a degree of freedom in clinical skills learning rather than 'spoon-fed learning'. The explanation that students provided for their views that RLOs would help them to be independent learners was that RLOs are trusted resources for them, interactive, and accessible at any time.

Nursing CSE has traditionally focused on teacher-centred approaches (didactic approach) involving mostly the lecture method of theoretical information transfer, followed by practice sessions in teaching labs (Silveira and Cogo, 2017, Ellis, 2016, Sheahan et al., 2015) where the student role is usually restricted to observing and then repeating the demonstration (where time allowed) (Silveira and Cogo, 2017). Therefore, learning consists mostly of merely the memorization of incontestable facts and standard problems and accordingly students become passive receivers (van Wyngaarden, Leech and Coetzee, 2019, Mthembu, Mtshali and Frantz, 2014). A study by Khan, Ali, Vazir et al. (2012), which aimed to explore nursing students' perceptions about the effectiveness of the utilized teaching and learning strategies in clinical education in improving

their knowledge, skills, and attitudes, concluded that demonstration was the most effective approach for improving students' skills. However, a didactic approach does not always accommodate the learning needs of students and could lead to a lack of consistency in the way in which skills are demonstrated and how theoretical information is provided by lecturers (Sheahan et al., 2015, McNett, 2012).

Many studies advocate a move towards student-centred teaching and learning approaches (van Wyngaarden et al., 2019, Ellis, 2016, Shellenbarger and Robb, 2015, Mthembu et al., 2014). Nevertheless, it would be difficult to some extent to pursue a student-centred approach in the clinical skills curriculum. The current rhetoric in higher education calls for a revolution in education, challenging traditional teaching approaches and strategies and placing greater emphasis on learner-autonomy and self-directed learning (Petit dit Dariel et al., 2013). Nursing literature is full of demands for a 'disavowal' of the behaviourist paradigm, which is claimed to have created generations of passive learners unable to implement much needed reforms in the healthcare service (Mitchell, Jonas-Simpson and Cross, 2013, Petit dit Dariel et al., 2013, Benner, 2012, Ewashen and Lane, 2007, Randall, Tate and Lougheed, 2007, Romyn, 2001).

Nonetheless, there is potential concern regarding learner autonomy in practice, because of the possible risk of allowing students to guide their own study and select paths that might be inconsistent with their curriculum objective (Leyshon, 2002). Thus, from the current study findings, it could be argued that using RLOs in a clinical skills curriculum could provide a student-centred and teacher-led approach. In clinical skills labs, tutors have the opportunity to explain and demonstrate the clinical skills, while students could refer to the RLOs, independently, at their own pace for many purposes such as revision and preparation, in case they did not understand specific information, or on a clinical placement. Independent learning urges students to read widely on the topic rather than depend on a demonstrator or their notes (Melby et al., 1997).

To sum up, the population factor (students and tutors) involved the attitude towards the RLOs and its usefulness and millennial students' characteristics were one of the key aspects that influenced the RLOs transferability.

9.1.1.2 Intervention: RLOs

The intervention, in many reviews regarding the intervention transferability, represents the characteristics of the innovation and evidence-based background such as the usefulness/utility of the primary evidence and its quality (Kocken et al., 2019, Burchett et

al., 2018, Schloemer and Schröder-Bäck, 2018, Cambon et al., 2012, Damschroder et al., 2009). In the determinants associated with innovation, Fleuren et al. (2014) also highlighted many extra factors such as the procedure clarity, complexity, completeness, compatibility, observability and relevance for client.

In the current study, the characteristics of the clinical skills RLOs that were adopted to be explored in the Saudi context were discussed in Chapter 3. The RLOs were developed based on a rigorous ASPIRE framework, clear pedagogical design (LOAM) which intend to measure their effect on reuse, and empirically derived evidence as described. The participatory design and peer review are key processes in ASPIRE that lead to alignment, reuse and quality of the RLOs. Also, they are trusted online resources compared with other resources available on the web, as the findings suggested. This in turn, as the data revealed, seemed to contribute to the many educational values and positive attitudes toward the UK RLOs from Saudi nursing students and tutors. Therefore, the pedagogical design plays a crucial role in the transferability of the RLOs. Nevertheless, the data revealed many limitations related to the RLOs design that could limit its usability. This section will discuss the aspects that might most limit the RLOs' usability from the transferability perspective.

Differences in practice in conducting nursing procedures in some RLOs was an important point highlighted in the findings which might prevent the transferability of the RLOs, especially in the first exploratory phase. This finding was also confirmed by three students who commented on the open-ended question on the SSEQ that the procedures in the RLOs should be compatible with/agree with their curriculum. In the follow-up focus-group in the third evaluation phase, some tutors confirmed this notion when they indicated that the 18% of the who students disagreed with the statement 'RLOs helped them to retain knowledge of clinical procedures' might be because they did not use the RLOs. According to the tutors, differences in practicing the procedure could be the main reason as this is an issue that students complain about when they practice in the clinical placement. This finding seems to be consistent with previous research by Blake (2010) who investigated the impact of the RLOs on students' learning experiences and compared their evaluation among nursing and medical students. The findings in her study highlighted the importance of the relevance of materials and of integrating RLOs directly with course content so that all the content is appropriate and relevant to the level of study.

Indeed, according to the findings, it would be difficult to judge the different steps in conducting the procedures as 'wrong' steps because each organisation has their own policies and regulations,

that is, unless the step could be harmful to the patient. This point was discussed in Chapter 6 where many of the tutors agreed that the differences in practicing the procedures could prepare the students for the for real practice in clinical placements. Nevertheless, most of the clinical skills RLOs were lacking in providing enough evidence to show that the resources are updated or even well known nationally such as by the Nursing and Midwifery Council (NMC) or internationally such as the WHO. Scully (2011) argues that the theory-practice gap could exist as a result of outdated theoretical concepts. As an end-user of the RLO resource, the rigorous process might not be as important as the evidence available in the RLO resources. Updated resources could contribute to the credibility and acceptability of the RLOs. This make the users more confident about the information in the RLOs, even though the steps of conducting the procedures are different, particularly in light of the evidence-based practice (EBP) movement in healthcare education in general and nursing education specifically. Stevens (2013) described the EBP movement and explored some of the impacts of EBP on nursing practice, education, and research. She argued that programs for basic preparation of health professionals needed to undergo program revision in order to focus on evidence-based quality improvement processes.

The NMC, which governs nursing professional practice and nursing education in the UK, outlines in its Code of Conduct an expectation that nurses must 'always practise in line with the best available evidence' (NMC, 2018a). In order to achieve this, according to NMC (2018a), nurses must make sure that any information given is evidence based and maintain the knowledge and skills they needed for safe and effective practice. The NMC standards for nursing curricula require that the curriculum should reflect contemporary knowledge and enable development of evidence-based practice (NMC, 2018b). Most of the educational organizations around the world have responded to practitioners' demands and policymakers and emphasise an EBP curriculum (Scurlock-Evans, Upton, Rouse et al., 2017, Stevens, 2013, Moch, Cronje and Branson, 2010, Cullum, Ciliska, Marks et al., 2008). Since the culture of the educational environment reflects expectations of how the nurse should act in the clinic (White and Winstanley, 2010, Warne and McAndrew, 2009), it is reasonable that improved EBP training at the undergraduate level will lead to better clinical practise implementation (Scurlock-Evans et al., 2017, Young, Rohwer, van Schalkwyk et al., 2015, Moch et al., 2010).

Cumulatively, in light of the evidence-based movement, it could be argued that the evidence and references that are included in the clinical skills RLOs should be of a high standard and up to date to

increase their credibility and transferability. The clinical skills RLOs selected for this study are considered to be high-quality OERs and were developed based on the rigorous ASPIRE framework. They also involved storyboard workshops with the end users and other stakeholders to make them well-aligned to user needs. In addition, robust quality assurance involving peer review are critical stages in the RLOs development process. In addition, robust quality assurance is involved in the RLOs development process. However, the end-user may not appreciate or be aware of the production method so much as the final production. In other words, the actual development process of the RLOs as OERs available on the web is of little concern to the tutors, students, and other stakeholders involved on the CSE process, compared to the actual resources used in the RLOs.

Another significant limitation that could impact negatively on the usability of the RLOs were the terms and abbreviations used in some RLOs. In the first exploratory phase, some of the students/participants highlighted some issues regarding the terms and abbreviation used in some RLOs. Likewise, in the evaluation phase around 15% of the students disagreed (when disagree and strongly disagree combined) that both the terms and the language were easy to understand in the RLOs. This was in addition to several students' responses (n=5) to the open-ended question on the SSEQ where they commented on negatively on the easiness of terms and

language in the RLOs. Terms such as 'hokey-cokey' are not familiar in different cultures and terms such as 'Z-track' may not be familiar for new nursing students. Using regional or national terms such as 'Trust' to describe an organisation may also be unfamiliar. However, this seemed to be linked less to the language, but rather more to the lack of a clear title and explanation for the RLO section. Therefore, further explicit description regarding their use was needed to make the RLOs easy to understand by different people in different contexts. It could be suggested from the findings that the terms and abbreviations used should be as explicit and as internationally accepted as possible in order to make the RLOs easy to reuse in different contexts. Although some common terms may exist in practice, titles should be direct and reflect the content of the aim of the RLO. Many of the students in the evaluation phase suggested adding subtitles in the Arabic language. However, as discussed previously, this would not support the students learning as they are taught the whole course in English.

RLOs by their nature are different than other familiar OERs available on the web such as through YouTube or Google. They a mix of media, interactive and activities features. Chapter 6 discussed many aspects related to the multimedia attributes that could impact the usability of the RLOs, including the problems that participants initially had at the beginning of the think-aloud activity, until they became more

familiar with the RLOs. For example, the presentation of the narrative part, and use of images and real patients. Although it is not a main aim of this study to understand cognitive processing and how the use of words and pictures (multimedia) promote meaningful learning, it is be important to highlight the cognitive theory of multimedia learning to understand how cognitive overload could impact the usability of the RLOs.

In the cognitive theory of multimedia learning, the theoretical explanation is that when words are presented in printed form, students may experience an overload of their visual channel because both graphics and words must be processed, at least initially, through the eyes of the learner in the visual channel (Mayer, 2009). This can create unwanted cognitive load, because the learner has to scan between the printed text and the graphic, and if the lesson is fast-paced, some content may be lost (Mayer and Fiorella, 2014). In brief, presenting printed text and graphics in the visual channel can cause split attention. By contrast, when words are presented as narration, the words are off-loaded from the visual channel to the verbal channel, thus freeing the visual channel's processing capacity (Lee and Mayer, 2018). Mayer (2009) highlighted the importance of considering the cognitive load and the recommended ways to reduce this load.

In relation to the pedagogical design of RLOs, Wharrad and Windle (2010) indicated that care must be taken to ensure that complex media components do not hinder learning by placing an undue cognitive burden on users or become too complex, thereby limiting reusability. Nevertheless, selecting appropriate and high-quality images and video demonstrations can contribute to reducing the cognitive load. As the data revealed, many of the participants in the first qualitative phase got confused by some images of injection sites. Also, many of them recommended to use real patient images and videos as it is a key part of CSE.

Importantly, although the RLOs were openly available on the web, it does not seem that they are easily accessible. Many of the participants did not know about the availability of RLOs and, according to some of them, RLOs do not appear as suggestions on Google when they search, for example, for hand hygiene learning resources. Many of the participants highlighted this issue in the exploratory phase and confirmed it in the evaluation phase whether in the open-ended question or follow-up focus-group. Thus, to make the RLO repository more searchable might involve looking at the meta-data that is attached to each RLO. Perhaps there are also specific terms for clinical skills that need to be added.

To sum up, the findings revealed that clinical skills RLOs as OERs were good quality, trusted resources. Nevertheless, some aspects need to be considered such as using updated and evidence-based sources, use of generic terms and abbreviations, and selection of the most appropriate images and animation to increase its credibility and transferability.

9.1.1.2.1 Recommendations for additional steps in the RLO development process

The pedagogical design of the RLOs has a positive impact on their transferability. However, the findings of this study suggest some recommendations for the developmental process of RLOs to be considered for inclusion in the ASPIRE framework, especially for clinical skills RLOs. This in order to make them more acceptable and transferable to another culture or context. These recommendations, indeed, could be considered for any open web-based resources available on the web. The suggestions are:

- Before releasing the RLOs, the content of the resource should be reviewed by peers or people similar to the target population of the RLOs from different contexts and language backgrounds. Producing a high-quality open online resource is cost and labour-intensive. Thus, including an international perspective would add

a new dimension of experience, perspective and knowledge and maximise the RLOs transferability worldwide.

- Use of up to date sources that involve national or international standards to increase the RLOs' credibility.

- Terms used in RLOs need to reflect universal and international rather than regional and national applications.

- Select clear images that reflect the clinical skills situation.

- Make the RLOs repository more searchable in the web. This could be by generating relevant and meaningful meta-data for the RLOs.

9.1.1.3 Environment: decision-makers, management, and educators

The environment, in much of the literature regarding transferability of an intervention, can be of a social, economic or political context (Kocken et al., 2019, Damschroder et al., 2009). It is the conditional criteria that influences the transfer of an intervention. The conditional criteria is described by local and organizational setting, policy and legislation, and health service provision (Musch, 2019, Schloemer and Schröder-Bäck, 2018). Many of the literature regarding the transferability of interventions have overlapped aspects included under the environment concept and this perhaps depends on the nature of the intervention and the study. In this

study, two environmental aspects were considered that influence the transferability of the RLOs: national and organizational setting and policy and legislation. Moreover, integration of the UK RLOs into the clinical skills curriculum had to fit both the current organisational setting and policy, as will be discussed in the next section.

9.1.1.3.1 National and organizational setting

Schloemer and Schröder-Bäck (2018) indicated that the local and organisational settings in transferability of intervention could involve aspects such as organisational structure and practice, awareness of the intervention and readiness with regard to pre-existing, and durable organizational will for intervention transfer. This section will discuss the current teaching practice of clinical skills at KAU in particular, and in KSA in general to explain how the current practice and needs contributed to the transferability of the RLOs. Also, it will discuss tutor, student and management awareness and readiness to reuse the RLOs.

Current nursing clinical skills teaching in KAU, and most nursing faculties in general is through using demonstrations of clinical skills by the nursing tutor followed by the students being assigned to different clinical skills laboratories to practise these skills, as discussed in Chapter 1. Additionally, many nursing faculties have a fully equipped clinical skills simulations centre in which to practise

the procedures. Usually the curriculum depends on two or three main textbooks for clinical skills procedures in KAU specifically (KAU, 2019) and other nursing colleges in KSA in general (KSU, 2020a, PNU, 2020, UoT, 2020, TU, 2018, KFU, 2016). Also, most of the nursing faculties, including KAU, have their own manual for clinical skills practice which also depends on the same textbooks for clinical skills procedures. Every course specification must involve some online resources as it is required from Saudi National Commission for Academic Accreditation and Assessment (NCAAA) (NCAAA, 2018b). However, in most of the curriculum specifications for clinical skills teaching, online resources are limited to general databases that need access permission such as MIDLINE or some specific journals such as the International Journal of Nursing Studies or online specific materials that are specific to the main textbook.

From the findings of this study, regarding familiarity with online resources and OERs, many students and tutors reported looking for resources by searching Google and YouTube, but with a minimum emphasis on materials with an open licence. Nevertheless, many of the tutors on the exploratory phase, questioned the copyright and permissions for usage of the RLOs. Both students and tutors stated that a negative factor was the huge amount of YouTube resources available on the web. The students felt that it was difficult to decide whether the videos were appropriate and pitched at the right level

for their studies. From the findings, it seems that there was a low awareness among the tutors regarding the different alternatives of OERs available on the web regardless of the willingness of most of the tutors and management in this study to reuse other educational resources (RLOs). These findings are consistent with Pounds and Bostock (2019) who evaluated the use and benefits of OERs in the aquaculture and fisheries sector and found that one of the main barriers to using OERs was low awareness about OERs and copyright usage permissions.

Furthermore, another study by de Oliviera Neto et al. (2017), used a survey taken by 295 randomly selected instructors at 28 higher education institutions in nine countries to provide baseline data regarding the use of OERs. They found that the level of awareness of different OER repositories was low and many educators' responses indicated confusion in their understanding of the characteristics and definitions of OERs. Additionally, many of the tutors in the current study highlighted the importance of e-learning for the millennial generation learner, as discussed in Chapters 6 and 8.

Millennial generation learners demands and expectations are forcing educational organizations to rethink their teaching and administering of education models (Ossiannilsson and Creelman, 2012). Thus, alternatives educational resources that fit the student needs are very

important to consider. Once information and learning resources are available at a click, the learning and education focus must be changed from content to context and learners should be able to orchestrate their own learning (Ossiannilsson and Creelman, 2012).

In addition to meeting the needs of students of this generation in keeping pace with technology and openness, changing the current practice of teaching clinical skills needs to be reconsidered in light of current challenges in nursing education in KSA. Nursing education faces many challenges such as time pressure, number of clinical tutors, language, and the need for nursing students to acquire skills which will enable them to become independent and self-directed learners. Alternative resources and changes in learning practice should be considered to confront these challenges. Thus, technology should be embedded and become a natural part of learning. Therefore, the demand for flexible, innovative access to lifelong learning has increased. To entirely achieve these goals, it was important to move towards reuse of the RLOs as OERs.

The introduction of OERs requires more than the introduction of new materials. Rather, it is a way of changing attitudes towards an open learning culture in which students have more opportunities to take control of their learning and thus take greater responsibility for their studies, and it may take some time to fully embrace this change

(Butcher, 2015). Therefore, educators in the nursing programme should learn to play new roles. They should move from merely acting as teaching experts who convey knowledge through lectures towards supporting students on their study path by discussing and reflecting on their learning. The educator's position is reinvented and enhanced rather than challenged, and the transition to technology transfers the focus from technical issues to practical resources and device use.

9.1.1.3.2 Policy and legislation

Policy and legislation could involve national policy and political programs, political climate, local policy, and legislation relevant to transferability of the intervention (Schloemer and Schröder-Bäck, 2018). According to Fleuren et al. (2014) legislation and regulations are about the degree to which the innovation fits in with existing legislation and regulations established by competent authorities such as financial structures, or substantive legislation. This section will present the current policy available to include web resources on the nursing curriculum at organisational and national level. It will also discuss how this policy plays a crucial role in the RLOs' transferability. It will then provide some recommendations to improve access to and use of RLOs and online resources in KSA specifically and other similar contexts in general.

Generally, the higher education system in KSA is a hierarchical and centralized education system that is governed by the Ministry of Education (MoE) (Hamdan, 2014, Alamri, 2011). Although the MoE aims for greater efficiency and effectiveness within each individual provider of higher education, it is also determined to create a strong and coherent national university system (Onsman, 2010). Rather than leave it to the 'open market' essentially, the MoE is the authority that regularly accredits all the academic institutions in the KSA as the most effective way to ensure high-quality university production. Thus, the National Commission for Assessment and Academic Accreditation (NCAAA) was established in 2004 to be responsible for establishing standards, academic accreditation, and quality assurance in Saudi higher education (NCAAA, 2020). NCAAA aims to ensure: the quality of student learning outcomes, including resource availability, procedures adopted, quality of teaching provided, and quality of student learning. In addition to this, it oversees the management and support services provided within institutions, and the contributions to research and communities served by post-secondary institutions, which are equivalent to high international standards (NCAAA, 2020).

The NCAAA is an independent authority reporting directly to the MoE. Accordingly, all universities must follow the standards and regulations of the NCAAA in developing programs or courses

specifications. To that end, the NCAAA has issued a template that is required to be filled in for each program taught in the KSA (NCAAA, 2018b). The template involves learning objectives (with reference to Bloom's Taxonomy), resources, assessment and so on. There is a pedagogical underpinning that gives the national approach some systemic and procedural legitimacy (Onsman, 2010). In brief, the NCAAA has identified many operational areas (criteria) in higher education where it will seek evidence of successful practice before it awards accreditation to the organisation (NCAAA, 2018a). Table 26 presents some institutional and program standards that relate to the current study. Rather than one stated specific standard for using open online resources or OERs, there are many standards encouraging student-centred and active learning and use of web-based resources and modern advanced technology that could support the use of RLOs as OERs.

Operational area	Category	Standard
Teaching and learning	Curriculum	The program study plan considers the adequate requirements for the different tracks in accordance with international practices and similar programs.
		Teaching and learning strategies are student-centered and encourage active learning.
		Teaching and learning strategies and assessment methods in the program vary according to its nature and level, enhance the ability to conduct research, and ensure students' acquisition of higher cognitive thinking and self-learning skills.
	Quality of teaching	The necessary training is provided for the teaching staff on learning and teaching strategies and assessment methods identified in the program and course specifications, along with the effective use of modern and advanced technology; and their use is monitored.
	Educational partnerships	The institution ensures that the programs or courses offered by the international educational institutions, including e-learning programs and distance education courses, are accredited, quality assured, and licensed by the Government at the country of origin.
		The institution - in the case of adopting programs from other institutions- takes appropriate procedures that ensure that the components of the adopted academic program, assignments and tests are in conformity with the society values and culture.
Learning resources	The program implements effective procedures for the management of resources and reference materials needed to support teaching and learning processes.	
	The program has specialized electronic resources (e.g., digital references, multimedia, software), and appropriate databases and electronic systems that allow beneficiaries to access the information, research materials, and scientific journals from within or outside the institution.	
	The teaching staff, students, and employee of the program have the appropriate orientation and technical training and support for the effective use of resources and means of learning.	
	The program has the appropriate technologies, services, and environment for courses offered through distance or e-learning.	
	The institution implements mechanisms to cooperate with local and international institutions and centres to allow and exchange resources and references that ensure meeting the needs of stakeholders.	

Table 26 Some of NCAAA standards (NCAAA, 2018a, NCAAA, 2018b)

With regard to current organisational policy, most nursing colleges in KSA aim to be centres of excellence in nursing education, scientific

research, and community partnership locally, regionally, and globally (IAU, 2020, PNU, 2020, TU, 2020, KAU, 2018). Based on this, many nursing programs, including in KAU, are required to provide a strategy to develop special learning attributes in students. These learning attributes include critical thinking skills (where the educator acts as facilitator of collaborative learning that requires students to be an active, responsible participant in their own learning), and IT literacy (where students demonstrate proficiency in evidence-based practice and electronic charting) (KAU, 2019, TU, 2018). Accordingly, the course specifications for most of the modules, especially curriculums that involve clinical skills, required web-based resources to be included. For example, the course objective of 'Fundamentals of Nursing' in some nursing college includes: direct the student in using web-based resources to access the most recent techniques and extend their knowledge; and implement new learning strategies (involving utilization of visual and auditory facilities) (KAU, 2019, TU, 2018). The learning resources used in the course specification of this course require electronic and online materials (KAU, 2019, TU, 2018). However, as indicated in the previous section, most educators use a general database that needs access permission or online materials that are specific to the main textbook.

A policy that supports the transferability of the RLOs or any OERs in general (intervention) is another key variable in the environment. Having described the national and institutional (the nursing faculty) policies and legalisations, integration of RLOs or web-based resources from different trusted organisations seems to fit the Saudi nursing programs and courses standards. The current national and organisational policies encourage educators to use online/web-based resources. Nevertheless, awareness needs to be facilitated of these available open web-based resources. The findings of this study suggest the efficacy of RLOs as OERs in nursing CSE. In other words, using available educational resources would not be less effective than using an online resource that is tailored for and/or by a specific organisation. Moreover, this study suggests that RLOs meet the standards of the Saudi nursing curriculum, regardless of the limitations in the RLOs identified in the findings. For example, the findings suggest that RLOs could enhance freedom, leading to better opportunities for self-directed learning approaches. Also, RLOs as OERs could support sustainability of legacy materials, and aid in reducing the cost of educational content, though the political will in KSA is supported by an unprecedented amount of financial support as discussed in Chapter 1. However, as highlighted previously, there is a shortage in experts in developing quality online resources. Thus, sharing the RLOs in this study could contribute to overcoming this

limitation and to improving the quality of education and enhancing the learning experience. Additionally, though, if there were learning technologists with the appropriate skills in the KSA, it would possible to repurpose the RLOs and address the limitations to make them suitable for Saudi nursing (or other) students. Certain derivatives of the Creative Commons 2.0 licence allow for modification, thus, the creators at UoN could be contacted for the RLO content package and the KSA would be able to adapt the RLOs accordingly.

In summary, the institutional environment has a crucial influence on educational practices, including engaging with web-based learning or OERs. This provides the necessary infrastructure and opportunity for the educators and other stakeholders to use web-based resources. The current teaching practice of clinical skills, the current policy and the need for change supports the transferability of the RLOs. The findings suggest that there is merit in using other educational resources (RLOs from the UK) in another context (KSA) in nursing CSE, despite some limitations with the intervention. However, low awareness regarding the use and availability of different open educational resources might limit their use. Therefore, the next section will provide a few recommendations regarding improving access to and use of different open educational resources available on the web.

9.1.1.3.3 Recommendation to improve access and use of RLOs and online resources

Recent developments in the widespread adoption of education technology combined with greater acceptance and openness in terms of resource sharing and open access for higher education allow a radical rethink of systems and educational strategies (Ossiannilsson and Creelman, 2012). This study suggests some recommendations for raising awareness of the potential of OERs such as RLOs and the requirements for successful use in nursing education:

- Running of parallel workshops and events and provision of specific training and instructions on how to search for relevant OERs and critically evaluate them for educators, students, and managers.

- Workshops and lectures to increase awareness regarding the issues around copyright and the proliferation of online content, many of which are freely licensed.

- Ongoing support and mentoring for development and delivery, technological training, and motivation for educator involvement in using online resources

- Encouraging collaboration with experts in organisations for developing OERs. For instance, the EU commission funded project

to train developing countries in how to develop RLOs using the ASPIRE framework (Wharrad, Konstantinidis, Lee et al., 2020).

- Identification of best practice examples of open online resource use and facilitation of institutional visits. Thus, stakeholders have a chance not only to observe effective use of these resources in practice, but also to begin forming support networks and communities of practice.

- Online resource developers need to disseminate their products to target developing countries in education. They could initiate collaboration or partnership by marketing their resources in different targeted countries or at international events. While many of the institutions are ready to, and support e-learning, or collaborations, they have low awareness regarding the available resources on the 'market'. Thus developers, especially universities who use their own repositories as a platform for the online resources, need to attract users and international institutions.

9.1.1.4 Implementation of RLOs in clinical skills curriculum

The implementation or adoption of intervention is included in the transfer factor in the PIET-T model for the assessment of intervention transferability (Schloemer and Schröder-Bäck, 2018). According to Barwick, Boydell, Stasiulis et al. (2005), implementation means entering a change or renewal.

Implementation, therefore, is a process rather than an event, with different concerns being dominant at different stages (Musch, 2019). The implementation process of the RLOs was informed by the findings related to RLO integration from the first exploratory phase and agreement with the management and tutors in the nursing college, as discussed previously in Chapter 7.

The implementation process is a crucial aspect that influences the transferability of the RLOs and is composed of several interrelated subprocesses. Planning the implementation is the degree to which a method of behaviour and tasks for implementing an intervention are developed in advance and the quality of these methods (Damschroder et al., 2009). Literature regarding transferability identifies many determinants to ensure successful implementation and to make the innovation or intervention transferable (Musch, 2019, Schloemer and Schröder-Bäck, 2018, Fleuren et al., 2014, Cambon et al., 2012, Damschroder et al., 2009, Barwick et al., 2005, Greenhalgh, Robert, Macfarlane et al., 2004). These determinants differ according to the nature of the study and the intervention or the innovation itself. However, they are highly conceptually similar and most are based on two key process theories: the implementation process by Damschroder et al. (2009), and innovation-decision process by Rogers (2003). Damschroder et al. (2009) describe four essential activities of the implementation process that are common

across organizational change models: planning, engaging, executing, and reflecting and evaluating. The innovation-decision process involves five main steps: knowledge of the innovations existence should be spread; persuasion, which takes place when an individual forms a positive or negative attitude towards the innovation; the decision of whether or not to adopt the innovation; implementation of the decision, and confirmation, where the user has to continue using the innovation (Rogers, 2003). In implementing the RLOs, most relative determinants influenced the transferability of the RLOs, as following:

9.1.1.4.1 Stakeholders support:

The relative stakeholders' (mainly the top management) support, advocacy and ongoing contribution to the implementation process enhance the success of implementation (Cambon et al., 2012, Gustafson, Sainfort, Eichler et al., 2003). In the early stages of the process, before implementation, the researcher introduced the RLOs to the top management and tutors to introduce its existence and allow them to become familiar with the content. This was in order to increase their knowledge regarding the RLOs as it was their first exposure to them (Rogers, 2003). The innovation must be presented in such a way that people want to know more about it and get the feeling that it is an important addition to or replacement of the

current practice (Musch, 2019). Thus, the stakeholders could be made aware of the current practice and the need to apply a change.

Following this, persuasion is an important step in the early implementation process as a positive or negative attitude will be taken towards the innovation by the stakeholders (Rogers, 2003). In addition to the information provided to the main stakeholders regarding the RLOs, conducting the first exploratory phase played an important role in persuading and engaging them in the implementation process. Damschroder et al. (2009) argue that engagement is one of the main aspects in the implementation process. According to them, engagement attracts and involves appropriate individuals in the implementation and use of the intervention via an integrated strategy of social marketing, education, training, and other similar activities. However, engaging team members tasked with implementing an intervention (or to be first users) is an often ignored part of implementation process (Pronovost, Berenholtz and Needham, 2008).

It is important that early members are carefully and thoughtfully selected or allowed to rise naturally (Stouten, Rousseau and De Cremer, 2018, Edmondson, Bohmer and Pisano, 2001), especially implementation leaders and champions (Damschroder et al., 2009). Accordingly, if the innovation aligns with the earlier goals of

stakeholders (management and educators) and if they are actively involved and often consulted, the innovation is more likely to be implemented successfully (Greenhalgh et al., 2004, Gustafson et al., 2003). Therefore, conducting the exploratory phase and discussing the findings helped to engage the stakeholders and enhance their support to implement the RLOs.

9.1.1.4.2 Resource availability

Implementation is associated with availability of all the resources and practices required to implement the intervention in the target context, including the cost and duration (Schloemer and Schröder-Bäck, 2018, Fleuren et al., 2014, Cambon et al., 2012). With regard to human resources, the presence of one or more practiced individuals responsible for coordinating the implementation of the innovation in the organisation is essential (Fleuren et al., 2014). During the implementation of the RLOs, the course coordinators were responsible for the implementation of the RLOs into the student clinical skills curriculum, as discussed previously in Chapter 7. The researcher provided all required training for the coordinators and to other tutors who were supposed to be involved in the teaching of the clinical skills course. However, during the evaluation phase in the focus-group discussion, some tutors had a negative attitude towards the implementation process. This was because, as the tutors

explained, they did not attend the introductory session by the researcher as they had newly joined the course. Accordingly, they were not positively engaged with the RLO implementation process and did not/ it is not known whether they encouraged the students to refer to the RLOs as planned. This was despite the fact that the course coordinators uploaded the links to the RLOs on the Blackboard before each related clinical skills procedure. Hence, the stakeholders' practice and preparation are important aspects that could influence the implementation process and, in the end, the transferability. Thus, the early and widespread involvement of staff at all levels, possibly through formal facilitation initiatives enhances implementation success (Greenhalgh et al., 2004).

Other determinants highlighted by the transferability literature include the financial resources needed to use the innovation, the amount of time available to use the innovation, and the presence of materials and other resources or facilities necessary for the use of the innovation as intended (Schloemer and Schröder-Bäck, 2018, Fleuren et al., 2014). The open and free availability and accessibility of the RLOs from the original context (UK) were the most driver to be transferred and adopted. However, other resources and facilities in the target context are required to ensure the successful implementation of the RLOs. For example, access to the computer labs and the internet in the nursing college which were available at

the time of the study. Although students are likely to have their own resources (i.e. internet and smart devices), it is the researcher's responsibility to ensure there are alternatives available in case any students do not have ready access to the required resources.

To sum, planned implementation, stakeholder support and training, and resource availability are key factors for facilitating RLO implementation and impacting on their transferability.

9.2 Strengths and limitations of the Study

This was, to the researcher's knowledge, the first study to explore the transferability of clinical skills RLOs created in the UK as OERs in another context (Saudi nursing CSE). The UK is more familiar with producing and using OERs than target context, which is less experienced in using OERs. Clinical skills education is a key aspect in nursing education. With the advent of the internet, interactive, multimedia, web-based learning is gaining popularity as a supportive method of delivering CSE. The research literature in Chapter 2 provides the reader with evidence of the efficacy of web-based learning in healthcare CSE. However, no studies specifically explored the value of web-based resources produced by others and available openly on the web. Few studies have been explicitly underpinned by theory or mention underpinning theories or frameworks for designing the online resource. Different models, the PEIT-T model,

TAM, and engagement theories, facilitated the development of the convergence for this research and were also influential in the analysis and interpretation of the findings. Thus, this study has explored the transferability and acceptability of a novel format of web-based learning using RLOs in the form of OERs in Saudi nursing CSE which could influence future studies in general rather than just this one study.

The application of MMR in this study gave the opportunity to draw on the strengths of qualitative data collection and analysis by exploring opinions and beliefs, alongside those of the quantitative approach by evaluating the value of the RLOs in a large and more representative sample. The think-aloud method in the first phase is a unique source of information, generating direct data on the ongoing thought processes and engagement with the RLOs which might not have been explicitly recognized using other methods such as interviews. The findings gained from the think-aloud discussions and focus-groups provide a rich source of qualitative data, from which items were developed for the student self-evaluation questionnaire (SSEQ). Furthermore, the current study could also enhance the quality and quantity of literature on web-based learning. While many web-based learning studies are criticised for weak methodologies, this study used a validated questionnaire utilising PCA to assess the value of the RLOs, which allows for

quantitative analyses and supports an evidence-based approach to nursing education. Moreover, the meta-inference of all findings in this study resulted in understanding the main factors that influenced the transferability of the RLOs and online resources to nursing CSE in a different context.

The limitations of each phase of this study were discussed in detail in Chapters 6 and 8. However, this section will highlight some limitations in the study generally which will be addressed in the implication and recommendations for further study section. One of the limitations of this study is the gender of the participants. All participants were female as it was difficult to access male nursing students and tutors at the time of the study due to cultural issues and regulations in KSA. The difference in gender might have different impact on the use of online resources.

A further limitation of the study is study size and timescale. This study was conducted for a doctoral study and data collected overseas with time and resource constraints ever present. Involving additional Saudi nursing institutions and undertaking data collection over a longer timescale might have allowed further in-depth understanding and evaluation of the RLOs' transferability and consequently increased the generalizability of the findings. However, the concepts that were found might be transferable to other nursing institutions,

or healthcare in general, in other similar settings due to the different perspectives produced.

9.3 Implications of the study

This section demonstrates how the findings that resulted from this study can have wider implications within education and clinical practices, and online resource development. It will also show the implications of the findings from this study on future research.

9.3.1 Implications for educational and clinical practice

The positive implications of these findings for nursing education and clinical practice are that the transferability of the RLOs created in another context could be as effective in CSE as online resources created by the organisation. In another words, high-quality OERs available openly on the web are not less effective than other resources tailored by a specific organisation for a specific group of students. The findings of this study have shown that tutors and students accepted the RLOs for their educational value, usability and utility, media and accessibility attributes, before, during and after the clinical lab session, and even for the clinical practice. Although it could be argued that the findings of this study may not be generalizable beyond the participants, as it is a relatively moderate

scale in one nursing institution, this could still have wider applications beyond the study area.

Clinical skills are a central part of a nurse's professional role and successful clinical outcomes depend on the competent performance of technical procedures as well as an appropriate level of knowledge and a professional attitude (Francis and O'Brien, 2019, Harmon, Clark, Dyck et al., 2016). Therefore, effective clinical skills teaching is a crucial part of the curriculum for undergraduate nursing programs. Nurse educators, as gatekeepers into nursing, are responsible for developing, delivering and assessing educational programmes, competence and fitness for practice. This involves mastering various teaching methods and technological tools, promoting student active learning and critical thinking, continuous student managing and advising, and enhancing curricula. Additionally, embedded in the role are maintenance of professional development and pursuit of scholarly activities to produce and generate knowledge. Therefore, nursing education faces a major challenge in the design and implementation of learning experiences that provide opportunities for students to improve their practical skills. Francis (2018) suggests that, in order to ensure effective clinical skills teaching that meets the requirements of the seven NMC skills platforms (NMC, 2018b), educators should be clinically current and competent in the range of techniques that can be used to teach

and facilitate skills development and technology. Cumulatively, these expectations mean that today's academic nurse educator has a complex role (Bono-Neri, 2019). Indeed, these expectations are not only limited to nursing educators, they also include institutional management and decision makers, and local policy and legislation which facilitate all the resources and set regulations.

This study suggests that all beneficiaries in nursing institutions and future clinical practice could directly benefit from using the RLOs. The RLOs provide accessible information for clinical skills in interactive, multimedia forms that could meet diversity of student needs. The findings revealed that the RLOs's unique design was the attribute that students liked most compared with other OERs. This finding could have implications for other comparative settings.

For nursing educators, in light of their complex role in developing an appropriate nursing curriculum and use of technological tools and online resources, RLOs assist them in providing alternative and complementary approaches to the learning environment. The data revealed that many tutors perceived that RLOs could support their teaching methods and save the time and effort needed to develop such interactive resources. Especially as these resources, according to their views, are trusted and produced by an organisation with a good reputation.

At the nursing organisation level, this study suggests that RLOs could help in saving costs and resources in developing quality online resources and provide a sustainable and life-long learning experience. Additionally, this study compared the two national standards in the UK (original context) and KSA (target context) in nursing programs (NCAAA, 2018b, NMC, 2018b). Both standards require similar strands in many items such as using technology, enhancing the active learner, and high-quality standards of learning, although there were also many differences. While the original context is expert in developing and using online resources, the target context is less expert in this field. Thus, transferability and knowledge openness could be beneficial for both contexts. The original context would increase the reputation of the organisation while the target context saves resources. Importantly, both contexts follow the national standard of nursing programs for their countries. Thus, this study could have an impact on other developing countries who seek to develop the use of online resources in education.

Furthermore, in clinical practice, patients and clinicians could be the beneficiaries of the findings of this study, indirectly perhaps but important nevertheless, as better trained nurses lead to better patient outcomes. The introductory chapter discussed how good teaching methods contribute to preparing future generations of nurses and helping them to advance their nursing careers and

profession. Accordingly, clinical skills teaching strategies play a vital role in strengthening the nursing workforce to improve nursing practice and, ultimately, patients' care, and are the centre of the world of practice (Lamphon, 2015). The findings of this study revealed valuable information regarding the value of the RLOs on student knowledge, skills performance, and confidence in conducting the clinical skills.

Importantly, potential negative impacts should be considered in using OERs indiscriminately, especially in CSE, without ensuring the quality and the content of the resource. Data reveals that RLOs include many limitations such as different practices and outdated resources. To an extent, the RLOs used in this study had different policies for conducting the clinical skills. However, other resources could include practices which could threaten patients' lives if students learned and used them. Therefore, nursing educators should be careful when selecting online resources for the clinical skills curriculum.

9.3.2 Implications for further research

This section provides implications of this study to inform future research. Having demonstrated the value of RLOs to develop established basic nursing clinical skill knowledge, this study could be extended to other advanced clinical learning skills with other

students in healthcare professions. These findings also could be extended to include graduate nursing students, or nursing interns. Furthermore, this study explored clinical skills RLOs, other RLOs for different subjects such as research and statistics or pharmacology, might produce different views in using others' online resources.

Moreover, although the SSEQ was analysed by PCA, the study has shown the need for further testing and development of the SSEQ that evaluates the reusability of clinical skills RLOs, and includes a larger sample. This is in order to enhance the design consistency, interpretative rigor and transferability of the results of this study.

Both qualitative and quantitative approaches were limited as they did not consider the value of the adopted clinical skills RLOs over time. Future longitudinal research is recommended to investigate more fully the influence of potential psychological, environmental, and social factors on participants' views on the adopted clinical skills RLOs or other OERs in general. This could include measuring the cut-off point in the survey. A concurrent or explanatory sequential MMR study would allow for further examination of contextual influences on participants' beliefs.

Moreover, one of this study limitations is gender, as explained in previous section. Thus, a similar study including male participants could provide different findings and accordingly different views on

the clinical skills RLOs' transferability. Also, this study was exploratory in its nature, therefore, it was looking for the general value of the RLOs. Further study with increased use of standardised definitions for outcomes and exposures is required

This study examined the students' perceptions at level one (reaction) and two (learning) of the Kirkpatrick framework (1967) using a cross-sectional survey to evaluate students' perceptions of the value of the RLOs. Evaluating user reactions and learning when using RLOs provides evidence of acceptability of this form of online resource but stronger evidence can be provided by an objective measure of knowledge and skills acquisition. This could help to provide robust evidence of learning gains. Therefore, further experimental design at level two of Kirkpatrick framework (1967) (learning), including pre- and post- or comparison design, and utilising more objective measures such as clinical skills examinations for competence or knowledge might provide more rigorous findings and stronger evidence.

9.4 Conclusion

This study is one of the first in the area of using RLOs in the form of OERs in clinical skills education (CSE) in a different context, to the researcher's knowledge. The primary aim of this study was to explore the transferability of open reusable learning objects (RLOs)

created in the UK to the context of CSE in Saudi nursing education. This study suggested that RLOs in the form of OERs could be transferred and reused in different contexts and that they could be valuable in CSE.

Nursing education faces many challenges in order to ensure that students are adequately prepared and competent for professional safe practice and for the effective fulfilment of patient care needs and safety. Consequently, in light of the ongoing 'fitness to practise' debate, a key challenge in nursing education is to make nursing CSE suitable, accessible, available, and smart for a larger student cohort, regardless of educational barriers such as lack of dedicated staff and time. Although the conventional approach has the benefit of providing an opportunity for students to learn directly from subject experts, it may lack flexibility, does not ensure teaching consistency and is unable to meet students' diverse learning needs. Thus, web-based/online learning technology has gained popularity in supporting nursing clinical skills education, in the era of rapid expansion of technology and the internet. The available literature shows the efficacy of web-based learning healthcare CSE in general, and in nursing specifically. Nevertheless, the development of these e-resources needs financial and human resources. This study indicated that inclusion of clinical skills RLOs could provide a supplementary

and complementary strategy, that of a flexible, asynchronous teaching-learning environment.

Furthermore, the findings from this study suggested that RLOs as OERs provide many advantages for both the target context (KSA) and different stakeholders. For the Saudi nursing college, the reusing of RLOs could boost the cost-effectiveness of online education and provide a sustainable approach to online learning. For the educators, the findings suggested that they could benefit from the availability of quality, trusted, peer-reviewed resources compared with other OERs they are using for CSE, and save them time and effort. For the students, this study suggested that RLOs as OERs provide accessible clinical skills information leading to better opportunities for independent learner approaches. Both students and tutors, as this study found, trust online resources that are produced by well-known organizations.

Given the current economic renaissance and the Saudi vision 2030, RLOs as OERs could contribute to saving resources of time and money, while providing high quality educational resources and an effective learning environment for Saudi nursing students. The findings suggested that RLOs are successful in supporting the students' understanding of basic clinical skills, and contribute to perceived support in performance, knowledge and confidence in

basic clinical skills competency outcomes compared with other educational resources that students had used. The RLOs were evaluated positively by the students and tutors. They were valued for their flexibility, as an aid in revision and knowledge gain, and as a method to illustrate concepts and skills.

Nevertheless, this study suggests that the lack of awareness of the availability of RLOs as OERs on the web, and some of the content and technical usability may limit the reuse of RLOs. Factors such as differences in practice, the perceived lack of updated and evidence-based sources, and the language used may inhibit reuse. Thus, this study provides some recommendations for RLO producers as well as to the organisation that is reusing them to enhance the likelihood of successful implementation and reuse.

Moreover, the current study also enhances the quality and quantity of nursing literature about open RLOs specifically and OERs in general, especially in the Saudi nursing education context. Whilst there is a lack of comprehensive evidence on using RLOs as OERs in clinical skills education, it is hoped that the evidence provided by this study will support reusability of clinical skills RLOs in the Saudi nursing curriculum and beyond.

The meta-inference of all findings in this study suggests that RLOs created in the UK, which is more familiar with producing and using

OERs, are transferable to another context which is less experienced in using OERs. This is in light of the four main factors that influenced the RLOs transferability: 1) participants' acceptance and attitudes toward the RLOs; 2) the RLOs themselves as an intervention in terms of quality, evidence-based content and usability; 3) the environment, which includes practice change, policy and legislation; 4) the successful implementation process of the RLOs.

Finally, the use of technology in nursing education is no longer a choice, it is mandatory. Thus, all effort should be made by educators to keep pace with the development of technology and employ it in the best way in order to fulfil the needs of the students and the nursing profession. These valuable educational resources are available online with just one click. Therefore, awareness about OER availability, accessibility, and quality is important in developing innovative, efficient, and flexible curricula for the future of nursing education.

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Appendix 1: Approval from the Research Ethics Committee

The University of Nottingham

E-mail: FMHS-ResearchEthics@nottingham.ac.uk

Faculty of Medicine and Health Sciences

Research Ethics Committee
C/o Faculty PVC Office
School of Medicine Education Centre
B Floor, Medical School
Queen's Medical Centre Campus
Nottingham University Hospitals
Nottingham
NG7 2UH

6th March 2017

Hadeel Lamphon
PhD Nursing Studies Student
c/o Professor Heather Wharrad
Professor of e-Learning and
Health Informatics, School of Health Sciences
Faculty of Medicine & Health Sciences,
The University of Nottingham
QMC Campus
Nottingham University Hospitals
NG7 2UH

Dear Hadeel Lamphon

Ethics Reference No:OVS14022017 – **please always quote**	
Study Title: The transferability of multimedia Open Educational Resources (OERs) to nursing clinical skills education in the Saudi context: a mixed method study. **Short Title:** Transferability of OERs: a mixed method study.	
Chief Investigator/Supervisor: Professor Heather Wharrad, Professor of e-Learning & Health Informatics, Linda East, Associate Professor, Dr Fern Todhunter, Assistant Professor, Nursing Studies, School of Health Sciences	
Lead Investigators/student: Hadeel Lamphon, PhD Student (The Saudi Arabian Cultural Bureau), Nursing Studies, School of Health Sciences	
Type of Study: overseas, PhD project, pilot study, feasibility, e-learning & Health informatics, mixed methods.	
Proposed Start Date: 01/04/2017	**Proposed End Date:** 31/12/2017 8 mths
No of Subjects: 16-210	**Age:** 18+years
School: Health Sciences (uK) **Study location:** King Abdul Aziz University, Jeddah, Kingdom of Saudi Arabia.	

Thank you for submitting the above application which was considered by the Committee at its meeting on 20th February 2017and the following documents were received:

Short Title: Transferability of OERs: a mixed method study

- Faculty of Medicine and Health Sciences Research Ethics application and supporting documents version 1.1 dated 14th February 2017.

These have been reviewed and are satisfactory and the study has been given a favourable opinion.

A Favourable opinion is given on the understanding that all appropriate ethical and regulatory permissions are respected and followed in accordance with all local laws of the country in which the study is being conducted and those required by the host organisation/s involved.

A favourable opinion is given on the understanding that the conditions set out below are followed:

The University of Nottingham

1. Please submit copies of letters of approval/permission from the ethical committee in Nursing College in King Abdul-Aziz University, Jeddah, Kingdom of Saudi Arabia when these are available for our records.

2. You must follow the protocol agreed and inform the Committee of any changes using a notification of amendment form (please request a form).

3. You must notify the Chair of any serious or unexpected event.

4. This study is approved for the period of active recruitment requested. The Committee also provides a further 5 year approval for any necessary work to be performed on the study which may arise in the process of publication and peer review.

5. An End of Project Progress Report is completed and returned when the study has finished (Please request a form).

Yours sincerely

pp

Professor Ravi Mahajan
Chair, Faculty of Medicine & Health Sciences Research Ethics Committee

KINGDOM OF SAUDI ARABIA

Ministry of Higher Education

KING ABDULAZIZ UNIVERSITY

Faculty of Medicine

المملكة العربية السعودية
وزارة التعليم العالي
جامعة الملك عبد العزيز
كلية الطب

Ref.FM: ..... الرقم : .....

Date : / / التاريخ : / / ١٤هـ

Encl. : ..... المرفقات: .....

UNIT OF
BIOMEDICAL ETHICS
Research Committee

Initial Approval

TO: Principal Investigator and Local Supervisor (KSA): Dr.Elham Nagshabandi From: Professor. Hasan Alzahrani

First Investigator: Hadeel Tayeb Lamphon (Doctoral candidate in nursing /Faculty of Medicine & Health Sciences, The University of Nottingham)

External Supervisor: Prof. Heather Wharrad. Local Supervisor: Dr. Maram Banakhar

External Co -Supervisor: Dr. Linda East External Co -Supervisor: Dr. Fern Todhunter

Date: Monday, March 13, 2017 CC:Vice-Dean, University /Hospital Director & Academic Affairs & File & Mentoring Committee

RE: " The transferability of multimedia Open Educational Resources (OERs) to nursing clinical skills education in the Saudi context: a mixed method study.." Intervention /Qualitative Research -Mixed Method (Reference No 80-17)

The above titled research/study proposal has been examined with the following enclosures:

- The Study Protocol.
- Application for Research Unit of Biomedical Ethics
- Informed Consent Form.

The REC recommended granting permission of approval to conduct the project along the following terms:

1. The PI and Supervisors are responsible to get Academic Affairs, hospital and departmental approval.
2. Provide to committee" Continuing Review Progress Report "every 3 months.
3. Any amendments to the approved protocol or any element of the submitted documents should NOT be undertaken without prior re-submission to, and approval of the REC for prior approval.
4. Monitoring: the project may be subject to an audit or any other form of monitoring by the REC.
5. The PI and Supervisors are responsible for the storage and retention of original data of the study for a minimum period of five years.
6. The PI and Supervisors are expected to submit a final report at the end of the study.
7. The PI and Supervisors must provide to REC a conclusion abstract and the manuscript before publication.
8. To follow all regulations issued by the National Committee of Bio & Med ethics - King Abdul Aziz City for Science and Technology.

The Organization & operating procedure of the KAU. Faculty of Medicine - Research Ethics Committee(REC) are based on the Good Clinical Practice (GCP) Guidelines.
PLEASE NOTE THAT THIS APPROVAL IS VALID FOR ONE YEAR COMMENCING FROM THE DATE OF THIS LETTER.

Professor Hasan Alzahrani

Chairman of the Research Ethics Committee

(HA-02-J-008) No of Registration At National Committee of Bio.& Med. Ethics.
Mohammed S. ALsearee (Reference No 80-17)

ص.ب ٨٠٢٠٥ جـــــــدة ٢١٥٨٩
P.O. Box 80205 Jeddah 21589

فاكس ٦٤٠٠٥٩٢ / ٦٤٠٨٤٥١
Fax : 6400592/ 6408451

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KINGDOM OF SAUDI ARABIA
Ministry of Higher Education
KING ABDULAZIZ UNIVERSITY
Faculty of Nursing

المملكة العربية السعودية
وزارة التعليم العالي
جامعة الملك عبدالعزيز
كلية التمريض

University of king Abdulaziz Research Ethics committee

Dear: Hadeel Tayeb Lamhon

Phd candidate at university of Nottingham uk.

Title : The transferability of multimedia Open Educational Resources (OERs) to Nursing clinical skills education in the Saudi context: a mixed method study

---

Iam writing to you to advise you that your ethics application has been reviewed and approved by the University of King Abdulaziz research ethics committee in Nursing College.

Approval is valid for two years from the date of this letter. Should your study continuo beyond this point, please request a renewal of the approval.

Yours sincerely,

Dr. ELham AL Naqshbandi

Elham Al Naqshbandi

Faculty Of Nursing
King Abdulaziz University
Elham@kau.edu.sa

Encl. : ..... المرفقات F.Ghalib Date : ..... التاريخ Ref. : ..... ٢٠١٧/٠٣/١٣ الرقم :

فاكس ٢٠١٧١/٢٠٠٠٠٠/٠٢٦ هاتف ٠٢٦٩٥١٠٥٩ ص.ب ٣٤٨٢٤ جدة ٢١٢٧٤
Fax: 02 6400000/20171 Tel: 02 6951059 P.O.Box 80324 Jeddah 21589

KINGDOM OF SAUDI ARABIA
Ministry of Education
KING ABDULAZIZ UNIVERSITY
Faculty of Nursing

المملكة العربية السعودية
وزارة التعليم
جامعة الملك عبد العزيز
كلية التمريض

الموضوع: بخصوص استضافة الطالبة هديل لفون لجمع البيانات

سعادة / الملحق الثقافي ببريطانيا حفظه الله،،،،

السلام عليكم ورحمة الله وبركاته

تهديكم الدراسات العليا والبحث العلمي بكلية التمريض أطيب تحية وتقدير،،، نفيد سعادتكم بأنه لا مانع لدينا من استضافة الطالبة **هديل لفون** وذلك لجمع بيانات بحث الدكتوراه لديها بكلية التمريض بجامعة الملك عبد العزيز من الفترة:

المرحلة الاولى: من ١/ ابريل / ٢٠١٧م إلى ١/ مايو / ٢٠١٧م

المرحلة الاولى: من١٥ / أكتوبر / ٢٠١٧م إلى ١٥/ نوفمبر / ٢٠١٧ م

للاستفسار يرجى الاتصال بمديرة وكيلة الدراسات العليا والبحث العلمي بكلية التمريض أ/ فاطمة غالب تحويلة (٢٤٤٦٦).

وتفضلوا بقبول وافر التحية والتقدير،،،

وكيلة كلية التمريض للدراسات العليا والبحث العلمي

د. إلهام بنت عبدالله النقشبندي

Encl. : ..... F.Ghalib ..... المرفقات : Date : ..... التاريخ : Ref. : ..... 3/13/2017 ..... الرقم :

فاكس: ٠٢٦٤٠٠٠٠٠/٢٠١٧١ هاتف: ٠٢٦٩٥١٠٥٩
Fax: 02 6400000/20171 Tel: 02 6951059 P.O.Box

Appendix 2: Information sheet and consent form



Information sheet and consent form to participate in a scientific research

Name of research: The transferability of Reusable Learning Objects (RLOs) to nursing clinical skills education in the Saudi context: a mixed method study

Name of Principle Investigator: Hadeel Lamphon

Name of Organization: Nursing College, KAU

This Informed Consent Form has two parts:

- **Information Sheet**
- **Consent form**

You will be given a copy of the full Informed Consent Form.

We would like to invite you to take part in our research study. Before you decide we would like you to understand why the research is being done and what it would involve for you. Ask us if there is anything that is not clear.

Part I: Information Sheet

Purpose of the research

The purpose of this study is to explore the transferability of open reusable learning objects (RLOs) across different countries through examining the transferability of multimedia Reusable Learning Objects (RLOs) in the form of OERs created in the UK to clinical skills education in the Saudi nursing context.

Type of Research Intervention

This research will involve your participation in an open discussion with your colleagues while you are navigating the online resource which will take about one hour, and then another one hour for focus group discussion with the researcher.

Participant Selection

For clinical skills tutors: You are being invited to take part because you are experienced in teaching nursing clinical skills. We are inviting 8 participants like you to take part. For senior students: You are being invited to take part because you experienced previously how nursing clinical skills is taught. We are inviting 8 participants like you to take part.

Voluntary Participation

Your participation in this research is entirely voluntary. It is your choice whether to participate or not. The choice that you make will have no bearing on your job or on any work-related evaluations or reports. You may change your mind later and stop participating even if you agreed earlier.

Procedures

We are asking you to help us know more about using online resource on clinical skills curriculum. We are inviting you to take part in this research project. If you accept, you will be involved in this phase of the research for two hours. The first 60 minutes will include 3 clinical skills tutors/ senior student who will attend an open discussion while they are navigating the online resource. The same discussion session of 60 minutes will be repeated with other 2 groups of your colleagues. Then all groups will be meet together one day after for one hour for discussion with researcher.

(Participant will indicate if they would like to participate in follow-up focus group or not).

During the group discussion while navigating the online resource for the 1st hour (think-aloud method):

It takes part in a discussion with 2 other colleagues with similar experiences. This discussion will be guided by the researcher. The group discussion will start with the researcher, making sure that you are comfortable. We can also answer questions about the research that you might have. Then the researcher will provide you with set of online resources (RLOs) about clinical skills procedures and give you time to navigate the resources. While you are navigating the resources you have to share, discuss and verbalize your feeling, and thoughts freely about the resources. The audiotape will be recording the voice, and the video-taping will capture the computer screen. After 60 minutes your group will leave and return for the focus group discussion.

During the group discussion with the researcher for 1 hour (focus group):

It takes part in a discussion with 7-8 other colleagues with similar experiences. This discussion will be guided by the researcher Hadeel Lampon.

We will ask you questions about your experience from the last session of discussion and give you time to share your knowledge. The questions will be about online resources, how it could integrate with our curriculum, what are their benefits and disadvantages. **You do not have to share any knowledge that you are not comfortable sharing.**

All discussions will take place in Nursing College, and no one else but the people who take part in the discussion and myself will be present during this discussion. The entire discussions will be tape-recorded, but no-one will be identified by name on the tape. The information recorded is confidential, and no one else except me, the translators, and supervises will have access to the tapes. As the study being a requirement for the award of a doctoral degree, data will be kept for 7 years after the study has ended and then securely destroyed.

Duration

The research takes place for two hours in the same day or two separate days, the think-aloud discussion will be held once and will take about one hour and then the focus group will take an hour.

Risks

There will be no risk on participation on this phase of the project. The participation has no effect on clinical skills tutors' job or on any work-related evaluations or reports and all volunteer participants can withdraw from the study at any time they deem necessary.

The participation has no effect on students' grades in the regular nursing courses and all volunteer participants can withdraw from the study at any time they deem necessary.

Benefits

The information we get from your participation in this study may help to understand how the online resources in particular the open educational resources could support the clinical skills education, to what extend clinical skills tutors and students are accepting the open educational resource in their clinical skills curriculum. This will be the first study of its kind to look at the issues specifically within the context of KSA. Therefore, many of the issues that we uncover are likely to be able to support the better use of online resources within developing countries more generally.

Reimbursements

We will not be able to pay you for taking part as this is research, I am undertaking as part of my doctoral studies, but will arrange the meeting so that you do not have to travel and will incur no expense. Students will be given a certificate for their participation.

Confidentiality

We will ask you and others in the group not to talk to people outside the group about what was said in the group. We will, in other words, ask each of you to keep what was said in the group confidential. You should know, however, that we cannot stop or prevent participants who were in the group from sharing things that should be confidential. We will follow ethical and legal practice and all information about you will be handled in confidence.

If you join the study, some parts of the data collected for the study will be looked at by authorized persons from the University of Nottingham, UK who are organizing the research. They may also be looked at by authorized people to check that the study is being carried out correctly. All will have a duty of confidentiality to you as a research participant and we will do our best to meet this duty.

All information which is collected about you during the course of the research will be kept **strictly confidential**, stored in a secure and locked office, and on a password

protected database.

Your personal data (email, and telephone number) will be kept for two years after the end of the study so that we are able to contact you about the findings of the study and possible follow-up studies (unless you advise us that you do not wish to be contacted). All other data (research data) will be kept securely for 7 years. After this time your data will be disposed of securely. During this time all precautions will be taken by all those involved to maintain your confidentiality, only members of the research team will have access to your personal data.

Sharing the Results

The study being a requirement for the award of a doctoral degree, it is anticipated that findings from the study will be disseminated at various stages of the in appropriate scientific journal in open access journals for wider coverage, poster and oral presentations in KSA and at international conference. You can send the researcher to have a copy of the publication and you will not be identified in any report/publication.

Right to Refuse or Withdraw

Your participation is voluntary, and you are free to withdraw at any time, without giving any RLOs. You do not have to take part in this research if you do not wish to do so and choosing to participate will not affect your job or job-related evaluations in any way. You may stop participating in the discussion at any time that you wish without your job being affected.

Who to Contact?

If you wish to ask questions, you may contact any of the following:

Investigators	Name	Emails
Principle investigators	Hadeel Lamphon	ntxhl6@nottingham.ac.uk
Chief investigators detail	Professor Heather Wharrad	Heather.Wharrad@nottingham.ac.uk
	Dr Linda East	linda.east@nottingham.ac.uk
	Dr Fern Todhunter	Fern.Todhunter@nottingham.ac
	Dr Maram Banakher	ahbbanakher3@kau.edu.sa

This proposal has been reviewed and approved by two committee: KAU, Faculty of Medicine and University of Nottingham, UK, which are a committee whose task it is to make sure that research participants are protected from harm.

Part II: Consent form

I have been invited to participate in research about open Reusable Learning Objects (RLOs) recourses and clinical skills education.

- I confirm that I have read and understand the information sheet for the above study. ☐
- I have had the opportunity to ask questions about it and the questions I have been asked have been answered to my satisfaction. ☐
- I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason. ☐
- I understand that relevant sections of my data collected in the study may be looked at by the research group and by other responsible individuals for monitoring and audit purposes. I give permission for these individuals to have access to these records and to collect, store, analyze and publish information obtained from my participation in this study. I understand that my personal details will be kept confidential. ☐
- I understand that information about me recorded during the study will be kept in a secure database. If the data is transferred is will be made anonymous. Data will be kept for 7 years after the study has ended and then securely destroyed. ☐

I consent voluntarily to be a participant in this study

Name of Participant _____

Signature of Participant _____

Date _____
Day/month/year

Name of Researcher ___**Hadeel Lamphon**_____

Signature of person taking the consent_____ _____

Date _____
Day/month/year

Appendix 3: Code scheme used in think-aloud data collection

Name of RLOs:
Start time:
End time:

N:

Starting				
C	Oral		OC	
	Code	comment	Code	Participant
Engagement	R		Time	- Oriented - Not oriented
	WRP		Follow-on task performance	- Strong: they follow the task smoothly - Good: struggled, but found their way - Poor: struggled, and ask for help
	WR		Concentration & focus	- Strong concentration - Good concentration - Poor concentration
	TE		Curiosity	- Participants want to see more - Skip with purpose to see more - Browsing backword and forward
Usefulness		Gives a great control, improve, saves, support, reduce, enhances		
Usability	Not easy, rigid, structured, easy to follow			
Ending				
Break				
Extra				

Oral expression:
Recommendation: R
Willingness to repeat: WRP
Willingness to recommend: WR
Trust and expectation: TE

Appendix 4: Guidelines for first focus-group discussion

Opening discussion (tutors and students):

- Confirm audio-recording to be used and that participants agree with this, have given consent to take part and assure right to free withdrawal at any time.
- Start the discussion with the question: 'How did you views the RLOs in the previous session?

Introductory questions/ probes (tutors and students):

- What did you most like? What did you least like? How might they be improved? Would you recommend them to others? (depending on what discussion evolves from first question).

Key questions/ probes (tutors and students):

- What kind of teaching materials are you currently using in the clinical skills curriculum? (Such as PowerPoint, are there any web-based resources?)
- How do you perceive the RLOs compared with other resources?
- What are the expected benefits or educational value of RLOs? Triggers: portability of RLOs
- Why do you think they could be important to the curriculum? (Pedagogical value)?
- What are the disadvantages of the RLOs?
- What are the expected barriers of using RLOs?
- How do you think you could integrate the RLOs with the clinical skills curriculum? /Do you think that RLOs could be integrated into your clinical skills curriculum? If yes, how? If no, why not?
- Can you give any examples of good resources you have used? Where do you go to find online resources? (i.e. YouTube, Google etc). What do you think of the quality of open resources you have accessed? /If your university provides an online resource, do you prefer to use your university online materials, or you will try to use other online resources? Why?

Ending the discussion:

- Would you like to add any further comments?
- Thank you for attending this discussion.

General props:

- Could you tell me a bit more about that, please?
- Do you mean by this…?/ What do you mean by …?

Appendix 5: Questionnaires adapted in this study

Student ratings of attributes of Meta-analysis RLOs divided into five categories, Educational value, Learning support, Flexibility and support, Usability and Media attributes (Bath-Hextall et al., 2011)
Educational Value
The content was appropriate and fitted my learning needs
The activity was appropriate and aided my understanding
The RLO encouraged me to reflect on the material
I am confident that I will be able to use the knowledge gained from this RLO in future practice
The RLO has aided my understanding and I feel I have achieved the learning objective.
The RLO will help me retain information
The self-assessment helped me gauge how well I'd understood the material
I will use this RLO again
The RLO integrated well with the module and other teaching sessions
Learning support
The RLO was interesting and engaging
I needed the help of a lecturer to understand the content
The RLO was pitched at the right level for me
I needed more support when using the RLO
Flexibility and control
I enjoyed being able to work at my own pace
I like the idea that I can access this RLO whenever I want to
Usability
The RLO was well structured and easy to follow
The RLO was easy to use
The RLO was easy to navigate I felt in control
I liked the look and feel of the RLO
Media attributes
The images and animations were valuable components of the RLO
The on-screen text was useful and helped me assess the amount of information each section contained.
The narration made the RLO more engaging.
The RLO took longer to complete than expected
I preferred this to text alone

Satisfaction and self-efficacy (Sowan and Idhail, 2014)
1. The hospital videos were very valuable in understanding the procedures. 2. The use of different learning materials (audio, video, text, pictures) was important to keep me interested in the course. 3. Having the videos posted before the lab session was very helpful to prepare me for the upcoming laboratory session. 4. The overall quality of the videos was excellent. 5. The "critical points" at the end of each lab video were very valuable. 6. Having the procedures available online at all times decreased my mistakes in performing the skills. 7. I wish all the procedures were videotaped. 8. Having the lab videos available online decreased my stress in the upcoming lab session. 9. The hospital videos helped me understand the difference between the ideal (lab) and practice (real hospital) world. 10. The voice in the lab videos was very clear. 11. Having a professional documentary narrator commenting on the steps in the videos helped me accurately pronounce the terms. 12. The design of the course modules was consistent and allowed easy navigation. 13. The steps in the lab videos were very clear. 14. I could manage viewing the videos (repeat a step, forward, etc.) easily. 15. The use of different learning materials (audio, video, text, pictures) enhanced my learning. 16. I prefer the traditional lab demonstration compared to the virtual course and videos. 17. Using the videotaped lab procedures helped me get a better grade on the exam. 18. When text was used "within" the lab videos, the font size was appropriate. 19. The images (before the video presentation) at the Blackboard were very important for me to understand the procedures. 20. Using Blackboard, this course served my learning needs well. 21. I felt that I had more responsibility in learning using the virtual course as compared to traditional laboratory sessions. 22. The orientation I received on how to use the virtual course was sufficient. 23. Online procedures allowed faster and better access to information. 24. The virtual course enhanced my learning. 25. I enjoyed studying the online procedures. 26. Technical support was sufficient to solve my problems to view the modules. 27. Answering the discussion board questions helped me understand the procedures. 28. Using discussion board questions facilitates a higher interaction between students themselves as compared to traditional lab. 29. The hyperlinks in the text materials were useful for me to understand the procedures. 30. The discussion board questions facilitated higher interaction between students and the instructor as compared to traditional lab demonstration

Appendix 6: Students self-evaluation questionnaire (SSEQ)

Questionnaire for the study of:

The Transferability of Open Reusable Learning Objects (RLOs) to Nursing Clinical Skills Education in the Saudi Context

الإستبان الخاص بالبحث بعنوان:

إمكانية نقل المصادر التعليمية المفتوحة ذات الوسائط المتعددة لتعليم المهارات السريرية للتمريض في المملكة العربية السعودية

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Dear student,

I would like to invite you to participate in this study about Reusable Learning Objects (RLOs). During your Fundamentals of Nursing course in the 1st semester you have had access to three sets of RLOs as shown below and these will be the focus of the questions in this questionnaire. We would like to know your views on the RLOs. Please give your honest opinions. All responses will be completely anonymous and will be kept strictly confidential, and will not be used for purposes other than this study.

Your participation will be through a questionnaire which will take approximately 15 - 20 minutes. It will be available in both Arabic and English, and you can choose your preferred language to participate. Your participation will be voluntary, there will be no compensation, and no risk in participation. Your participation will not affect your grade in your regular nursing courses and you can withdraw from the study at any time.

In order to participate in this questionnaire, you must be a second-year nursing student in King Abdulaziz Universty who has completed the Fundamentals of Nursing course and was exposed to RLOs in the clinical lab sessions during the course in 1st semester.

If you have any questions about this questionnaire or want more information about this study, please contact the researcher by e-mail.

Thank you, I really appreciate your participation.

عزيزتي الطالبة:

يسعدني دعوتك للاشتراك في بحثي عن أثر استخدام المصادر التعليمية الإلكترونية (Reusable Learning Objects; RLOs). خلال الفصل الدراسي الأول في مادة أساسيات التمريض تم عرض ثلاثة مصادر تعليمية إلكترونية (RLOs) لثلاث مهارات سريرية كما هو موضح في الجدول أدناه. أرغب في معرفة وجهة نظرك عزيزتي الطالبة في هذه المصادر الإلكترونية (RLOs) والتي ستكون المحور الأساسي للأسئلة القادمة في هذا الإستبان. المرجو منك عزيزتي الطالبة أن لا تترددي في إعطائنا آرائك و مقترحاتك بصدق وصراحة تامة. تأكدي عزيزتي الطالبة بأن جميع المعلومات المعطاة منك سيتم التعامل معها بسرية تامة، ستكون مجهولة الهوية، ولن يتم استخدامها لأي غرض آخر لغير البحث.

مشاركتك عزيزتي الطالبة ستكون من خلال تعبئة الإستبان المرفق والذي سيستغرق من١٥ الى٢٠ دقيقة تقريباً. الإستبان متوفر باللّغتين العربية والإنجليزية ولك حرّية اختيار اللّغة لتعبئته. مشاركتك في هذه الدراسة تطوعية ولك الحق في الإنسحاب من المشاركة في هذه الدراسة بأي وقت، كما أنه لا يوجد أي ضرر من المشاركة ولن تؤثر بأي شكل من الأشكال على درجاتك.

لكي يتسنى لك الاشتراك في هذه الدراسة يجب أن تكوني طالبة في السنة الثانية من كلية التمريض في جامعة الملك عبد العزيز وفي فترة دراسة أساسيات التمريض وقد تسنّى لك الدخول ومشاهدة المصادر التعليمية الإلكترونية (RLOs) خلال المحاضرات العملية للمادة (التدريب المعملي) في الفصل الدراسي الأول.

في حال وجود أي استفسار عن الإستبان أو البحث الرجاء التواصل مع الباحثة عبر البريد الإلكتروني أو الهاتف.

شاكرين ومقدرين لك حسن تعاونك.

The sets of clinical skills RLOs you have been exposed to:	مجموعة المصادر التعليمية الإلكترونية (RLOs) للمهارات السريرية الثلاثة:
1- Hand hygiene	
2- Glove use	
3- Injections: • Skin preparation prior to intramuscular and subcutaneous injections • Subcutaneous injection sites • Intramuscular Injection sites for adults • Intramuscular injection by the Z-track technique	

General questions: اسئلـة عامـة:

1. **Which of the RLOs associated with the Fundamental of Nursing course in the first semester did you access (select as many options as appropriate):**
١- أي من المصادر التعليمية الإلكترونية (RLOs) قمت بالدخول إليها او استخدامها في مادة أساسيات التمريض للفصل الدراسي الأول (يمكنك تحديد اكثر من اختيار):

a- Hand hygiene ○

b- Glove use ○

c- Injections:
- Skin preparation prior to intramuscular and subcutaneous injections ○
- Subcutaneous injection sites ○
- Intramuscular Injection sites for adults ○
- Intramuscular injection by the Z-track technique ○

d- Other RLOs ○

If other RLOs, please specify: رجاء حددى إذا استخدمتى اخرى "other RLOs":

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2. **I have accessed the RLOs (select as many options as appropriate):**
٢- أين قمت بالدخول على المصادر التعليمية الإلكترونية (RLOs) (يمكنك تحديد اكثر من اختيار):

- At home ○ - في البيت
- At university ○ - في الجامعة
- Elsewhere ○ - في مكان اخر

If "Elsewhere", please specify: أذا كانت الأجابة "مكان أخر"، الرجاء التحديد أين:

3.When did you access the RLOS (select as many options as appropriate):
٣- متى قمت بالدخول على المصادر التعليمية الإلكترونية (RLOs) (يمكنك تحديد اكثر من اختيار):

- Before the clinical skills lab session ○ - قبل معمل المهارات السريرية
- During the clinical skills lab session ○ - خلال معمل المهارات السريرية
- After the clinical skill lab session ○ - بعد معمل المهارات السريرية
- End of the foundation course/ revision ○ - نهاية المقرر الدراسي لأساسيات التمريض/ المراجعة
- For clinical area training ○ - للتدريب العملي في المستشفى
- Others ○ - أخرى

If "Others", please specify: أذا كانت الأجابة " أخرى"، الرجاء التحديد متى:

Questions about the RLOs:
Please carefully read each of the following statements and respond by ticking ☑ the response box that best reflects your opinion. Please be completely open and honest in your responses.

أسئلة خاصة بالمصدر التعليمي الإلكتروني (RLO):
يرجى قراءة كل من العبارات التالية بعناية والرد من خلال وضع علامة ☑ على مربع الإجابة الذى يعكس رأيك بشكل أفضل. آمل أن تكوني صادقة و صريحة في ردودك وأن تأخذى وقتك الكافي في الإجابة.

N	Questions in English	Strongly Disagree لا أوافق بشدة	Disagree لا أوافق	Agree أوافق	Strongly Agree أوافق بشدة	الأسئلـــة بالعربـــى	ر
1	The RLOs were interesting and engaging					كانت المصادر التعليمية الإلكترونية (RLOs) جاذبة و مثيرة للاهتمام	١
2	The RLOs were helpful for learning the clinical skills					كانت المصادر التعليمية الإلكترونية (RLOs) مساعدة لتعلم المهارات السريرية	٢
3	The RLOs were valuable in understanding the clinical skills procedures					كانت المصادر التعليمية الإلكترونية (RLOs) مرجع قيم لفهم المهارات السريرية	٣
4	The content of the RLOs fitted my learning needs in clinical skills					محتوى المصادر التعليمية الإلكترونية (RLOs) كان مناسباً لإحتياجاتى التعليمية الخاصة بالمهارات السريرية	٤
5	The activity in the RLOs aided my understanding of the clinical skills					الأنشطة التدريبية فى المصادر التعليمية الإلكترونية (RLOs) ساعدتنى فى فهم المهارات السريرية	٥
6	The RLOs helped me to address specific gaps in my knowledge					ساعدتنى المصادر التعليمية الإلكترونية (RLOs) على تحديد بعض الثغرات الخاصة بمعرفتى بالمهارات السريرية	٦
7	The RLOs helped me to retain knowledge in clinical skills procedures					ساعدتنى المصادر التعليمية الإلكترونية (RLOs) على حفظ و تذكر المعلومات الخاصة بتطبيق المهارات السريرية	٧
8	The RLOs enhanced my confidence in my clinical skills					المصادر التعليمية الإلكترونية (RLOs) عززت ثقتى فى تطبيق المهارات السريرية	٨
9	Having the procedures available online at all times decreased my mistakes in performing the skills					توفر المصادر التعليمية الإلكترونية (RLOs) على الإنترنت فى جميع الأوقات قلل من أخطائى فى تطبيق المهارات السريرية	٩
10	The RLOs helped me to practise the clinical skills procedures independently					ساعدتنى المصادر التعليمية الإلكترونية (RLOs) فى تطبيق المهارات السريرية بشكل مستقل	١٠
11	The RLOs prepared me for the lab sessions					المصادر التعليمية الإلكترونية (RLOs) أعدتنى و حضرتنى للمعامل السريرية	١١
12	The RLOs decreased my anxiety in the lab sessions					المصادر التعليمية الإلكترونية (RLOs) قللت من توترى فى المعامل السريرية	١٢

N	Questions in English	Strongly Disagree لا اوافق بشدة	Disagree لا أوافق	Agree أوافق	Strongly Agree اوافق بشدة	الأسئلـــة بالعربـــى	ر
13	The RLOs ensured parity of clinical skills information across all classes					تضمن المصادر التعليمية الإلكترونية (RLOs) على توحيد معلومات المهارات السريرية لجميع الطالبات فى جميع الشعب الدراسية	١٣
14	I preferred learning from books or the clinical lab manual to learning from RLOs					افضل التعلم من الكتب و كتيب المهارات السريرية على التعلم من المصادر التعليمية الإلكترونية (RLOs)	١٤
15	The RLOs helped me get a better mark on the clinical skills exam					ساعدتنى المصادر التعليمية الإلكترونية (RLOs) فى الحصول على درجات افضل فى اختبار المهارات السريرية	١٥
16	I intend to use the RLOs from this course again					سوف استخدم المصادر التعليمية الإلكترونية (RLOs) من هذا المنهج مرة اخرى	١٦
17	I am confident that I will be able to use the knowledge gained from RLOs in future practice					انا واثقة بانى ساستخدم المعلومات التى اكتسبتها من المصادر التعليمية الإلكترونية (RLOs) فى ممارسة المهارات التمريضية فى المستقبل	١٧
18	I would like to see more RLOs in other clinical skills					اود أن ارى المزيد من المصادر التعليمية الإلكترونية (RLOs) فى مهارات سريرية اخرى	١٨
19	I would recommend these RLOs to other students					ارغب بان اوصى الطلبة الاخرين باستخدام المصادر التعليمية الإلكترونية (RLOs)	١٩
20	I enjoyed being able to study procedures at my own pace					استمتعت فى ان اكون قادرة على تعلم المهارات السريرية فى وقتى الخاص	٢٠
21	I like being able to access the RLOs whenever I want to					اعجبنى ان اكون قادرة على الدخول للمصادر التعليمية الإلكترونية (RLOs) كلما اردت	٢١
22	The RLOs enabled faster and better access to clinical skills information					مكنتنى المصادر التعليمية الإلكترونية (RLOs) من الوصول إلى معلومات المهارات السريرية بطريقة أسرع و افضل	٢٢
23	I needed the help of a lecturer to understand the RLOs					احتجت الى مساعدة الأساتذة لفهم المصادر التعليمية الإلكترونية (RLOs)	٢٣
24	The RLOs introduced new concepts clearly					قدمت المصادر التعليمية الإلكترونية (RLOs) المفاهيم الجديدة بوضوح	٢٤
25	The information in RLOs were at the right level for me					كانت المعلومات فى المصادر التعليمية الإلكترونية (RLOs) فى المستوى المناسب لى	٢٥
26	The steps of procedures in the RLOs were clear					خطوات إجراءات المهارات السريرية فى المصادر التعليمية الإلكترونية (RLOs) كانت واضحة	٢٦

N	Questions in English	Strongly Disagree لا اوافق بشدة	Disagree لا أوافق	Agree أوافق	Strongly Agree اوافق بشدة	الأسئلـــة بالعربـــى	ر
27	The terms used in the RLOs were easy to understand					كان من السهل فهم المصطلحات المستخدمة فى المصادر التعليمية الإلكترونية (RLOs)	٢٧
28	The language was easy to understand in the RLOs					كانت اللغة فى المصادر التعليمية الإلكترونية (RLOs) سهلة الفهم	٢٨
29	The RLOs were clear about their objectives					كانت المصادر التعليمية الإلكترونية (RLOs) واضحة فى اهدافها	٢٩
30	Having the video with a narrator commenting on the steps helped me to pronounce the terms correctly					وجود التعليق الصوتى على خطوات المهارات السريرية فى الفيديوهات ساعدنى على نطق بعض المصطلحات بشكل صحيح	٣٠
31	The images and animations were valuable components of the RLOs					كانت الصور والرسوم المتحركة محتويات قيمة فى المصادر التعليمية الإلكترونية (RLOs)	٣١
32	The on-screen text was useful in helping me to understand the information					كان النص الكتابى الموجود على جانب الشاشة مفيداً وساعدنى على فهم المعلومات	٣٢
33	The narration made the RLO more engaging					التعليق الصوتى فى المصادر التعليمية الإلكترونية (RLOs) جعله اكثر جاذبية	٣٣
34	The self-assessments at the end of the RLO helped me gauge how well I had understood the material					ساعدنى الإختبار الذاتى فى نهاية المصادر التعليمية الإلكترونية (RLOs) على قياس مدى استيعابى وفهمى	٣٤
35	The RLOs were well integrated with the foundation course and other teaching sessions					دُمجت المصادر التعليمية الإلكترونية (RLOs) بشكل جيد مع منهج اساسيات التمريض والمحاضرات العملية الأخرى للمادة	٣٥
36	The RLOs were difficult to use					كانت المصادر التعليمية الإلكترونية (RLOs) صعبة الاستخدام	٣٦
37	The RLOs were easy to navigate					كانت المصادر التعليمية الإلكترونية (RLOs) سهلة التصفح	٣٧
38	The RLOs were well structured					كانت المصادر التعليمية الإلكترونية (RLOs) منظمة بشكل جيد	٣٨
39	I liked the multimedia design of RLOs					اعجبنى تصميم المصادر التعليمية الإلكترونية (RLOs) والطريقة التي تبدو عليها	٣٩
40	RLOs were superior to other online learning resources available on the web, for example from YouTube, Google, Wikipedia or other sites					كانت المصادر التعليمية الإلكترونية (RLOs) أفضل من المصادر التعليمية الإلكترونية الأخرى المتوفرة على الإنترنت، على سبيل المثال من اليوتيوب، جوجل، ويكيبيديا أو مواقع أخرى	٤٠

Please add any comments or suggestions: الرجاء اضافة آرائك ومقترحاتك:

Thank you, I really appreciate your participation. شاكرة ومقدرة لك حسن تعاونـك...

Appendix 7: Guidelines for second focus-group discussion

Opening discussion:

- Confirm audio-recording to be used and that participants agree with this, have given consent to take part and assure right to free withdrawal at any time.
- Start the discussion with the number of the students who used the RLOs in the Fundamentals of Nursing course, e.g., around 138 students out of 140 used at least one RLO during their course; Some of them use it before the clinical skills lab session, some of the after the lab session or for the review, and some of the use it for the clinical practice this semester (I will specify the number after I complete entering my data into SPSS).

Introductory questions/ probes:

- Has using the RLOs changed your approach to clinical skills teaching? (e.g., in seeking online resources?)/ What can you say about using RLOs in terms of your approach to clinical skills teaching?
- What are your views on using open resources developed in other countries in KSA?
- How did you integrate the RLOs (recap).

Key questions/ probes - not all statements of SSEQ will be mentioned, it depends on how the discussion develops (try to cover the main areas):

Q1: Why do you think some of the students didn't like certain aspects of the RLOs?

Some statements to discuss with tutors to understand why students didn't like certain aspects:

- Around 20% of students disagreed with the statement that "RLOs were superior to other online learning resources available on the web, for example from YouTube, Google, Wikipedia or other sites"
- Around 22% of the students disagreed with the statement "I liked the multimedia design of RLOs".

Q2: Was there anything about the students' behaviours, responses, and/or assessment results that suggest the RLOs had any impact on them? For example, did they perceive that the students appeared more knowledgeable in the clinical skills procedures?

Some statements to discuss with tutors relating to the impact of RLOs:

- Around 21% of students disagreed with the statement that "The RLOs helped me get a better mark on the clinical skills exam"
- Around 33% of the students disagreed/ 67% agreed with the statement that "The RLOs decreased my anxiety in the lab sessions"
- Around 19% of the students disagreed with the statement that "The RLOs enhanced my confidence in my clinical skills"

Q3: What do you think is the value of the RLOs for learning clinical skills?

Some statements to discuss with the staff relating to the drivers/barriers to effective use of RLOs in clinical skills teaching:

- Around 10% of the students disagreed with the statement that "The RLOs were well integrated with the foundation course and other teaching sessions"
- Around 10% of the students disagreed with the statement that "The language was easy to understand in the RLOs"

Q4: What do you think are the drivers/barriers to effective use of RLOs in clinical skill teaching?

Some statements to discuss with the staff relating to the drivers/barriers to effective use of RLOs in clinical skills teaching:

- Around 10% of the students disagreed with the statement that "The RLOs were well integrated with the foundation course and other teaching sessions"
- Around 10% of the students disagreed with the statement that "The language was easy to understand in the RLOs"

Q5:Do you think that RLOs are transferable to another context?

If not, how do they need to be changed?

Ending the discussion:

1- Would you like to add any further comments?
2- Thank you for attending this discussion

General props:

3- Could you tell me a bit more about that, please?
4- Do you mean by this…? / What do you mean by…?
5- How did you find the experience?

Appendix 8: Summary of the decisions and experiments of PCA

N	Sample size			Extraction		Rotation	Option	Components Extracted	Decision	Rational
	Number of cases counted	KMO	Bartlett's	Scree plot	Eigenvalue	Method	Missing value			
1st trial	127	.872	.000	Cut-off at 4th point	1	Direct Oblimin	Exclude case list wise	9	Reject	Sample size influenced by the listwise option
2nd trial	127	.872	.000	Cut-off at 4th point	1	Varimax	Exclude case list wise	9	Reject	Sample size influenced by the listwise option
3rd trial	138	.891	.000	Cut-off at 4th point	1	Direct Oblimin	Exclude case pairwise	9	Reject	Rotation failed, did not produce component matrix
4th trial	138	.891	.000	Cut-off at 4th point	1	Varimax	Exclude case pairwise	9	Reject	Rotation failed, did not produce component matrix
5th trial	127	.872	.000	Cut-off at 4th point	2	Direct Oblimin	Exclude case list wise	3	Reject	-Sample size influenced by the listwise option -Components did not make sense
6th trial	127	.872	.000	Cut-off at 4th point	2	Varimax	Exclude case list wise	3	Reject	-Sample size influenced by the listwise option -Components did not make sense
7th trial	138	.891	.000	Cut-off at 4th point	2	Direct Oblimin	Exclude case pairwise	3	Reject	The result did not give a true structure matrix (to assess the adequacy of the rotation). Although medium loading size founded in the raw, more than one high correlation corresponds to variables were obtained. It has been suggested by Tabachnick et al. (2007) to avoid them because they make the component interpretation more ambiguous.
8th trial	138	.891	.000	Cut-off at 4th point	2	Varimax	Exclude case pairwise	3	Accept	-Complete sample size -The component matrix produced -3 reasonable extracted component

Note: all coefficient display format was sorted by size, and supressed the small coefficients

Appendix 9: Structure matrix, Direct Oblimin rotation Eigenvalue 2

Structure Matrix			
	Component		
	1	2	3
6	.729		-.361
16	.719		-.333
11	.715		-.429
19	.709		-.377
15	.684	.358	
8	.683		
7	.669		-.378
17	.667		-.353
9	.654		-.336
2	.644		-.637
10	.641	.393	-.343
5	.619		-.437
4	.617		-.468
24	.611		-.449
12	.607		
1	.600		-.448
3	.598		-.517
20	.595		-.351
18	.586		-.351
25	.569		-.465
26	.564	.408	-.520
29	.559		-.444
27	.388	.672	-.370
28	.462	.593	-.436
40	.345	.579	
14		.507	
13	.487	.503	-.302
30	.369		-.785
31	.396		-.760
32	.327		-.719
38	.514	.533	-.653
33	.379		-.640
22	.373		-.615
35	.530	.402	-.586
39	.447	.551	-.582
21	.491		-.573
37	.374	.457	-.568
34	.401	.459	-.506
36	-.304		.354
23			

Appendix 10: Categorisation of the students' responses to the open-end question

Component 1: Educational values of clinical skills RLOs for Saudi nursing students		
	SN	Feedback
I would like to see more RLOs in other clinical skills	2	Increase the number of RLOs in nursing clinical skills
	14	I wish you add other clinical skills even for the students in the 4th and 3rd years in nursing college.
	19	Please add more videos
	22	Add more clinical skills RLOs as an essential reference to the students for learning when they don't understand the skills procedures in the clinical lab session
	28	Add more clinical skills RLOs
	32	I think we should watch more videos in clinical skills procedures to further increase and maintain the information
	39	Provide RLOs for all clinical skills in Nursing even for a very simple and not important procedures
	60	I wish you can add a variety of clinical skills
	105	I wish you can add more clinical skills
The RLOs enhanced my confidence in my clinical skills	105	I wish that all tutors can allowed us use this on all subjects to add more information to what we had and increase our confidence in practice
The activity in the RLOs aided my understanding of the clinical skills	104	I liked the activities after each demonstration video to maintain the information
The RLOs were helpful for learning the clinical skills	8	It looks really good, and it would be an awesome if I knew it before the OSCE, it is very helpful.
	53	these resources had a huge role in my learning the clinical skills in the 1st term, thank you for this
	68	It's really useful to understand the clinical skills
I am confident that I will be able to use the knowledge gained from RLOs in future practice	96	I didn't use this resource except for one time in the beginning of the year, however, after my friend said how easy it is during our revision time, I use it and I will use it this term too
The RLOs were valuable in understanding the clinical skills procedures	99	Great resources, easier the understanding of the clinical skill for students
Component 2: Students' view on the usability and utility of the RLOs		
The terms used in the RLOs were easy to understand	36	simplify the concept
The language was easy to understand in the RLOs	19	Translate the important concepts
	36	Provide some Arabic RLOs
	119	Add Arabic subtitles for different language to clarify the information when it is difficult to understand the language
	36	adding a subtitle under the videos will make it easier to understand and more helpful
RLOs were superior to other online learning resources available on the web, for example from YouTube,	105	it is trustful compering with lots of videos and resources on google and YouTube that make me confused which one I ned to trust.

The steps of procedures in the RLOs were clear	33	Explain more in depth
	22	This procedures steps should be compatible with/ agreed with our curriculum
Component 3: Students' view on the impact of the RLOs attribute in supporting clinical skills learning		
The on-screen text was useful in helping me to understand the information	119	I wish that this resource design to be more clear, attractive, and decrease the words on the on-screen text
I like being able to access the RLOs whenever I want to	2	Simplify the access way to RLOs
	34	I couldn't find other clinical skills RLOs easily
	36	Make the access to the RLOs easier
	57	Make the access to this more easer, some of them didn't open sometimes
	59	Make the home page more easier to browse and access the RLOs easily
The RLOs were difficult to use	43	Very difficult to use
	87	Difficult
	104	In the first use of theses RLOs, I faced some difficulties in using it but then it became easy.