

Adoption of reusable learning objects by postgraduate nursing students in Oman

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Abstract

Background: E-learning offers innovative methods of education and is increasingly recognized as an advanced teaching strategy in healthcare education and lifelong learning, facilitating nurses' continuous professional development. E-learning offers various solutions in higher education and nursing, but raises challenges in terms of the provision of high-quality materials, in terms of both content and media. Therefore, there is a need to explore the extent to which reuse of materials can be a successful strategy. This study explores how innovative technologies like reusable learning objects (RLOs) can support postgraduate nursing education in theory and clinical in Oman. Specifically, it explores the adoption of RLOs developed at the University of Nottingham (UK) for use in Oman Higher Institute of Health Specialities (HIHS).

Aim: To explore the drivers of and barriers to the adoption of RLOs by postgraduate nursing students in Oman, to improve their knowledge, skills, and confidence.

Methods: Q-methodology was used, building Q-statements guided by the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2), and the Hofstede's (1991) Culture Model. Data were collected from 24 postgraduate nurses in HIHS by Q-sort, followed by interviews. A follow-up qualitative study was conducted using semi-structured interviews with seven graduates one year after completion of their programs in their clinical areas, to explore the impact of RLOs in their clinical practice.

Results: Q analysis revealed three groupings of reusable learning object use perceptions and experience factors with consensus statements. Factor 1

(traditionalist) participants valued face-to-face education and had limited experience of online learning. However, they did agree that RLOs could be used with suitable advice and support from faculty members. They also acknowledged that the attractive design of RLOs, along with belief in the flexibility of the tool and ease of use. Factor 2 (pragmatism) participants believe that RLOs are crucial tools for learning and should be used in higher education. These students believe that RLOs support the learning process in the theory class and practice sessions. Thus, RLOs support the application of knowledge in practice more quickly. Factor 3 (self-regulated) participants were similar to those of Factors 1 and 2 in acknowledging the design of RLOs, but the students in this factor had a stronger belief in their pedagogical value. Students believed in their responsibility and initiative in using RLOs. RLO authentication was seen as very important, in terms of the type of knowledge and related resources being recognized and reliable. Consensus statements included the reusable nature of RLOs, which was considered in all factors, while weak Wi-Fi was a persistently bemoaned problem that acts as a barrier to the use of RLOs in the institute. Finally, age and gender were not viewed as instrumental in the ability to use RLOs for any factors.

The qualitative research study findings indicated that RLOs positively affected graduates' clinical practice, as reflected in the reuse of some RLOs (particularly for pharmacology), as well as the use of additional RLOs not originally included in the implementation phase. The current study used UTAUT2 and the Culture Model; from the integration of findings of Q methodology and qualitative study, it was found that some factors were common across both models, while others differed according to culture, which could influence RLO reusability in Oman

and in other national and cultural contexts involving RLO adoption and adaptation. Consequently, the current study proposed a variant UTAUT2 representing factors specifically influencing reuse acceptance of technology across cultures, the Technology Reuse Acceptance Model (TRAM).

Conclusion: This thesis contributes original knowledge on the adoption of e-learning from a Western to non-Western cultural context, specifically from the UK to Oman. It has also created the new TRAM to guide such adoption. This research contributes to existing knowledge on e-learning in Oman and other countries. Implementing RLOs is known to be valid and reliable in the UK, but application in other contexts such as Oman necessitated identifying drivers and barriers in successful adoption, as explored in this study, which pioneers analysis of RLO reuse among postgraduate nursing students, and reuse in their clinical practice. This contributes to understanding factors relating to the use and reuse of valuable learning resources, particularly across cultures with different languages. E-learning might save money, time, and effort in nursing education, with its use and reuse features. The study recommends future research directions in nursing education and practice towards the development of open education resources (OERs).

List of Presentations

Published conference proceedings

Al HASNI, A. (2019) Drivers of and barriers to adopting RLOs by postgraduate nursing students in Oman to improve their knowledge, skill and confidence.

WHARRAD, H, LAMPHON, H., AlHASNI, A. et al. (2018) Transferability of open resources to global audiences. ALT Annual Conference, Manchester, UK.

Invited presentations

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Dedication

To my dear mother and father

To my dear brothers and sisters

To my beloved husband and children

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Table of Contents

Abstract ii

List of Presentations v

Acknowledgement vii

Table of Contents ix

List of Tables xvii

List of Figures xix

List of Abbreviations xx

Chapter 1 Introduction and Background 22

1.1. Introduction 22

1.2. Evolution of nursing education 24

1.3. Innovative technologies in nursing education 28

1.4. E-learning in nursing education 34

1.5. Open education resources 38

1.5.1. OER advantages 40

1.5.2. OER challenges 42

1.6. Reusable Learning Objects 45

1.6.1. RLOs attributes 47

1.6.1.1. Reusability 47

1.6.1.2. Learning 49

1.6.1.3. Object 50

1.6.2. RLO development 51

1.6.3. RLOs pedagogical attributes 55

1.6.4. University of Nottingham RLOs 58

1.7. Research context 60
1.7.1. Oman 61
1.7.2. Health system 62
1.7.3. Nursing education 63
1.7.4. Adult critical care and emergency nursing programs 65
1.7.5. Information and communication technology in Oman 68
1.8. Thesis organization 70
Chapter 2 Literature Review 73
2.1. Methods of conducting the literature review 74
2.2. Steps of scoping review 75
2.3. Identifying the research question 77
2.4. identifying relevant study 77
2.5. Study selection 80
2.6. Charting the data 82
2.7. Collating, summarizing, and reporting results 88
2.7.1. Types of e-learning interventions 89
2.7.2. Characteristics of the studies designs 98
2.7.3. Assessment of the impact of the interventions in the included studies using Kirkpatrick's model 99
2.7.4. Impact of e-learning in nursing education 110
2.7.4.1. Level 1: Reaction 110
2.7.4.2. Level 2: Learning 115
2.7.5. Impact of RLOs in nursing education 120
2.7.5.1. Level 1: Reaction 126
2.7.5.2. Level 2: Learning 128

2.8. Summary of the literature review 131
Chapter 3 Theoretical Framework 136
3.1. Models and theories on technology acceptance and use 136
3.1.1. Theory of Reasoned Action (TRA) 137
3.1.2. Technology Acceptance Model (TAM) 137
3.1.3. Motivational Model (MM) 139
3.1.4. Theory of Planned Behaviour (TPB) 139
3.1.5. Combined TAM and TPB (C-TAM TPB) 140
3.1.6. Model of PC Utilization (MPCU) 140
3.1.7. Innovation Diffusion Theory (IDT) 141
3.1.8. Social Cognitive Theory (SCT) 141
3.2. Unified Theory of Acceptance and Use of Technology (UTAUT) ..142
3.3. Hofstede Cultural Model and Arab countries 145
3.4. Culture and technology adoption in Arab countries 148
3.5. Significance of the models chosen for this study 150
Chapter 4 Methodology 152
4.1. Introduction 152
4.2. Implementation phase of RLOs 153
4.3. Aim and objective 155
4.4. Q methodology overview 155
4.4.1. Description 155
4.4.2. Theoretical development 157
4.4.3. Research philosophy guiding this research 158
4.4.4. Strengths 165
4.4.5. Limitations 166

4.5. Concourse generation....169
4.6. Q set development....169
4.7. Participant comprehension of statements and pilot study....173
4.8. Ethical consideration....174
4.8.1. Participant information and informed consent....174
4.8.2. Anonymity, confidentiality and data protection....175
4.9. Participants selection/ P-set....176
4.10. Q sort and post-sort interviews....179
4.11. Factor analysis....183
4.11.1. Correlation....184
4.11.2. Factor extraction....185
4.11.3. Factor rotation....190
4.11.4. Factor loading....192
4.11.5. Factor arrays....195
4.11.6. Crib sheet....199
4.11.7. Qualitative analysis....200
4.11.8. Factor interpretation....200
4.12. Summary....200
Chapter 5 Qualitative Study....202
5.1. Introduction....202
5.1.1. Overview....202
5.1.2. Research objective....204
5.1.3. Research design....204
5.1.4. Participant sampling and selection....204
5.1.5. Data collection method....207

5.2. Qualitative data analysis 212
5.2.1. Process 212
5.2.2. Data trustworthiness 215
5.2.3. Credibility 215
5.2.4. Transferability 217
5.2.5. Dependability 217
5.3. Summary 218
Chapter 6 Q Methodology Findings 219
6.1. Introduction 219
6.2. Three-factor solution 219
6.3. Factor characteristics 220
6.4. Factor narratives 221
6.4.1. Factor 1: Traditionalist 222
6.4.2. Factor 2: Pragmatist 233
6.4.3. Factor 3: Self-regulator 243
6.5. Consensus statements 256
6.6. Discussion of findings 260
6.6.1. Factor 1: Traditionalist 262
6.6.2. Factor 2: Pragmatist 268
6.6.3. Factor 3: Self-regulator 271
6.6.4. Consensus statements 277
6.7. Summary 280
Chapter 7 Findings of Qualitative Study 282
7.1. Overview 282
7.2. Impact of RLOs on clinical practice 283

7.2.1. Level 1: Reactions 286
7.2.2. Level 2: Learning 288
7.2.3. Level 3: Behaviour 290
7.2.4. Level 4: Result 297
7.3. Summary....298
7.4. Discussion of the findings 298
7.4.1. Reaction....299
7.4.2. Learning 301
7.4.3. Behaviour....303
7.4.4. Results....307
7.5. Summary....308
Chapter 8 Final Discussion and Conclusion 310
8.1. Integration of Q methodology and qualitative study findings 313
8.2. Reusability of RLOs 316
8.2.1. Reuse of RLOs in theoretical learning 319
8.2.2. Reuse of RLOs in clinical practice 321
8.3. External factors 325
8.3.1. Performance expectancy (PE)....325
8.3.2. Effort expectancy (EE)....328
8.3.3. Trust in resources 332
8.3.4. Institutional reputation....336
8.4. Internal factors 337
8.4.1. Hedonic motivation 337
8.4.2. Self-control....340
8.4.3. Culture 342

8.4.3.1. Local and organizational setting....344
8.4.3.2. Implementation of RLOs in ACCNP and ENP curriculum....347
8.5. Reuse of other materials....351
8.6. Recommendations....354
8.7. UTAUT2 and Hofstede Culture Model....357
8.8. Impact of COVID-19 on the current study....359
8.9. Strengths and limitations....361
8.9.1. Strengths....361
8.9.2. Limitations....365
8.10. Implications....367
8.10.1. In education in theory and clinical practice....367
8.10.2. Recommendations for future research....370
8.11. Conclusion....371
References....374
Appendix 1: Oman Vision 2040 Indicators....400
Appendix 2: Approval from University of Nottingham Research Ethics Committee (I)....401
Appendix 3: Approval from University of Nottingham Research Ethics Committee (II)....403
Appendix 4: Approval from Sultanate of Oman Ministry of Health Research Ethics Committee....404
Appendix 5: Participant Information Sheet....405
Appendix 6: Q Statements....410
Appendix 7: PQM Results....413
Appendix 8: Middle East RLO feedback (UoN)....427

Appendix 9: UTAUT 428

List of Tables

Table 1.1: Digital experience insight survey 2018 (JISC) 31

Table 1.2: The level of reusability of RLOs, ...48

Table 1.3: Learning Object Attribute Metric (LOAM) tool 57

Table 1.4: UoN pharmacology RLOs 59

Table 1.5: Oman age distribution 62

Table 2.1: Scoping review framework 76

Table 2.2: Keywords and terms to search in database 78

Table 2.3: Inclusion and exclusion criteria 80

Table 2.4: Summary of included studies 83

Table 2.5: Summary of included reviews 88

Table 2.6: Multimedia e-learning 91

Table 2.7: Online video e-learning 93

Table 2.8: Website e-learning 94

Table 2.9: Impact of e-learning in nursing education 103

Table 2.10: Drivers and barriers of e-learning in nursing education 106

Table 2.11: Impact of RLOs in nursing education 121

Table 2.12: Drivers and barriers of RLOs in nursing education 123

Table 4.1 Research paradigms 165

Table 4.2: P matrix showing participant characteristics 178

Table 4.3: P-set characteristics 179

Table 4.4: Four extracted factors 188

Table 4.5: Eigen value and explained variance table 190

Table 4.6: Factor matrix indicating defining sort 194

Table 4.7: Q sample and factor arrays for each factor 196

Table 5.1: Semi-structured interview questions 211

Table 5.2: The six phases of thematic analysis 214

Table 6.1: Three factor solution participant loading 220

Table 6.2: Correlation between factor scores 221

Table 6.3: Characteristics of the three factors 221

Table 6.4: Factor 1 crib sheet 223

Table 6.5: Distinguishing statements for Factor 1.....232

Table 6.6: Factor 2 crib sheet 234

Table 6.7: Distinguishing statements for Factor 2.....242

Table 6.8: Factor 3 crib sheet 245

Table 6.9: Distinguishing statements for Factor 3.....255

Table 6.10: Consensus statements 257

Table 6.11: Thematic analysis 261

Table 7.1: Demographic data and summary of RLO reuse 283

Table 7.2: RLOs used as result of implementation of pharmacology RLOs in the first part of this study by graduates in clinical practice.....285

List of Figures

Figure 1.1: Types of e-learning 46

Figure 1.2: ASPIRE framework 53

Figure 1.3: Map of Sultanate of Oman 62

Figure 2.1: PRISMA diagram 81

Figure 2.2: Kirkpatrick model evaluation process 101

Figure 3.1: Theory of Reasoned Action 137

Figure 3.2: Technology Acceptance Model 138

Figure 3.3: UTAUT2 144

Figure 4.1: Q methodology process 157

Figure 4.2: Q set development process 172

Figure 4.3: Q grid for this study 182

Figure 4.4: PQ method 2.35 184

Figure 4.5: Correlation matrix for this study 185

Figure 4.6 The step of performing varimax rotation in PQMethodology software 192

Figure 6.1: Factor 1 Q sort model 222

Figure 6.2: Factor 2 Q sort model 233

Figure 6.3: Factor 3 Q sort model 244

Figure 6.4: Consensus statements Q sort model 257

Figure 8.1: Technology reuse acceptance model (TRAM) 316

List of Abbreviations

ACCNP	Adult critical care nursing program
BLS	Basic life support
DOI	Diffusion of Innovation
CRD	Centre for reviews and dissemination
ENP	Emergency nursing program
EBP	Evidence-based practice
GCC	Gulf Cooperation Council
HEIs	Higher Education Institutions
HIHS	Higher Institute of Health Specialities
HELM	Health E-Learning and Media
IBM	International Business Machines Cooperation
ICT	Information and communication technology
IT	Information technology
JISC	Joint Information Systems Committee
NCSBN	National Council of State Boards of Nursing
NCSI	National Centre for Statistics and Information
MoH	Ministry of Health
MHERI	Ministry of Health and Ministry of Higher Education, Research and Innovation
MCQ	Multiple choice questions
MERLOT	Multimedia education resource for learning and online teaching
MOOCs	Massive Open Online Courses

MM	Motivational model
OSCE	Objective Structured Clinical Examination
OERs	Open education resources
PCC	Population, concept, and context
PG	Postgraduate
RLOs	Reusable learning objects
TAM	Technology Acceptance Model
TPB	Theory of Planned Behaviour
TRAM	Technology Reuse Acceptance Model
C-TAM TPB	Combined TAM and TPB
MPCU	Model of PC Utilization
SCT	Social Cognitive Theory
TRA	Theory of Reasoned Action
UTAUT	Unified Theory of Acceptance and Use of Technology
UTAUT2	Unified Theory of Acceptance and Use of Technology 2
UK	United Kingdom
UoN	University of Nottingham
USA	United States of America
VLE	Virtual learning environment
WHO	World Health Organization

Chapter 1

Introduction and Background

1.1. Introduction

New pedagogical approaches, supported by modern informational and communication technology (ICT), are offering opportunities to address long-standing issues in nurse education, but successful use requires more development. There are particular challenges to clinical education for nursing students, such as placements in real clinical settings for clinical practice components in nursing curriculums. These are vital for nurses to acquire skills and experience to deliver real-life patient care, but general problems in healthcare settings undermine resource availability for educational purposes. On the most basic level, global nursing shortages and increasing numbers of inpatients with complex needs mean that there are fewer clinical placement opportunities for nursing students to learn and apply their knowledge and skills (Bloomfield and Jones, 2013).

New learning solutions can also improve on certain structural problems in traditional teaching methods in themselves, such as their potential lack of consistency and flexibility, and their reduced scope to accommodate diverse student learning needs (Sung et al., 2008, Bloomfield and Jones, 2013). In addition, the COVID-19 global pandemic since early 2020 has exacerbated these issues for higher education in general, particularly for healthcare education such as nursing, where face-to-face practical skills are vital components of training.

Clinical practice in nursing education is particularly challenging in more demanding and busy departments with a shortage of facilities for educational purposes, such as critical care and emergency nursing (AACN, 2017). Consequently, there is increased demand to search for alternative and innovative methods that can deliver required learning solutions, through improved learning resources and pedagogical approaches (Bloomfield and Jones, 2013, Cooke et al., 2012). Therefore, it is a necessary to consider different innovative methods to improve students' knowledge. As in all pedagogical contexts, there is no 'best method' of teaching, and modern approaches emphasize the importance of innovative and broad strategies to support students with learning various knowledge and clinical skills (Ghasemi et al., 2020, Sterling-Fox et al., 2020).

In recent decades the landscape of higher education has been transformed, and trends continue to be shaped by the emergence of new technologies. The proliferation and development of the internet and information and communication technologies (ICTs) has increased the popularity and scope of application of related solutions, offering interactivity, multimedia, and web-based learning to support the teaching strategies and learning processes. The facilitation of material uploads to the internet led to the creation of open education resources (OERs) (Hjorth-Johanse, Hofoss and Margrethe Kynø, 2019). One form of OERs is reusable learning objects (RLOs), the focus of this study. The aim of this study is to explore drivers of and barriers to adopting RLOs by postgraduate nursing students in Oman to improve their knowledge, skills, and confidence, as discussed in more detail in later sections.

This chapter provides an overview of nursing education, innovative technologies used in nursing education, e-learning and open education resources (OERs). This is followed by description of the research context, giving an overview about Oman, its health system, nursing education, and ICT development. Finally, the thesis structure is presented.

1.2. Evolution of nursing education

Numerous socio-economic and cultural factors shaped the emergence and development of the nursing profession, and the barriers it faces today (Al-Riyami et al., 2015, Gerard et al., 2014). Modern nursing as a profession is traditionally traced to Florence Nightingale (1820-1910), who was certainly a galvanizing figure in the understanding of the nurse as a healthcare professional. The image of “the lady with the lamp” was romanticized during the 19th century and set the scene for the popular image of the nurse as an educated and self-sacrificing woman who performed a merciful, maternal role in helping the sick, particularly in battlefield nursing as a volunteer, without formal medical education. A formal one-year nursing instruction course was started and was subsequently extended to two years at St. Thomas Hospital in London in 1860, to equip enthusiastic amateurs with the basic skills necessary for nursing (Malka, 2007).

The Nightingale paradigm subsequently spread throughout the British Empire and the world, with many foreign experts visiting St Thomas’s Hospital to learn directly how to apply its nursing education methods in their own countries, and written briefs were sent by request to interest nursing educators worldwide. The first nursing education centre in the US opened in Philadelphia in 1872, and there were 432 nursing colleges across the country by 1900. The incremental

development of nursing education and pedagogy led to an increasingly academic orientation (as opposed to basic procedural drilling to enable expedient hospital care), and nursing education subsequently shifted from the hospital to the university, and in 1910 the first dedicated university nursing school was established in Minnesota in 1910, followed by a few more prior to the First World War (1914-1918) (Malka, 2007).

The 20th century saw the gradual emergence of bachelor's degrees as opposed to diploma programs, with Baccalaureate of Science in Nursing (BSN) becoming a normal expectation for qualification as a professional nurse. Later, postgraduate and specialization programs were added by universities. By the late 20th century nursing education was a normal and respected academic discipline, essential to healthcare systems to provide qualified, trained nursing professionals (Ketefian et al., 2001). Nursing is increasingly pioneering healthcare research, and (pedagogically) an inquiry-based learning format with increased academic recognition and professional respectability. The improved quality of nursing professionalism has increased inter-professional collaboration opportunities, enabling nurses to learn from and with allied health professionals, such as physicians and pharmacists, enhancing nursing education and practice, benefiting colleagues, and improving the quality of care provided to patients (Holmgren, 2017).

However, nursing education continues to face various significant challenges, especially in terms of the theory-practice gap between academic instruction and the real clinical context graduate nurses subsequently face as registered nurses. The mainstay of traditional education to help mediate the theory practice gap is clinical practice, but healthcare institutions are increasingly

challenged to provide sufficient placement opportunities or required duration to equip nursing students with a meaningful and useful experience. This is due to shortages of clinical staff and the systemic difficulties faced by clinical practitioners in providing necessary high-quality holistic care for service users before the perceived burden of instructing nursing students is added to the mix. Such problems are particularly acute in high-intensity, under-staffed clinical contexts, such as emergency rooms and intensive care units (van der Riet, Levett-Jones, and Courtney-Pratt, 2018).

The improvement of health systems worldwide is generally outpaced by the increasing needs of larger populations with people living longer, with commensurate increases in-patient admissions and care requirements. There is an insatiable demand in health systems for more nursing graduates, and despite the global proliferation of nursing schools, there are still shortages of nurses. The Third Global Forum on Human Resources for Health estimated that there will be a nursing deficit of 12.9 million places by 2035, according to the World Health Organization (WHO, 2020). Low nursing staffing in clinical areas is believed to be associated with most recognized in-hospital mortalities. Recent shortages during the COVID-19 pandemic have evoked attempted solutions, such as a radical recruitment drive to find thousands of nurses through re-recruiting retired staff and fast-tracking students into the system as a stop-gap to increase personnel resources to address the pandemic situation (Ball, 2021).

According to the WHO (2020) Eastern Mediterranean Region Observatory, there are 4.6 nurses per 10,000 population in the Eastern Mediterranean Region (which includes most of the Middle East), approximately 95% of whom

are expatriates, which affects the sustainability of nursing and nursing education. In Arab countries, the shortage of qualified nurses is considered the main fundamental obstacle to improving the quality of healthcare services. Even in Arab countries with relatively well-funded health systems the problem of advanced nursing education issues such as the shortage of qualified faculty members is endemic (Al-Riyami et al., 2015, Kaveevivitchai et al., 2009). A lack of nursing faculty members reduces the number of students who can be accepted in nursing schools, ultimately contributing to the shortage of nurses in clinical areas (Harris and Panozzo, 2019).

Shortages of nurses increase the workload for existing staff in clinical practice areas, which reduces the availability of clinical instructors, as in most cases they are working nurses in the placement departments. Consequently, nursing students face systemic challenges to learn in clinical areas, and practicing nurses face challenges to continue learning because of workload, time, and accessibility issues (Rich and Nugent, 2010, Lee and Lin, 2013).

Despite all the challenges facing nursing education worldwide, innovation in technology can contribute effectively in positive ways to facilitate the learning process of nursing, saving time and money, and helping develop nursing education. Therefore, innovative ways to support nursing education are required, to maximize the efficiency of resource utilization and make sure that nursing students acquire the prerequisite knowledge and skills needed for clinical practice, and on-going professional development throughout their careers. Innovation that supports pedagogical learning can fundamentally improve nursing education and thus practice over the long term, increasing the quality of care provided by health systems. Innovative and flexible pedagogical

strategies can also attract people to nursing and enable study alongside other commitments.

This research focuses on exploring the drivers of and barriers to adopting innovative e-learning technologies to support nursing education and faculty members, particularly in terms of RLOs with high-quality materials, both in terms of content and media in e-learning. This addresses the need for research exploring the extent to which reuse of materials can be a successful strategy. Hence, this study explores and contributes to the evidence base for adopting innovative methods internationally, in the case of RLO adoption from the UK in Oman, to enhance the learning process.

1.3. Innovative technologies in nursing education

Innovation refers to developing something new, to address a problem or improve existing products and services. In the nursing context, this essentially refers to increasing the quality of nursing education and practice to optimize evidence-based practice (EBP) in terms of education, clinical practice, and patient outcomes (Gürdaş Topkaya and Kaya, 2015). However, precise conceptual definitions for operationalization in nursing vary. General definitions affirm its role to renovate scientific and technological aspects for societal benefit. The National Health Service Institute for Innovation and Improvement considers innovation primarily in terms of changing processes to improve performance (West, Eckert, Collins; et al., 2017). Most successful innovations are developed by grassroots personnel working in areas concerned (Fressoli et al., 2014).While this pertains mainly to the healthcare organizational context, the nursing profession also includes specific technological innovations, as noted by the International Council of Nurses (ICN, 2009). At the decision

making level, innovations are adaptions to existing processes or the adoption of new methods or equipment to improve cost and service efficiency (Lachman, Glasgow and Donnelly, 2009).

Modern nursing education and practice must continually keep pace with emerging solutions and adopt appropriate innovations to improve quality, while avoiding change for its own sake. The EU and the ICN, among others, have increasingly entered into strategies such as the 2009 ‘Year of Innovation’ in order to improve collaboration in scientific progress for healthcare (ICN, 2009). Nursing needs innovation within strategic planning to support skills development and professional competence among nursing students and practitioners (Williamson and Muckle, 2018).

Innovative pedagogical methods are necessary to meet the needs of modern healthcare, especially in relation to clinical practice and placements, and with regard to healthcare delivery options and large numbers of nursing students in educational contexts. The education of nurses must enable them to adapt to dynamic practice contexts and changing placements. A pedagogical approach that includes self-directed learning (SDL) with an emphasis on social context, metacognition, and decision making can facilitate the adult learning process, as adults tend to choose what, when, how to learn, and the depth and breadth of their learning (Bonham, 1992, Schmidt, 2000, Nyoni and Botma, 2020). In advanced innovative pedagogies, this can be facilitated by e-learning technologies (Røe et al., 2019), integrated with pedagogical designs to facilitate the engagement of the students in educational activities and increase self-responsibility. However, the effectiveness of e-learning depends on how it is

designed and implemented by educators, and engaged with by learners (Røe et al., 2019).

The use of technology can be beneficial in education if it is implemented with appropriate pedagogical sensitivity to the learning context and learners' needs; it is not good in and of itself, and technology-led innovations in education that do not take account of the educational needs of users are unlikely to be effective. Learner needs and adaptability can affect students' readiness and capacity to participate in the meaningful use of technology. Studies show that attitude about the use of technology can directly affect the intention to use it, related to barriers arising from the costs, compatibility, technical issues, and the culture of the organization, all of which need to be evaluated to successfully integrate technology into the curriculum (Williamson and Muckle, 2018, Strandell-Laine et al., 2014).

A report by the Joint Information Systems Committee (JISC) in the UK in 2018 presented a three-year project to understand 37,720 students' expectations and experiences of technology. Of these participants, 14,292 were further education (FE) students, and 23,428 were higher education (HE) students, studying at 83 different colleges across UK. The study identified four themes: the digital lives of learners, digital in the institution, digital at course level, and attitudes to digital (Table 1.1).

Table 1.1: Digital experience insight survey 2018 (JISC)

Theme: Student expectations and experience
Digital lives of learners Students regularly used digital technologies in their own learning time 70% of HE students used digital tools on a weekly basis to look for additional resources not recommended by their lecturers/tutors About 8% of students considered assistive technologies to be vital for their learning needs HE students cite Google Scholar as number 1 app. Students also used a wider range of tools for online research, including online journals and journal catalogues.
Digital in the institution Students rated their institutions' digital provision as good and excellent All types of institutional device were reportedly used A lack of reliable, robust, and ubiquitous WiFi 54% of HE students agreed that they could access health and wellbeing services online Only 41% agreed that their institution helped them stay safe online 39% of HE students disagreed when asked whether they were told how their personal data was stored and used by their institution A third of all students turned first to their fellow students when looking for support with digital devices or skills.

Source: JISC (2018)

Table 1.1: Digital experience insight survey 2018 (JISC) (cont.)

Theme: Student expectations and experience
Digital at course level
Students rated the quality of digital teaching and learning on their course as above average (good and excellent)
Students agreed that their virtual learning environment (VLE) was well designed
Students accessed their VLE regularly on their mobile
Students thought digital skills would be important for their chosen careers, but they lacked full awareness of digital skills' importance in the modern workplace
Only 41% of students agreed that their course prepares them for the digital workplace
Only about a third of students agreed that they were told what digital skills they would need before starting their course
21% of HE students had never worked online with others
Only a third of students agreed that they were given the chance to be involved in decisions about digital services
Attitudes to digital
73% of HE students agreed that they are more independent in their learning when digital is used
Only about 10% of students said that the use of digital on their course meant they were less likely to attend classes or made them feel more isolated.
Over a third wanted more digital technology use; 60% were happy with the current amount; only 5% wished for less
56% of HE students liked a mix of group and individual work
20% of students agreed that they were more easily distracted when technology was used on their course
Concerning potential digital technology learning enhancements, feeling more connected (either with other learners or with lecturers/tutors) was ranked lowest

Source: JISC (2018)

From the JISC (2018) report, technology is beneficial in student's lives and can facilitate learning if reviewed frequently and updated to make it easy-to-use and accessible for most students. However, even in developed countries, there are still some challenges to implement the technology in the education, which need to be addressed and resolved to facilitate the learning process.

In nursing education in particular numerous efforts have been made to resolve pedagogical challenges using technology. For example, using simulation for class laboratories, in order to increase the knowledge and skill of nursing students and support faculty members in their teaching, circumventing the shortage of real clinical opportunities and avoiding the dangers posed by live demonstrations of clinical procedures for students. However, it has been found that there are different barriers to implementing simulations, including that they have high-intensity resource requirements in terms of time, faculty members, skills, and associated hardware and software, such as manikin cameras, pre-packaged scenarios, maintenance, updates and technical support. Due to the highly demanding requirements of nursing education and the prerequisite technologies and ancillary services, nursing simulations are prohibitively expensive, and incur labour loads for faculty members. Aside from such pragmatic considerations, simulations *per se* can solve some problems in nursing education, with the proviso that staff and students are given comprehensive training on how to use simulations effectively to increase practice skills (Al-Ghareeb and Cooper, 2016, Vuuren et al., 2018).

E-learning in general has been seen as a harbinger of a potential revolution in education for health science education, but implementation has been staggered

and has in general failed to galvanize professional education comprehensively; nevertheless, it is universally endorsed as tool to facilitate learning through lifelong professional development (Rigby et al., 2012). This study adds to efforts seeking to translate the theoretical benefits of e-learning into tangible benefits by resolving some issues faced by nursing education today. Therefore, the focus of this study is to explore the drivers of and barriers to adopting OERs/RLOs in Oman that were developed elsewhere.

1.4. E-learning in nursing education

E-learning has several definitions, due to the range of technologies considered to comprise it, and different disciplines concerned with its classification (Dariel, 2011) (Figure 1.1), and the specializations and interests of each researcher. It is difficult to find a common accepted definition for e-learning (Wong et al., 2009). For example, some educators could consider using PowerPoint presentations during lectures to be e-learning, or the administrative applications of technology (e.g., links to online resources and email); others may conceptualize it in terms of more sophisticated examples such as online scientific games or immersive technology (e.g., Second Life simulations) (Rodrigues et al., 2019).

A comprehensive definition of e-learning includes all web-based, computer-assisted, internet-based, flipped, blended, hybrid learning and online learning formats (Arkorful and Abaidoo, 2015). Some researchers defined it based on its characteristics. Welsh, Brown, Wanberg et al. (2003) defined it as a learner-centred approach designed to involve interactive systems through the internet

to provide information and instruction to end users (learners). Others defined it as:

> "an innovative web-based system based on digital technologies and other forms of educational materials whose primary goal is to provide students with a personalized, learner-centred, open, enjoyable and interactive learning environment supporting and enhancing the learning processes" (Rodrigues et al., 2019, p. 95).

E-learning has been introduced as a dynamic, innovative and substantial method to offer learning opportunities. It is specifically related to electronic mediated learning based in the internet and associated computer-based technologies. The use of information and communication technology (ICT) has proliferated widely in education as it enables numerous innovative strategies to deliver education across the lifespan (Lahti, Hätönen, Välimäki, 2014). It is growing rapidly also in health education due to its convenient, flexible and interactive educational characteristics (Cooke, Watson and Blacklock, 2012). While traditional face-to-face learning tends to be centred on the lecturer as instructor, with learners being mainly passive, online learning maybe at its best, but not always is intrinsically a more student-centred educational experience (Horiuchi, Yaju, Koyo et al., 2009)

The improved flexibility of e-learning is particularly appreciated by learners, with anytime, anywhere access to learning materials (Bloom and Jones, 2013, Bath-Hextall, Wharrad and Leonardi, 2011, Blake, 2009, Kelly, Lyng and McGrat et al., 2009). Suen (2005) found that that RN to BSN students who received an e-learning epidemiology course considered it more stimulating, flexible, and creative than traditional instruction, and they enjoyed proceeding in their own

time, downloading materials and performing activities as needed. Flexibility, active learning, computer confidence, and teaching practicality were the main advantages of e-learning in a course on health informatics studied by Kenny (2002). Course content was rated beneficial and useful by learners, while instructors experienced empowerment by teaching utilizing technology.

E-learning is increasingly used to impart skills teaching as well as academic knowledge in nursing education, with positive outcomes in most cases, but some barriers. Advantages are clearest in improved academic knowledge among learners, and increased satisfaction with the learning process. Huckstadt and Hayes (2005) analysed the outcomes of advanced practice nursing interactive courses and reported significantly improved post-test knowledge scores after instruction in two modules delivered online (dermatology and pain management) in comparison to pre-test knowledge.

Furthermore, students were more satisfied with the program, considering the online modules to be more convenient, time-efficient, accessible, and innovative (Huckstadt and Hayes (2005). However, the need for online modules was not mentioned clearly in the research, nor were time and accessibility issues covered. The modules required high interaction between faculty members and students, and did not seem likely to save time for either students or faculty members which made it similar to traditional ways of teaching.

Sowan and Jenkins (2013) explored the experiences of undergraduate nursing students in online distance learning with a comparative study, between a group trained to use distance learning without face-to-face learning, and a group with hybrid classes who used distance learning with two hours of weekly face-to-face meeting interactive lectures. The distance learning was delivered via the

Blackboard system. The results showed that the majority of distance learning students did not use Blackboard, but they did use the provided CD to listen to video sessions. Although students expressed that they were satisfied with distance learning through the Likert scale survey administered by the researchers, the students reported some barriers in the distance learning, including feeling overloaded, a lack of time management skills, negative attitudes toward group assignments and psychological stress. It should also be noted that this study was done for a specific, proprietary institutional program, and it cannot be generalized other. This course also took time and required comprehensive training for the faculty members and students to use the distance learning tools.

A meta-analysis of randomized controlled trials (RCTs) by Lahti et al. (2014) reviewed the impact of e-learning on the knowledge, skills, and satisfaction of nurses and nursing students. The review identified 11 RCTs that included 2,491 nurses and nursing students. The studies utilized a range of interventions, mainly based on computer programs with or without e-learning. The review showed that no statistically significant differences were observed between traditional learning and e-learning related to knowledge, skill, and satisfaction, although it did emphasize that e-learning was used as an alternative method for education. However, the results of this meta-analysis should be interpreted with caution due to the heterogeneity of interventions used in each study, which raises questions about the fundamental utility of the conclusions of the analysis.

As mentioned above, numerous studies and systematic reviews have demonstrated some promises of e-learning, and that it might be equal to traditional methods of learning or teaching. However, there is still limited

empirical evidence to demonstrate how e-learning can be effectively deployed to improve education and learning, and the factors in successful or failed e-learning adoption (Regmi and Jones, 2020). Cook, Levinson and Garside et al. (2008) pointed out that different questions need to be answered about e-learning, such as which part or element of e-learning is effective in health education and what designs are effective. Moreover, it is very important to mention that at moment the challenge in nursing education is to make or find programs that meet course objectives, and which are accessible and smarter, with the ability to be used and reused as OERs (Tarhini, Teo and Tarhini, 2016). Therefore, this research sought to address this issue by exploring in more depth the issues related to the adoption of e-learning and reuse of OERs available in the web.

1.5. Open education resources

E-learning could be applied using OERs, which is one of the possible advantages for global nurse education. There has been a rapid increase in the development of OERs globally in Higher Education Institution (HEIs), with the potential to revolutionize the ways in which education is designed, imparted, and adopted (Windle, Wharrad and McCormick et al., 2011). Although, OERs were acknowledged by UNESCO in 2000, there is no authoritatively accredited definition for the term (wiley, 2002). The definition given by the Organization for Economic Cooperation and Development (OECD) is commonly used: ‘digitized materials offered freely and openly for educators, and learners, to use and reuse for teaching, learning and research’. OERs may consist of:

- Learning materials, such as full programs/courses, modules, videos, articles, learning objects and multimedia resources and applications

- Developing, using, and distributing software tools like learning management system (LMS).
- Applying and implementing resources utilizing open licences (Affouneh and Khlaif, 2020).

OERs are considered to support education world-wide and reduce barriers to learning by enhanced motivation, engagement, interaction and retaining the attention of students (McGreal, 2011) and provides sustainability (Littlejohn & Pegler, 2014). The main features of OERs is that they are free to use, reuse and can be downloaded, with appropriate originality of creation and licenses accrued by the main authors as long as there is internet access (Cobb, 2018). This distinguishes OERs from other digital teaching and learning tools that could facilitate the learning process (Coughlan, 2020, Rets et al., 2020).

A survey done by McKerlich, Ives and McGreal (2013) to measure the use and creation of and attitudes towards OERs to determine how OERs were adopted in their institute in Canada. They found that faculty members are intrinsically motivated to use and create OERs. They perceived that such tools support the education process and student success, by increasing accessibility due to the ability to be used on the web. They also thought such features could reduce the challenges of learning through motivation and encouraging engagement and attracting students' attention.

It is the task of educators to ensure that pedagogically appropriate and effective OER tools are selected and used in order to achieve learning objectives. Some very common and popular types of OERs are Massive Open Online Courses (MOOCs), which started in the USA, which is massively used in the UK and Europe (Krelja Kurelovic, 2016).

Another application of OERs is RLOs, which are the focus of this study. They are open digital, reusable learning objects that can be shared from a central online repository to support learning (Grunwald and Corsbie-Massay, 2006). RLOs are discussed in detail throughout this study, and the rationale for using them in this study is explained in section 1.6.

1.5.1. OER advantages

OERs can support knowledge acquisition across traditional barriers, potentially reducing gaps between developed and developing countries to disseminate knowledge, improve educational quality, and increase the share of the knowledge by increasing the number of people involved in the learning process (Krelja Kurelovic, 2016). The reputation of Higher education institutions (HEIs) can be enhanced by using OERs, potentially increasing student intake and extending educational reach to educate geographically (and socio-economically) distant and deprived students, thereby providing more efficient product delivery. They can also utilize OERs to improve collaboration with various academic, governmental, and private organizations to increase the exchange of experience outside the education sector, maintaining sustainable legacy materials. Through the sharing and reuse of materials they could significantly reduce the cost of educational content development worldwide.

OERs can increase cost effectiveness by promoting recycling and reuse, which could make e-learning a sustainable approach (Pulist, 2019, Littlejohn and Pegler, 2015). A case study by Wimpenny, Nascimbeni and Affouneh et al. (2019) on the South Mediterranean region showed that open education approaches are sustainable and can be made interesting to stakeholders through trust development, exchanging different ideas in early collaborative

preparation, and making partnerships across different cultures with different languages, which helps facilitate international collaboration. Despite its obvious utility in enabling international shared interactions, open education is actually fragmented and rare in practice, especially between contexts with different first languages.

Another advantage of OERs is that learners could be exposed to different educational materials and resources that may support and facilitate their learning process and learning needs. This can be associated with learners being more active and self-efficacious in the education process (Geng, Law and Niu, 2019). Self-directed learning approaches in an OER context can contribute to enhance freedom and access to education (Henderson and Ostashewski, 2018).

Along with that, educators can benefit from OERs through finding and sharing available quality peer reviewed materials that are related to their curriculum, saving time and other resources (Geng et al., 2019, Henderson and Ostashewski, 2018). They benefit from the experience of conferring with peers around the world and can learn how to release their own work through OERs in licensed platforms, which could improve their teaching strategies and encourage pedagogical approach development. This could accelerate the change in the traditional teaching role and facilitate more independent learners (OECD, 2007). Moreover, the OER could benefit educators who do not having experience by supporting them with knowledge around the subject they are teaching (Wright and Reju, 2012).

1.5.2. OER challenges

The openness of OERs has some issues concerning whether a culture of openness will be incorporated entirely or by limited adoption (Wiley, 2007). Another issue is maintaining the sustainability of OERs, which might need a diverse, sustainable model that could fit the local needs of each project (Wiley, Bliss and McEwen, 2014). Licensing was formerly considered to be an important issue in OERs, but to a great extent it has been solved because of the Creative Commons licence. There are also the neo-colonial arguments that circulate around OER in its global context, where 'despite increasing support, little consideration has been given to whose knowledge, values, and cultural norms are legitimized within these open education platforms' (Cobb, 2018, p. 15).

A wide-ranging literature review by (Luo et al., 2020) to explore the benefits of and barriers to OERs identified that most studies in this field were conducted in the UK and USA, with some reports from Brazil, Canada, China, Indonesia, Singapore, and South Africa, along with two collaborative studies including the USA, UK, and Australia. These studies identified similar themes, including those faulty members, students, and institutions struggled to embrace OERs even when their advantages were clear. They found that the first barrier was discoverability, referring to the difficulty of discovering and selecting appropriate materials that can be integrated in courses. Faculty members had difficult ensuring the quality of OERs, and locating these resources was particularly difficult due to siloed repositories with inconsistent depths of coverage, and incompatible or inadequate metadata.

The other difficulty found in Luo et al. (2020) literature review concerns the accessibility of OERs. Students often have difficulty in obtaining consistent access to the technology, and this factor should be taken into consideration during the selection process. Accessibility is often undermined by the availability of licensed material to permit derivative works, and faculty members faced uncertainty around copyright issues and procedures for sharing remixed materials. Remixed materials combine original resources with other existing resources to create something new. Having created the adaption, determining how to license the creation to ensure new audiences do not run into the same problem when attempting to remix can be an additional layer of challenge associated with remixing.

The final group of challenges found in the literature review by Luo et al. (2019) concerned the sustainability of adopting OERs through institutional support. Where the studies in this literature showed that systematic burdens embedded within higher educational institutions create difficulty in initiating OERs and in continuing them, because funding runs out. As described in the review, one of the reasons why sustainability cannot be maintained is because most:

> "OER initiatives are individual projects rather than large-scale curriculum redesigns. Such format of implementation narrows the work burden to individuals rather than sharing the load, and does not address cultural and structural barriers across an institution" (Luo et al., 2019, p. 9).

From the above challenges of OERs, it is important to research appropriate ways to implement OERs that can work effectively in learning process and facilitate the sustainability of the resources in higher education institutions. It is

also important to note that most previous studies on this subject were conducted in Western countries, with very little attention to OERs in Arab or Gulf Cooperation Council (GCC) countries like Oman. Tlili, Jemni and Khribi et al. (2020) identified the OER gap in the Arab League of 22 countries. They distributed a questionnaire via the Arab League Educational, Cultural and Scientific Organization (ALECSO), which creates and coordinates projects and activities in the fields of education, culture, and science in the Arab World. The questionnaires covered perceptions of OER, its use, empowering it, and accessibility. The results showed that most of the participants are aware of the advantages of OER in learning, and 73% agreed or strongly agreed that the process of creating and publishing OER is a difficult process in the Arab region. The reusability of open education resource was not identified as significant, because participants perceived that OER is used in a very simple way, by accessing open resources online, without being used in a structured way for effective open teaching and collaboration. Moreover looking at the sample size of Tlili et al. (2020) study, its only 3 participants from Oman which is the research context for the current study. Hence, lack of knowledge of OERs in the area is clear.

The participants stated that they faced difficulty in creating OER because of absence of motivational factors like lack of time, copyright, and the absence of authoring tools. In addition, Tlili et al. (2020) concluded that Arab governments support OER, but without clear vision. The participants thought that the accessibility of OER was not easy because of difficulty in finding a specific OER, lack of awareness of it, and general problems in ICT. Hence, it is very important to notice from this recent study that there has been no study conducted to

investigate OER by implementing structured, web-based resources in higher education settings in Arab countries in general, and specifically in postgraduate nursing programs. With the challenges of OERs in Western and Arab countries, it should be recalled that, when properly applied, OER has great advantages for the education process. It is essentially:

> "learning, teaching and research materials in any format and medium that reside in the public domain or are under copyright that have been released under an open license that permit no-cost access, re-use, re-purpose, adaptation and redistribution by others" (UNESCO, 2019)

Thus, it is important in this study to explore some of these challenges and consider them in the context of RLO adoption in the context of Oman.

1.6. Reusable Learning Objects

RLOs are open digital education resources and the focus of this study. They are 'small, granular e-learning resources and generally utilize multimedia elements to engage the learner in a visual and interactive learning experience' (Windle and Wharrad, 2010, p. 244). Also defined as 'interactive multimedia web resources based on single learning objective which can be used in multiple contexts', they comprise a type of e-learning focused on specific subjects (Bath-Hextall et al., 2011, p. 12) Figure 1.1. RLOs can be shared and reused through central online repository to support learning (Grunwald and Corsbie-Massay, 2006).

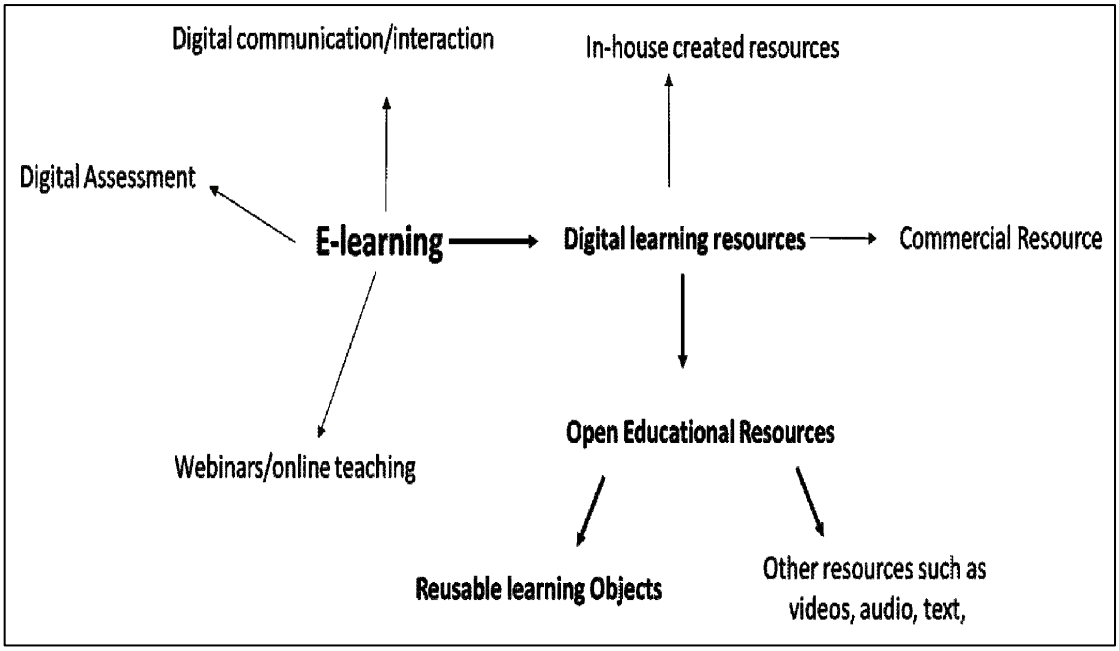

Figure 1.1: Types of e-learning

RLOs are widely used in many fields, including instruction in academic institutions (e.g., schools, colleges, and universities), corporations, government, and military settings. They are widely used due to their innate attractiveness in focussing learning on clear objectives in a structured way. RLOs circumvent many limitations of traditional learning formats, especially the time-limited nature of the latter, due to the flexibility and easy access of e-learning contents, which enable widespread and ubiquitous access beyond the confines of traditional classroom learning (e.g., users can access contents anytime, anywhere), with the added benefit of learning facilitation by offering learning content in a variety of forms. On a practical level, RLOs are more cost-efficient, saving time, money, and human resource commitments entailed in traditional learning formats. Digital repositories of RLOs such as Merlot, ACoRD (Malaysia), HelmOpen that can be accessed, used, and disseminated by groups of users across the world with similar learning goals. Enabling a broader

pool of experts to contribute to RLO creation, including academics, extension agents, instructors, scientists, students, and learners in numerous learning contexts. Therefore, the attributes of RLOs were found to be the main motivation for their use, including their reusability, learning potential, and objects' quality.

1.6.1. RLOs attributes

1.6.1.1. Reusability

The "reusability" of RLOs pertains to the possibility of using them in contexts other than the specific ones for which they were originally designed. The associated content must therefore have a broader appeal for various groups of learners, or highly similar learners in different contexts. For example, an RLO concerning an aspect of pharmacokinetics would intuitively deploy examples of drugs with which the target learners are familiar, but students and practitioners specializing in other care specialties may not be familiar with such medications. Skilful RLO design would therefore seek to balance these considerations, such as choosing more generic drugs or explaining the usage context clearly (Windle and Wharrad, 2010).

Aside from learning content, reusability also entails the platform-independent nature of the RLO. RLOs predicated on specialist software packages are to be avoided, as are those bound within proprietary web environments and learning management systems. HTML formats are generally the first preference, as they can be easily accessed via normal web browsers. RLOs seek to facilitate and ease access to learning, with free distribution (albeit copyright is usually maintained). RLOs distributors must be entitled to deploy and disseminate associated media assets, which can entail issues with third-party copyright. The

ultimate determinant of reusability is that the RLOs can be easily distributed, located, accessed, and used in the learning process. This entails efficient and effective labelling, especially in relation to key terms pertaining to the learning content, making searching and locating relevant RLOs easy for users. Technical accessibility such as compliance with standard (e.g., SCORM or IMS content) is also important for incorporation of RLOs in learning environments (Windle and Wharrad, 2010).

Therefore, the main motivation to use RLOs is reusability, which is the part of this study research as mentioned previously. RLOs can be reused by as many people as possible (Wiley, 2000). The benefit is to reuse learning material that can be created by others which emphasize learning process between the organizations and develop mutual collaboration. Also, RLOs save time and effort to create new RLOs, with the benefit of using RLOs created by others as OERs (Noor, Yusof and Hashim, 2011). According to Currier and Campbell (2005), reusability could be horizontal and vertical. Horizontal reusability focuses on how subject-specific the learning object is (Khoo, Chaudhry and Butdisuwan et al., 2010). The levels of reusability are shown in Table 1.2.

Table 1.2: The level of reusability of RLOs,

1	Generic objects	Can be used in any subject field or discipline
2	Interdisciplinary object	Objects are applicable to more than one discipline or subject
3	Subject-specific object	For use only within a specific subject
4	Resource-specific object	Designed for use in a specific context

Source: Khoo et al. (2010)

On the other hand, vertical reusability is using the learning objects at more than one educational level, and (if they have the necessary support) at different levels (Currier and Campbell, 2005).

1.6.1.2. Learning

The “learning” component of RLOs is much broader than the narrow sense of the academic content of the objects, pertaining to the associated pedagogy in context (Boyle, Windle and Leeder et al., 2006). Some RLOs neglect the constructivist dimension alluded to above (and they are thus considered “instructivist”), due to which RLOs in general have been criticized for lacking sensitivity to the “learning” dimension as properly understood (Zacharia, 2007). In some cases RLOs design has been dominated by technical capabilities and factors rather than the actual needs of real learners, which are ultimately the most important consideration (Herrera-Pavo, 2021, Goodnough, 2020).

This problem was particularly common during the early years of RLO development and application, but since the 2000s there has been great progress in situating RLOs within pedagogical contexts, engaging learners in interactive learning experiences. Modern RLOs support learners to broaden their perceptions and reflect upon their learning progress, with ways to measure and analyse the achievement of learning goals. This has been commensurate with increased quality control to improve the content and pedagogical suitability of RLOs (Windle and Wharrad, 2010).

Moreover, RLOs are not often given to learners just on their own, but as part of a wider learning design - perhaps in a blended environment. For example, if they are placed on a virtual learning environment (VLE) as part of a wider activity are pharmacy, nursing, medicines administration. This would also

answer the tracking question because as SCORM packages they may be tracked as part of this wider resource (Windle and Wharrad, 2010, Farhat et al., 2009)

There is often no formal system of quality control processes applied to RLOs in most cases although sometimes software design methodologies are employed which incorporate integrative review steps for example the Agile development method (Boyle et al., 2006) However, here has been an impetus toward more transparency and improved practice to improve RLOs. There are now meta data systems devised to record the progress of RLOs, which is particularly important in health and social care education due to the fundamental importance of these disciplines to ensure the quality of care and patient health and satisfaction in clinical contexts. Quality assurance via peer review involves the review of RLOs materials by interdisciplinary professionals to ensure they are fit for the purposes for which they are designed (Windle and Wharrad, 2010).

1.6.1.3. Object

The “object” dimension of RLOs includes the degree of unity and portability; RLOs should be self-contained with no need for outside dependencies to function effectively as learning resources (Boyle, 2002). “Object” also implicitly refers to the small and flexible nature of RLOs, including small, bite-sized chunks of knowledge that are generally preferred by healthcare learners (Wharrad, Kent and Allcock et al., 2001). ‘Granularization refers to the size of learning objects and it is a necessary condition for learning objects to be shared and reused’ (Benitti, 2018, p. 3). Each RLO may typically comprise 5-20 minutes of learning activity (Windle and Wharrad, 2010). However, the

granularity of RLOs is an ambiguous and ill-defined concept, and ultimately relates to specific contexts (Noor et al., 2011, wiley, 2002).

A study of RLOs by Multimedia Education Resource for Learning and Online Teaching (MERLOT) found that most of the learning resources which integrated several information objects and education components in fixed and unchangeable ways reduced the chances of reusability. Moreover, reusability can be derailed in very large RLOs due to the complexity of content, which reduces the scope of contextual relevance to numerous diverse settings (Benitti, 2018). Therefore, RLOs developers have to consider RLOs attributes and try to make them accessible, usable, and reusable, and adoptable for different contexts, such as Oman in the case of this study's interest. As the focus of this study is to explore the drivers and barriers of adopting RLOs in nursing education, the development process of RLOs is explained in the following section.

1.6.2. RLO development

Ideally RLOs are created with broad inputs from numerous stakeholders, which helps target the design to the precise requirements of the learning context (and, most importantly, the learners themselves). A consultation session should be held at the outset incorporating all stakeholders, including instructors, learners, relevant clinical experts (for healthcare RLOs), and university staff. This should constitute an open forum for a broad ranging discussion and debate in order to orient the RLOs according to all stakeholders' needs, in terms of required content and formats (Windle et al., 2007). Aside from direct benefits in RLOs creation, this infuses stakeholders with a sense of ownership over the process, which helps avoid resistance to proposed pedagogical changes implied by

RLOs development and application, and it promotes interdisciplinary collaboration that is a general asset to organizations, increasing the dissemination of knowledge and skill throughout the network. Nevertheless, this entails a substantial commitment of resources (including human and capital resources), predicated on the assumption that the RLOs produced will pay off in high production value that greatly facilitates the learning process, catering for and engaging learners in the process and empowering them to achieve their learning goals (Boyle et al., 2006, Benitti, 2018)

The quality of RLOs depends on the development process. At University of Nottingham (UoN) a strategic decision was made to develop RLOs to support the nursing curriculum. The development of RLOs historically emerged during collaboration projects including different UK university partners, University Collaboration in E-Learning (UCEL) and the Centre for Excellence in Teaching and Learning (RLO-CETL) (Boyle et al., 2006, Leeder et al., 2004). RLOs developed in UoN have been selected for this study based on empirical evidence, having been demonstrated by many studies to be effective, peer-reviewed, and based on the effective ASPIRE Framework (Figure 1.2) (Bath-Hextall et al., 2011, Lymn, Bath-Hextall and Wharrad, 2008). The ASPIRE framework has been developed and trialled by Health E-Learning and Media (HELM) team in UoN. It has a systematic, dynamic, and logical process which shows the rigour of the development process. This framework helped to ensure the quality of RLOs in the production process to facilitate the adoption and transfer of these RLOs to other and different contexts.

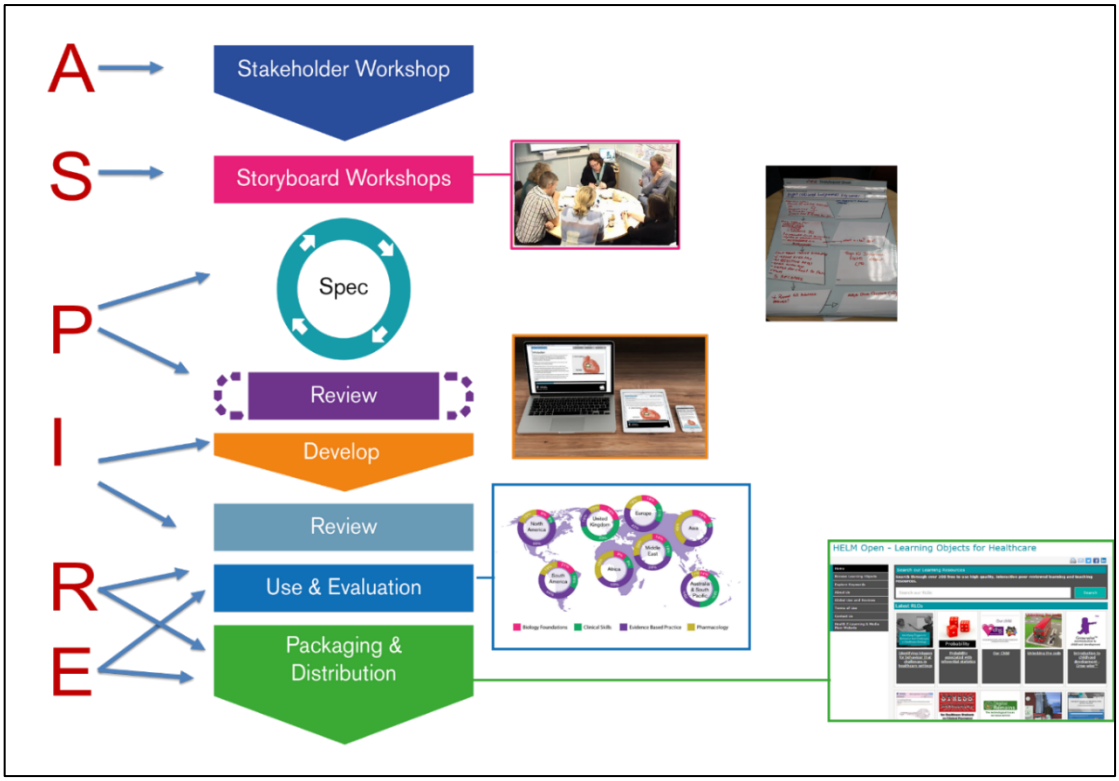

Figure 1.2: ASPIRE framework

Source: UoN, HELM Team (2010)

As Figure 1.2 shows, the development stages of RLOs in UoN start with a team meeting with projects of stakeholders, for example tutors and students, to clarify and refine the aim, ideas, and scope of the project. Then, a peer review of written story boards is part of rigorous quality assurance in e-learning solutions, after which the production process is initiated. Followed by another peer review on the media products, using standardized forms for this purpose, along with a review to elicit learners' feedback. Subsequent amendments are applied, after which the final RLOs are published in the repository, packaged and tagged with meta data (Windle and Wharrad, 2010).

Including the stakeholders in the development process of RLOs at UoN leads to well-aligned resources that meet user expectations and needs for high-quality resources, as evidenced by the positive results of multiple studies with

rigorous evaluation trails and studies (Ferguson, Brandreth, Brassington et al., 2016, Lymn et al., 2008). However, it remains to be tested whether such RLOs created in UK as OERs are aligned with student needs in different contexts, and more research is needed to explore the adoption UK RLOs to other contexts; this study addresses this gap in the context of Oman.

E-learning effectiveness is related to a coherent theoretical underpinning and pedagogical deployment. While the theoretical specifics of such fundamentals vary, they all concur on certain essential dimensions that pertain to this field (Schmidt et al., 2009). Constructivism has been a widely used paradigm for e-learning studies, premised on the epistemological assumption that learners autonomously construct novel realities in response to their interactive experiences with stimuli, as discussed in more detail with regard to the study methodology (Chapter 4) (Ellaway and Masters, 2008).

Under constructivism, cognitive theories have emerged to conceptualize multimedia (visual and aural) RLOs design, learning effectiveness and outcomes, and e-learning regulation (De Leeuw, Westerman, Nelson et al., 2016). Some scholars have emphasized the need for interactive multimedia assessment to galvanize the approach as a useful one for learners to achieve their goals and formulate conceptual connections (Redmond, Davies, Cornall et al., 2018). The RLOs created by the UoN are small, chunk-sized learning solutions that take 5-15 minutes to complete. They consist of four components:

1. Presentation: a multimedia presentation of the story, concept, fact, process, principle, or procedure to be understood by the learner, in order to support the learning goal or aim.

2. Activity: something the learner must do to engage with the content in order to better understand it.

3. Self-assessment: a way in which learners can apply their understanding and test their mastery of the content.

4. Links, resources, and feedback: external resources to reinforce the content of the RLO and support the learning goal or aim. At the end of each RLO there is small evaluation feedback could be submitted to UoN for evaluation.

It is essential when designing RLOs to consider the pedagogical attributes that they display. There are tools to investigate how different aspects of pedagogy influence factors such as use and reuse. The University of Nottingham Health E-learning and Media (HELM) Team have constructed and validated a tool known as the Learning Object Attribute Metric (LOAM) of RLOs (Windle and Wharrad, 2010).

1.6.3. RLOs pedagogical attributes

LOAM is an analysis tool for learning objects based on their 12 pedagogical attributes, which are deployed on a set of mature RLOs to determine how the expression of these pedagogical attributes is mapped to patterns of use and reuse (Windle, Wharrad, Leeder et al., 2007). The pedagogical attributes are derived from the framework design of Instructional Management System (IMS-Global Learning Consortium) (Cook et al., 2008), which conceptualises the occurrence of learning in terms of three fundamental dimensions: the environment; the participants; and their role-play in the learning process and the types of activities. The attributes could ensure that the designed RLO has

a suitable multimedia environment, wherein the learner can be involved in the learning process and getting the appropriate support through the help and feedback (Windle et al., 2007). Through the activities of RLOs the learner could be active and engaged in the process learning and getting the feedback from self-assessment to achieve the learning objectives (Windle and Wharrad, 2010).

This tool determines which (if any) factors influence reusability, a core aspect of RLOs. Analysis of the relationships between the pedagogical attributes in this tool enables RLOs designers to understand the ways in which authors plan their learning designs. The LOAM attribute criteria are show in Table 1.3.

Table 1.3: Learning Object Attribute Metric (LOAM) tool

#	**Attribute**	**Definition**
1	Interactivity	The level of interactivity or the extent to which the learner can engage actively with the learning object
2	Objective	The learning objective (goal) states what the learner should be able to successfully demonstrate or accomplish after working through and engaging with the RLO
3	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
4	Context	The degree of contextualization of the materials or how specific to a discrete group of learners
5	Media standard	The quality and appropriateness of individual media elements
6	Pre-requisites	The extent to which a learner is required to possess pre-requisite knowledge in order to successfully achieve the learning objective
7	Support	The level of support provided to the learner by the content author within the learning object – e.g., help menus, glossaries navigational support, on screen advice etc.
8	Feedback	The level of feedback provided to the learner whilst undertaking the interactive elements or assessments within the learning object
9	Self-direction	The level of self-direction afforded to the learner through open navigation, optional interactivity, optional sections etc.
10	Navigation	The extent to which the learning activity forms part of the learning design
11	Assessment	He extent to and ease of which the learner can perform an effective self-assessment
12	Alignment	The extent to which the assessment elements measure attainment of the learning

Source: Windle et al. (2007)

In this study the pedagogical attributes in LOAM will contribute to understand the participant's view about RLOs and it is specific features and how these

specific features of RLOs could influence the adoption of RLOs which will be discussed in Chapters 5, 6, 7 and 8.

1.6.4. University of Nottingham RLOs

All RLOs produced by the HELM team at the University of Nottingham are open source and freely available for educational purposes as per Creative Common Licence terms and condition and they are accessible via the UoN nursing portal (www.nottingham.ac.uk/nursing/sonet). Policies on open educational resources by the UK government (Lipsett, 2008) and numerous UK Joint Information Services Committee (JISC) initiatives (www.JISC.ac.uk) indicate that open source content initiatives will increasingly facilitate RLOs dissemination for higher and further education in the UK and worldwide (Windle and Wharrad, 2010). Given that the focus of this study is to explore the drivers and barriers of adoption of RLOs in nursing education in Oman, 11 RLOs from the UoN were chosen in this study as they are based on empirically derived evidence and the ASPIRE framework, and they are peer-reviewed, being affirmed to support the role of pharmacological RLOs (Table 1.4), as support components of the nursing curriculum.

As mentioned previously, RLOs are widely used in the UK health sector, but they are not used in any substantial form in Arab countries like Oman. The adoption and transferability of RLOs from countries where they have been successful to other contexts is also an area of research where more exploration is needed. However, before going on to explore the adoption of RLOs in Oman, it is very important to understand the research context and explore the nursing education and e-learning in Oman. Therefore, the next section discusses the research context in detail.

Table 1.4: UoN pharmacology RLOs

Description	Design
RLO1: Half-life of drugs, https://www.nottingham.ac.uk/nmp/sonet/RLOs/bioproc/halflife/resourceshtml	
To understand the half-life of the drugs and its relationship with volume distribution and clearance	Flexible navigation, menu for content, clear audio audio and video, large text with feature of hiding the supporting text features, also features to increase and decrease size of text. Narration feature. Activity crossword. Resources. Feedback
RLO2: The liver and drug metabolism, https://www.nottingham.ac.uk/nmp/sonet/RLOs/bioproc/liverdrug/index.html	
The role of the liver in the metabolism of drugs	Flexible navigation, menu for content, clear audio and video, large text with feature of hiding the supporting text features, also features to increase and decrease size of text. Assessment with quiz. Feedback. Resources
RLO3: Drug receptor interaction, https://www.nottingham.ac.uk/nmp/sonet/RLOs/bioproc/drug-receptor/index.htm	
Introduction to the interaction of cell receptor with drugs	Flexible navigation, menu for content, clear audio and video, large text with feature of hiding the supporting text features, also features to increase and decrease size of text. Activity include drag and drop box. Assessment with crossword. Feedback.
RLO4: An introduction to receptor pharmacology, https://www.nottingham.ac.uk/nmp/sonet/RLOs/bioproc/intro-receptor	
To describe the different types of receptor which drug target	Fixed linear navigation. Tabbed access to sections. Large images, audio, but no on-screen text
RLO5: Actions of drugs target carriers, https://www.nottingham.ac.uk/nmp/sonet/RLOs/bioproc/carriers	
This learning resource introduce carriers as target for drug action and describes how carriers function and how drugs utilize these carriers	Fixed linear navigation. Tabbed access to sections. Large images, audio, but no on-screen text
RLO6: Action of drugs target enzymes, https://www.nottingham.ac.uk/nmp/sonet/RLOs/bioproc/drugenzymes	
This describe how enzymes function and how drug inhibitors block this action	Fixed linear navigation. Tabbed access to sections. Large images, audio, but no on-screen text

Table 1.4: UoN pharmacology RLOs (cont.)

Description	Design
RLO7: Action of drugs target ion channels, https://www.nottingham.ac.uk/nmp/sonet/RLOs/bioproc/ion-channels	
This learning resource introduces as target for drug action	Fixed linear navigation. Tabbed access to sections. Large images, audio, but no on-screen text
RLO8: Bioavailability, https://www.nottingham.ac.uk/nmp/sonet/RLOs/bioproc/bioavailability/home.htm	
Introduction to the concept of the bioavailability of drugs	Fixed linear navigation. Tabbed access to sections. Large on screen text, audio and video. Assessment include 3 questions. Resources. Feedback.
RLO9: Clinical impact of changes in drugs clearance, https://www.nottingham.ac.uk/nmp/sonet/RLOs/bioproc/clearance2/10.html	
Examines some of the factors which affect total body clearance of the drug and how this, in turn, influences a drug's clinical impact	Fixed linear navigation. Tabbed access to sections. Large on screen text, audio and video. Assessment include crossword puzzle. Feedback. Resources.
RLO10: Plasma proteins and drug distribution, https://www.nottingham.ac.uk/nmp/sonet/RLOs/bioproc/plasma_Proteins/page_nine.html	
Examine the role of plasma protein in the blood in the distribution and elimination of drugs in the body	Flexible navigation, menu for content, clear audio audio and video, large text with feature of hiding the supporting text features, also features to increase and decrease size of text. Narration feature. Activity drag the slider with right and left arrows
RLO11: Understanding the first pass metabolism, https://www.nottingham.ac.uk/nmp/sonet/RLOs/bioproc/metabolism/default.html	
Description of first pass metabolism of orally administrated drugs in the liver and gastrointestinal tract	Fixed linear navigation. Tabbed access to sections. Images, audio, screen text

1.7. Research context

In this study to implement a new educational intervention in nursing education in Oman, it is crucial to understand the nursing education system there. This section will present an overview of Oman, nursing education and e-learning in Oman.

1.7.1. Oman

It's officially called Sultanate of Oman and be known as Oman. Oman is located at the southeast tip of the Arabian Peninsula, lying on the Arabian Sea and the Gulf of Oman. It is bordered by Saudi Arabia, the United Arab Emirates, and Yemen. Oman is a member of Gulf Cooperation Council (GCC) established in 1981. The GCC consist of six countries: Oman, Saudi Arabia, the United Arab of Emirates, Qatar, Kuwait, and Bahrain. Oman covers a total land area of 309,500 km^2 (Figure 1.3). It is surrounded by the Gulf of Oman, and the Arabian Sea. Oman has five regions and four governorates, sub-divided into 60 districts. The capital city is Muscat. The total population of Oman is 5.102 million, according to the mid 2020 census (National Centre for Statistics & Information [NCSI], 2020). The age distribution in Oman is shown in Table 1.5, which clearly indicates that Oman has a relatively young population (MoH, 2018). The life expectancy at birth is approximately 77 years (79.1 for females, and 75 for males) (MoH, 2018).



Figure 1.3: Map of Sultanate of Oman

Source: https://www.alamy.com/stock-photo-oman-political-map

Table 1.5: Oman age distribution

Age	Percentage
< 5 years	15.3%
< 15 years	37.3%
15-49 years	51.9%
50-59 years	4.9%
60+	5.9%

1.7.2. Health system

The main regulatory body for health in Oman is the Ministry of Health (MoH), whose facilities are mainly provided by the government. There are 49 hospitals and 205 health centres distributed across all regions of the country. Under the *Health Vision 2050* program, Omani health policy is committed explicitly to the

global Health for All (HFA) strategy (MoH, 2014). Healthcare in Oman is free for all Omani citizens and all foreigners working with the government. Foreigners working in the private sector are covered by company insurance and can receive treatment in private hospitals and clinics authorized by the government. All emergency cases are treated freely in government hospitals for all citizens.

1.7.3. Nursing education

The first development of nursing in Oman was in the 1950s, and it was officially recognized as a profession in 1972, with the establishment of a Directorate of Nursing at the MoH (Watkins and Ryan, 2015). With rapid national development since 1970, the Omani government worked continuously toward improving the infrastructure of the country, which included health and education (Al-Riyami et al., 2015). Oman's Vision 2040 (Appendix 1) represents major structural shifts in different sectors in Oman, prioritizing education and health, and putting them in the front line of the continuous development agenda (Omanuna, 2020). Vision 2040 states the aim of developing:

> "Inclusive education, lifelong learning and scientific research that lead to knowledge-based society and competitive national talents and a leading healthcare system with international standards".

The Vision aims to expand the quality of health professional education and quality of healthcare to meet the national needs and international accreditation standards. For example, the nursing program in Sultan Qaboos University was accredited by the Accreditation Commission for Education in Nursing (ACEN) in 2015, and this process facilitated the use of English as the universal medium of instruction for nursing education in Oman (Al Maqbali, Al Omari, Slimane et

al., 2019). As a result of sustained efforts, ‘nursing is highly respected in Oman and is positively perceived by service users’ (Shukr, 2007, p. 1). The Oman government considers nursing to be a vitally significant profession, to be developed continuously, which underpins work on Oman’s standards of higher education and international standards of nursing education (Al Maqbali et al., 2019)

Nurses in Oman make up the majority of healthcare force; with midwives, they comprise over 40% of all healthcare workers in the country, and approximately 60% of healthcare professionals (MoH, 2019). An educated and competent nursing workforce is vital for meeting national demand and maintaining quality in healthcare (Al-Riyami et al., 2015). Omani colleges and institutes with nursing faculties recruit doctoral nursing faculty members from different countries, and the MoH has collaborated with the Ministry of Higher Education (MHERI) to sponsor many Omani nursing professionals to obtain their PhD degrees from respected global universities, including in Australia, Canada, Ireland, the UK, and the USA. Despite the development of nursing and nursing education in Oman, like other counties it faces the global shortage of nursing practitioners and academics (Shukr, 2007).

Currently, there are three universities in Oman implementing undergraduate nursing education under the umbrella of higher education and awarding bachelor’s degrees, although they differ in some respects from the MoH itself (Al Awaisi et al., 2015). The MoH has a College of Health Sciences based in Muscat, with eight branches in each region of Oman, which offer bachelor’s degrees in nursing. In addition, there is a Higher Institute of Health Specialities

(HIHS) in Muscat offering specialty postgraduate diplomas for graduate registered nurses.

It has eight nursing programs, as follows:

1. Adult Critical Care Nursing Program (ACCNP)
2. Emergency Nursing Program (ENP)
3. Pediatric and Neonates Critical Care Program (PNCCP)
4. Nephrology Nursing Program (NNP)
5. Midwifery Nursing Program (MNP)
6. Mental Health Nursing Program (MHNP)
7. Community Nursing Program (CNP)
8. Infection Control Nursing Program (ICNP)
9. Health Administration Program (HAP)

1.7.4. Adult critical care and emergency nursing programs

From the above list, the ACCNP and ENP are the programs of concern to this study. ACCNP It was designed to improve the knowledge, skill and attitudes of nurses working in critical care areas such as the Intensive Care Unit (ICU), Coronary Care Unit (CCU) and Accident and Emergency (A&E) departments, and to add to quality care. ACCNP was started in the academic year 2004-2005 in partnership with faculty members from the University of Central Lancashire in UK and ran for three years (2004 to 2007). It has since been administered fully by the ACCNP faculty members at HIHS.

In 2015 an Emergency Nursing Program was initiated along with ACCNP. Both programs have staff members from several nationalities. The faculty members teach theory and clinical skills, but staffing is inconsistent and erratic, as Omani

professionals need to be qualified in their postgraduate studies abroad (i.e., in Western/ developed countries), while their non-Omani counterparts typically have a maximum contract of four years' service in the country. This might affect the teaching strategy in the program and hinder achievement of the main objective of the curriculum due to institutional and educational discontinuity. Faculty members have varying levels of education and certification. Some have bachelor's degrees and some have master's degrees. The programs are postgraduate and have an annual intake of 40 students from critical care areas (ICU, CCU, post-cardiac surgery unit, neuro-intensive care unit, and A&E) in various hospitals across Oman.

Medical education (including nursing education in Oman) uses English as the medium of instruction, and all courses and subjects are delivered in English. The communication in hospitals between healthcare professionals is also in English. The default teaching paradigm in Omani nursing schools prior to the COVID-19 pandemic during 2020 was traditional teacher-led lectures for theory, and instructor-led skills demonstration in skills laboratories and clinical practice in hospitals. The faculty members are fully responsible for teaching and assessing students in the modules and subjects of nursing programs. The curriculum is prepared by HIHS in the MoH, sometimes in affiliation with international nursing schools, and is reviewed to be appropriate for national nursing practice. The theoretical part of each module is planned by faculty members to achieve program goals. Each module in the program includes specific subjects and online resources to support students in their learning. These online resources mainly comprise articles published on topics related to course subjects. Skills and practice are learned in consistence with theory

modules in the curriculum, with skills demonstration components and competencies evaluation either in skills laboratories through objective structured clinical examinations (OSCEs), or in clinical practice during clinical practice sessions.

Faculties use textbooks and online EBP to prepare classes. The faculty members are monitored by program leaders and deans in implementing their classes. The faculty members have freedom in the way they implement classes and achieve program outcomes. They submit plans to program leaders detailed how they will implement theoretical lectures. The students in the program mainly follow the dedicated lectures and get knowledge from books and research articles provided in the program. Besides that, they use online resources, mainly Google and YouTube, to get information and knowledge needed. The MoH provides them with some databases through MoH libraries, to search for information and get updates on resources needed.

Despite the nursing education in Oman advancing the education method by using technology, for example using high fidelity simulation, still facing challenges of simulation; very expensive, time consuming, work overload on the faculty members, updating the software and difficulty in the equipment maintenance (Vuuren et al., 2018). It is crucial to note that the traditional face-to-face teaching methodology was the predominant strategy in nursing education in Oman before the COVID-19 pandemic, with limited learner experience of self-directed study. This relates to generally low autonomy among learners in the GCC, and an expectation of and familiarity with traditional teacher-led instruction (Alrabai, 2017). Although these challenges are not only in Oman, these challenges encouraging the nursing education in Oman to move

forward from traditional education method to more advance and modern web-based learning generational requirements in using technology, and to meet the Oman Vision 2040.

1.7.5. Information and communication technology in Oman

Oman's utilization of ICT in higher education has increased rapidly in recent decades (Al Musawi and Ammar, 2015). Sultan Qaboos University (the flagship university in Oman) began to implement e-learning using WebCT in 2001. It started with eight online courses and 981 users. By the end of 2002, 40 courses were offered, and 3001 students used the online facilities. Today Omani universities and colleges are adopting e-learning in their education in different categories (Al Musawi, 2018). Students in Oman can easily navigate the internet and search for resources. Al Musawi and Abdelraheem (2004) have predicted that the utilization of ICT in higher education in Oman is promising, regardless of challenges in technical, logistical and human factors. According to Development Index rankings, Oman's rank for ICT improved from 68 in 2010 to 54 in 2015 (International Telecommunication Union-ITU, 2015, p. 12). Almost 95% of families have smartphones, with equal gender utilization (1:1). The dominant age group in the population pyramid is between 15 and 64 years of age. The demand for and access to internet services is much related to the availability of means of access such as computers, fixed lines, and public access centres, such as internet cafes. It was also evident that on an average an Omani individual spends USD 7.8 per month for Internet access (ITU, 2015).

A 2020 survey of ICT use in Oman by the Ministry of Technology and Communications (MTC) and the National Centre for Statistics and Information (NCSI, 2020) found that the vast majority of inhabitants own

mobile phones (97%) and smartphones (94%), and use computers, including smartphones (95%). The results indicated that there has been a noticeable increase in the use of social media by individuals, reaching 95% (up from 92% in 2019), and that there is slightly higher Internet use among females (97%) than males (94%); and among those aged 18-54 years (90%) than among those aged 55 years and above (80%).

The survey showed that about 92% of individuals aged 18 years and above have the ability to send messages, whether through e-mail, WhatsApp, or SMS. The percentage of using cutting and pasting tools reached 84%, while the use of searching for, downloading or installing software, or adjusting the settings was 67%. However, this survey was conducted during the peak of the COVID-19 pandemic in 2020, which was characterised by extraordinary increases in Internet use worldwide, and it was a general survey. As such, it has no statistics about the use of online or information about e-learning in Oman, nor did not include any particular facets that would be of interest to the current study, such as information on how many universities are using e-learning, and what type of e-learning was used (NCSI, 2020)

Numerous studies explored the utilization of general ICT in higher education in Oman (Al-Senaidi et al., 2009, Al Musawi, 2018). Most of these studies mainly explored the barriers to adopt ICT among faculty members. Al-Senaidi et al. (2009) conducted a study in Sultan Qaboos University (SQU) and identified five main barriers to faculty members' effective use of ICT: lack of computing equipment, lack of institutional support, disbelief in technological values and benefits, lack of personal confidence in using technology, and lack of time. As

a result of this study, SQU has regularly provided professional development workshop for its staff to familiarize them with e-learning. It was also recommended that researchers in Oman need to investigate the effectiveness e-learning components in learning and training in higher education, and study the effects of cultures and preferences in e-learning design and implementation (Al Musawi, 2018).

It is clear that previous research conducted in Oman was limited to exploring rudimentary ICT, with no dedicated interventional studies to explore e-learning adoption in postgraduate nursing education, which supports the rationale for conducting this study investigating the drivers of and barriers to adopting e-learning among postgraduate nursing students in Oman, to improve their knowledge, skill and confidence.

1.8. Thesis organization

Following this overview of the research background and context, the remaining chapters of this thesis are structured as described below.

Chapter 2 critical analyses literature on the factors influencing the adoption of e-learning in healthcare education. It analyses the drivers of and barriers to adopt e-learning in healthcare education and what are the frameworks and models utilized to explore the adoption of the technology in the previous research. Also it reviews the effects of e-learning resources on the health professional students, the pedagogical values of web-based resources, and investigate the method of evaluation. The finding shows that there are different e-learning utilized each research study and there is no evidence available in

the literature of how reusable learning objects as open education resources are adopted in different setting that have different culture.

Chapter 3 provides a critical analysis of technology acceptance models and Hofstede's Culture Model, explaining their significance and how they meet the objectives of this study.

Chapter 4 presents an in-depth look at the first-phase research study using Q methodology. It presents the research philosophy, strengths, and weaknesses of the Q methodology process, as well as its stages and factor analysis. It also addresses ethical issues pertaining to this research study.

Chapter 5 presents the second phase of the study, which included the qualitative research study that explored the impact of RLOs graduate nursing students in their clinical practice. It presents the research objective, design, participants sampling and selection, data collection method, qualitative data analysis.

Chapter 6 presents the Q methodology factors that emerged from the Q analysis described in Chapter 4. The model of Q-sorts, crib sheets and factor narrative presented including the consensus and disagreement to provide an in depth understanding of the nursing students on the adoption of RLOs in their study and the discussion of these factors are presented.

Chapter 7 presents the findings of the follow-up qualitative study and finally discussing the findings by using Kirkpatrick Model.

Chapter 8 presents the final meta-inference for the study, comparing and synthesizing the findings from both phases. Additionally, strengths, limitations and implications of the research are discussed. Finally, this chapter provides

the thesis conclusion, which reviews and assesses how the aims and objectives of the research were met.

Chapter 2

Literature Review

In Chapter 1, the background of nursing education was presented focusing on technology implementation in nursing education. It presented the benefits of implementing e-learning in education and the benefits of open education resources. Also, it presented the growth of using RLOs and OERs in health education. However, little research is available on them to show the experience of the users generally and specifically in postgraduate nursing education. Thus, the reason for this literature review is to search more thoroughly the factors influencing e-learning, as web-based or online resources, on postgraduate nursing education.

These e-learning solutions in literature review might not be RLOs *per se*, but they could be similar to RLOs in many aspects. As mentioned in Chapter 1, e-learning as OERs/or not OERs could include all types of resources, from program course modules to learning objects (Figure 1.1).

Exploring whether these resources have educational value or not for the users might guide the benefit of their adoption with other users in different countries which is the fundamental of this body of review.

Although, the focus of this research is the adoption of RLOs in *postgraduate* nursing education, the search in the literature would be extended to nursing education as whole as this will explore the effectiveness of e-learning education that could guide the current study and identify the important gaps. In addition, the literature might be extended to include midwifery education, which is

commonly grouped under the nursing profession in general in many countries, including the USA and Oman. Hence, the objective of this review is:

1. To explore the existing evidence on the effectiveness of e-learning on nursing students.
2. To determine whether adoption by other users as web-based/online resources are explored in the literature.
3. To investigate the method and methodology used in the included studies.

2.1. Methods of conducting the literature review

This review was conducted according to the Joanna Briggs Institute's (JBI) scoping method, which allows reviewers to iteratively and extensively investigate the literature (Peters, Godfrey, Khalil et al., 2015). According to Tricco, Lillie, Zarin et al. (2016), a scoping review allows researchers to explore the breadth of the literature and identify available materials in the field. The aim of and the question behind this literature review are broad and require a systematic approach to identify a wide range of research studies. This review follows a systematic scoping review as the question of this review is not precise, as the systematic review method requires. The scoping systematic review method was followed in order to comprehensively explore the range and relevant literature of RLO adoption in health care professional education and to identify gaps in the existing literature.

Some reviews are highly targeted towards particular issues, such as those that systematically review intervention efficacy according to certain experimental outcome variables. A typology can be applied to a research topic with the aid

of systematic scoping reviews and by outlining germane data types and conceptualisations (Peters, Godfrey, Khalil et al., 2015, Mays, Roberts and Popay, 2001). Scoping reviews additionally enable scholars to devise more targeted research questions and related criteria for exclusion and inclusion, including the intervention type and variables (Algoso, Peters, Ramjan et al., 2016). In addition, in evidence-based practice, the value of the scoping review is the examination of the broader area to identify gaps in the literature. This is through mapping the conclusion from the existing literature about the overall state of research activity relevant to previous research or systematic literature reviews (Davis, Drey and Gould, 2009). It is useful for inspecting evolving evidence when it is still ambiguous: what other more specific questions can be shaped and valuably addressed by a more specific systematic review (Munn, Peters, Stern et al., 2018).

2.2. Steps of scoping review

The framework of the scoping review was proposed originally by Arksey and O'Malley (2005). The scoping review methodology was then further refined, and the corresponding guidance was developed by a working group from the JBI and the JBI Collaboration (JBIC). The method used to identify literature in a scoping study requires the researcher to achieve in-depth and broad results and identify all relevant literature regardless of the study design (Peters et al., 2015).

This might lead the researcher to redefine search terms and undertake more sensitive searches of the literature. Consequently, it may be preferable to retain some flexibility in the scope of the literature search, with liberal terms used to search for and identify studies during the initial phases. Literature selection is

generally a nebulous process of qualitative analysis (despite the aspiration of a linear and clear-cut process) involving researcher engagement and judgement on how to search, which studies to include or exclude during successive stages and how to achieve a comprehensive survey of *all* relevant literature of commensurate relevance and quality that is feasible to analyse (Arksey and O'Malley, 2005). The scoping review in this study followed the JBI systematic scoping review guidelines shown in Table 2.1

Table 2.1: Scoping review framework

#	Steps of scoping review	Description
1	Identifying the research question and aims	For appropriate search, determine which aspects or "facets" of research question are most significant.
2	Identifying relevant study	Identify primary studies (published and unpublished) and reviews to answer the central research question via different sources such as electronic databases, reference lists, hand-searching of key journals, existing networks, relevant organizations and conferences.
3	Study selection	From the outset adopt greater flexibility with inclusion and exclusion criteria; as familiarity with data progress, redefinition of search term may be needed.
4	Charting the data	From the primary research reports being reviewed. This stage is equivalent to "data extraction" in systematic review. It uses narrative review framework with a broader view.
5	Collating, summarizing and reporting the results	Present the overview of materials reviewed.
6	Consultation (optional)	This is an optional stage. It involves discussion with key stakeholders to add value and insights.

Source: JBI (2015)

2.3. Identifying the research question

The aim of this scoping review is to collect as much evidence as possible to answer the review question. The question that guided this literature review is: 'what are the drivers and barriers influence the adoption of e-learning in nursing education?'

The review conducted was through a comprehensive and understandable search strategy. There are three manageable parts in the stated review question of this scoping review that are considered as inclusion criteria: Population, Concept and Context (PCC) (Algoso et al., 2016).

Population: nursing students

Concept: e-learning

Context: nursing education

2.4. identifying relevant study

The JBI recommends that a three-step search strategy should be used for all types of reviews. Each step must be clearly stated in this section of the protocol. This review included the following three stages.

First stage: A limited initial search of Google Scholar, MEDLINE and Ovid was conducted to identify articles related to the topic. The search employed keywords such 'health care education', 'nursing education', 'e-learning', 'online learning', 'open education resources' and 'nursing student'. The retrieved articles were then analysed for the text words contained in their titles and abstracts and the index terms used to describe the articles.

Second stage: All identified keywords and index terms were used to search across all included databases, including ASSIA, CINAHL, DOAJ, EBSCO,

Education Portal, EMBASE, ERIC, Higher Education Academy, HIGHWIRE, MEDLINE, Ovid, PSYCHINFO, PubMED, SAGE and Zetoic (Table 2.2).

Table 2.2: Keywords and terms to search in database

Population	Students, Nursing/ or Nursing Education / or Students, Nursing/ or nurs* student*.mp. Or Education, Nursing/ or Education, Nursing, Baccalaureate/ or exp Nurse Midwives/nurse*[Education] or/ Nurse Midwives/Health Personnel/ or Students, Health, or health care students.mp.
And	
Concept	Exp Computer-Assisted Instruction/ or exp Education, Medical/ or (E learning or e- education).mp or e-learning.mp. Online learning.mp. Or Education, or Distance/ Integrated learning.mp. Or web based learning.mp or blending learning.mp. Or virtual learning.mp. Or e-education.mp or e-teaching.mp. Or e-tutorial.mp. Or Learning objects.mp. Or multimedia learning.mp. Or hybrid learning.mp. Or open education resource.mp. Or RLO.mp. Or RLOs.mp. Or computer assisted.mp. Or Exp Computer-Assisted Instruction/ or ('reusable learning object*' or RLO or @open educational resource*' or OER).mp. Or MOOC.mp. Or low fidelity.mp. Or exp Simulation Training/ or high fidelity.mp. Or computer simulation.mp. Or Computer Simulation/ or exp Education, Distance/ or Massive open online course.mp. Or (CAI or CAL or (computer adj (assist* or aid*) adj (instructor* or learn*))).mp.
And	
Context	Exp Health Knowledge, Attitudes, Practice/ or health care education.mp. Or exp Education, Medical/ or exp Education, Nursing/ or nursing practice.mp. Or medical education.mp. Or Education, Medical/ or health education.mp. Or Health Education/ or clinical education.mp. Or exp Students or Midwives/nurse education.mp.

The search was conducted from January 2017 to April 2017 and updated in July and August 2020, with particular attention given to the subject headings used across each database. Keywords gathered from the first and second stage were reviewed by experts in the field and by a senior librarian at the University of Nottingham (UoN) to make sure that the search strategy and process was carried out thoroughly and appropriately according to the guidance of the Centre for Reviews and Dissemination (CRD, 2009). No time limitation

was imposed on the review. The search strategy considered alternative spellings and common abbreviations (British American) related to the topic. In the databases, the key words were inserted individually, for example, ‘nursing student’ inserted alone and then ‘e-learning’ inserted alone. This was done to facilitate the editing when needed and to track the number of studies resulting from each key word (Debrún and Pearce-Smith, 2011).

The Boolean operator ‘OR’ was used between each element in the PCC, and the main result of each PCC was linked by the ‘AND’ Boolean to extract the final articles, which were scanned by titles and abstracts. For some key journals, a manual search was conducted, for example, for the Directory of Open Access Journals (DOAJ) and Zetoc, to complete an in-depth search for relevant literature. Moreover, the studies found in broad searches using the reference list of the systematic search and from Google Scholar were included.

Third stage: A total of 7,300 studies were used, and they were screened against the eligibility criteria for inclusion and exclusion (Table 2.3).

Table 2.3: Inclusion and exclusion criteria

Criteria	Inclusion criteria	Exclusion criteria
Type of participants	Nursing and midwifery students with e-learning experience	Any non-nursing students
Type of intervention	E-learning (web-based or online learning)	Any e-learning based on communication technologies, including email and social media. Any app downloads from iTunes or Google Play
Study design	All types of study design published in English or Arabic languages	Other studies without empirical interventions, such as descriptive reports, or studies not providing clear information about the intervention
Outcome measures	Any outcomes exploring nursing students' experiences of e-learning and any outcomes related to nursing education influences on their knowledge, skills, confidence, and behaviour. Any studies including adoption of e-learning or reuse of e-learning by other user groups	Any study that did not explore student experiences of e-learning, or other e-learning solutions not related to educational values like knowledge and skills

2.5. Study selection

The total number of studies as mentioned previously was 7300 and after removing the duplicates, it remained 4860. Then after examining the in-depth titles and abstracts of the articles, 3820 articles were irrelevant and were removed, such as articles with different populations, studies with campus e-learning only, and studies with descriptive reports only or not related to the topic. Then a full review of the remaining studies was conducted and got a total of 45. A total of 24 studies were identified to be included in the review. The assessment of the actual relevance of the studies was decided through the eligibility criteria and through agreement with experts in the field. Figure 2.1

shows a PRISMA flow diagram illustrating the literature scanning process and the results.

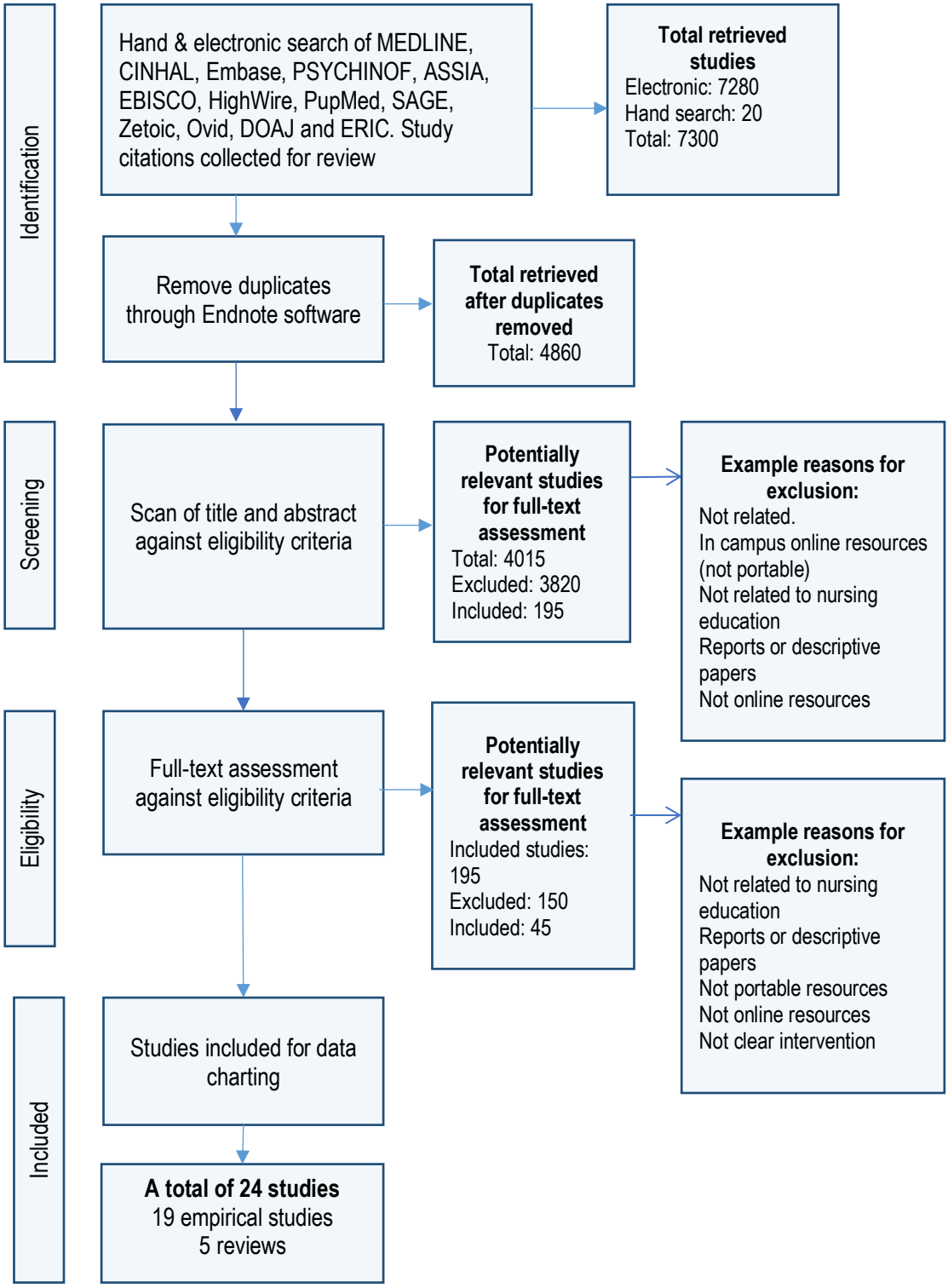

Figure 2.1: PRISMA diagram

2.6. Charting the data

In scoping reviews, the data extraction process may be referred to as “data charting”. This process provides the reader with a logical and descriptive summary of the results that aligns with the objectives and questions of the scoping review (Peters et al., 2015). The data in this review is extracted, gathered and presented in charting tables that include specific details:

- Study characteristics like design, population, method, context and analysis.
- Intervention, which includes the name of the intervention, theoretical framework for design, interactivity, content, quality assurance and tracking system.
- Significant outcome which includes the impact of intervention on the students like knowledge, skill, confidence and behaviour. As well drivers and barriers of the implementing and using of the intervention.
- The publication information, such as the year of the publication.
- Descriptive or contextual data
- Any framework used in the study to implement the intervention.

Table 2.4 summarizes the included studies, and Table 2.5 presents details of the included reviews.

Table 2.4: Summary of included studies

Participants	Design	Data collection tool	Intervention
1. Lymn, Bath-Hextall & Wharrad (2008), UK			
84 nursing students Follow-up with 10 students	Quantitative study	Questionnaire data Telephone interviews	RLOs
2. Kelly et al. (2009), Ireland			
204 undergraduate nursing students 14 out 204 volunteered to outcome evaluation	Quasi-experimental post-test	Questionnaire	Using online video to demonstrate skill
3. Kaveevivitchai, chuengkriankari, luecha et al. (2009), Thailand			
117 undergraduate nursing	A randomized experimental design	Semi-structured interview Performance checklist for skills, MCQ	a computer-assisted learning multimedia on vital signs
4. Lu, Lin & Li (2009), Taiwan			
147 undergraduate nursing students	Experimental design	Survey	Web-based videotaped with narration on intramuscular injection skill

Table 2.4: Summary of included studies (cont.)

Participants	Design	Data collection tool	Intervention
5. Blake et al. (2010), UK			
163 undergraduate nursing and 73 medical	Cross-sectional questionnaire study	Questionnaire survey	RLOs
6. Gerdprasert, Pruksacheva, Panijpan et al. (2010), Thailand			
85 undergraduate nursing and midwifery students	Mixed-method design	Questionnaire, follow-up interview Competency test for skills MCQ	web-based learning media on the process and mechanism of labour
7. Windle, McCormick, Dandrea, & Wharrad (2011), UK			
3 cohorts Undergraduate nursing student 1st cohort (42 students) 2nd cohort (50 students) 3rd cohort (26 students)	Quantitative study	Questionnaire containing Likert rating and free-text questions MCQ	RLOs for chemistry
8. Bath-Hextall, Wharrad, & Leonardi-Bee (2011), UK			
Convenience sample of 12 Postgraduate diploma in nursing and 26 Master in Public Health course	Mixed-method	Questionnaire	RLOs in meta-analysis

Table 2.4: Summary of included studies (cont.)

Participants	Design	Data collection tool	Intervention
9. Gerdprasert et al. (2011), Thailand			
84 undergraduate nursing students	Quasi-experimental	Questionnaire	web-based learning unit on intrapartum nursing care
10. Keefe & Wharrad (2012), UK			
42 undergraduate nursing students	Randomized cohort design	questionnaire	RLOs (pain management)
11. Ozturk and Dinc (2013), Turkey			
111 undergraduate nursing students	Quasi-experimental	MCQ and skill checklist	Web-based education (urinary catheterization skills)
12. Holland, Smith, McCrossan et al. (2013), UK			
322 undergraduate nursing students	Mixed-method prospective cohort design	Survey Focus Group	Online video of the oral medication administration process
13. Sowan & Idhail (2014), Jordan			
120 undergraduate nursing students	Mixed-method	Survey	A web-based virtual course streaming videos on medication administration

Table 2.4: Summary of included studies (cont.)

Participants	Design	Data collection tool	Intervention
14. Williams, O'Connor, Windle et al. (2015), UK			
46 undergraduate nursing students 265 international healthcare professionals	Evaluation study	Survey	RLOs package in injection skill
15. Yeoh & Wee (2017), Malaysia			
118 undergraduate nursing students	Survey using acceptance theoretical framework	Survey	Internet-based information resources
16. Sheikhaboumasoudi, Bagheri, Abbas et al. (2018), Iran			
60 undergraduate nursing students	Post-test experimental study	Questionnaire OSCE	Designed educational website

Table 2.4: Summary of included studies (cont.)

Participants	Design	Data collection tool	Intervention
17. Redmond, Davies, Cornally et al. (2018), Ireland			
192 undergraduate nursing students	Evaluation study	Questionnaire	RLOs package in wound care
18. Junsawang, Jittivadhna, Luealamai et al. (2019), Thailand			
65 undergraduate nursing students	Pre-test and post-test design	Focus group discussion Questionnaire	Multimedia-aided instruction for Basic Life support (BLS) package
19. Johansen, Hofoss & Kyno (2019), Norway			
15 postgraduate nursing students 13 nurses	Comparative interventional study	pre-test and post-test knowledge	Online computer-based learning

Table 2.5: Summary of included reviews

#	Authors	Review	Aim
1	Du, Liu, Liu et al. (2013)	Systematic review	To examine the efficacy of web-based distance education for nursing students
2	Lahti, Hatonen and Valimaki (2014)	Systematic review and meta-analysis	To review the impact of e-learning on nurses' and nursing student's knowledge, skills and satisfaction related to e-learning
3	Button, Harrington and Belan (2014)	Review of the literature	To examine primary research articles published between January 2001 and December 2012 that focused on the issues for students and educators involved with e-learning in preregistration nursing programs
4	Cant and Cooper (2014)	An integrative review	To review the literature on utilization and place of Web-based simulation within nursing education
5	Macutcheon, Lohan, Traynor et al. (2015)	Systematic review	Evaluating the impact of online or blended learning vs. Face-to-face learning of clinical skills in undergraduate nurse education

2.7. Collating, summarizing, and reporting results

The aim of the scoping review is to examine the impact of e-learning as a web-based online resource for nursing students and to explore the drivers of and barriers to adopting these resources in nursing education. The findings in this section were compiled to compare the types of e-learning interventions, the characteristics of the studies, the impact of e-learning on nursing education and the drivers of and barriers to these e-learning resources. The review will explore the main area of interest and identify any significant gaps that these studies may have.

Generally, all the studies shared similar aims when examining and evaluating web-based online learning for nursing students and when exploring the pedagogical values regarding students' knowledge, skill, confidence and behaviour. When exploring the perception of the students towards e-learning, most of them mentioned the drivers of and barriers to e-learning in these institutions. Also, there is a study mentioning the framework used to adopt e-learning in education and how this e-learning can be accepted. These studies were conducted in an institutional environment, which is a university. Most of them were conducted in Western universities, and a few were conducted in Asian universities.

2.7.1. Types of e-learning interventions

Technology can be beneficial in education and can play an important role in achieving learning outcomes; however, technology-led innovations in education that do not consider the educational needs of users are unlikely to be effective (Williamson and Muckle, 2018, Strandell-Laine et al., 2014). For example, presenting a huge amount of material as text on a website will not induce online learning, whereas well-designed e-learning resources with appropriate academic content might motivate the learning process and help learners achieve the learning outcomes (Reime, Harris, Aksnes et al., 2008). In designing web-based learning, educators are required to do more than just develop new ICT skills; the online resources need to be designed with pedagogy in mind and with an understanding of the context, diversity and dynamic of the groups (Islam, Beer and Slack, 2015). In addition, 'the quality of online learning course materials is an important issue that should be considered during the conceptual design of an online course' (Martin, Polly and Jokiaho et

al., 2017, p. 2). Hence, in this section, it is important to consider the e-learning interventions included in studies from all aspects that would affect their quality, such as how they are designed, the theoretical framework used in design, content quality assurance, the implementation process, the interactivity of the intervention, if there is a tracking system or not and if they are open education resources or not. Another consideration is if any theoretical framework or model was used to adopt these interventions and to implement them in any institutions or universities. Tables 2.6–2.8 summarise the types of e-learning interventions used in the included studies, where they are grouped under multimedia, online video and website e-learning.

Table 2.6: Multimedia e-learning

Author	Type of intervention	Mode delivery	Design theoretical framework	Open education resources	Interactive	Track
Lymn, Bath-Hextall & Wharrad (2008)	RLOs	Supplement	Developed using the Universities of Nottingham Collaboration in E-learning (UCel) framework	Yes	Yes	Yes
Blake et al. (2010)	RLOs	Supplement	Developed through the Centre for Excellence in Teaching and Learning in Reusable Learning Objects (RLO- CETL)	Yes	Yes	Not clear
Kaveevivitchai, chuengkriankari, luecha et al. (2009)	A computer-assisted learning multimedia on vital signs	Supplement	An integration of cognitive learning theory and 5Es inquiry cycle	No	Yes	No
Gerdprasert, Pruksacheva, panijpan et al. (2009)	Web-based learning media on the process and mechanism of labour	Supplement	5Es inquiry cycle	No	Yes	No
Windle, McCormick, Dandrea, & Wharrad (2011)	RLOs for chemistry	Replaced foundation for chemistry lectures	tutor-centred, community-of-practice approach	Yes	Yes	Yes

Table 2.6: Multimedia e-learning (cont.)

Bath-Hextall, Wharrad, & Leonardi-Bee (2011)	RLOs in meta-analysis	Supplement	AGILE	Yes	Yes	Yes
Gerdprasert et al (2011)	Web-based learning unit on intrapartum nursing care	Blended learning	Constructivism and the 5Es model	No	Yes	No
Keefe & Wharrad (2012)	RLOs-pain management	Supplement	AGILE	No	Yes	No
Ozturk and Dinc (2013)	Web-based education (urinary catheterization skills)	Supplement	No	No	Yes	Yes
Williams, O'Connor, Windle et al. (2015)	RLOs package in injections skill	Supplement	AGILE	Yes	Yes	Yes
Redmond, Davies, Cornally et al. (2018)	RLOs package in wound care	Supplement	AGILE	No	Yes	Not clear
Junsawang, Jittivadhna, Luealamai et al. (2019)	Multimedia-aided instruction for Basic Life support (BLS) package	Supplement	No	-	Yes	-

Table 2.7: Online video e-learning

Author	Type of intervention	Mode delivery	Design theoretical framework	Open education resources	Interactive	Track
Kelly et al. (2009)	Using online video to demonstrate skill	Supplement	No	No	No	Yes
Lu, Lin and Li (2009)	Web-based videotaped with narration on intramuscular injection skill	Supplement	No	No	Yes	Yes
Holland, Smith, McCrossan et al. (2013)	Online video of the oral medication administration process	Supplement	No	No	No	Not clear
Sowan & Idhail (2014)	A web-based virtual course streaming videos on medications administration	Supplement	No	No	No	No

Table 2.8: Website e-learning

Author	Type of intervention	Mode delivery	Design theoretical framework	Open education resources	Interactive	Track
Sheikhaboumasoudi, Bagheri, Hosseini et al. (2018)	Designed educational website	Blended learning	No	No	Yes	No
Yeoh & Wee (2017)	Internet-based information resources	Not clear	No	No	Yes	Not clear
Hjorth-Johansen, Hofoss and Kyno (2019)	Online computer-based learning	Supplement	Nokelainen's suggestions for pedagogical usability	No	Yes	No

Most of the e-learning resources in Table 2.8 were created and evaluated by researchers at the institutions where they were implemented. The creation process was not clear in only two studies (Yeoh and Wee, 2017, Kelly, Lyng, McGrath et al., 2009). The multimedia resources, which were described as RLOs, computer-assisted learning (Khan, Tarling and Calder, 2019), web-based learning and multimedia-aided instruction, were standalone multimedia content with several activities, quizzes and assessments. The quality of the content of the interventions was reported in most of the studies, where the content was reviewed and validated by internal subject experts or by peer review.

Nine out of twelve studies about multimedia resources described a theoretical framework for the design of the intervention. RLO studies done by Bath-Hextall et al. (2011), Keefe and Wharrad (2012), Williams et al. (2015) and Redmond, Davies, Cornally et al. (2018) used an agile method whereby each stage in the design process was optimised through rigorous evaluation (Boyle, Cook, Windle et al., 2006). Other RLOs, such as those developed by Lymn et al. (2008) and used in the Universities of Nottingham Collaboration in E-learning (UCel) framework and those developed by Windle et al. (2011), used the tutor-centred, community-of-practice CETL approach. In addition, RLOs developed by CETL were evaluated by Blake (2010). These seven studies on multimedia resources as RLOs indicated through the design frameworks the rigorous quality of the development of the e-learning process.

Three studies used the 5Es (engagement, exploration, explanation, elaboration and evaluation) inquiry cycle, and Kaveevivitchai et al. (2009) used an integration of the cognitive learning theory and the 5Es inquiry cycle. A study

by Gerdprasert, Pruksacheva, Panijpan et al. (2011) used constructivism and the 5Es model, and a study done by Gerdprasert, Pruksacheva, Panijpan et al. (2009) used the 5Es inquiry cycle. However, the 5Es inquiry cycle does not include a rigorous quality process for the development of e-learning design. Two studies did not use any theoretical framework for the development of the e-learning (Junsawang et al., 2019, Oztürk and Dinç, 2013).

All multimedia resources are interactive. Most of the RLO studies were open education resources (OERs), and only the study done by Redmond et al. (2018) was not an OER. Five RLO studies used a tracking system so that the RLO developer could track how many people were using it and where (Lymn et al., 2008, Windle et al., 2011, Bath-Hextall et al., 2011, Williams et al., 2015). Most of other studies did not have a tracking system. In addition, they were not OERs and were restricted to their own institutional use.

Four studies included in this review used online videotaping to demonstrate content and clinical skills in nursing care (Table 2.7). Two studies (Kelly et al., 2009, Lu et al., 2009) had a tracking system, and only Lu et al. (2009) was interactive. None of these studies used a theoretical framework for e-learning design, and only studies done by Sowan and Idhail (2014) and Lu et al. (2009) validated the content of online resources. None of the e-learning resources in these studies were OERs.

The last three studies included in this review used websites, and they were interactive. Sheikhaboumasoudi et al. (2018) reported in general what content was included on the website, but only Hjorth-Johansen et al. (2019) reviewed the content with internal experts and used a theoretical framework, which was Nokelainen's suggestion for pedagogical usability, including stating clear goals,

breaking down the material into units and offering learner control in the form of flexibility and interactivity with immediate response. However, there was no explanation of how this framework was used as a rigour process to develop the e-learning intervention. None of the studies was an OER. A study done by Yeoh and Wee (2017) used a technology acceptance model (Letizia and Jones, 2012) to explore the acceptance of e-learning by students. This technology acceptance model (TAM) will be explained in the next chapter.

Most of the educational e-learning interventions in this review were implemented as a supplement or for blended learning. Only a quantitative study by Windle et al. (2011) used RLOs as replacement foundation chemistry lectures in three cohorts of undergraduate nursing students. In addition, few of the e-learning interventions in these studies have a tracking system, and they are mainly in RLO studies. The tracking system could indicate the usability of the intervention, which might be explored through an empirical analysis (Morris, Finnegan and Wu, 2005). This feedback from users would facilitate improvements to the programme. Furthermore, creating interactive e-learning would support students by allowing them to discover more about what they are learning, linking topics they are studying and allowing them to follow their own investigations (Holliman and Scanlon, 2013).

In conclusion, RLO studies have a rigorous theoretical framework for design, and most of them are interactive and have a tracking system. However, these studies were done in institutions and were only explored with a specific group of students. Most studies on videotapes and websites had no quality assurance standards for the content and did not have a clear theoretical framework for the

design. Also, they were not OERs and were restricted to institutional students. Some were created and implemented expressly for the period of the research.

2.7.2. Characteristics of the studies designs

A range of research designs was used in the included studies in this review. Ten of the studies were comparative studies, and seven were control group studies. Despite the fact that these studies used a comparison between experimental and control groups, the sample size was considered small, ranging from 60 to 147 participants, which offers the study limited generalisation. It is clear that most of the studies have a small sample size, as it could be difficult to increase the number of participants as the intervention is implemented in a single institution with a specific group of students (Lu et al., 2009, Gerdprasert et al., 2009, Gerdprasert et al., 2011, Ozturk and Dinc, 2013, Holland et al., 2013, Sheikhaboumasoudi et al., 2018, Hjorth-Johansen, Hofoss and Kyno, 2019). In addition, as there was one study (Holland et al., 2013) with 322 participants, the bias could be in the e-learning intervention, as the theoretical framework for e-learning design development was not mentioned.

Although critical appraisals are not required in a scoping review (Peters et al., 2015), the bias risk of the included comparative studies remains unclear. In addition, besides the risk of bias, the rigours of these studies rely on the design of the interventions (e-learning) (Raaff, Glazebrook and Wharrad, 2014), which, as mentioned previously, were not rigorous in their design quality (for example, in the development of the intervention, which was not clear in these studies). In addition, there was an inadequate balance in reporting data in some parts of these studies (Hjorth-Johansen et al., 2019, Yeoh and Wee, 2017, Kaveevivitchai et al., 2009, Gerdprasert et al., 2009)

2.7.3. Assessment of the impact of the interventions in the included studies using Kirkpatrick's model

The outcome measures and the drivers of and barriers to e-learning in these included studies have been categorised in specific learning outcomes: (1) the reaction of participants towards the e-learning; (2) the effect of e-learning on knowledge, skills and confidence; and (3) the behaviours of participants following the use of the intervention. Kirkpatrick's framework (1967) uses these levels of outcomes to measure the impact of an educational intervention on learners.

The Kirkpatrick Model is the most well-known and widely used tool to evaluate a training programme in four levels. Donald Kirkpatrick introduced this model in 1959. It has gained support over time and is now the most recognised and influential model with a logical framework to examine results and impacts at the individual and organisational levels (Kirkpatrick and Kirkpatrick, 2016)

When the four levels of the model were introduced in the 1950s, professionals struggled with the concept of evaluation, as there was no standard language or system to communicate the meaning of evaluation or how it could be accomplished (Reio et al., 2017). Therefore, the concept of evaluation was explained in a series of Kirkpatrick's published works, which included four articles in the series Techniques for Evaluation Training Program for the *Journal for the American Society of Training Directors*, which increased the utilisation of the model in the evolution of training programmes.

Originally, the model used four steps, described as four levels in the industry, which, in the academic literature, become recognised as the Kirkpatrick Model (Reio et al., 2017). Despite criticism of the model and the development of

alternatives for evaluation purposes, the Kirkpatrick model remains in widespread use due to its simplicity and practicality (Kirkpatrick and Kirkpatrick, 2005). Since its introduction, it is the most reviewed model used to assess workplace training (Praslova, 2010, Roos et al., 2014).

When using the Kirkpatrick model, not all programmes need to be evaluated through the four levels, and it is unnecessary for the levels to be in sequential order (Kirkpatrick and Kirkpatrick, 2016). Nevertheless, the basic premise is four levels of evaluation: creation, learning, behaviour and result. The levels represent a sequence and continuum of complicity, considering immediate and long-term effects (Praslova, 2010). The Kirkpatrick Model can be used in the literature review to measure the effects of e-learning in health education (Rouleau et al., 2019, Yardley and Dornan, 2012). Figure 2.2 displays the Kirkpatrick Model levels, described in more detail below.

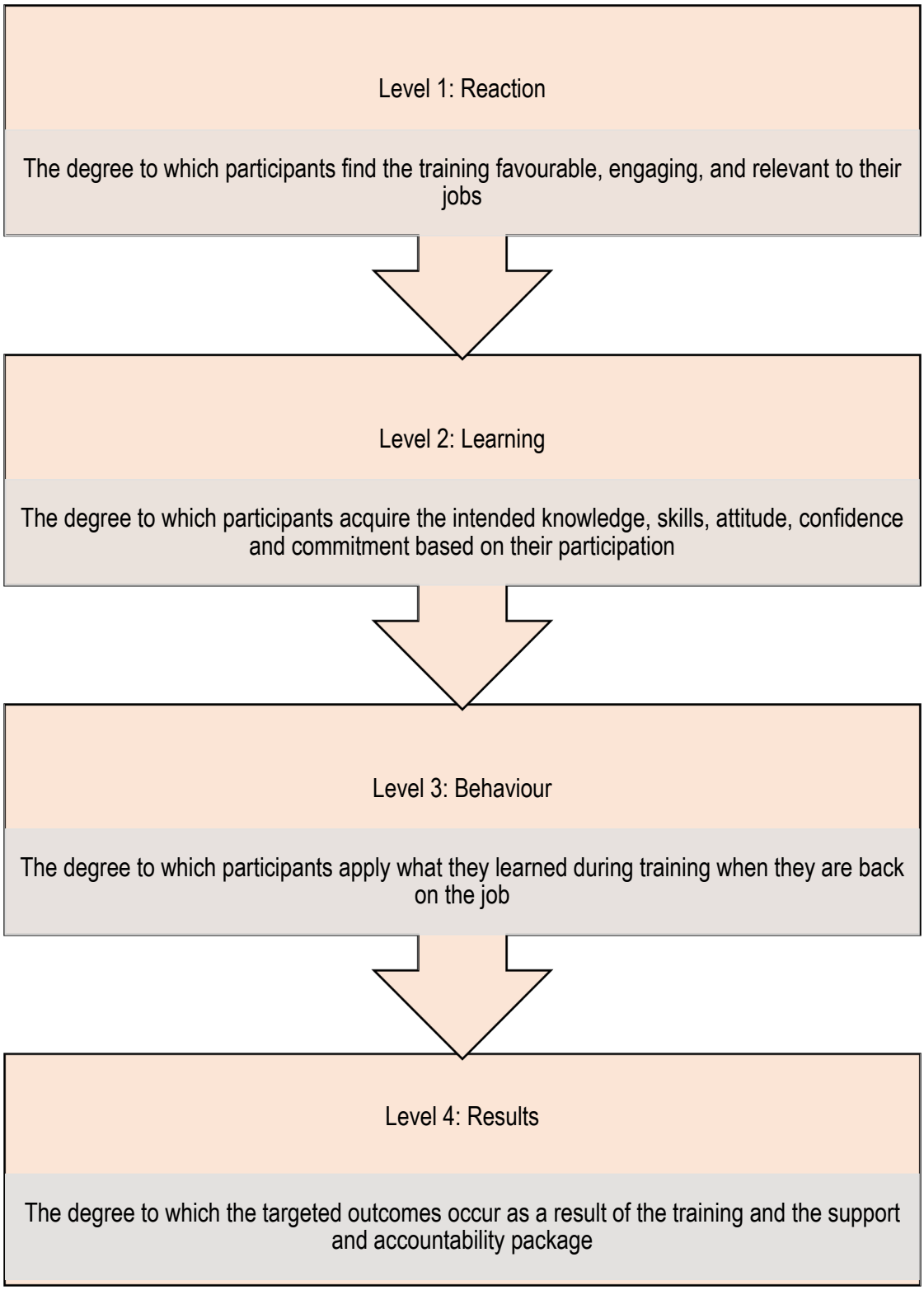

Figure 2.2: Kirkpatrick model evaluation process

Most of the studies in this scoping review measured the reaction and knowledge of the participants and ten studies measured the skill of the participants (Table 2.9). Only three studies measured the confidence of the participants (Lymn et al., 2008, Holland et al., 2013, Sowan & Idhail, 2014) and only one study measured the behavioural outcome (Lymn et al., 2008).

The role of e-learning and its effects on the learner's performance or enhancing their learning were measured in different ways in the included studies. Seven studies used RLOs as the e-learning intervention (Table 2.6). The impact of e-learning in nursing education as categorized by Kirkpatrick is presented first (section 2.7.4) and in Tables 2.9 followed by the drivers and barriers identified in these studies in Table 2.10. As the focus of this study is to explore the adoption of RLOs in postgraduate nursing education in Oman, the evaluation of RLO interventions specifically, are dealt with in section 2.7.5 and in Tables 2.11 (Impact of RLOs in nursing education) and 2.12 (Drivers and barriers of RLOs in nursing education) with the associated narrative.

Table 2.9: Impact of e-learning in nursing education

Study	Intervention	Outcome				
		Reaction	Knowledge	Skill	Confidence	Behaviour
1. Kelly et al. (2009)	Using online video to demonstrate skill	Student feel motivated to learn, view the videos more favourably	Useful for revision	No significant difference between control and experimental groups Help students prepare for skills	-	-
2. Kaveevivitchai et al. (2009)	Computer-assisted learning multimedia on vital signs	High satisfaction and quality of CAL multimedia from user's perception	Did not enhance their factual knowledge	Interactive multimedia with animation and audio enhanced student performance skills	-	-
3. Lu et al. (2009)	Web-based videotaped narration on intramuscular injection skill	Positive reactions from participants	There were no significant differences on the knowledge gain	Increased knowledge about skills	_	_
4. Gerdprasert et al. (2010)	Web-based learning media on process and mechanism of labour	Satisfied with their web-based learning experiences	Improved nursing students' factual knowledge	-	-	-

Table 2.9: Impact of e-learning in nursing education (cont.)

Study	Intervention	Outcome				
		Reaction	Knowledge	Skill	Confidence	Behaviour
5. Gerdprasert et al. (2011)	Web-based learning unit on intrapartum nursing care	Positive attitude to the web-based learning unit, students agreed that web-based learning unit was useful, well designed and friendly to use	Higher scores in conceptual knowledge test	Higher scores in performance skills	-	-
6. Ozturk and Dinc (2013)	Web-based education (urinary catheterization skills)	-	No difference between groups in the knowledge	Students in web-based group had higher scores for urinary catheterization skills	-	-
7. Holland et al. (2013)	Online video of the oral medication administration process	Satisfaction significantly higher	-	Improvement of student medical administration performance		-
8. Sowan & idhail (2014)	A web-based virtual course streaming videos on medications administration	Students were satisfied with the virtual course	-	Mean achievement scores significantly higher than previous control cohort without virtual learning	High level of self-efficacy	

Table 2.9: Impact of e-learning in nursing education (cont.)

Study	Intervention	Outcome				
		Reaction	Knowledge	Skill	Confidence	Behaviour
9. Yeoh & wee (2017)	Internet-based information resources	Easy to use	-	-	-	-
10. Sheikh aboumasoudi et al. (2018)	Designed educational website	The satisfaction of male students in intervention group was higher than in females	-	Effective supplement for improving nursing students' clinical skills.	-	-
11. Junsawang et al. (2019)	Multimedia-aided instruction for Basic Life support (BLS) package	The majority of participants (92%) had positive perception toward the multimedia-aided instruction, Satisfied student learning needs	Multimedia-aided instruction package on BLS concepts supplemented with cooperating learning group improved undergraduate nursing students' understanding of BLS.	-	-	-
12. Johansen et al. (2019)	Online computer-based learning	The traditional learning group was more satisfied with the learning method than the e-learning group	No differences between e-learning and traditional learning	-	-	-

Table 2.10: Drivers and barriers of e-learning in nursing education

Authors	Type of intervention	Drivers	Barriers
1. Kelly et al. (2009)	Blended model	Flexibility Can learn/watch in own time	No interaction Difficult downloading to home computer Inadequate internet access Cannot ask questions
2. Kaveevivitchai et al. (2009)	A computer-assisted learning multimedia on vital signs	Flexible Interactive	Time constraint: only 90 min was allowed for the study
3. Lu et al. (2209)	Web-based videotaped with narration on intramuscular injection skill	Interactive course Technical support Student were excited to use e-learning Flexibility to use e-learning anywhere and anytime	Some technical problems when the internet or WiFi is slow
4. Gerdprasert et al. (2010)	Web-based learning media on the process and mechanism of labour	Web-based materials appropriate Students enjoyed doing the quizzes and exercises due to the interactive feature Flexibility in time and space	It contains too much content Lack of know-how for using the web-board Inadequate instruction Lack of technology and computer experience Differences in culture

Table 2.10: Drivers and barriers of e-learning in nursing education (cont.)

Authors	Type of intervention	Drivers	Barriers
5. Gerdprasert et al. (2011)	Web-based learning unit on intrapartum nursing care	Bridge the gap between theory and practice Animation helped students understand certain processes, such as placental separation Immediate feedback	Few students said that they did not like e-learning because they did not know which part of the content the instructors would like to focus Some students needed more technical support on computer skills Some students still preferred face-to-face learning
6. Ozturk and Dinc (2013)	Web-based education (urinary catheterization skills)	Flexibility for students in time, place, and access to teaching content The use of video and pictures Use of web-based education as a supplement	Limitations of interaction Need ID and password Need registration
7. Holland et al. (2013)	Online video of the oral medication administration process	The video appeared to enhance the Usefulness and relevance of the taught content Useful revision tool Supportive role of peers	Some students experienced technical difficulties in accessing the video and this was perceived as being particularly problematic Lack of consistency in teaching in video and actual teaching

Table 2.10: Drivers and barriers of e-learning in nursing education (cont.)

Authors	Type of intervention	Drivers	Barriers
8. Sowan & idhail (2014)	A web-based virtual course streaming videos on medications administration	Easy to learn, enjoyable, motivating Easy to understand Good resources for future reference	Technical difficulty in course access from home Some students also objected to learning using SVS in the middle of the course and suggested including them either at the beginning or at the end of the course Students suggested translating more medical terms into Arabic
9. Yeoh & Wee (2017)	Internet-based information resources	Easy to use, flexible Enjoyed using it Communicating with others Internet Motivation	Need additional training for accessing resources

Table 2.10: Drivers and barriers of e-learning in nursing education (cont.)

Authors	Type of intervention	Drivers	Barriers
10. Sheikhaboumasoudi et al. (2018)	Blended learning	Not clear	Not clear
11. Junsawang et al. (2019)	Multimedia-aided instruction for Basic Life support (BLS) package	Multimedia-aided instruction combining animation, audio, pictures, and text kept their attention focused on the contents Made the contents easier to understand Interactions	The multimedia package contained too much information on the four concepts of BLS to be learned within 45 min and needed more time to assimilate the information.
12. Johansen et al. (2019)	Online computer-based learning	E-learning group completed the courses more quickly Working in peace time	No interaction

2.7.4. Impact of e-learning in nursing education

2.7.4.1. Level 1: Reaction

This level evaluates the satisfaction of the participants towards the programme. It is usually covered by the perception and experience of the learner with the programme's content, objectives, materials, instructors and teaching method (Curran and Fleet, 2005). Most of the included studies evaluated the students' reactions and their experiences with e-learning as education interventions (Table 2.9). Although many of these studies were cautious about using reaction alone while assessing the e-learning intervention, the reaction level remains the most assessed level because of its easy measurement (Arthur, Tubre, Paul et al., 2003). According to Reio et al. (2017), organisations and researchers might evaluate lower levels in the framework as there is a misconception that higher levels in the framework need more effort and experience for measurement. However, most researchers agree that other higher levels need to be measured to precisely evaluate training outcomes.

Most studies in the scoping review evaluated the perceptions and experiences students had towards the e-learning intervention by evaluating, for example, the e-learning usefulness, access and design as integrated or on its own (Hjorth-Johansen et al., 2019, Junsawang et al., 2019, Sheikhaboumasoudi et al., 2018, Sowan and Idhail, 2014, Gerdprasert et al., 2011, Gerdprasert et al., 2009, Lu et al., 2009, Kaveevivitchai et al., 2009, Kelly et al., 2009) or as part of the whole learning experience (Yeoh and Wee, 2017, Holland et al., 2013). Different tools were used to evaluate the perceptions and satisfaction of the students in the included studies, and some studies used more than one tool. These tools included questionnaires, semi-structured interviews, focus groups

and Likert scale questionnaires. Regardless of the different tools used in these studies to measure perceptions, the participants in most of these studies had a positive reaction and were satisfied with e-learning.

- **Perception of students towards e-learning**

Six studies evaluated the perceptions of students towards e-learning (Junsawang et al., 2019; Yeoh and Wee, 2017; Gerdprasert et al., 2011; Kelly et al., 2009; Lu et al., 2009; Gerdprasert et al., 2009). Kelly et al. (2009) found that students felt motivated to learn; however, the tool used to evaluate this perception was not clear. Despite the fact that students liked the flexibility of e-learning, they found that there was no interaction, experienced difficulty downloading to home computers and had inadequate internet access. Whereas in Gerdprasert et al. (2009), students found that the material was appropriate, and they enjoyed the quizzes and exercise due to the interactivity and the flexibility in time and place. They highlighted that the challenge was that e-learning contains too much content. Students also faced difficulties related to technology, computer experience and cultural differences, and they preferred face-to-face learning where they could discuss things with a group. However, the tool used in this study as a semi-structured interview was not clear. Similarly, Gerdprasert et al. (2011) conducted a study on 84 students and found that students had a positive attitude towards the web-based learning unit; they agreed that the web-based learning unit was useful, well-designed and user friendly. They said that animation helped them to understand certain processes, such as placental separation, and that they liked the feedback feature in e-learning. However, students disliked e-learning because they did not know

which part of the content the instructors would like to focus on, and culturally, students prefer face-to-face learning and need technical support on computers.

A recent study evaluated reaction levels by exploring factors that influenced e-leaning in nursing education. Yeoh and Wee (2017) used the TAM to investigate the use of ICT in learning. An analysis of the results from 118 nursing students in Singapore showed that the integration of technology in learning is beneficial in allowing students to communicate with others. Participants enjoyed the flexibility of the e-learning, and they were motivated to use it. One barrier that the study revealed is that participants reported the need for additional training in accessing the resources. Despite this study using TAM to evaluate the usefulness of e-learning, the tool created for data collection was not clear, and validity and reliability were not mentioned. E-learning solutions are commonly analysed by their creators; thus, the potential for bias, particularly outcome bias, is a constant criticism of such studies (Mohammadi et al., 2021).

Junsawang et al. (2019) explored the perceptions of 65 students in a single group pretest-posttest design using focus group discussion. The majority of participants (92%) had positive perceptions towards multimedia-aided instruction and were satisfied with student learning. A driver revealed by the study was multimedia-aided instruction combining animation, audio, pictures and text, which kept students' attention and made contents easy to understand, as there was interaction. However, the barriers were that the multimedia contained too much information on the four concepts of basic life support (BLS) to be learned in 45 minutes and that learners needed more time to assimilate information. Despite the details given in this study about the implementation

process of e-learning, the e-learning role was unclear as it was only implemented for 45 minutes.

This section of the study concluded that students are positive towards e-learning as a supplement to their education and may have a positive learning experience. However, these resources still have different challenges in the design and implementation process. In addition, students need more training in computer skills. The literature reviewed by Button, Harrington and Belan (2014) concluded that students had positive and negative views on e-learning. The positive aspects were that the e-learning was flexible, enjoyable as a learning environment, motivational and ultimately grade-enhancing. The negative aspects were a lack of skill, a lack of technological support and increased levels of anxiety while using computers. However, some studies in this review were relatively old and the resources involved do not reflect the much more advanced facilities available in modern e-learning applications.

- **Satisfaction of students toward e-learning**

Five studies evaluated the satisfaction of students with e-learning (Hjorth-Johansen et al., 2019, Sheikhaboumasoudi et al., 2018, Sowan and Idhail, 2014, Holland et al., 2013, Kaveevivitchai et al., 2009). Most results indicated that students were satisfied with e-learning. Kaveevivitchai et al. (2009) reported that this was due to flexibility and interactivity, while time constraints were noted as a barrier, with only 90 minutes allowed for e-learning, which is considered a limitation in this study. Similarly, students' high level of satisfaction was statistically significant in Holland et al.'s (2013) study, in which students judged video to be useful and relevant to the course content, and e-learning to be a useful revision tool; they also reported being supported in its use by their

peers. However, some students faced challenges with technical difficulties in accessing videos and a lack of consistency in teaching in the video and actual teaching. Technical difficulty was also identified by Sowan and Idhail (2014), but students were nevertheless satisfied with online resources, especially with video content and the posting of videos before the lab sessions.

In a study by Sheikhaboumasoudi et al. (2018), the satisfaction of male students in the intervention group was higher than that of females. However, the implementation of e-learning in the two groups was not clear. Moreover, the drivers of and barriers to this result were not mentioned in this study. However, in a recent experimental study by Hjorth-Johansen et al. (2019), although the e-learning group completed the courses more quickly than the group in the traditional class, the students in the traditional group were more satisfied with the learning method than the e-learning group. However, in this study, the implementation time for e-learning was unclear. This casts doubt on the time of the intervention given to the participants and how this could affect the result of the study.

The findings of two reviews (Du et al., 2013, Cant and Cooper, 2014) reported that participants had high satisfaction, but as Cant and Cooper (2014) included descriptive studies, they recommended the necessity for more research to be conducted objectively to evaluate learner outcomes and justify web-based use. A systematic review by Lahti et al. (2014) found no statistically significant difference between groups in e-learning and traditional learning related to the satisfaction of nurses or student nurses. However, there was heterogeneity in the sample of the review. Furthermore, some studies included in this review did

not report numerical data, which may make the results of the review biased or of limited utility for practical implementation.

2.7.4.2. Level 2: Learning

Curran and Fleet (2005) state that the aim of Level 2 assessment is to determine how learners' skills have developed and the degree to which they have improved their knowledge and attitudes; this can be assayed using pretest and posttest study designs. Praslova (2010) noted that a range of learning criteria are harnessed to measure learning outcomes, and these are commonly evaluated by using a number of knowledge tests. In addition, performance and skills are measured within the context of training immediately after the latter has been conducted.

Self-reported measures based on reaction criteria are put into operation, but learning criteria tend to be categorised by objectives and the use of quantifiable measures of learning outcomes, for example, long-established tests of explicative and formal knowledge, which are assessed through official examinations (Arthur et al., 2003). Arthur et al. (2003) added that in higher education classroom settings, pretests and posttests are commonly used to directly measure levels of learning.

The New World Kirkpatrick model has shed light on the exact nature of the four levels of training evaluation. Regarding Level 2 (learning), the earlier definitions now have revised explanations specifying how particular elements can be measured to determine the degree to which the learners have mastered them. Thus, the model considers intended knowledge (I know it), skills (I can do it right now), attitudes (I believe that this will be worthwhile to do on the job), confidence (I think I can do it on the job) and the commitment individuals demonstrate while

doing the training (I intend to do it on the job) (Kirkpatrick and Kirkpatrick, 2016). The majority of the studies included in this scoping literature review assessed both the knowledge and skills of the learners, while two studies evaluated the degree to which students demonstrated self-efficacy.

- **Knowledge**

Eight studies evaluated the impact of e-learning on the knowledge of students (Hjorth-Johansen et al., 2019, Junsawang et al., 2019, Ozturk and Dinc, 2013, Gerdprasert et al., 2011, Gerdprasert et al., 2009; Lu et al., 2009, Kaveevivitchai et al., 2009, Kelly et al., 2009). Five studies evaluated knowledge by multiple choice questions (MCQ) (Gerdprasert et al., 2011, Gerdprasert et al., 2009, Kaveevivitcha et al., 2009, Lu et al., 2009, Ozturk and Dinc, 2013) and a questionnaire used by Kelly et al. (2009).

In Kelly et al. (2009), the students found that e-learning was useful for revision. In the study by Lu et al. (2009), students in the experimental group had significantly higher scores on intramuscular injection knowledge. However, the researcher stated that students in this study stayed in the same classroom for most of their lectures and lived near each other in the nursing dormitory, which could bias the study, as both groups (experimental group and control group) could share the website and learn. Gerdprasert et al. (2009) and Gerdprasert et al. (2011) compared knowledge in pretests and posttests and found that there was an improvement in nursing student knowledge. Moreover, recently, a study by Junsawang et al. (2019) found that a multimedia-aided instruction package on BLS concepts supplemented with a cooperative learning group improved undergraduate nursing students' understanding of BLS. Moreover, a systematic literature review and scope review done by Du et al. (2013) found that web-

based distance learning has produced equivalent or better effects in knowledge acquisition.

Different results found by Kaveevivitcha et al. (2009) and Oztürk and Dinç (2013) showed that e-learning did not enhance the knowledge of students. However, as mentioned previously, in Kaveevivitcha et al. (2009), e-learning was only implemented for 90 minutes, which casts doubt on the result. In Oztürk and Dinç (2013), a convenience sample recruited for this study may affect the result. A similar study to compare traditional methods with e-learning by Hjorth-Johansen et al. (2019) found that there are no differences between e-learning and traditional learning in enhancing knowledge. However, the knowledge tool in this study was not validated and was sent to the participants through envelopes which doubts who answered the questions of the knowledge in post-test, which may have a risk of bias. A systematic review by Lahti (2014) found that there was no statistical difference between groups in e-learning and traditional learning relating to the knowledge of nurses or student nurses. However, this systematic literature review found that the outcome data was sparsely reported, and due to this, it was found that numerous papers included did not report any numerical data.

Overall, e-learning could enhance the knowledge of students if it is well designed and implemented appropriately. The outcome measure needs to be evaluated with valid and reliable tools.

- **Skills**

Eight of the included studies evaluated the effect of e-learning on student's skills (Kelly et al., 2009, Kaveevivitchai et al., 2009, Lu et al., 2009, Gerdpraser et al., 2011, Ozturk and Dinc, 2013, Holland et al., 2013, Sowan & Idhail, 2014,

Sheikhaboumasoudi et al., 2018). The tools used to evaluate the skills varied in these studies. Some studies used objective structured clinical examination (OSCE) to measure skills (Ozturk and Dinc, 2013, Holland et al., 2013, Sheikhaboumasoudi et al., 2018), while other studies used usual clinical examinations (Kaveevivitchai et al., 2009, Gerdprasert et al., 2011) or created specific exams with skill checklists by researchers (Lu et al., 2009).

The students in the experimental group who used e-learning got higher scores in skill performance than the control group in two studies (Gerdprasert et al., 2011, Ozturk and Dinc, 2013). However, in Ozturk and Dinc (2013), the skill observation procedure was long, and the tiring of some observers; such a tiring and long-lasting process of observation might have decreased the vigilance of observers and influenced inter-rater reliability, which could have affected the results of the study. Kelly et al. (2009), in a quasi-experimental study, showed that videos help students to prepare for the skill classes; however, the tool in this study was not described clearly. Holland et al. (2013), in a study of 322 students, found an improvement in the students' performance in the administration of medicines in a comparative study of experimental group and control group. Similarly, OSCE was used by Sheikhaboumasoudi et al. (2018) to find that applying educational websites and interactive online resources for fundamentals of nursing course instruction can be an effective supplement for improving nursing students' clinical skills.

Results from a final exam of skills among an experimental group who had received e-learning and the preceding academic intake cohort of students who had not were compared by Sowan and Idhail (2014). It was discovered that the experimental studies had significantly higher results. A systematic review by

McCutcheon et al. (2015), Cant and Cooper (2014), and Du et al. (2013) showed that available evidence suggests that online learning for teaching clinical skills is no less effective than traditional means. However, it should be noted that some studies' reports did not describe clearly the tool for measurement, time of data collection, validation or the pre-intervention information. This could be explained by the fact that most of these studies focused mainly on the impact of e-learning on nursing students rather than reporting the factors that could affect the results of the study.

- **Confidence**

A study by Sowan and Abu Idhail (2014) evaluated students' confidence after using e-learning through a tool created by a researcher and reviewed by expert faculty members. They found that the self-efficacy of students increased because of the multimedia interactive online learning environment. Although the evidence suggested that e-leaning could increase the student's efficacy, this depends on the online design, content and method of implementation.

In summary of this section, which is the impact of e-learning on nursing education, most of the studies were conducted on undergraduate nursing students and only one study included 15 postgraduate students (Hjorth-Johansen et al., 2019). Most of the studies evaluated the impact of e-learning in Level 1 and Level 2 of Kirkpatrick's framework (1967). In level 1, some studies evaluated the perception and experience of students towards e-learning, and some studies evaluated the satisfaction of students with e-learning. There are generally positive perceptions about e-learning and students were satisfied with the interventions. However, there are different drivers and barriers that could affect e-learning. The drivers and barriers of e-

learning depend on individual and organizational factors, which vary in terms of e-learning acceptance in nursing education generally.

In Level 2 of Kirkpatrick's framework (1967), which is learning, the result showed that e-learning could enhance the knowledge and skill of the students. However, some studies found that there was no difference between traditional and e-learning in the skill performance. However, these studies have different limitations, as mentioned previously, which could affect their results.

2.7.5. Impact of RLOs in nursing education

Seven studies included in the scoping review used RLOs as interventions for e-learning with nursing students. As RLOs is the focus of this study, the impact of RLOs on nursing students was evaluated in this section according to Kirkpatrick's framework (1967), as mentioned previously.

Table 2.11: Impact of RLOs in nursing education, and Table 2.12: Drivers and barriers of RLOs in nursing education.

Table 2.11: Impact of RLOs in nursing education

Reaction	Knowledge	Skill	Confidence	Behaviour
1. Lymn et al. (2008), RLOs				
-	Increases understanding of pharmacology concepts increased substantially	The students practice changed as their knowledge increased by RLOs	Increase confidence	50% of interviewees continued to access RLOs on the clinical practice
2. Blake et al. (2010), RLOs				
Responses were positive; 94% reported that they would use RLOs again	Useful as learning tools	-	-	-
3. Windle et al. (2011), RLOs for chemistry				
Positive intervention that supported student learning	RLOs were having a significant effect on examination attainment	-	-	-
4. Bath-Hextall et al. (2011), RLOs in a meta-analysis				
Responses overall were positive	Understanding of meta-analysis as improved after a lecture and further improved after completing the RLOs	-	-	-

Table 2.11: Impact of RLOs in nursing education (cont.)

Reaction	Knowledge	Skill	Confidence	Behaviour
5. Keefe & Wharrad (2012), RLOs in pain management				
-	Knowledge improvements result of RLOs	-	-	-
6. Williams et al. (2015), RLOs package in injection skill				
Students rated the RLOs highly across all categories of perceived usefulness, impact, access and integration	RLOs have had a positive impact on student knowledge and on knowledge retention	-	-	-
7. Redmond et al. (2018), RLOs package in wound care				
Students rated the RLOs highly across all categories of perceived usefulness, impact, access and integration	-	Competency outcomes for wound care increased significantly after engaging with the RLOs	Finding highlight the low level of competence in wound care that these third-year students considered they were entering this module with, and the learning and confidence students subsequently gained from engaging with the developed RLOs	-

Table 2.12: Drivers and barriers of RLOs in nursing education

Drivers	Barriers
1. Lymn et al. (2008), RLOs	
Ease of use, flexible (can be use anywhere and anytime) RLOs achieved learning objectives RLOs do not require more than around 15 minutes to complete Multimedia (video, audio) Technical support	-
2. Blake et al. (2010), RLOs	
Ease of access Convenient time and location Access from anywhere Value of RLOs for 'repeatability' 'Manageable chunks' of learning Use RLOs for revision aids	Minority reported technical difficulties in accessing the RLOs Titles not indicative of RLO content Slow internet access Locating the desired RLOs A lack of confidence with computer use

Table 2.12: Drivers and barriers of RLOs in nursing education (cont.)

Drivers	Barriers
3. Windle et al. (2011), RLOs for chemistry	
Flexibility to study anytime, anywhere Being small and self-contained Ease of use Packages of interactive learning. Sense of ownership and control of these resources Resources met diverse student needs (age and computer ability) In terms of the factors that supported learning, students rated functional characteristics, such as universal availability and control over learning, as more important than media characteristics, such as audio-narration and interactivity	Age and computer skills Particular media elements did not fit with their learning style No pause or replay button (navigation)
4. Bath-Hextall et al. (2011), RLOs in meta-analysis	
Features of the RLOs Flexibility The visual and interactive elements along with the use of analogies to describe the meta-analysis process seemed to contribute to the students' perceived improvement Freely and openly accessible Only take around 15 minutes to complete Ease to use	Some students would have struggled with the content of the RLO using it alone as a replacement for the didactic lecture and they would need the support of a teacher

Table 2.12: Drivers and barriers of RLOs in nursing education (cont.)

Drivers	Barriers
5. Keefe & Wharrad (2012), RLOs in pain management	
Improve knowledge	-
6. Williams et al. (2015), RLOs package in injections skill	
RLOs are well integrated into the relevant course Align with course content Any time availability Reusability Self-directed learning	One of the RLOs (RLO three) has a negative response because of non-alignment with regional skin preparation
7. Redmond et al. (2018), RLOs package in wound care	
Flexibility and control Authentic learning (feel like a real situation) Enjoyed the holistic nature of these exercises RLOs useful as a method of consolidating learning undertaken in earlier modules and in clinical practice Ease of access, at any time and place and at students' own pace	Self-assessment exercises did not contribute to learning

2.7.5.1. Level 1: Reaction

Five of the RLOs studies used questionnaires to evaluate the perception and experience of students (Redmond et al., 2018, Williams et al., 2015, Bath-Hextall et al., 2011, Windle et al., 2011, Blake et al., 2010). Studies evaluated student perceptions of the RLOs' design, usefulness, access, effectiveness, impact and integrations. The measurement was either to measure RLOs as standalone strategies of teaching or supplement strategies to other learning strategy. Blake et al. 2010 study evaluated RLOs' impact on the student learning experience and compared the use and evaluation of RLOs with nursing and medical students. An online questionnaire survey was completed by 233 students (163 nursing students and 73 medical students). Responses from students were positive, with 94% reporting that they would use RLOs again, and RLOs were more commonly used by nursing students than medical students. Students found RLOs flexible as they can be used anywhere, anytime, can be repeated, manageable chunks and used study revision. Students faced a challenge using RLOs where a minority reported difficulties in assessing the RLOs, titles of RLOs not indicative of RLOs content, slow internet access, difficulty in locating desired RLOs and lack of confidence in using computers. However, in this study, RLOs used for evaluation are not mentioned, nor are these RLOs created in the same university or in different places.

Windle et al. (2011) evaluated six developed RLOs by the author and research team in the university within three cohorts of undergraduate nursing students. They were positive about RLOs and felt that they supported their learning. Flexibility to study anytime, anywhere, being small and self-contained, user

friendly, interactive, sense of ownership and its ability to meet the needs of the whole range of students on the course, regardless of the age and computer ability. The barriers to using RLOs in this study were age, computer skills, some particular media elements that did not fit with the student's learning style and there was problem with navigation. Similarly, Bath-Hextall et al. (2011) evaluated RLOs in meta-analysis with a convenient sample of postgraduate students in nursing courses. The response overall was positive towards RLOs.

Two studies (Williams et al., 2015, Redmond et al., 2018) evaluated RLOs for usefulness, impact, access and integration by the students using the well validated RLOs CETL Questionnaire. In both studies, the students rated the RLOs highly across all categories. Williams et al. (2015), in the access category, 98% of students reported accessing RLOs anywhere and anytime, and in the usefulness category, students agreed that RLOs are clear about their purpose, easy to navigate, introduce new concepts, are interactive and help students to work at their own speed. Also, students agreed that RLOs are well integrated into the relevant course (82%) and align with course content (100%). The package of RLOs used in this study went through validated RLOs development methodology between 2009 and 2011, with the resources being peer-reviewed by their intended end users at two points during their development to ensure their quality and relevance. Both studies (Williams et al., 2015, Redmond et al., 2018) mentioned that drivers for using RLOs were flexibility and user friendly. Moreover, in Williams et al. (2015) study, more drivers were found, and it will be described in Level 3 in Kirkpatrick's framework (1967). The only barrier in this study is that one of the RLOs has a negative response because it might not align with region of skin preparation. However,

this is normal in the evaluation process of RLOs as it could be an update to the change of knowledge or procedure in education.

Although students in Redmond et al. (2018) rated RLOs high in all categories, it was not clear whether this was solely due to the OER or whether tracking was used, as mentioned previously. Moreover, the results in the four categories were not described clearly. The students in this study found that the self-assessment exercise of RLOs did not contribute to learning. Overall, it is clear in this level of reaction in Kirkpatrick's framework (1967) that the students were positive about the RLOs and had different drivers to use them.

2.7.5.2. Level 2: Learning

This level indicates how much the participants learned and retained from the training program. It concerns learning knowledge and skills relevant to participants in the program (Kirkpatrick and Kirkpatrick, 2016)

- **Knowledge**

Different tools were used in the studies to evaluate students' knowledge. Some studies used the questionnaire as a tool to rate students' understanding (Lymn et al., 2008, Keefe and Wharrad, 2012, Williams et al., 2015). Lymn et al. (2008) evaluated the use of RLOs focused on pharmacology concepts and found that students' perceptions of their own understanding of pharmacology concepts increased substantially following the introduction of RLOs to supplement the pharmacology component of the course. In addition, the students found that RLOs achieved learning objectives as they have multimedia (video, audio) and do not need more than 12 minutes to complete and implement with technical support. Similarly, Keefe and Wharrad (2012) and used an adapted, valid self-

administered questionnaire related to pain management skills to evaluate students' knowledge, which they found had improved after using RLOs.

Williams et al. (2015) assessed the impact of RLOs within pre-registration nursing students through a questionnaire, and the results showed that RLOs have had a positive impact on student knowledge and on knowledge retention. Bath-Hextall et al. (2011) used a well-adopted questionnaire to evaluate two RLOs of meta-analysis with postgraduate diploma in nursing course. Result showed that RLOs were flexible, easy to use, had visual and interactive elements and took only 15 minutes to complete, which improved students' understanding of meta-analysis when used as a supplement. However, the sample size of postgraduate nursing students was small.

Windle et al. (2011) compared students' results in the pre-and post-intervention assessments to determine the effectiveness of RLOs with module assessment and a multiple-choice paper. For each cohort, the results of questions related to chemistry were isolated and analysed, and then aggregate data were compared with previous annual cohorts. The results revealed that the number of students answering chemistry equations correctly increased significantly. However, in this study, the sample size in the previous annual cohort was not described clearly, which could affect the study result. Despite the sample size used in some of the studies, all studies showed that RLOs have a positive impact on students' knowledge.

- **Skill**

Two studies (Lymn et al., 2008, Redmond et al., 2018) explored the impact of RLOs in clinical skills of the students. Lymn et al. (2008) results showed that the students practice changed as their knowledge increased due to RLOs.

Redmond et al. (2018) found that competency outcomes for wound care had increased significantly after engaging with the RLOs. The results of these studies showed that RLOs can be an effective supplementary learning strategy to teach some clinical nursing skills.

- **Confidence**

There were two studies that assessed student confidence after using RLOs by questionnaire. Lymn et al. (2008) explored RLOs to develop students' understanding of the theoretical concepts of pharmacology for application in clinical areas (developing evidence-based practice skills). The study found that students' confidence was increased by the RLOs, such that they continued to apply the RLOs even after graduation (which has implications for bridging the theory–practice gap commonly experienced by newly qualified nurses in clinical settings). Redmond et al. (2018) used pre-test post-test design with third year students and found that their learning and confidence had increased as a result of engaging with the developed RLOs.

- **Level 3: Behaviour**

Behaviour in this context concerns 'the degree to which participants apply what they learned during training when they are back on the job' (Kirkpatrick and Kirkpatrick, 2016). Lymn et al. (2008) evaluated the use of RLOs focused on pharmacological concepts to promote the understanding of these concepts among students. The study was conducted in three cohorts of 84 nursing students: the first cohort involved the pharmacology module without the RLOs, the second cohort received it with four RLOs, and the third cohort had the same course of pharmacology and received eight RLOs in pharmacology.

The questionnaire was distributed to students at the end of the pharmacology module. The results indicated that the students evaluated RLOs positively. One year after graduation, ten of the students were identified for longitudinal follow-up with RLO-related behavioural evaluation. The results indicated that they continued to access RLOs even after obtaining qualifications when working in clinical settings. In conclusion, it is clear from the literature that certain attributes of RLOs act as drivers for use; however, drivers and barriers across cultures are largely unknown.

In conclusion, based on the levels of Kirkpatrick's framework, the studies of RLOs showed that they have a positive impact on the knowledge, skill, confidence and behaviour of nursing students. It is clear from the literature that the impact of RLOs depends on the design, contents, outcomes and implementation.

2.8. Summary of the literature review

The scoping review explores the existing evidence on the impact of e-learning on nursing students, which would provide a comprehensive understanding of e-learning, RLOs, and OERs, and their efficacy on the learning process of nursing students, along with the drivers and barriers in using e-learning in nursing education. In addition to explore the pedagogical value of the e-learning resources and investigating the methodology used to evaluate these resources, the review achieved the above objective and arrived at the following conclusion.

The design and development of any e-learning multimedia intervention is connected strongly to the success of intervention generally (Raaff et al., 2014). However, it is clear from this scoping review that studies have a deficit in

reporting the e-learning intervention, design, development, implementation and content validation in some included studies. Thus, there is a need to do further research that describes the use of e-learning in nursing education well to have a clear understanding of the outcomes and validity of the findings.

The reviewed literature on e-learning in nursing education had various limitations regarding the research method, including small sample sizes, potential bias in the tool (validity and reliability) and implementation of the intervention, along with methodological flaws and ethical issues. In addition, the majority of the studies focussed on undergraduate students, and only two studies (Bath-Hextall et al., 2011, Hjorth-Johansen et al., 2019) explored the impact of e-learning among postgraduate nursing students. Most of the studies were experimental designs and few were mixed-method designs.

Despite some of these studies using a qualitative method of data collection, there were insufficient details about the methods used. There is a need for further research, specifically qualitative, to explore and address the current challenges in educational research, extensively understand e-learning in nursing education and move beyond comparison with the traditional education system, alongside finding the most appropriate effective approach and technology to support nursing students in their learning.

The literature also revealed that RLOs have been based on different empirical evidence, whereby many studies have shown that they are effective, peer reviewed and based on effective frameworks. RLOs have a systematic, dynamic and logical process, which shows the rigours of the framework development. RLOs from UoN are well designed, easy to navigate, and based on the ASPIRE framework (Figure 1.2). The studies in this review using RLOs

used methods that contributed to the more refined and developed ASPIRE framework, which reflected the increasing skill of experts in creating RLOs. This has been driven by the development and adoption of RLOs within universities, such as the UoN (Windle and Wharrad, 2010). However, most RLOs were designed primarily for use in specific universities within specific groups, despite which OERs came to be used by different groups of international students. It has been suggested that there is a need to explore the acceptance and success of RLO adoption in non-Western cultural contexts, such as e-learning in Arab countries.

All pedagogical values in the scoping review of included studies focussed on Level 1 and/or Level 2 of the Kirkpatrick Framework, and only one RLOs study by Lymn et al. (2008) measured the impact of e-learning on the behaviour of students (Level 3). This is perhaps because the main aims of the included studies were to evaluate newly integrated educational resources.

The deployment of various kinds of web-based e-learning solutions in nursing education is received affirmatively among nursing students and manifests in positive levels of student satisfaction. This is generally in the context of solutions integrated with, and parallel to, traditional learning formats as a complement, and not a substitute for traditional classroom instruction. Such solutions have demonstrated empirical impacts such as student self-efficacy (reported by three studies) and learner knowledge and academic performance; the least that can be said based on the reviewed studies is that e-learning is as effective as legacy methods of instruction when used to complement the latter. Regarding Level 3 of the Kirkpatrick Framework, one study showed that students continued to use RLOs in their clinical areas after their graduation.

Despite that, there was no clear evidence on the adoption of RLOs in other national and cultural contexts, and their impacts on postgraduate students. Indeed, there is little clear reporting on the reusability of RLOs even within the countries or universities that created these educational tools.

In addition, there was a deficit in the results from previous studies, which could be limited in their generalisability, as only one type of subject was evaluated in most of the studies and they have moderated sample sizes in one setting. Furthermore, the review highlights the need for more technical and potentially extensive support for online resources. Moreover, the drivers and barriers of e-learning are different in each study because of the various types of e-learning used, different institutions and different cultures. Hence there is a need to explore the drivers and barriers that could be a factor in using e-learning within different students who have different cultures, as most of the studies were done in western countries. Despite the fact that the samples in these studies included students from different cultures, it is clear as mentioned previously that most of the studies were conducted in Western countries, and there is a scarce study with nursing students in Arab countries, which limits the generalisability of the findings.

The inherently positive perceptions of e-learning and tentative successful implementation evinced by empirical studies are premised on effective implementation. This entails analysis and adaptation to a particular learning context relating to the expectations and needs of learners and instructors, curriculum design, institutional resources and facilities. None of the reviewed studies analysed contextual factors and their effects on effective e-learning deployment about institutional resources.

Seven studies on RLOs exist, most of which were done in UK. Majority concentrated on undergraduate nursing students utilizing different designs and methodologies. Moreover, the literature showed that no studies were conducted among postgraduate nursing students, although Lymn et al. (2008) demonstrated that RLOs can be used as part of continuous professional development.

There are also no studies on RLOs in Oman or similar Arab countries. Therefore, this research aims to understand factors relating to the reuse of valuable learning resources, particularly across cultures with postgraduate nursing students. It was clear that some studies used different theories to explore the acceptance and adoption of e-learning in any organization, varying in their aims and objectives (Kijsanayotin, Pannarunothai and Speedie, 2009). Therefore, the next section explores the theoretical framework used to study the adoption of technology across cultures and how this will be applied to this research study. It should be noted that the remainder of this thesis specifically concerns the RLOs, the focus of this study, and not other e-learning solutions considered in previous studies.

Chapter 3

Theoretical Framework

There are several models and theories of technology acceptance which have been used in healthcare and other fields like business organization (Anderson and Schwager, 2003) and education (Birch and Irvine, 2009). The intention of an individual to use technology is referred to as technology acceptance. Technology acceptance model (TAM) was based on the Theory of Reasoned Action (TRA) (Davis et al., 1989, Gefen and Straub, 1997) which was created to understand individual voluntary behaviours (Ajzen and Fishbein, 1975). According to the TRA, an individual performance of specific behaviour is the result of a person's behavioural intention to perform the behaviour. Hence, the behavioural intention is determined by personal attitude in conjunction with subjective norms (Ajzen and Fishbein, 1975, Davis et al., 1989). From this theory many models for technology acceptance were developed, the most recent commonly used version of which is unified theory of acceptance and use of technology (UTAUT) (Venkatesh, Morris, Davis et al., 2003).

3.1. Models and theories on technology acceptance and use

While in this study UTAUT2 used as a technology acceptance model, it is crucial to discuss the other models to explain the rationale for the choices made. These models, as mentioned previously, are TRA, TAM, the motivational model (MM), the Theory of Planned Behaviour (TPB), the Combined TAM and TPB (C-TAM TPB), the Model of PC Utilization (MPCU), Diffusion of Innovation (DOI), and Social Cognitive Theory (SCT) (Venkatesh et al., 2003).

3.1.1. Theory of Reasoned Action (TRA)

TRA (Figure 3.1), developed by Ajzen and Fishbein (1975) in the domain of social psychology, is one of the most influential theories in human behaviour, used to predict different types of behaviour. The primary constructs of TRA are attitude toward behaviour and subjective norm. Ajzen and Fishbein (1975) defined attitude toward behaviour as 'an individual's positive or negative feelings about performing the target behaviour' (p. 216), and subjective norm as 'the person's perception that most people who are important to him think he should or should not perform the behaviour in question' (p. 302). TRA is a general model, not designed for specific behaviour or technology, and this is considered its main limitation. The other limitation of the theory is correspondence, whereby the prediction of specific attitude, behaviour, and intention needs to be agreed upon a target, context, action, and timeframe (Davis et al., 1989).

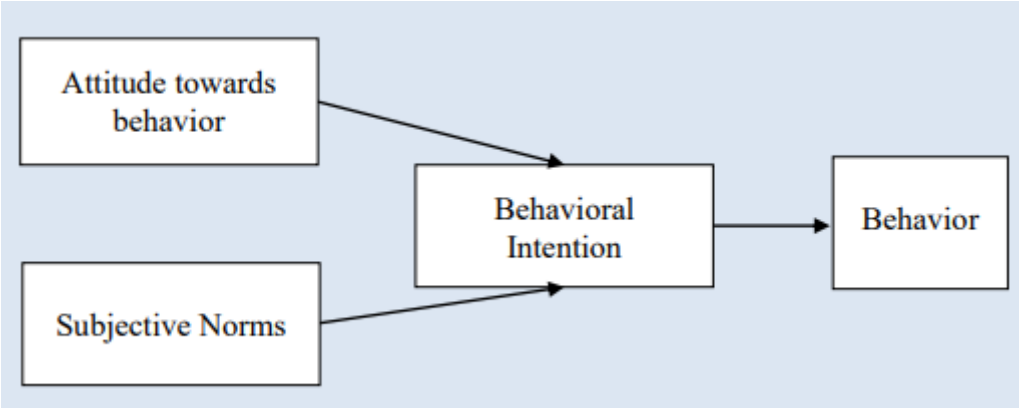

Figure 3.1: Theory of Reasoned Action
Source: Fishbein (1979)

3.1.2. Technology Acceptance Model (TAM)

TAM designed to predict the acceptance of information technology and its use in the job (Davis et al., 1989). It was developed for TRA theory; however, unlike

TRA, TAM excluded attitude constructs to better explain the intention of using technology, as suggested by its designers. The objective of TAM was to clarify and determine computer acceptance in general, which might be capable of explaining the broad range of behaviour in user acceptance of technology. The primary constructs of TAM are perceived usefulness, perceived ease of use, and subjective norm (Figure 3.2). TAM then was extended to TAM2 by Venkatesh and Davis (2000). Whose aim was to explore the critical influence factors that could affect the acceptance of technology, which could be outside the constructs of perceived usefulness and perceived ease of use. These external variables are social influence (subjective norm, image, and voluntariness) and cognitive instrument processes, which are job relevance, output quality, result demonstrability and perceived ease of use (Venkatesh and Davis, 2000).

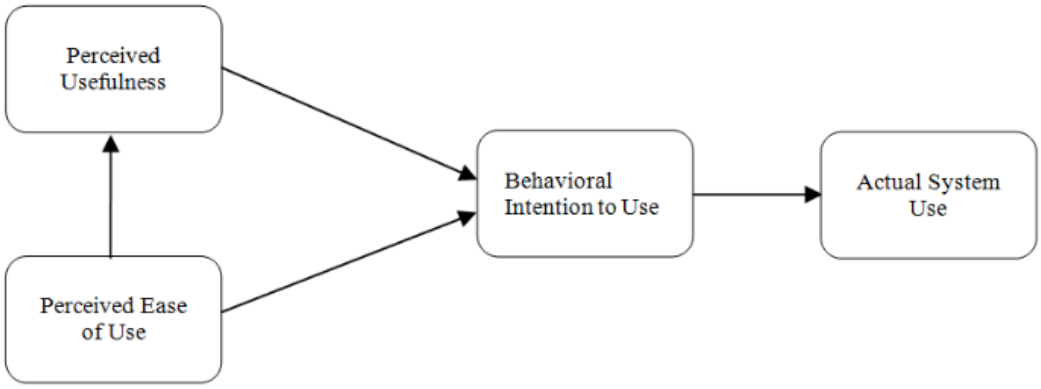

Figure 3.2: Technology Acceptance Model
Source: Davis et al. (1989), Venkatesh et al. (2003)

Venkatesh and Bala (2008) modified TAM according to the constructs and factors are related to the organizational decision-making process, developing TAM3 from the original TAM and TAM2. TAM3 consists of subjective norm, image, job-relevant, output quality, result demonstrability, experience, and

voluntariness. Although Surendran (2019) showed that TAM is a powerful model to study the acceptance of technology, it cannot predict user behaviour in the cultural dimension (Momani and Jamous, 2017).

3.1.3. Motivational Model (MM)

Since the 1940s several theories have explored motivation, from which self-determination theory (SDT) was subsequently developed by Deci and Ryan (1985) to focus on intrinsic tendencies influencing human behaviour to determine individual human quality. Having the choice, making a choice, and experiencing the choice were considered to determine human quality in SDT (Momani and Jamous, 2017). SDT was based on advancement and human motivation. Motivation is defined as the process inside the human that gives the energy and direction to the behaviour (Bhushan, 2014). Extensive psychological research supported the use of motivation theory in explaining human behaviour. In accepting technology Venkatesh et al. (2003), for example, redesigned TAM with a motivational frame (UTAUT). Therefore, MM needs several factors to make it suitable for use to study technology acceptance (Parijat and Bagga, 2014).

3.1.4. Theory of Planned Behaviour (TPB)

An extension of TRA, and the postulation of TPB, is that human behaviour can be predicted by cognitive self-regulation, not only from people's nature, such as personality traits or general social attitudes (Ajzen, 1987). Truong (2009) believed that TPB does not consider environmental or economic factors which could influence the behaviour of the individuals.

3.1.5. Combined TAM and TPB (C-TAM TPB)

This model was developed by Taylor and Todd (1995) from the TAM and TPB, including perceived usefulness from the former and the predictors of the latter TPB to better understand the use of TPB in the adoption and acceptance of technology (Samaradiwakara and Chandra, 2014).

3.1.6. Model of PC Utilization (MPCU)

Triandis (1977) proposed in this model that behaviour has objective consequences interpreted by individuals, and the consequences of this interpretation could reinforce individuals' constructions. The perceived behaviour can be affected by reinforcement in two ways: 'it changes the perceived probabilities that the behaviour will have particular consequences, and it changes the value of these consequences' (Triandis, 1977, p. 198). Later, this model was adopted and refined by Thompson, Higgins, and Howell (1991), who used it to predict the utilization of the PC in information system contexts. The refined model is used to predict individual acceptance and utilization of different information in technology. Individual feeling toward PCs influenced utilization, affected by habits, social norms, expected outcomes, and facilitating conditions. The intention of use was excluded from this model, which was developer-focused in studying the actual use of PCs (Momani and Jamous, 2017). Other constructs added to the model include job fit and complexity, to clarify the viewpoints of the perceived consequences aspect. The developer of the model later added experience, which was thought to have direct and indirect influences on PC usage (Samaradiwakara and Chandra, 2014, Venkatesh et al., 2003).

3.1.7. Innovation Diffusion Theory (IDT)

One of the oldest social sciences theories, developed to study any kind of innovation, IDT resulted from different studies of diffusion done in the 1950s (Rogers, 2003). Innovation, time, social system, and communication channels were the main four factors proposed by Rogers to determine behaviour. Innovation was defined as a process communicated through different channels, within a group of people in the social system, over time. Innovation attributes explain the adoption of innovation in the effects manifest in individual behaviour: compatibility, trialability, complexity, and relative advantage.

Fichman (2001) found that IDT is applicable to the adaption of technology, and More and Moore and Benbasat (1991) adopted the attributes of IDT theory to explore the acceptance of technology in the organization, and added voluntariness. As a result, the leading constructs of technology acceptance were perceived usefulness, ease of use, and compatibility. However, the IDT does not show the resources or social support that can affect the adoption of the technology (Momani & Jamous, 2017).

3.1.8. Social Cognitive Theory (SCT)

SCT was first developed by Miller and Dollard (1941) as a social learning theory. It introduced in the purpose of modelling the concepts of learning. Several researchers worked on the theory, particularly Bandura (1986). The social influence, and its effect on the external and internal social reinforcement, is considered the dominant feature in this theory. Besides, the previous experience of the individual is considered as an influencer. Compeau and Higgins (1995) modified SCT to be suitable to study the usage of the computer. Self-efficacy was added to explore its impact on the behaviour. The main

constructs in this refined model in acceptance technology are emotional reaction to computers, self-efficacy, and outcome expectations. However, the STC was believed to be more focused on the learning process than on the acceptance of technology (Conner and Norman, 2005).

3.2. Unified Theory of Acceptance and Use of Technology (UTAUT)

The UTAUT presents a complete picture of acceptance processes more comprehensively than previous models, combining eight theories of technology acceptance (Venkatesh et al., 2003, Kijsanayotin, 2009): TRA, TAM, the motivational model (MM), the theory of planned behaviour (TPB), the combined TAM and TPB (C-TAM TPB), the Model of PC Utilization (MPCU), Diffusion of Innovation (DOI) and Social Cognitive Theory (SCT) (Venkatesh et al., 2003).

UTAUT (Appendix 9) was built based on the conceptual and empirical similarities within the eight models and validated by Venkatesh et al. (2003) through a longitudinal field study of employee technology acceptance. He found that the UTAUT model explains approximately 70% of the variance in behavioural intention and about 50% of variance in technology use (Venkatesh et al., 2012), whereas previous models of technology acceptance could only explain 40% of the variance in behavioural intention (Kijsanayotin, 2009). Derived from the eight theories, the UTAUT suggest that four core constructs are direct determinants of technology acceptance (behavioural intention) and use (behaviour): *performance expectancy*, *effort expectancy*, *social influence* and *facilitating conditions*. The theory also suggests that the effect of these four constructs is moderated by four other variables: age, gender, experience and voluntariness of use (Venkatesh et al., 2003) (Table 3.1).

Table 3.1: Definitions of the constructs in the UTAUT 2

Construct	Definition
Performance expectancy (PE)	The degree to which individuals believe that using the system will help them improve job performance
Effort expectancy (EE)	The degree of ease associated with the use of the system
Social influence (SI)	The degree to which individuals perceive that *important others* believe they should use the new system
Facilitating conditions (FC)	The degree to which individuals believe that an organizational and technical infrastructure exists to support use of the system
Hedonic motivation	The intrinsic enjoyment derived from using a technology
Price value	Cognitive trade-off between the perceived benefits of the application and the monetary cost for using them
Habit	The extent to which people tend to perform behaviours automatically because of learning and repetition

Since the publication of UTAUT (Venkatesh et al., 2003) it has been analysed and developed by many studies. Although few studies have implemented the full model of UTAUT (Williams, Rana, Dwivedi, & Lal, 2011). Venkatesh et al. 2012, p. 2) reported that "our review of this body of work revealed that most studies using UTAUT employed only a subset of the constructs". Consequently, Venkatesh et al. (2012) extended the UTAUT in exploring technology acceptance to reveal that the behavioural intention increased from 70% to 74% and technology used increased from 40% to 52%. The extended UTAUT (UTAUT2) (Figure 3.3) is superior in explaining the acceptance and adoption of technology (Khan & Adams, 2016), including *performance expectancy* (PE), *effort expectancy* (EE), *social influence* (SI), *facilitating conditions* (FC), *hedonic motivation* (HM), *price value* (PV) and *habit* (H) as core constructs, with *age*, *gender* and *experience* acting as moderators.

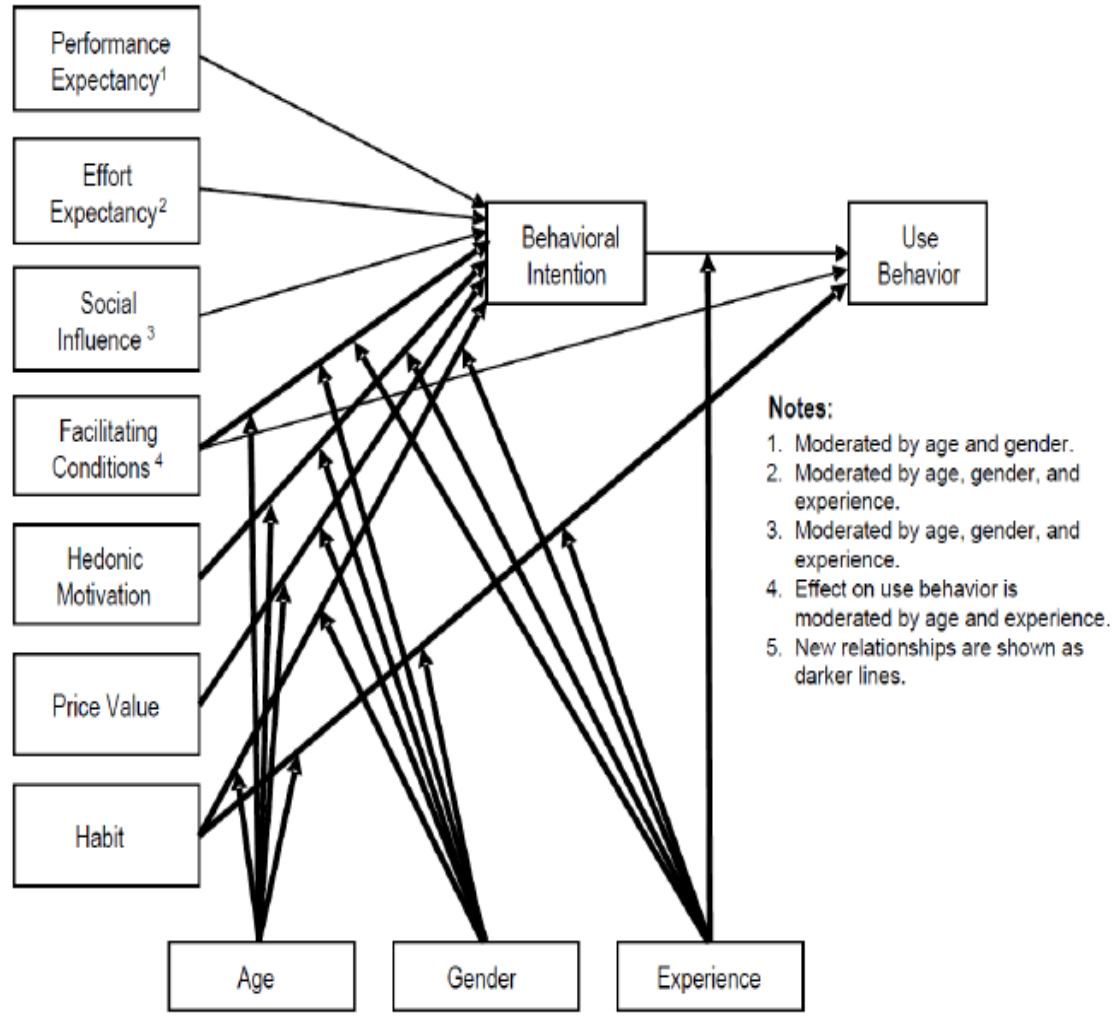

Figure 3.3: UTAUT2

Source: Venkatesh et al. (2012)

UTAUT2 has been tested in numerous studies and found to be simple to use (Alalwan et al., 2017, El-Masri and Tarhini, 2017, Khan and Adams, 2016) and methodologically robust (Venkatesh et al., 2012, Tarhini et al., 2016). Therefore, this study selected UTAUT2 as the most appropriate model as it is an empirically validated and unified model that integrates all of the models analysed above. Moreover, it empirically demonstrated significant improvement in explaining variance in technology acceptance (e.g., behavioural intention 74%, and technology user 52%). UTAUT is 'a powerful framework and when it is extended by relevant constructs, it can contribute to the understanding of

important phenomena, here consumer use of technologies in general' (Venkatesh et al., 2012, p. 171). In addition, this study employs the UTAUT2 to guide building the Q statements to explore the drivers of and barriers to the adoption of RLOs in nursing institutes in Oman. However, the price value construct will not be used in this study, as the RLOs are free for all students and no payment would be expected at any time, consequently, the price value will not be one of the constructs during building the Q-statements.

In summary, to explore individuals' behaviour towards technology acceptance, different theories and models have been developed and designed to measure acceptance and the level of individuals' satisfaction with the technology. The measurement and prediction of the acceptance were viewed from different points, depending on the constructs of each model and theory. These theories and model were developed through a process of research, based on previous studies. These theories were created from behavioural studies involving psychological and social studies. These models and theories were used according to the purpose of the research and studies. Most of them were modified to answer some researcher studies and to fit the study purposes. The next section introduces a model guiding cultural components of e-learning adoption, which are not directly engaged by the UTAUT2 paradigm.

3.3. Hofstede Cultural Model and Arab countries

Whilst UTAUT2 provides a good model for this study, it is inadequate to explore the cultural factors pertinent to the adoption of RLOs from Western (i.e., UK) contexts to other cultural environments such as Oman and other Arab nations. Previous studies emphasized the significant effect of culture in adopting e-

learning. Some studies used a cultural model to explore the acceptance of technology in different countries.

Current scholarship in this area incorporates multiple studies and paradigms designed to illuminate cultural values and their relevance to managers seeking to refine their approach to commercial activities in different cultural contexts. Whilst these theoretical frameworks utilize different numbers of dimensions, they are broadly similar in their consensus on essential cultural values. In the Hofstede Cultural Model, these are closely referred to as *time orientation*, *masculinity*, *individualism*, and *affective orientation* (the more precise taxonomy is explained below). Hofstede's paradigm has been found to be particularly useful in the exploration of technology acceptance, partly as his original study concerned global IBM employees; not all alternative cultural paradigms are useful for technology acceptance, which is why Hofstede's Model was chosen for the purposes of this study (Tarhini et al., 2016).

The most commonly used tool in accepting technology is Hofstede's Model (1991, 5) , which defines culture as "the collective programming of the mind which distinguishes the members of one group or category of people from another". Hofstede's original research surveyed IBM employees in subsidiaries in 66 countries (Huettinger, 2008). Based on his findings, he formulated his initial four dimensions based upon his observation of 76 countries and regions. Hofstede's work was widely acknowledged in the academic community, particularly following the publication of *Culture's Consequences: International Differences in Work-Related Values* (Hofstede and Bond, 1984), and *Cultures and Organizations: Software of the Mind* (Hofstede, 1991). Hofstede (1991) classified culture into four dimensions: *individualism vs. collectivism*,

masculinity vs. femininity index, *power distance* and *uncertainty avoidance* (Table 3.2).

Table 3.2: Hofstede's (1991) cultural dimensions

Dimension of culture	Definition
Individualism vs. Collectivism	Refers to the degree to which people prefer to act as members of a group or individuals
Masculinity vs. Femininity	Refers to the gendered nature of society including 'masculine' and 'feminine' traits, associated with distinguished gender roles
Power distance	Refers to how the society values hierarchical relationships and respect for authority
Uncertainty avoidance	Refers to the extent to which the society lives in fear of unknown and ambiguous situations

Hofstede's (1980) cultural dimensions posit that cultural expectations and values vary on a national basis, and influence learning, interactions, communication, and cognitive appraisal of stimuli (Olaniran, Rodriguez and Williams, 2010, Swierczek and Bechter, 2010). Hofstede's (1980) cultural dimensions have been studied with regard to e-learning design (Hammer, Janson and Leimeister, 2014, Olaniran et al., 2010). For instance, Chinese e-learners prefer colourful and nature-inspired imagery with a central alignment, while their German counterparts prefer neutral pastel shades and simple, linear text (Hammer et al., 2014). Such cultural preferences clearly have implications for the use of imagery in e-learning experiences such as RLOs. As this study is concerned with RLOs adoption for Oman, with a different culture from the UK, Hofstede's (1991) Culture Model is employed within the UTAUT2 to build Q statements to facilitate the exploration of the drivers of and barriers to adopting

RLOs in nursing institute in Oman. This is also to cover as much as possible the cultural points of view in the Q-statements.

3.4. Culture and technology adoption in Arab countries

A small number of studies (Hamdan, 2014, Tarhini et al., 2016) have explored the effects of culture on the adoption of the technology in Arab countries. Tarhini et al. (2016) examined the effects of individual-level culture on the adoption and acceptance of e-learning tools by students in Lebanon, using TAM and Hofstede (1991). They collected data from 569 undergraduate and postgraduate students via questionnaire. The result showed that behavioural intention to use e-learning was particularly sensitive to differences in individual cultural values, with significant moderating effects observed for all four of the cultural dimensions studied. However, the study sample was only from private universities, which might be unrepresentative of students in public universities, limiting generalization (Robson, 2011).

In Saudi Arabia, Albugami and Ahmed (2016) showed that culture and religion have a significant impact on the adoption of ICT in the education system. For instance, national statistics show that the Saudi government banned approximately 200,000 websites in 1999, which had doubled five years later, on the grounds of protecting society from harmful ideas and materials. The cultural implications on ICT adoption were studied with regard to Hofstede (1991) by Albugami and Ahmed (2016), who found that students were seen to represent the collectivism culture and needs of a system to support teamwork and social interaction, this is associated with the relatively low masculinity index of Arab countries. It is seen also as high power distance, where there is no cordiality between students and teachers, and the former follow teachers'

orders. The students have high uncertainty avoidance, requiring extensive guidance and simple design to decrease their uncertainty.

More research is needed in this area, as recommended by Hamdan (2014), based on her primary data drawn from undergraduate female students' responses regarding how online education is changing their learning culture, and how their culture is influencing online education. The sample of the study comprised 67 undergraduate Saudi female students who participated in a survey, with follow-up interviews. The study showed that participants were positive about online learning and considered it to be another source of learning. They indicated that it assisted them to challenge some cultural norms and improved their communication skills. However, this study was conducted with a small sample in Saudi Arabia and with females only, therefore the results have limited generalizability.

Shatat (2017) investigated influential actors in the adoption and usage of online services in Oman. The study was conducted in a business environment using survey through e-services, with TAM and TRA as a theoretical framework. Convenience sampling was used. The results showed that privacy, awareness, ease of use, usefulness, security and trustworthiness all positively influence the adoption and usage of online services in Oman, whereas culture *per se* was not a significant factor in the use of e-services. While this study concerns a specific environment with a specific group (Bryman, 2016), its findings do give interesting insights about the Omani cultural milieu.

From the above literature, it is clear that culture has a significant influence in the adoption of e-learning. Different methods have been utilized to explore the effects of the culture in the adoption of technology, however most studies

utilized Hofstede's (1991) Culture Model of cultural dimensions (Tarhini et al., 2016).

It is also apparent that studies utilized different models to explore technology adoption and acceptance, like UTAUT2 and Hofstede (1991). These models can be extended to different constructs according to the context of each research. Therefore, the UTAUT2 and Hofstede (1991) model are utilized in this study to build the statements of Q-methodology in order to understand how the factors can influence the adaptation of RLOs in a postgraduate critical care nursing program in Oman.

3.5. Significance of the models chosen for this study

The aim of this research is to explore the drivers and barriers in the adoption of UK-designed RLOs in postgraduate nursing in Oman, thereby contributing to existing knowledge of RLOs via OERs and their adoption in an Arab country. Despite evidence showing the benefits of RLOs, no studies were found concerning their use in Oman, particularly in the area of nursing education. Therefore, implementing a valid and reliable multimedia RLOs might help to explore the drivers of and barriers to the adoption of RLOs in nursing education across significant cultural boundaries. Insights from such analysis can help practitioners save money, time, and effort, and serve as a baseline for the future development of suitable learning technology for HIHS among other researchers.

UTAUT2 and Hofstede's (1991) Culture Model enable this study to explore Arab students' responsiveness to RLOs when used to complement teacher-led sessions. The research thereby uncovers Arab students' estimation of the

flexibility and control RLOs components offer, which are valued by UK students. The next chapter discusses the methodology used to explore the drivers and barriers to RLO adoption in Oman among postgraduate nursing students.

Chapter 4

Methodology

4.1. Introduction

The previous chapter explained the theoretical model (UTAUT2) and Hofstede's Model (1991) in detail, to show how these models work to facilitate the exploration of the drivers and barriers of accepting RLOs among postgraduate nursing students in Oman. These models have been used in previous studies to explore technology acceptance with different participants and different cultures and were utilized to build the tool within this study. There are two stages in the study: the Q methodology study, and a separate qualitative study. Q methodology was used in this study prior to a follow-up qualitative study using semi-structured interviews with seven graduates one year after completion of their programs in their clinical areas. This was in order to explore the impact of RLOs in their clinical practice. Therefore, the aim and objectives of the research study are discussed in this chapter. Moreover, this chapter discusses Q methodology in detail. The follow-up qualitative study was discussed in detail in Chapter 5.

The first stage of this study was the implementation of RLOs in Oman among postgraduate nursing students, and the second stage was to collect the data using Q methodology. Hence, it was very important to explain the implementation of RLOs in Oman in detail, then to discuss the Q methodology of this research study.

4.2. Implementation phase of RLOs

RLOs were implemented in Higher Institute of Health Specialties (HIHS) in Muscat, Oman, as described in the Chapter 1. The Institute is under the umbrella of Ministry of Health (MoH). RLOs were implemented in ACCNP and ENP for four months, in the second term in the academic year of 2017-2018, from beginning of January 2018 to end of April 2018. A total of 11 RLOs were used in the study intervention, as shown in Table 1.4 in Chapter 1. These RLOs are consistent with topics in the ACCNP and ENP curriculum in Oman, and the pharmacological information in the curriculum. The RLOs supported the teaching strategy in the program.

The first stage was choosing RLOs that are appropriate to be implemented in the programs. This was done by the researcher and the leaders of programs in Oman. Multiple meetings were held between researcher and the administration of the HIHS to discuss the implementation of RLOs, including the orientation of the leaders of the program to the definition of RLOs, and explanation of how they can be used and their potential benefits. The researchers discussed RLOs implementation strategy with program leaders, covering the same subjects as ACCNP and ENP. The researcher and program leaders then chose 11 pharmacology RLOs that were germane to the ACCNP and ENP curriculum in Oman.

Subsequently, the researcher worked with faculty members in Oman to add the pharmacology RLOs as e-learning education in the curriculum, and to combine each RLO with appropriate topics from the critical care and emergency modules, to ensure the coherence of the flow of RLOs within each lecture. The outcomes were reviewed with all faculty members to elicit feedback and

troubleshoot any issues. The researchers and the curriculum leaders discussed the timetable for the programs and when students would use RLOs relative to their classes. In addition, a meeting was held with the information technology (IT) Department in Oman to orient them about RLOs and the reason for their implementation. This also helped identify any technical problems in the implementation so they can report such issues to the researchers, and assure the availability of necessary technical support during implementation.

After that, a guideline was emailed to each faculty member and student demonstrating the process of how to find RLOs online, how to use them, and which lectures they were related to. Appointments were made with faculty members to arrange online meetings among all students and faculty to orient them in the RLOs. During these meetings, RLOs were introduced, and researchers answered any questions. The address of researchers was given to the students and faculty members for any inquires after the meeting.

Emphasis was placed on how and when students can use RLOs, calibrated with the ACCNP and ENP timetable, followed by monitoring the use of RLOs by the faculty members in the program. The researcher continues to communicate with faculty and staff to learn how they experienced RLOs use in their program. In addition, the research followed up the implementation process with institute administration to facilitate the implementation process for students and to help in any technical problem and receive a technical support during the use of RLOs in Oman.

4.3. Aim and objective

The study aim is to explore the drivers and barriers of adoption of RLOs in postgraduate nursing programs in Oman to improve their knowledge, skill and confidence. This will be achieved by introducing RLOs to postgraduate students in Oman and discovering their views and opinions about the new innovative idea and how this new teaching strategy could enhance their learning. The objectives are:

1. To explore postgraduate nursing students' views on the factors influencing reusable learning objects (RLOs) adoption in Oman and use in clinical practice by using Q-sort.
2. To gain an understanding of the drivers and barriers for using and reusing reusable learning objects (RLOs) in Higher Institute of Health Specialities (HIHS) in Oman.

4.4. Q methodology overview

This section gives an overview of Q methodology, explaining it theoretical development, research philosophy, strengths and limitations, and its practical steps, as implemented in this research study.

4.4.1. Description

Before presenting more detailed epistemological analysis and description of the particular steps of Q methodology, it is useful from the outset to present and give an overview of what the methodology essentially comprises. Q-methodology combines qualitative and quantitative methods to clarify individuals' subjective viewpoints on certain issues, interests, and feelings (Neilson, Gibson, Jeffares et al; 2020). It is particularly useful for understanding

health-related thoughts and behaviours of students or their experiences and attitudes regarding teaching-learning methods in the nursing field (Akhtar-Danesh et al., 2008).

This methodology also enables the exteriorization of individuals' inner worlds. Q-methodology is also a method that converts subjective points of view into an objective outcome (Neilson et al., 2020, Cai et al., 2016, Simons, 2013, Dziopa and Ahern, 2011, Brown, 1980). Q methodology is having three main parts: Q sorting, Factor analysis and interpretation. "Q uses integrated qualitative–quantitative data with integrated analyses to determine and describe the divergent viewpoints that exist within a group or with an individual sorting under multiple conditions of instruction" (Ramlo, 2021, p2). Q methodology can be assuaged by focusing on Q methodology's position within the qualitative-quantitative continuum known as mixed-methods(Ramlo and Newman, 2011).Thus will be discussed in details in 4.4.3.Q methodology has five sequential processes: concourse generation, Q set development, participant selection (P set), Q sort, factor analysis, and factor interpretations (Figure 4.1). These practical steps are used in this study to explore the opinions and viewpoints of postgraduate nursing students from the adult critical and emergency nursing programs in Oman on the acceptance of RLOs to improve their knowledge, skill and confidence. The rationale for choosing Q methodology is expounded in the following sections.

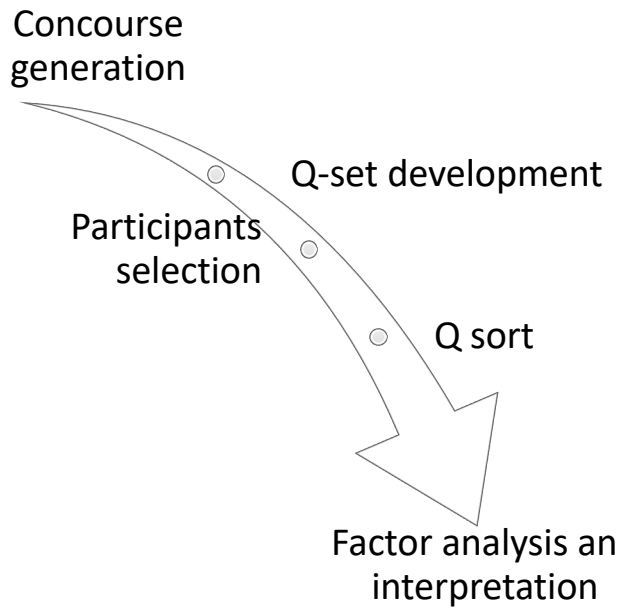

Figure 4.1: Q methodology process

4.4.2. Theoretical development

Q methodology was originally developed by an English psychologist and physicist, William Stephenson, during the early 1930s. He created Q methodology to measure the subjectivity objectively (Stephenson, 1953). The method demonstrates how people's subjectivity can be measured with scientific and rigorous analysis, contrary to the assumptions of the positivist approach (Akhtar-Danesh et al., 2008). Q methodology has become increasingly popular across different specialities and topics due to its utility in qualitative investigations. The underlying epistemology of Q methodology posits that subjective opinions have a structured pattern, which can be extracted from clear observation and study (Watts, 2008/2009, Brown, 1986). This is obvious in Q when participants engage in sorting exercises, in which they prioritize the statements about the subject that reflect their views about a phenomena.

Sorting can be analysed by person factor analysis, which some researchers consider to be the reverse of factor analysis technique in R method. Indeed, the

assignation of ‘Q’ in the name of the methodology is primarily to differentiate it from R method (from Pearson’s product moment correlation, r). The factor analysis in R method finds correlations between variables, such as the height and weight of participants (Mckeown, 1990), whereas Q finds correlations between participants’ Q sorts (Mckeown and Thomas, 2013). Thus, the factor analysis in Q methodology is called person factor analysis, which reduces the opinions and views of participants to a few factors which represent a shared way of thinking between participants concerning topics or phenomena of research interest.

Q methodology seeks to scientifically assay elements of human subjectivity, such as feelings, thoughts, beliefs, and opinions. Some researchers consider this method to be a distinct paradigm with a unique methodology (Dziopa and Ahern, 2011, Webler et al., 2009, Stenner and Rogers, 2004). It is believed to be complementary and supplementary to qualitative and quantitative aspects of human science research (Ellingsen et al., 2010). More discussion about the research philosophy and the position of Q methodology as a mixed-method approach is given below, along with the rationale for the choice of a mixed-method design for this research.

4.4.3. Research philosophy guiding this research

Creswell and Clark (2011) state that all research studies are shaped by underlying philosophical suppositions about the characteristics of the world and the means by which we acquire knowledge about it (Spector et al., 2002). The way in which researchers understand and see the world, and the philosophy which determines their view, is termed a ‘paradigm’. Any group of experts who share values, beliefs, and generalizations about the nature of reality and

knowledge support a specific paradigm. Referring to an alternative term for this concept, “worldview”, Patton (2002, p. 69) pointed out that it can be defined as a way of reflecting on and building an understanding of the many intricate elements which make up the real world.

Modern social work research is organized and carried out in line with a broad range of paradigms, founded on philosophical approaches – such as post-positivism, constructivism, and pragmatism (Table 4.1). Their differences are manifest in the following dimensions:

- Ontology – hypotheses about the nature of being.
- Epistemology – assumptions about the nature of knowledge, how we know the world and amass knowledge, and the link between the knower and what is known.
- Axiology – the study of the role of values and principles in research.
- Methodology – organizing principles for gathering knowledge about the world.
- Rhetoric – shared understanding of the language used in research studies (Creswell and Clark, 2011).

All paradigms differ in their approach to axiology, ontology, epistemology, methodology, and rhetoric. To take one example, post-positivism, a well-established approach to social research, is closely linked with quantitative methodology, which concentrates on accuracy, generalizability, validity and repeatability. Post-positivist researchers maintain that investigation is made up of number of logical and interrelated stages, and assert that knowledge stems

from objectivity, standardization, deductive reasoning, and organization, which are central features of the research process (Creswell and Clark, 2011).

Nevertheless, post-positivism has its critics, particularly in the area of defining and explaining laws, whereby positivism takes little account of the erratic nature of human behaviour, or the culture and background of individuals, which are crucial factors in the existence and implementation of laws. This results in researchers establishing laws which do not always dovetail with social science. The researcher's role is restricted to gathering and explaining data, on the basis of which rules and laws are created. However, the law is not generalizable, since the same observation will not necessarily apply in every situation (Chalmers, 1999).

Howell (2013) expounded the argument of Popper (1994) that any form of absolute law prevents a theory from developing, and acts as a brake on its flexibility and growth. Adding that anti-positivists have emphasized that there are clearly significant differences between human social life and the natural world. For example, the laws of natural sciences are separate from all alleged random human behaviours. In addition, Chalmers (1999) and Bogen (2014) pointed out that since the positivist paradigm cannot measure a number of variables, the latter could not be investigated by positivist research studies.

Following some studies analysed in the literature review, this research could have potentially utilized an experimental design such as a comparison study, exploring online-based resources in nursing education with experimental and control groups, receiving e-learning and traditional instruction, respectively. However, the introduction of RLOs in Oman is considered an inherently new concept. This necessitates an in-depth understanding of participants' views and

experiences of RLOs to understand the drivers and barriers of accepting them within postgraduate nursing education in Oman. Thus, the researcher needed a methodology with instruments capable to explore highly rich data, suitable for the context and situation.

The constructivist paradigm is normally linked to qualitative methodology and both literary and relaxed rhetoric, since it focusses on collecting the opinions and beliefs of participants and allows the researcher to construct subjective meanings of the phenomena which are being studied. Schwandt (2000) and Andrews (2012) pointed out that constructivism, as the term implies, views reality as something which is created rather than uncovered, and therefore it is social interaction which determines reality. Since society is subjective as well as objective, it is solely individuals who are accountable for both acquiring and interpreting this knowledge and thus constructing reality (Howell, 2013, Schwandt, 2000).

The constructivist worldview does not accept that realities are fixed and predate human interaction, since it is individuals, who are in turn shaped by their own social and cultural backgrounds, who construct their realities. Logically, therefore, from the constructivist perspective, reality is subjective, socially-shaped, and comes in many forms. Creswell and Clark (2011) state that constructivist research works from individual views upwards, finding general patterns and then continuing to use those patterns to reach broader understanding. Kaushik and Walsh (2019) argues that post-positivist and constructivist research are diametrically opposed and lie at opposite ends of a paradigm continuum. Critics of constructivism state that it is far too subjective, that its findings are specific to the people who take part and thus not

generalizable and only apply to a specific time and place. Benton (2011) noted that its outcomes depend on the context of the research, and that consequently constructivism can be viewed as a relativist approach.

The other paradigm is pragmatism. According to (Creswell and Clark, 2011), pragmatism is a paradigm which acts as a bridge between old, established approaches, with their scientific methodology and structuralist leanings, and modern, more realistic, and naturalist methods and non-interventionist approaches. Pragmatism as a research paradigm is rooted in the philosophy of pragmatism, which advocates using a range of research methods expedient to answering a research question (Maxcy, 2003). Tashakkori and Teddlie (1998) stated that the pragmatic research paradigm encourages researchers to feel free to use any methodology or philosophical approach which is suited to the research subject being studied.

Pragmatism is often linked to the use of mixed methods or multiple methods (Morgan, 2013, Creswell and Clark, 2011, Tashakkori and Teddlie, 2009), where the emphasis is on the findings and outcomes of the research, and answering the research questions, rather than the methodology used in the study. Pragmatism uses both formal and informal rhetoric. The pragmatist paradigm asserts that both single and multiple realities can be the focus of experiential enquiry (Creswell and Clark, 2011). Certain pragmatic scholars have stated that an objective reality exists apart from and parallel to individuals' experience, but since this reality is based within the environment it can only be accessed through human experience (Morgan, 2013).

Yefimov (2003) pointed that pragmatist philosophy is based on the assertion that both reality and knowledge derive from socially constructed beliefs and

habits. While the majority of pragmatists agree that knowledge is socially-constructed, they also argue that certain kinds of social constructions mirror the experiences of individuals more than others (Morgan, 2013). It is evident that pragmatism is not a hybrid which combines constructivism with post-positivism, but rejects both philosophies, arguing that reality is neither absolute nor subjective. From the pragmatist perspective, the truth is essentially "what works" (Dewey,1974, p. 198). Pragmatism thus views knowledge as something which is constructed as well as being founded on the reality of the world we experience and inhabit.

As the current study aim is to explore the drivers and barriers of adopting RLOs with in postgraduate nursing in Oman, the researcher sought to explore the views and attitudes of postgraduate nursing students in accepting RLOs in a systematic way, thus Q methodology was selected. As explained previously, Q methodology was created to measure the subjectivity objectively (Stephenson, 1953). Q methodology has the power to collocate data subjectively in terms of the possible viewpoints of participants as well the power to interpret data in quantitative manner (Watts and Stenner, 2012). Thus Q methodology is a mixed-method approach situated in the paradigm of pragmatism. Q methodology has been posited by some researchers to be a wholly unique methodological paradigm (Dziopa and Ahern, 2011, Stenner and Stainton Rogers, 2004), while others consider that it tends toward the orbit of qualitative approaches, adding an element of stringent criticism (Watts and Stenner, 2005b; Gautier et al., 2016). Others feel that it is equidistant between the quantitative and qualitative poles, making it essentially a mixed-method paradigm (Ramlo and Newman, 2011b; Onwuegbuzie and Frels, 2015).

Given these considerations, Q methodology is ideally placed for use in mixed-method research designs (Creswell and Clark, 2011, Tashakkori and Teddlie, 2010, Tashakkori and Teddlie, 1998). Q methodology is intrinsically mixed, but it should be noted that it is not a statistical procedure to analyse data, although it does include a statistical element; rather it is a whole methodology that includes philosophy, theory, and procedure, in addition to statistical analysis techniques (Brown, 1980).

According to Bryman (2006) by combining quantitative and qualitative approaches, mixed-methods research can avoid potential limitations associated with using only a qualitative strand, such as semi-structured interviews and focus groups, or a quantitative one, such as structured survey questionnaires. The reflexivity of Q methodology allows the acceptance of technology like RLOs discourse to be subjectively organized by individuals in a self-directed way, facilitated by the researcher (Robbins and Krueger, 2000). Therefore, Q methodology is deployed in this study as an appropriate method to explore the drivers and barriers of adoption of RLOs among postgraduate nursing students in Oman.

Table 4.1 Research paradigms

Paradigm	Ontology	Epistemology	Description
Positivism	Objective reality exists	Quantitative	Objective experimentation to test hypotheses and generate universal, generalizable conclusions
Interpretivism	Multiple realities are socially constructed	Qualitative	Inductive analysis of complex, rich data on human perceptions and experiences for specific situations (limited generalizability)
Pragmatism	Adopts expedient ontological assumptions to answer research questions	Mixed methods	Combines quantitative and qualitative perspectives for a holistic overview of the researched phenomena

4.4.4. Strengths

Q methodology has been utilized in numerous research areas, including agriculture (Davies and Hodge, 2012), education (Mckenzie, 2009), transportation (Logo, 2013, VanExel and Graaf, 2011), mental health (Barker (Barker, 2008), end-of-life decision making (Wong et al., 2004) and heterogeneous concepts of love (Watts and Stenner, 2005). Q methodology is a unique research method with the ability to explore feelings, opinions, and ideas that individuals experience about researched phenomena in a tangible, substantive, analytical way (Mckeown and Thomas, 2013, Webler et al., 2009, Stenner and Rogers, 2004, Brown, 1980, Stephenson, 1953). Q-methodology gives the participants this strength with its holistic, robust and in-depth

technique by allowing the participants to actively engage in establishing meaning to statements derived from the context which affects them (Watts and Stenner, 2012).

In traditional qualitative methods of exploring participant subjectivity, such as focus groups or in-depth interviews, there is a manifest influence of the subjectivity associated with both participants and researchers, with the potential to distort the authentic meanings intended by the former. Q methodology addresses this by combining the Q sort (participants' views) and factor analysis to decrease the influence of subjectivity (Davis and Michelle, 2011). Moreover, Q methodology is able to reduce the data through person factor analysis, which facilitates data interpretation, while qualitative studies have challenges in reducing the data, and quantitative studies fail to apprehend individual subjectivities entirely (Ladan, 2018, Barker, 2008). Moreover, it is more that important issues are not likely to be missed or overlooked as the concourse is created and presented to the subjects, so in some ways it has the advantage of the semi structured qualitative approach. This makes this methodology important to this study. Postgraduate nursing students within this study that interact with technology (RLOs) may have divergent or convergent views/opinions about how such technologies are accepted by them.

4.4.5. Limitations

Any research method has limitations as well as advantages. Q methodology is concerned with exploring the viewpoints of individuals with limited samples needed to illuminate the researcher. However, the small number of participants used limits the generalization of research results, and thus the general utility of the research in itself. The generalization of findings in Q methodology is of little

concern because participants reflect their views on the phenomena, and the findings clearly show the subjectivity of these participants and not only a percentage of a larger target population (van Exel et al., 2011, VanExel and Graaf, 2005). Others argue that generalizability is still applicable as Q methodology findings from semantic bodies are a 'conceptual form of generalization driven by semantics rather than statistics' (Watts and Stenner, 2012, p. 73). In other words, the concepts arising from analysis in Q methodology can still have wider implications. This was described with regard to the identification of opinion clusters, which may subsequently be tested by large (possibly quantitative) surveys:

> 'Most Q-methodology studies are exploratory and qualitative in nature and tend not to use random sample designs. Generalizations rarely occur beyond the immediate set of participants and are typically not based on the numerical distribution of study participants among factors. The value of Q-methodology lies in uncovering valid and authentic opinion clusters and does not occur beyond the immediate set of participants'. (Valenta and Wigger, 1997, p. 504)

However, there is also a critique around the validity and reliability of Q methodology. Brown (1980) indicated that concepts such as validity have little use in Q methodology, as the aim is to explore and understand the opinions of participants (Valenta and Wigger, 1997). 'Validity of a Q-study is evaluated by content, face, and Q-sorting validity' (Akhtar-Danesh et al., 2008, p. 765). Face validity is ensured by checking the grammar and readability of the statement through reviewing and adjusting the words to cover the studied issues (Akhtar-

Danesh et al., 2008, Valenta and Wigger, 1997). Content validity of statements is usually assessed by literature review and a team of domain experts, which is a common practice in qualitative research. It also depends on the researcher comprehensively covering the issues around the phenomena as articulated by participants in relation to provided items (Brown, 1980). Expert advice on the development of items with a pilot study is recommended to increase content validity. Moreover, it is important to recruit participants who have a wide breath of views of the issues concerning the researched phenomena in order to ensure validity (Valenta and Wigger, 1997). The Q-sorting operation is subjective and represents an individual's point of view. There is no external criterion for evaluating an individual's response to a particular statement (Brown, 1986), thus, each individual's set of rank-ordered statements is deemed a valid expression of his or her opinion.

Reliability in Q method is appraised differently from quantitative studies (Valenta and Wigger, 1997). According to Watts and Stenner (2012) and Brown (1980), the administration of Q sort repeatedly ensures the reliability of participants' viewpoints, rather than reliability of the method *per se*. For test-retest reliability, studies have shown that administering the same instrument (Q sample) to the same individuals at two points in time have typically resulted in correlation coefficients of. 80 or higher (Brown, 1980). Q-methodology has also produced consistent findings in two more types of study comparisons: first, when administering the same set of statement to different person samples; and second, when pursuing the same research topic, but using different sets of statements and different person samples.

4.5. Concourse generation

The concourse is essentially a clearinghouse of possible statements approaching subjects from numerous participant perspectives (Ramlo, 2015, van Exel et al., 2011). The statements should contain all the relevant aspects of the topic or the subject, calibrated to the range of viewpoints and feelings of respondents, including positive and negative aspects about the subject generated through different resources like interviews, questionnaires, scientific journals, and the mass media (Paige and Morin, 2015, Jeffares and Skelcher, 2011). Concourse generation also includes informal interviews with staff, as well as personal and professional experiences. The concourse for this study is derived from the literature around e-learning, nursing education, higher education (HE), UTAUT2, and Hofstede's (1991) Culture Model of cultural dimensions.

4.6. Q set development

The Q-set is defined as the subset of statements drawn from the concourse to be presented to participants (Watts and Stenner, 2012). The researcher can use structured approaches by inductive or deductive methods to draw statements. Further examination of the statements in the concourse and building a framework through the literature could be described as an inductive method. Deductive method is by following some existing theories that could fit the study (Brown, 1980). Since the participant engagement relies on the Q set, they should be examined by a team of experts or pilot study to ensure content and face validity (Watts and Stenner, 2012, Cross, 2004). The wording of the statements and editing of the readability and grammar also ensure face and content validity (Dariel, 2011). It is important to mention that achieving adequate

coverage of the issue is an unrealistic aim, as different items contain different meanings for different individuals (Rogers, 1991).

This study drew on the Q set (Appendix 6) by following a structured approach through the literature studies (Tarhini et al., 2016, Ramlo, 2015, Sowan and Idhail, 2014, Sowan and Jenkins, 2013, Venkatesh et al., 2012, Sanchez-Franco, 2010, Venkatesh et al., 2003) (Figure 4.2). This is by using a structured inductive approach, described in reviewed literature (Chapter 3), whereby the theoretical framework UTAUT2 and the Hofstede Model found to be the most appropriate and relevant models to guide the building of the Q set for this research project. A total of 140 statements arose from the concourse. These are categorized according to the framework to ensure that most of the issues around the research phenomena are covered. This included eight themes, with several subthemes in each of the themes. The themes were:

- Performance expectancy
- Effort expectancy
- Social influence
- Facilitating conditions
- Hedonic motivation
- Experience
- Habit
- Culture

While using these frameworks it is important to recognize that *a priori* categories 'are not to be used for subsequent interpretation of the data, since is not measuring identified categories' (Dariel, 2011, p. 96, Rogers, 1991). The Q analysis and interpretation resulting from the Q sort is done by the participants

as they elaborate their thoughts during the sorting exercise, and not from the testing theoretical framework used to get out the Q sort (Kramer et al., 2003).

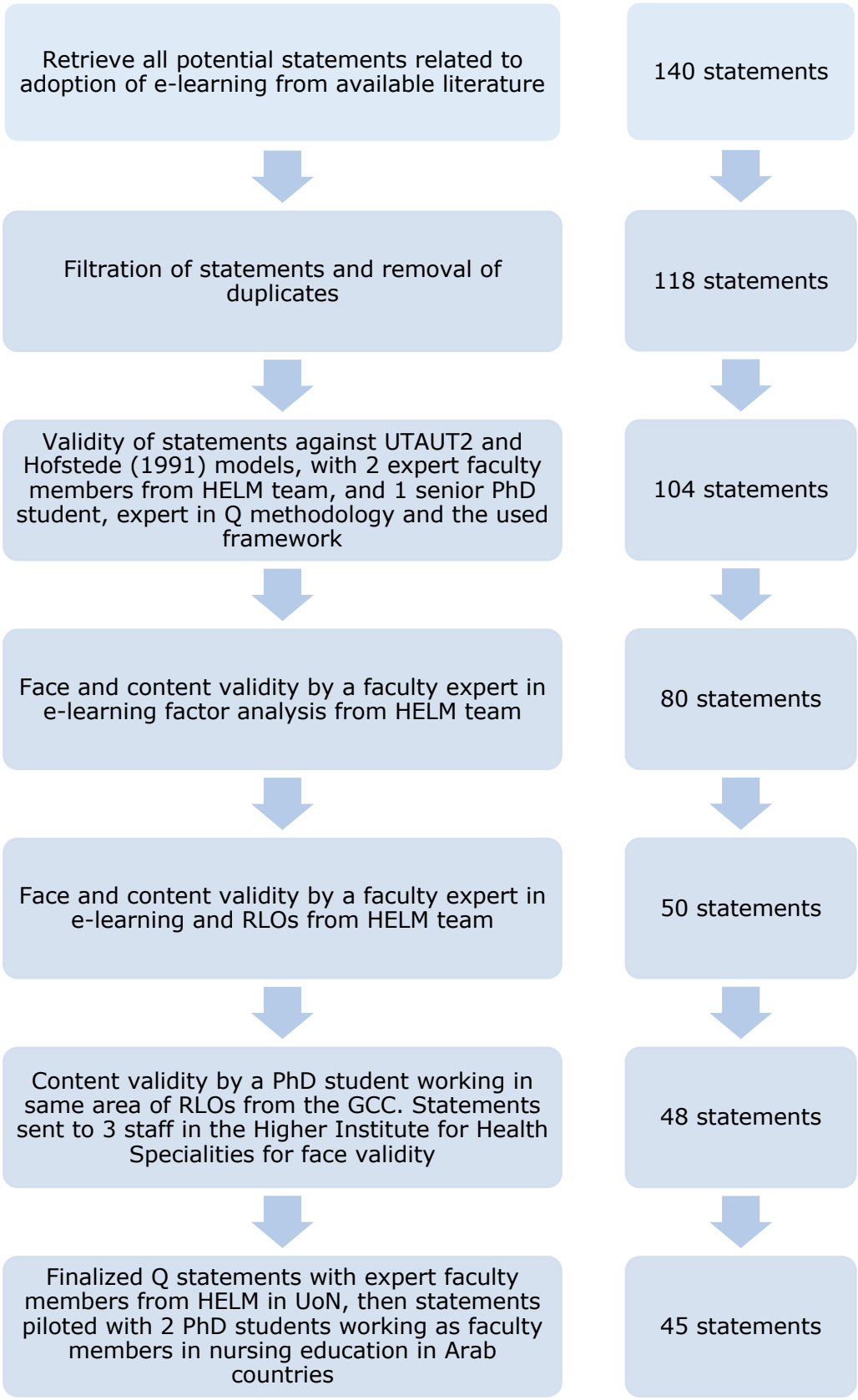

Figure 4.2: Q set development process

4.7. Participant comprehension of statements and pilot study

The statements were reviewed and reduced to 118 after the removal of duplicates. In order to ensure participants comprehension of against the UTAUT2 and Hofstede (1991) model theoretical framework, They were assessed by two faculty members from the HELM team who are expert in e-technology and Q methodology, and a senior PhD student expert in Q methodology and the used framework, whereby the statements were reduced to 104. Subsequently, face and content comprehension of the statements were determined by a faculty expert in e-learning factor analysis from the HELM team, whereby statements were corrected for grammar and readability, which reduced the statements to 80. These statements were reviewed by another faculty expert in e-learning, and RLOs were reviewed by the HELM team, whereby statements with the same meaning were removed, resulting in 50 statements.

Subsequent review with a PhD student working in the same area of RLOs from the GCC enabled the removal of two further statements, resulting in 48 statements that were then sent to three staff members at the Higher Institute for Health Specialities in Oman for face validity. As a result, some statements were altered to be clearer and understandable by postgraduate students in Oman. In addition, the statements were sent to three postgraduate students who were not participating in the study for critique regarding readability and clarity for the Omani context. These students were recruited from a variety of departments in the Institute, to avoid their potential participation in the main study. These statements were reviewed with the supervisors of this study, who

were experts in e-technology, RLOs, and Q methodology. As a result, the total number of statements was 45 statements that were ready for piloting.

The pilot study was done with five students from the University of Nottingham from the School of Health Sciences. The pilot was done for the Q sort and post sort interviews. A room was booked in the Health and Social Sciences School to conduct the pilot study, with times adjusted according to student availability. Each student was provided with an instruction sheet for Q sort, and an A0 size sheet was provided with a Q sorting grid. They were given 45 statements in small, laminated cards for Q sorting. After each Q sort, the students were interviewed for a short time to understand their views about the sorting process and the extent to which they think that the statements covered the issues around RLOs and their acceptability for postgraduate nursing students. The pilot study yielded useful feedback, with minor corrections applied to two statements.

4.8. Ethical consideration

The study obtained ethical approval from the Nottingham University Faculty of Medicine and Health Sciences (FMHS) and the study site Ministry of Health (MoH) in the Sultanate of Oman. The FMHS gave a favourable opinion (Appendix 2) and approval was received from MoH in Oman (Appendix 4). These ethical approvals did not require any corrections from either committee.

4.8.1. Participant information and informed consent

After the study obtained ethical approval, the ethical approval information sheet was sent to the critical care course coordinators in the study settings (ACCNP and ENP). Explaining to them the nature of the study and

requesting their cooperation, particularly to facilitate the data collection process by providing a room to collect data and stationary facilities, and disseminating study invitation letters to their students. The researcher physically attended the study settings, but participants were recruited via emailed forms. Recruitment letters were disseminated to the postgraduate students in ACCNP and ENP via email. Advertisement posters for the study were also displayed in the faculty members' room and student classrooms. This poster was also sent to each student via email. The advertisement explained that data collection would start in May 2018. The faculty coordinator was contacted to advertise the study for the students, and copies of letters were sent to them to print and give to students in hard copy. Students who agreed to participate in the study responded through email, whereupon participant information sheets and informed consent forms were sent to them. Times and dates were sent to each participant to coordinate and agree on meeting for data collection in the campus (at students' convenience).

The informed consent was signed in duplicate before commencing the Q sort process. The participants were informed that their participation was entirely voluntary, and they could decline to take part at the outset, or subsequently withdraw at any time. The signed informed consent copy was given to participants, and the first copy kept by the researcher for record purposes.

4.8.2. Anonymity, confidentiality and data protection

Participant data was protected in line with guidelines of the University of Nottingham (UoN), subject to the UK Data Protection Act (2018). All collected data were anonymized, with alpha-numeric characters attached to each participant. All the data collection sheets with Q sort and post

interview audio interviews were only available to the research team. These records were kept in a secure archive in UoN under the responsibility of the chief investigator. Data input in Q methodology software and NVivo software were stored in password-protected files in secure office computers.

4.9. Participants selection/ P-set

Q methodology does not require large cohorts of respondents, and the priority in selection is the number of perspectives available across the population (Mckeown and Thomas, 1988). The purpose is to have enough subjects to establish factors for comparison (VanExel and Graaf, 2005). It is suggested that 40 to 60 participants is usually appropriate for Q studies, although fewer may be required for more specific studies (Brown, 1980). Some researchers suggested the use of a ratio between the number of statements and participants. Watts and Stenner (2012) suggested a minimum of two statements to one participant, or three statements to one participant. Other researchers suggested a ratio between the participants and the themes, such as having three participants loaded to each theme built during concourse development (Dariel, 2011, Webler et al., 2009). However, it is noted this is not applicable to Q methodology studies, as some concourses will not have themes during concourse development (Dariel, 2011).

In addition, this is considered problematic because the number of statements and participants depends on the discipline and particular context in which the research is carried out (Webler et al., 2009). Brown (1980) argued that there are only a limited set of views on any specific subject, based on Stevenson's lifelong research on the structure of most individuals' views (Stephenson, 1953, Dariel, 2011). Stephenson (1953) found that subjectivity is restricted to

available cultural and social discourses at the time, while Q methodology groupings may have similar viewpoints and merge them, even though this is statistically improbable (Watts and Stenner, 2005).

More recently, Brown (2010) challenged the use of such rules originating from R factor analysis and from the logic of large numbers, which is not applicable for Q methodology (Gilbert Silvius et al., 2017). He suggested the P-matrix as a guide for participant selection, to ensure the diversity of participants, reflecting the nature of Q sample. He emphasized the use of the P-matrix to uncover salient perspectives within Q sample. Therefore, some Q methodology analysts, including Dariel (2011) and Ladan (2018), used a P-matrix because the diversity of participants was more important to their studies than their number (Brown, 2010).

Therefore, in this study, a P-matrix was used to identify the participants from the postgraduate nursing programs in Oman. Three identified participant characteristics comprised age, gender, and use of RLOs. Age and gender were chosen based on the UTAUT2, which repeatedly showed their relations with other constructs in the UTAUT2 model (Venkatesh and Zhang, 2010). Moreover, gender is seen as a critical moderator in both the UTAUT2 and Hofstede Model used in this study. The third characteristic (use of RLOs) was identified from the objective of the study, which reflects the acceptance of RLOs among postgraduate nursing students in ACCNP and ENP. The use of RLOs was categorized as 1 RLO, lower users, medium users, and high users, according to the number of times they used each RLO. This is to encourage diversity of the participants. The matrix resulted in 24 possible combinations, as shown in Table 4.2.

Table 4.2: P matrix showing participant characteristics

A. Age	< 30		30-35	> 35
B. Gender	M		F	
C. Use of RLOs	1 RLO	Low users (2-3)	Medium users (4-7)	High users (7^{+})

In the P matrix, the *characteristics* have varying numbers of *categories*: age (three categories), gender (two categories), and use of RLOs (four categories). These categories result in possible combinations represented in the following formula:

$$\{3(\text{Age}) \times 2\ (\text{Gender}) \times 4\ (\text{use of RLOs})\} = 24$$

The participants in Q methodology are selected from ACCNP and ENP, as the goal is achieving diversity of participants who can give a broad perspective on the phenomena of interest (VanExel and Graaf, 2005) in this case concerning the adoption of RLOs in Oman. Table 4.3 shows the socio-demographic characteristics of the P-set from the postgraduate nursing program at ACCNP and ENP. It can be seen that there were more female than male participants (62.5% versus 37.5%). Most of the participants were within the age range between 30-35 (45.83%), while nine participants were less than 30 years old, and only four were above 35 years. Overall, the youngest was 26 and the oldest was 38 years old. The experience of the students in their clinical area ranged between 5-18 years, with the majority (58.3%) having 5-8 years of experience, seven participants had 9-12 years and only two participants had more extensive experience of 17-20 years (8.3%).

Table 4.3: P-set characteristics

	Frequency	Percent (%)
Gender		
Male	9	37.5
Female	15	62.5
Age (years)		
Less than 30	9	37.5
30-35	11	45.83
Above 35	4	16.6
Experience (years)		
5-8	14	58.3
9-12	7	29.1
13-16	1	4.16
17-20	2	8.3

4.10. Q sort and post-sort interviews

Data collection in Q methodology is achieved by Q sorting statements in the Q grid chart (Jeffares and Dickinson, 2016). Participants sort or rank statements in the Q grid of agreement and disagreement in a quasi-normal distribution. The quasi-normal distribution has columns ranged from two poles, representing points of strong agreement and strong disagreement. This feature of Q methodology does not allow duplication and prevents sorting everything into either 'neutral' or 'strong agreement'. The grid usually takes a shape of upside curve bell, ranging from -5 or -6 to +5 or +6. 'The precise shape of the grid tends to be a matter of judgment although there is some debate about how much the distribution actually affects the results' (Dariel, 2011, p. 111).

Brown (1980) argued that the structured distribution in Q grid forces the participants to sort statement cards in this shape consciously, with minimal influence on the pattern of the factors that emerge in the end. Brown (1980) demonstrated this using 33 statements and 14 distributions (including normal distribution, inverted distribution, both left and right skewed distribution, and rectangle distribution), which resulted in minimal influence on the subsequently emergent factors.

In addition, it is important to mention that the statements might be interpreted differently by each participant. In this regard, statement ambiguity is not problematic *per se*, as the method encompasses the concept that participants generate their own meaning for the statements. This work in Q methodology explores the views and opinions of participants concerning the phenomena of concern to the study, thus their own interpretations of the Q statements are intrinsically important for analytical purposes (Herrington and Coogan, 2011, Zabala et al., 2018) .

In this study, a room was booked in the HIHS and logistical facilities were provided by the Institute. The Q sort and post-sort interview was conducted in this room. Before each meeting, the Q statements were prepared and presented in laminated cards, each of which were 8 x 5 cm. The Q grid was printed on A0 laminated poster board, taped to the table. Prior to meeting, conditional instructions were provided to participants, printed on A4 paper and placed near to the grid sheet. The condition instruction was ‘considering your use of RLOs, sort the following statements on how you agree or disagree with them’.

Before each Q sort, the researcher reviewed the objective of the study with each participant, and informed them about the condition of instruction, as explained previously. The process of sorting was explained to each participant, and they were informed about interview and the purpose of the interview after the Q sort. A chance was then given to participants to ask any questions prior to signing the informed consent form, which each participant was then asked to read and sign if they agreed to participate, after which they began the sorting process.

In Q sorting process, participants are invited to read all card statements and separate them in the beginning into three piles: “agree with them”, “disagree with them”, and “unsure with them”. They then sort the cards in the Q grid, determining the degree to which they agree or disagree with the statements.

During the Q sorting process, participants were encouraged to ask if they have any enquiries regarding the process itself. After the participants completed the Q sort, they were asked if they still needed to change any placements of the cards. When they felt they had finishing the sorting, the researcher copied the result at sort onto an A4 paper sheet with a Q grid replicating the A0 one on the table, which was subsequently transferred to the computer software PQM. A digital picture was taken of the completed Q-sort sheets as a backup mechanism and to check data accuracy. Figure 4.3 shows the Q grid for this study.

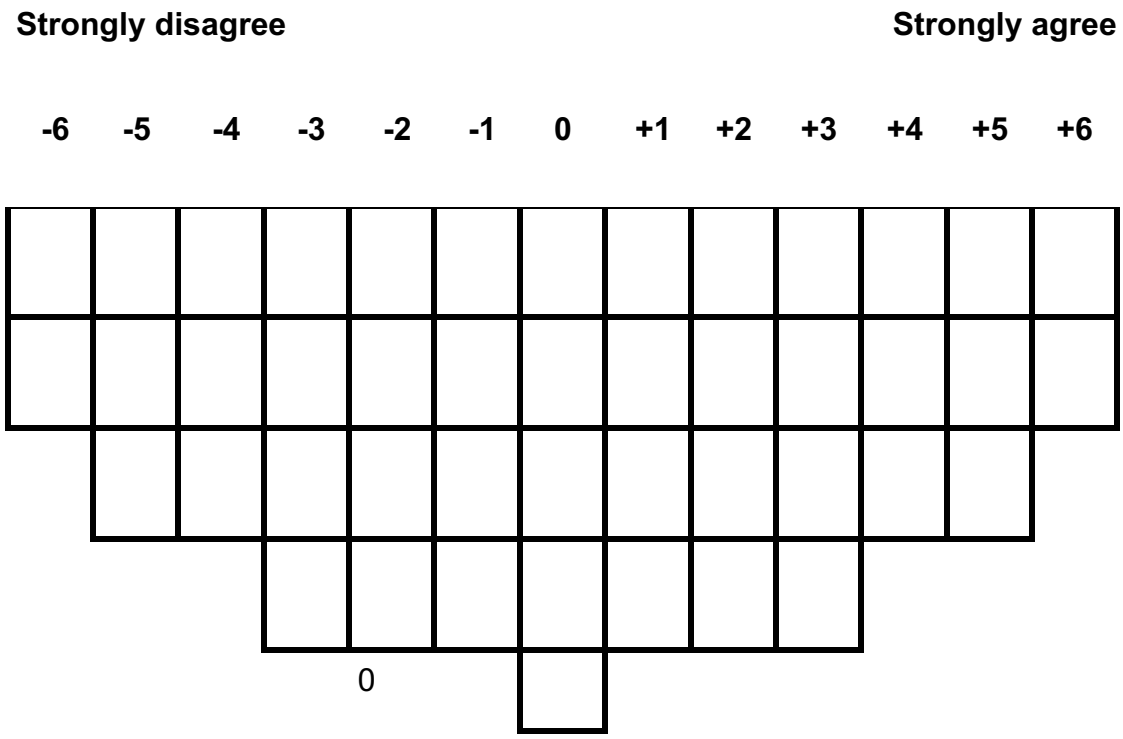

Figure 4.3: Q grid for this study

After the Q sort process was complete, the interview post-sort process was conducted. Interviews to support Q sort information have been found to be useful during the data interpretation phase (Jeffares and Skelcher, 2011). Such interviews are usually brief, including open-ended questions that might cover the interpretation of participants about the most extreme ends of the grid, querying whether they have any general comments about the whole process of the Q-sorting (Watts and Stenner, 2005).

Post-Q sort interviews seek to determine why participants place cards as they do in the Q sort response grid. This facilitates interpretive analysis of factor arrays in relation to participants' attitudes and perceptions relating to studied phenomena. The interview seeks to determine participants' values and beliefs that shape their own interpretations, and not to analyse what they think of the phenomena *per se*, which is expounded during the separate process of factor

analysis (Gallagher and Porock, 2010, Akhtar-Danesh et al., 2008, Watts and Stenner, 2005).

The post-interview is considered a complement for the final Q-sort data (VanExel and Graaf, 2005) and in recent online Q sort processes the interview has been omitted (Paige and Morin, 2015). However, traditional Q researchers argue that more in-depth insights can be gained from details on the reasons for certain statement positions in the Q sort grid. Therefore, in this study, once all statements were placed completely in the Q-grid, participants were asked to discuss their interpretations of the reasons they sorted statements in the way they did, and their responses were audio recorded (with their permission). All recordings were subsequently transcribed and uploaded to NVivo version 12 for the subsequent factor analysis and interpretation process.

4.11. Factor analysis

The purpose of factor analysis in Q methodology is to group similar views into factors, whereby participant views can be captured in the form of a Q sort. Q analysis involves three stages: correlation, by person analysis, and computation of factor scores (Ramlo and Newman, 2011, Brown, 1980). All collected data from Q sort were entered to dedicated software for Q analysis, namely PQMthod 2.35. This program was produced for Q methodology by Peter Schmolck and is an open resource, freely available online for any Q study (Figure 4.4).

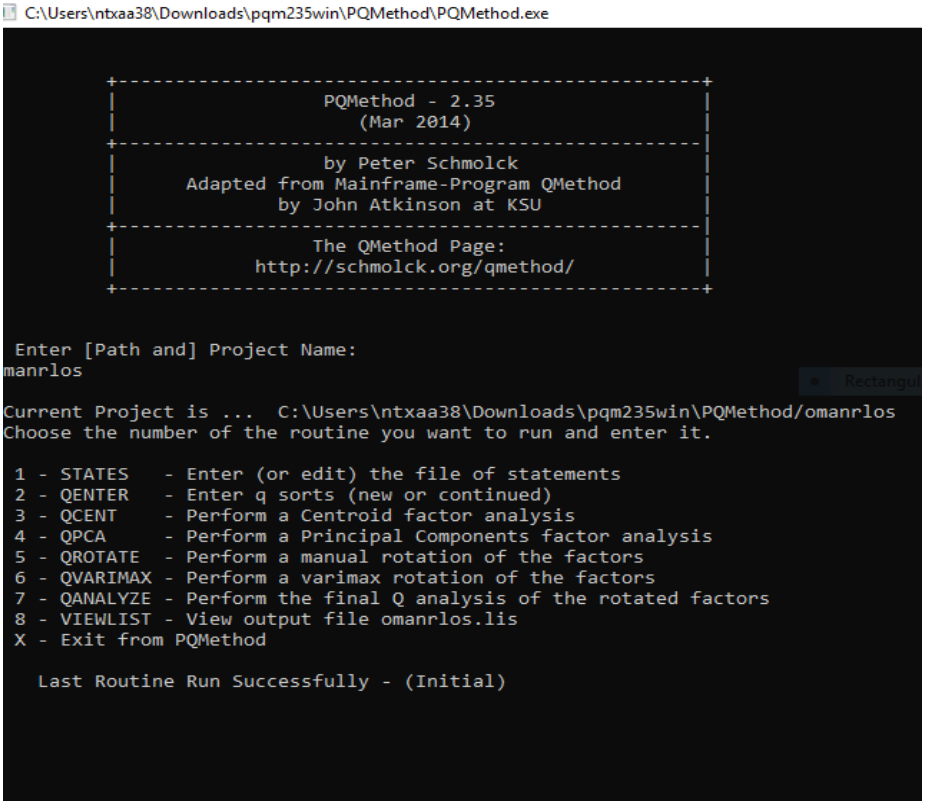

Figure 4.4: PQ method 2.35

Source: Schmolck (2014)

4.11.1. Correlation

After entering the 24 Q sorts in the PQMethod 2.35 software, the correlation matrix (Figure 4.5) was produced, which shows the patterns of relation between Q sorts as differences and similarities, which result in a factor at the end of the analysis. Each Q sort of each participant is inter-correlated with other Q sorts, yielding a resultant correlation matrix (Meshaka, Jeffares, Sadrudin et al; 2017, Watts and Stenner, 2012).

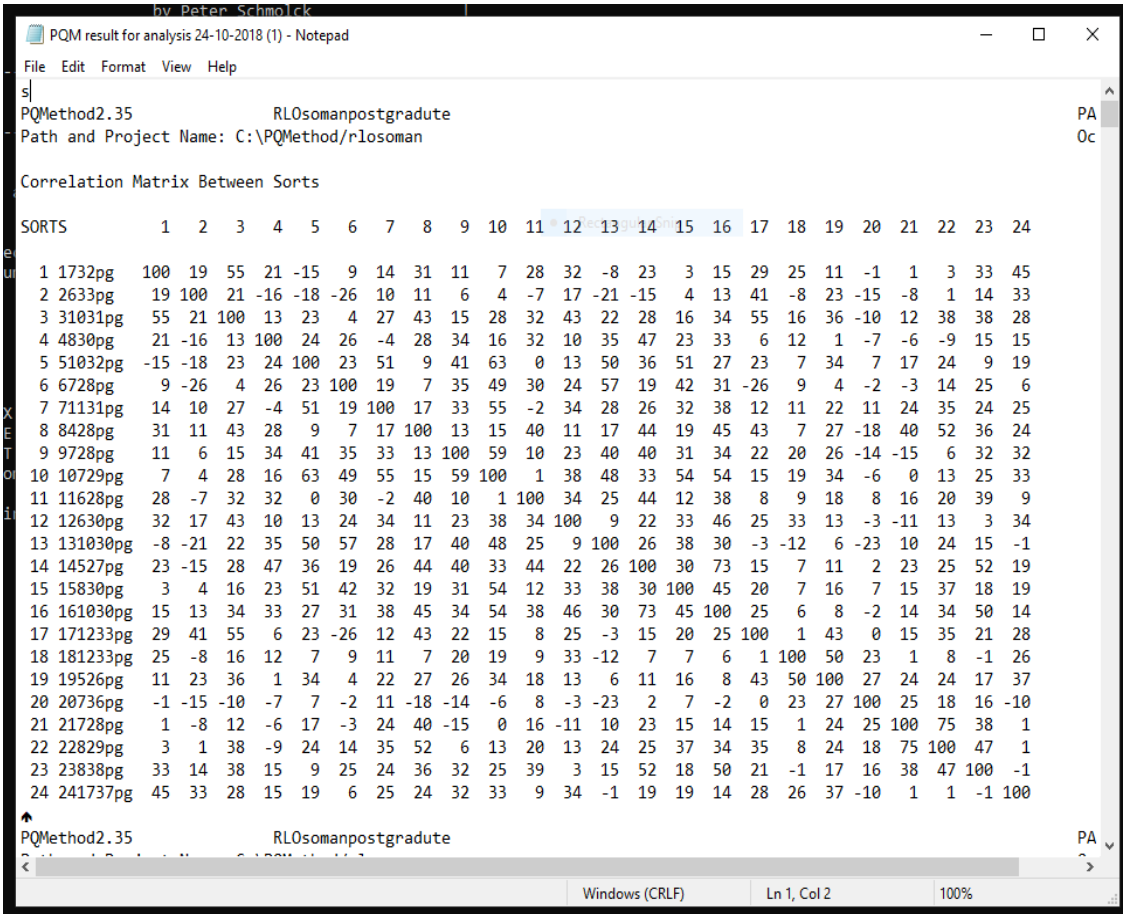

Figure 4.5: Correlation matrix for this study

4.11.2. Factor extraction

By-person factor analysis is employed in Q methodology, which is based upon correlations between participants represented by Q sort (Akhtar-Danesh et al., 2008). Participants' viewpoints are identified by the analysis to calculate the correlation coefficient between the Q sort, then correlated data undergoes the extraction process. In this study, PQMethod software (PQM 2.35) was utilized to analyse the data, as recommended for Q methodology research. Subsequently, statements which are most valued or most disagreed with will be clearly identified by factors. In this context, a factor represents a group of individuals with analogous views, feelings, and experiences in relation to the theme of the study. Factors are then interpreted by a qualitative view in a

narrative account. The correlated data went through an extraction process involving centroid factor analysis or principal component analysis (PCA), both of which extraction methods produce satisfactory outcomes (Dariel, 2011, Webler et al., 2009, Watts and Stenner, 2005).

Stephen (1953) and other Q methodology researchers prefer to use CFA for its indeterminateness, entailing consideration of alternative explanations rather than rushing to the best mathematical solutions, which could be easily result from PCA (Ramlo, 2016). As Ramlo (2016, 67) noted:

> 'Indeterminate means there is not one best solution but instead an infinite number of possible solutions. None of these infinite number of solutions violate statistical assumptions. PCA on the other hand has a single best mathematical solution'.

CFA was also preferred because of the theoretical reasons as explained by Wright (2013, p. 156), in terms of 'looking for factors that may chime in with a theoretical standpoint that the researcher or literature may identify'. Hence, in CFA there is a flexibility to test different solutions to get a group of sorts with similar pattern that can explore participants' views in depth. Although PCA and CFA tend to produce similar results (Webler et al., 2009), most Q methodology studies prefer to use CFA (Watts and Stenner, 2012, Ramlo and Newman, 2011, Brown, 1980, Stephenson, 1953) as it is believed that PCA statistical results could be restricted in discovering any theoretical aspects of potential relevance to the inquiry (Dariel, 2011). CFA was employed in this study as it was identified as a traditional method of extraction in Q methodology, preferred by most Q researchers for its indeterminacy (Brown, 1980, Ramlo, 2016, Watts and Stenner, 2012). As suggested by them a Factor could be extracted for

every six Q sorts. This means for this study with 24 Q-sorts, four Factors was extracted. Table 4.4 shows the four extracted factors.

Table 4.4: Four extracted factors

Factors	1	2	3	4
Sorts				
1: 1732pg	0.3774	-0.4886	0.1724	0.1051
2: 2633pg	0.0783	-0.4293	0.1274	-0.0461
3: 31031pg	0.6067	-0.4133	0.1168	0.1941
4: 4830pg	0.3336	0.0601	0.0038	0.1191
5: 51032pg	0.5066	0.4164	0.1422	-0.2649
6: 6728pg	0.3619	0.3952	0.1272	-0.0600
7: 71131pg	0.5304	0.1776	0.0262	-0.2618
8: 8428pg	0.5512	-0.1377	0.0099	0.5048
9: 9728pg	0.5221	0.1399	0.0168	-0.2357
10: 10729pg	0.6510	0.2672	0.0575	-0.4959
11: 11628pg	0.4306	-0.0370	0.0000	0.3484
12: 12630pg	0.4849	-0.2277	0.0308	-0.2074
13: 131030pg	0.3986	0.4807	0.1953	0.0124
14: 14527pg	0.6217	0.2102	0.0362	0.3262
15: 15830pg	0.5615	0.3012	0.0728	-0.1868
16: 161030pg	0.7029	0.1665	0.0236	0.1404
17: 171233pg	0.4366	-0.3977	0.1069	0.0449
18: 181233pg	0.2645	-0.1966	0.0222	-0.3143
19: 19526pg	0.4976	-0.2657	0.0435	-0.2941
20: 20736pg	0.0286	0.0376	0.0019	-0.0343
21: 21728pg	0.2938	0.1080	0.0105	0.2992
22: 22829pg	0.5271	0.0786	0.0061	0.2581
23: 23838pg	0.5555	0.1059	0.0102	0.3731
24: 241737pg	0.4195	-0.3855	0.0996	-0.3145
Eigenvalues	5.4302	1.9619	0.1707	1.6719
% Expl. Var.	23	8	1	7

The decision about how many factors to be identify and carried forward following extraction is difficult, However, Brown (1980) and Watts and Stenner (2012) identified certain criteria for retention of factors, and these are: the use Kaiser-Guttman criterion, the use of two or more significant loadings (the factor should have two or more significant q sort loading to be retained) and Humphrey's rule, these will be explained in more detail below.

In factor analysis, the Kaiser-Guttman criteria (Guttman, 1954) Kaiser rule, uses a standard of an eigenvalue (EV) of at least 1.0, which is often used to choose which factors are included in further analysis such as rotations. EV indicates factors' statistical strength and potential explanatory power, which suggests that factors can or should be retained if they have an EV of 1.00 or above (Watts and Stenner, 2012). The EV is calculated by summing the squared loading of all the Q sorts on the factor. For example, the EV for Factor 1 can be calculated by:

EV for Factor 1 = (Q sort 1 loading on Factor 1) ² + (Q sort 2 loading on Factor 1) ² + (Q sort 3 loading on Factor 1)² and + … (Q sort N on Factor 1).

Table 4.5 summarizes the Eigen value and explained variance for extracted factors for this study. The EVs are above 1 for Factor 1 (5.4302), Factor 2 (1.9619), and Factor 4 (1.67197), and below 1 for Factor 3 (0.17071). Q methodology researchers who extracted the factors with an EV of less than 1.00 justified that this actually accounts for less study variance than the Q sort (Watts and Stenner, 2012).

The Humphrey's rule suggested for a Factor to be retained the cross product of its two highest loadings should at least exceed its standard error which is computed by the formula: Standard error (SE) = 1/√number of statements, for this study was computed to: (SE) = 1/√45= 0.149≈0.15. The objective of using these criteria is for the final factors to account for as much of the variability from the original correlation matrix as much as possible (Watts and Stenner, 2012)

Table 4.5: Eigen value and explained variance table

	Factor 1	**Factor 2**	**Factor 3**	**Factor 4**
Eigenvalue	5.4302	1.9619	0.1707	1.6719
Factors met the Kaiser-Guttman's criteria	1	2	-	4
Factors that met the Humphrey's rule	1	2	-	4

Thus, by adopting the above criteria for retention of factors which are summarized in Table 4.5, the final factors retained are Factor 1, Factor 2 and Factor 4.

4.11.3. Factor rotation

Rotation is 'the process of manipulating the reference axes' (Child, 1970, p. 52). The factors are rotated to simplify the interpretation, as the unrotated factors tend to be complicated or overlap with many variables instead of only a few. There are two types of rotation: manual rotation (MR) and varimax rotation. MR, also known as judgmental or theoretical rotation, depends on the prior knowledge of the researcher concerning the issues of the study or the participants, or emergent ideas arising during the study (Ramlo, 2016, Watts and Stenner, 2012, Dariel, 2011, Webler et al., 2009, VanExel and Graaf,

2005). This technique allows the researcher to rotate factors of any size in different directions around the origin. It can be done by researchers with a predetermined theoretical context, so this rotation could lead to a subjective, data-driven solution (Watts and Stenner, 2012).

Varimax rotation is the default rotation option in statistical packages like SPSS and PQMethod software, and it is popular because of its ability to mathematically produce simple structures that maximize separated and clearest factors. Varimax rotation is the most common rotation used in statistical analysis to reduce the number of variables with high loadings in each factor (Akhtar-Danesh, 2017). It has the mathematical power to provide an orthogonal solution by rotating the factors at right angles to each other. Following the iterative process, variance is distributed in each factor, whereby each Q sort is associated with one factor only to reach maximum saturation, with as many Q sorts as possible in each factor (Watts and Stenner, 2012). In this study, varimax rotation was performed to find structured and easily interpreted factors.

The literature indicates that there is no right or wrong choice of rotation method in factor analysis in Q methodology, as the 'interrelationships of sorts are fixed by the sorts themselves, via their Q sort' (Ramlo, 2016, p. 79). The rotation only changes the axes, and does not rotate the sorts themselves (Zabala et al., 2018, Ramlo, 2016). In addition, the literature showed that both rotations were adjudged to yield similar results (Zabala et al., 2018). In this study, varimax was used to explore the dominant points of view of the participants through the best factor solution. Therefore, the four factors in Table 4.5 were rotated by varimax rotation, which resulted in the solution as shown in Figure 4.6.

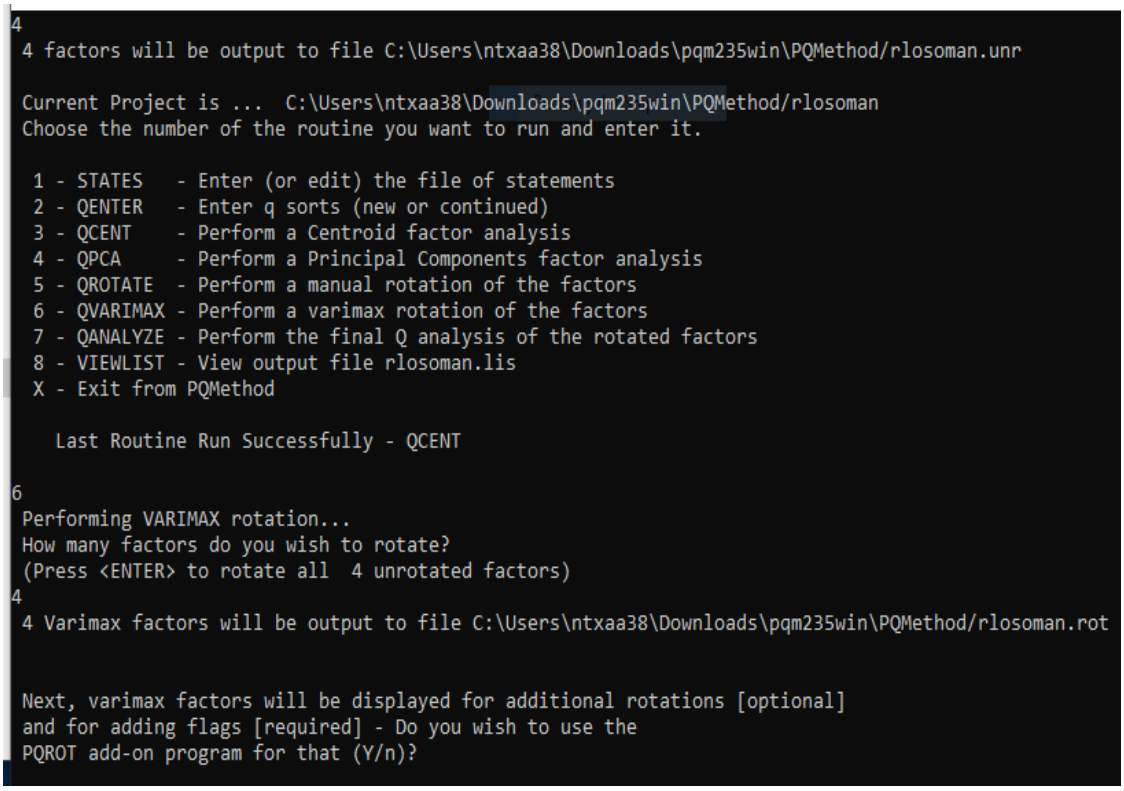

Figure 4.6 The step of performing varimax rotation in PQMethodology software

4.11.4. Factor loading

The factor loading is the result of factor rotation, which maximises the loading of the Q sort on a specific factor and 'flags' it (Dariel, 2011). Significant factor loading simply shows that the loading of each Q sort in the factor can be determined by calculating a significant loading factor at P=0.01 level with the following equation (Brown, 1980):

$2.58 \times (1 \div \sqrt{\text{number of items in the Q set}})$

The significant loading for this study = $2.58 \times (1 \div \sqrt{45})$

$= 2.58 \times 0.1490 = +/- 0.38$ (significant loading)

After determining the significant loading, the process of flagging each load in the factor in PQM 2.35 is important. Although PQM 2.35 has an automated

flagging system, Q researchers recommend flagging the loading manually, to ensure that each loading equal to or above 0.38 is flagged (Akhtar-Danesh, 2017, Mckeown and Thomas, 2013, Watts and Stenner, 2012) and to prevent mixing the Q sort or insignificant loading. The Q aim is to have Q sorts highly correlating on only one factor, with minimal or no correlations on other factors. Q requires this simple structure to be accompanied by coherent and interpretable factors. However, in practice some Q sorts could load significantly in more than one factor, which is called mixed load or confounded. A mixed load during the Q sort could happen to more than one factor, so some researchers suggest excluding mixed loading, because it makes it more difficult to interpret the factors. They explain that more than one factor results in a high correlation between factors, which indicates that factors that are too similar cannot be distinguished from each other (Akhtar-Danesh, 2017). Therefore, with manual flagging it is obvious that there is no significant loading, as the Q sort does not load in any factor (Watts and Stenner, 2012).

Therefore, in this study, manual flagging by the researcher is indicated by an X symbol near each load in Table 4.6, which clearly shows that Factor 1 has 7 significant loadings, Factor 2 has 7, and Factor 3 has 6. Table 4.6 also demonstrates that there is a mixed loading in Q sort 3 (Factors 2 and 3) and Q sort 16 (Factors 1 and 3), therefore, these loadings are excluded, as explained previously. There is no significant loading for Q sort 4 and Q sort 20, so these sorts are excluded.

Table 4.6: Factor matrix indicating defining sort

No.	Q sort	Factor 1	Factor 2	Factor 3
1	1 1732pg	-0.1258	0.5604 X	0.2851
2	2633pg	-0.1812	0.4116 X	-0.0184
3	31031pg	0.0060	0.5737	0.5095
4	4830pg	0.1604	0.0766	0.3117
5	51032pg	0.7017 X	0.0421	0.1543
6	6728pg	0.4963 X	-0.0862	0.2130
7	71131pg	0.5497 X	0.2177	0.1611
8	8428pg	-0.0461	0.2050	0.7304 X
9	9728pg	0.5065 X	0.2324	0.1731
10	10729pg	0.8019 X	0.2940	0.0686
11	11628pg	0.0314	0.1197	0.5411 X
12	12630pg	0.2444	0.4930 X	0.1444
13	131030pg	0.5402 X	-0.1476	0.2943
14	14527pg	0.3082	0.0354	0.6647 X
15	15830pg	0.6100 X	0.1192	0.2442
16	161030pg	0.4239	0.1714	0.5757
17	171233pg	-0.0128	0.5279 X	0.2876
18	181233pg	0.1965	0.3954 X	-0.0777
19	19526pg	0.2758	0.5611 X	0.0843
20	20736pg	0.0579	-0.0030	-0.0046
21	21728pg	0.0726	-0.0415	0.4241 X
22	22829pg	0.2060	0.1095	0.5440 X
23	23838pg	0.1779	0.0632	0.6507 X
24	241737pg	0.1762	0.6332 X	0.0073
	Variance	14	11	14

Note: X indicates flagging

Significant loading

No significant loading

Mixed loading

4.11.5. Factor arrays

Q methodology analysis explores the viewpoints of participants by taking many of their social viewpoints and narrowing them down to a few common thematic ideas (Tiernon et al., 2017). Statistically, Q methodology analysis creates a few new variables to justify the differences seen in many initial ones. Once factor scores have been computed, each factor is represented in a diagram showing all of the overall points of view, whereby factors are represented by 'gestalt' (Watts and Stenner, 2012), and no further reduction can be applied to the data. Thus, the factor array indicates where each statement was placed on the Q sort grid, which could be called the Q model or Q diagram, showing values indicating the relations between each item and factor.

The factor array is 'no more or less than a single Q sort configured to represent the viewpoint of a particular factor' (Watts and Stenner, 2012, p. 140). The arrays are the Z scores, which are the average scores specified by the statements of the Q sorts associated with them (Zabala et al., 2018). In this process the Q sort model is created by converting Z scores back to their original values, as shown in Table 4.7, with a column number, for example +6 and -6 creates the model of Q sort. The model will represent the theoretical sort of each respondent for each factor (Zabala et al., 2018). No participants would sort the cards exactly same as the model of Q sort, however, the model 'represent how a hypothetical respondent with a 100% loading on that factor would have ordered all the statements of the Q-set' (VanExel and de Graaf, 2005, p. 9).

In PQM 2.35, after flagging the Q sort to their specific factors, the factor arrays determined the weighted average of the sorts, as shown in Table 4.7.

Table 4.7: Q sample and factor arrays for each factor

No. Statement	F1	F2	F3
1: RLOs enable me to understand the topics	3	4	1
2: The use of different presentation materials (audio, video, text, pictures) enhanced my learning	6	2	6
3: The assessments at the end of each RLOs were useful	2	3	-3
4: Having a professional narrator commenting on the steps in the videos helped me pronounce the terms	0	0	-1
5: I can accomplish my learning tasks more quickly using RLO	-1	0	3
6: RLOs are as informative as the teacher	-3	-1	4
7: Using RLOs for my course improved academic performance in that subject	0	5	1
8: Using RLOs for my course increased my understanding of the subject	1	3	3
9: Using RLOs in my course are helpful in preparing for quizzes/tests/examinations	1	-1	1
10: I think that using RLO fits well with the way I like to study	-1	-2	2
11: I felt more engaged in learning using RLOs as compared to traditional sessions	-4	2	5
12: Using RLOs allow me to apply my knowledge more easily in practical sessions	-1	1	-2
13: Using RLOs allow me to apply my knowledge more quickly in practical sessions	0	5	-2
14: Using RLOs make my practice sessions more productive	-2	-2	0
15: The design of the RLO was consistent and allowed easy navigation	2	-3	-4
16: I could manage viewing the videos (repeat a step, forward, etc.) Easily	5	-5	1
17: When text was used “within” the videos, the font size was appropriate	3	-3	-1
18: Overall, I believe that it is easy to use RLOs to support my learning	5	1	6
19: I can use RLOs if there is no one around to tell me what to do as I go	4	-2	2
20: Having the information available online at all times helps me to catch up missed lectures/information	4	2	3
21: I like the flexibility of RLOs, as I can learn anytime, anywhere	-5	6	5
22: I have no difficulty accessing RLOs	-5	-3	-4
23: RLOs are compatible with other technologies I use	-3	-4	0

Table 4.7: Q sample and factor arrays for each factor (cont.)

No. Statement	F1	F2	F3
24: I prefer to use RLOs on my own	5	0	-3
25: The faculty members' supported the use of the RLOs	6	2	-1
26: I use RLOs because my teacher advised me to do so	2	6	-3
27: People (colleagues/students) who are important to me think that I should use RLOs	1	4	-5
28: Using RLOs in my program gives it more prestige	-2	-5	2
29: The overall quality of the RLOs was excellent	0	-4	3
30: The orientation and training I received on how to use the RLOs was sufficient	-3	-5	0
31: Guidance was available to me when using RLOs	-2	0	-2
32: Technical support was available to solve difficulties when using RLOs	-4	-4	-3
33: I have appropriate technology to use RLOs	-1	5	-2
34: I enjoyed using the RLOs to learn	-3	1	4
35: RLOs held my interest	1	0	4
36: I have the knowledge necessary to use RLOs	0	-2	-5
37: I have a lot of experience in the use of RLOs in my study	-6	-3	-4
38: The use of RLOs has become a habit for me	-5	-1	-5
39: I will use RLOs on a regular basis in the future	2	-1	0
40: If RLOs are available in other subjects I will use them	3	4	0
41: I will recommend others to use RLOs	4	3	5
42: My age affects my ability to use RLOs	-4	-6	-6
43: My gender affects my ability to use RLOs	-6	-6	-6
44: With RLOs I can take responsibility for my learning	-2	1	2
45: RLOs allow me to study in line with the outcomes of my course	3	3	-1

PQM 2.35 presented the overall factor loadings in tables with lists of statements and their associated Z scores. The Z score is the measure of the distance of

each statement from the middle of the distribution (Webler, 2009). For example, a statement with a Z score of -2.0 will be two standard deviation points below the midpoint of the mean of the distribution, which places the statement in the middle-far-left of the Q sort grid. Hence, the statements with the most characteristics of each factor are listed at the top of the factor arrays shown in Table 4.7 (shown in descending order).

Statements with different views are identified as distinguishing statements, whereas those with similar viewpoints are identified as consensus statements (Neilson et al., 2020, Jeffares and Dickinson, 2016). The distinguishing statements are placed in particular factors, as they are statistically significant in their position on the other factors, and they have different scores between the factors ($P < 0.05$ or < 0.01) (VanExel and Graaf, 2011). On the other hand, consensus statements having similar participant viewpoints are placed in statistically significant similar positions, to identify agreed viewpoints among all participants (Dariel, 2011).

Factor loading is an important element that determines which Q sort falls in each factor by the Z score, which is a crucial element in the interpretation of data (Ramlo, 2018). The Z score gives a deeper insight into phenomena compared to only considering the factor loading in R analysis. While R analysis focuses directly on the nature of the investigated issue or object and their features on the factor loading, Q focuses directly on the nature of the links and shared views points of participants that result from the factor scores (Brown, 1980). Therefore, the three factors in the study were interpreted using factor arrays, represented by the model Q sort for each factor in terms of distinguishing and consensus statements, and post-sort interview.

The distinguishing statements in the extreme of both sides of the grid (+6, +5 and -6, -5) are essential, and are considered significant to identify the most important issue to the participants, however it is very important to look at items ranked in the middle, to ensure that nothing obvious is missed or overlooked. Therefore, to simplify the interpretation of the statements, a crib sheet system was created that offers a systematic and methodical approach to interpret factors, with demonstrable rigour (Watts and Stenner, 2012).

4.11.6. Crib sheet

The Crib sheet facilitates the interpretation of the factors so that important issues to participants are not missed or overlooked. The crib sheet used in this study was that developed by Watts and Stenner (2012). It provides organization for the interpretation process, encouraging engagement in the interpretation of each item in a factor. The crib sheet also facilitates the interpretation of the factor by containing the necessary information, identifying the potential importance of ranked statements that in the middle or zero point of distribution. This helps to review each item's ranking with consideration of its implications (Watts and Stenner, 2012). The crib sheet includes the four basic categories:

1. Highest ranking item in the factor
2. The items ranked higher in factor array than other factors arrays
3. Items ranked lower in Factor 1 array than other factors arrays
4. The lowest ranking items in the factor

Details of each crib sheet for each factor are explained in Tables 6.4, 6.6, and 6.8 for Factors 1-3 (respectively).

4.11.7. Qualitative analysis

The interview data was processed using NVivo software 12, whereby each group of statements is assigned to a preliminary theme (e.g., either *agree statements* or *disagree statements*), under which there are a number of statement nodes. During the analysis of interview data, any viewpoints about the statement are coded to the number of the statement, which facilitates relating participant feedback to each Q sort. The narrative data from the interviews is presented in chapter 6.

4.11.8. Factor interpretation

Three factors of this study were interpreted using factor arrays (model Q sort): the distinguishing statement, consensus statements and the interview data. A crib sheet developed by Watts and Stenner (2012) was used to facilitate the interpretation of the factors in this study. NVivo software version 12 was used to code interview data and make nodes for statements, in order to organize them according to the factor results and facilitate the interpretation of the interview as related to the statements. The process of interpretation in this study described in detail in Chapter 6.

4.12. Summary

This chapter discussed the implementation phase of RLOs in Oman and the process of Q methodology. The implementation spanned four months, to give students time to use RLOs in their classes. The implementation process was done in collaboration with the HIHS administration in Oman, including academic staff administering PG nursing courses in ACCNP and ENP, and technical support personnel.

Q methodology process was applied in this study to measure subjectivity objectively, and explore participants' viewpoints. It is a mixed-method approach situated in the pragmatist paradigm. Each stage of the method was described, to show the building steps of the process. It has five sequential processes: concourse generation, Q sort development, participant selection (P set), factor analysis, and factor interpretations. The concourse for this study is derived from the literature around e-learning, nursing education, higher education (HE), UTAUT2, and Hofstede's (1991) Culture Model, with its related cultural dimensions. A total of 45 Q statements were subsequently developed in Q set development, via the described Q set development process. 24 participants were selected using P matrix. Post-sort interview was conducted, which considered as complement for the final Q-sort data. PQmethod 2.35 software was used for factor analysis, whereby three factors were extracted.

In addition, this chapter discussed the strengths and limitations of the Q methodology in detail, and the justification for using it was explained at length. This method is a pragmatic mixed-method approach of utility to analyze and interpret findings concerning the phenomena under investigation. Q methodology findings are discussed in detail in Chapter 6.

A follow-up qualitative study was conducted using semi-structured interviews with seven graduates one year after completion of their programs in their clinical areas, to explore the impact of RLOs in their clinical practice. The method of qualitative study is discussed in the following chapter, and the findings are presented in Chapter 7.

Chapter 5

Qualitative Study

5.1. Introduction

5.1.1. Overview

As mentioned in the previous chapters, Q methodology was used to achieve the objectives of this study:

3. To explore postgraduate nursing students' views on the factors influencing reusable learning objects (RLOs) adoption in Oman and use in clinical practice by using Q-sort.
4. To gain an understanding of the drivers and barriers for using and reusing reusable learning objects (RLOs) in Oman Higher Institute of Health Specialities.

This study also aimed to gain in-depth knowledge about the use and reuse of RLOs in clinical practice area, to understand the drivers and barriers of using RLOs in clinical practice in Oman. This is fundamental to the study aim of identifying drivers of and barriers to adopting RLOs among postgraduate nursing students in Oman, to improve their knowledge, skills, and confidence.

As the study sought a deep appraisal of perceptions, in-depth qualitative research was necessary to explore the meanings participants attached to the pertinent social contexts of learning (Silverman, 2016). The qualitative part was added for 'deep understanding of the particular' (Domholdt, 1993), to understand in-depth knowledge about the impact of RLOs in clinical areas among the graduates and to determine the long-term, sustained effects of the

intervention after the implementation during the first phase (Creswell and Clark, 2011).

Qualitative research employs non-statistical data to derive meaning and interpretations in order to gain a comprehensive understanding of a phenomenon or experience. For example, while methods of quantitative research can determine how many people engage in a specific behaviour or action, qualitative research methods can aid researchers in comprehending how and for what reasons such behaviours or actions occur (Vass et al., 2017, Clark and Sousa, 2017).

The task of the researcher in utilizing a qualitative research method is to open and delve into the views and mindsets of the participants of the study in order to gain an enhanced understanding of the overall picture and the meaning that people assign to their experiences. Qualitative methods provide in-depth context to understand phenomena, and can aid examinations of areas that are new, are relatively under-researched, or which are highly complex (Creswell and Clark, 2011). Qualitative research plays an increasingly important role in health economics, as it can assay subjective perceptions relating to service quality outcomes and patient satisfaction (Vass et al., 2017). Qualitative research is also highly valuable in terms of identifying and addressing barriers to changing practices in healthcare by exploring the expert views of healthcare professional (Al-Busaidi, 2008). Interviews with either clinicians or service users can yield in-depth insights into any problems or complications experienced in healthcare system service delivery, enabling appropriate EBP to improve services and efficiency.

A semi-structured interviews were conducted to explore impact and reusability of RLO in clinical practice among the graduates of critical care nursing program (ACCNP) and emergency nursing program (ENP) one year after graduation from the academic programs. Therefore, a semi-structured interview with seven graduates from different hospitals in Oman was conducted. The follow-up interview questions were applied during the interview to explore the impact of RLOs on clinical practice following the completion of the course. The following sections present the detailed research objective, design, sampling, data collection method, and data analysis techniques.

5.1.2. Research objective

The objective of the qualitative study is to explore the impact of RLO on the skill of graduates when practising in their clinical areas in Oman.

5.1.3. Research design

A qualitative design was used to explore the drivers and barriers of using RLOs in clinical practice, and the impact of RLOs on the clinical practice of clinical nurses one year after completing their nursing post-graduate education in Oman.

5.1.4. Participant sampling and selection

There are various methods of sampling in qualitative studies, including non-probability sampling techniques such as convenience, snowball, theoretical, and purposive sampling (Silverman, 2016). Each has particular criteria to achieve the objectives of the research and it is the role of the researcher to choose the most suitable options for the particular research objectives (Patton, 2015).

For instance, in snowball sampling the researcher identifies initial subjects to participate in the study, and subsequently engages these primary subjects' assistance to recruit further secondary participants with similar characteristics pertinent to the research. It is particularly useful to study hard-to-reach populations, such as when exploring sensitive issues (Etikan et al., 2015). It uses primary recruits as seeds who inform secondary subjects, growing a tree of participants (or a ball of rolled snow in the eponymous metaphor) to recruit an extensive number of a specific network (Patton, 2015). Convenience sampling is method where the researcher recruits participants that can be easily contacted (Miles et al., 2014). Convenience sampling is often coincidental, selecting participants for convenience of accessibility, such as living near the study site (Etikan et al., 2015). Theoretical sampling is used in grounded theory studies where participants could be selected according to the first analysis of the first stage of the study. Finally, purposive sampling involves identifying and selecting individuals or groups of individuals of participants who are particularly familiar with experienced intervention or phenomena (Creswell and Clark, 2011). The aim of this sampling method is to recruit participants that can produce detailed information and generate data about the phenomena (Green and Thorogood, 2004).

In addition to the knowledge and experience of the participants of the phenomena, it should be noted that the participants must be available and willing to participate in the study (Etikan et al., 2015). Therefore, in this study purposive sampling found to be more appropriate than theoretical sampling, as the study in this qualitative part aimed to answer part of the main objective of

the study, and not simply to follow-up the findings of the first study, which is in fact a different research question.

Moreover, purposive sampling is an ideal for this study as the aim is to generate rich data about the impact of RLOs on the clinical practice of graduates who experienced an RLOs educational intervention in their program one year previously, while they were studying in the High Institute of Health Specialities (HIHS). Qualitative studies aim for depth rather than breadth and numerical weight, thus they typically have a relatively small number of participants, although there are no absolute parameters for sample size (Mason, 2018). The selection of the sample and the size of the sample have to be appropriate to answer the research question (Patton, 2015).

Choosing the appropriate number of participants for each study required thoughtful decision making. Too many participants may produce superficial data, and too few may risk adequate depth and breadth of data (Sandelowski, 1995). While quantitative approaches seek to determine statistical significance, which determines certain minimum requirements for sample size, qualitative studies typically do not begin with an *a priori* sampling requirement, and the number of participants can be adjusted as the study progresses (such as ceasing to recruit more participants for qualitative interviews when data saturation is reached). The richness of collected data is the essential element in qualitative research rather than the number of participants, for the purpose of achieving statistical power. However, broader and more in-depth insights can typically be gleaned by using more participants; researchers must ultimately include as many participants as necessary achieve the study purpose, with the required richness of data (Patton, 2002).

The number of participants in studies using qualitative interviews usually ranges from 8 to 15 participants (Lopez and Whitehead, 2013) Some qualitative methodologists suggested guidelines for sample size. For example, Creswell (2009) suggested 3-5 participants for a case study, 10 for a phenomenological study, and 15-20 for grounded theory study. Morse (2015) noted that as few as six participants may suffice for a phenomenological study.

Therefore, six to eight graduates of the adult critical care nursing program and emergency nursing program were considered as an adequate sample size to provide in-depth data to answer the research question in this phase. Therefore, an email was sent to the 24 graduates who participated in the first phase of the study to inform them about the study and invite them to participate in the second phase. The email contained detailed information about the study and the nature of their informed consent. The graduates who replied to the initial invitation emails were invited to participate in the research. After eight of the graduates who responded signed the consent form, the interviews were scheduled according to their availability. However, one graduate at the end of data collection withdrew from the study due to unforeseen circumstances, thus the final number of participants was seven, from different hospitals in Oman.

5.1.5. Data collection method

The most common method used to collect data in qualitative studies is in-depth interviews, typically administered face-to-face. This is a vital format in exploratory studies. Semi-structured interviews can be used to gain specific information from the participants, guided by the pre-determined questions to retain focus on the issues being explored, while allowing some flexibility to explore emergent areas of interest. This method allows the researcher to cover

a list of questions or issues related to the research question. In addition, it gives flexibility to the researcher to digress and probe during the interview while interacting with the participants (Virginia, 2012).

In this study the researcher used telephone interview as the main advantage of the interview is specifically to concentrate on the research question of the study. This because interviews can be administered using alternative communication methods, such as remote interviews (e.g., by telephone or video conferencing), which has increased in recent years due to improved online technologies to facilitate this, reducing the costs of traditional interview formats (Vogl, 2013, Irvine, 2010, Novick, 2008). For instance, they can obliterate distance-related barriers, enabling ubiquitous contact with interviewees all over the world, extending the scope of potential research subjects and enabling access to hitherto inaccessible populations (Glogowska et al., 2011). In addition, 'interacting from separate physical locations can be more convenient for both parties, letting each stay in a familiar and safe environment' (Kazmer 2008, p. 265). Moreover, remote interviews are more flexible in terms of time and place. However, traditional face-to-face interviews are more conducive to developing rapport with participants, which can elicit fuller and more frank disclosures of information. They also enable the researcher to capture paralinguistic features and nonverbal cues, although telephone interviews can also elucidate more information on sensitive subjects due to being perceived as less interpersonal by interviewees, with reduced social pressure (Ryan et al., 2009, kazmer, 2008, Wilson et al., 1998).

Telephone interviews were conducted with graduates, who move from the capital to regions where they work. These regions are far from the capital

(Muscat), and the shortest period to travel to such regions would be 3.5 hours (the longest duration could be up to 12 hours). In addition, these participants were working in critical areas and they are busy most of the time, thus telephone interviews were an expedient and appropriate choice, given the situation and the nature of their type of work. Hence to save time and to arrange time for interview that suitable to participants, phone interviews were seen as a good choice to collect data in this study.

Conducting interviews via phone has some advantages, and prolonged engagement with participants by telephone or email is generally recommended even when these are not the primary method of data collection; this is also generally necessary to explain the study, participant rights, and ethical issues (Glogowska et al., 2011, Musselwhite et al., 2007) In order to facilitate interviews and avoid attrition (participants dropping out), interviews ought to be conducted at the convenience of interviewees as far as possible, and rapport should be built up by conventional interpersonal communication ancillary to the academic purposes of the data collection method. This can accompany the full disclosure of interviewees' rights and the study features and possible benefits. It is also recommended that novice researchers have training and practice prior to conducting interviews, and that they conduct reflective post-interview de-briefing following them (Glogowska et al., 2011).

Following these guidelines, in the current study a reminder was sent to participants prior to the interviews to remind them of the schedule and to ask if they were still available, or if they would prefer to reschedule for a different time. At the outset of interview sessions, the researcher repeated the explanation of the purpose of the study and the nature of the interview, reiterating participants'

rights and the right to withdraw. During interviews the researcher followed the participants' talk and probed them with follow-up questions when needed. Before finishing the interviews, the researcher briefed the participants about what been discussed and asked if they would like to add anything else.

Semi-structured interviews were conducted to explore the impact of RLO on the skill and knowledge of nursing graduates in their clinical practice in Oman. Table 5.1 shows the semi-structured interview questions used to interview the participants. The questions in the semi-structured interviews were formulated based on the reviewed literature presented in Chapter 2. To ensure the validity of the data collection tool, the questions were reviewed with an expert from the HELM team in UoN. In addition, the questions were reviewed with supervisors who experts in this area are to maintain validity. Piloting was done with two students from the UoN School of Health Sciences, who used RLOs. Moreover, the questions reviewed with lecturer PhD student in UoN from Saudi Arabia who has experience in RLOs. Eventually, these questions were finalized with the research supervisors, who are experts in the field.

- How RLOs have an impact on your clinical practice?
    - Why had you remembered to use RLOs?
    - How did you use RLOs, in the phone or in the computer of your department?
    - Can you explain the situation when you used RLOs?
    - What information you gained from RLOs?
    - How did you use the information you gained from RLOs in your clinical practice?
- How many RLOs you used during your clinical practice?
    - Which RLOs you used?
    - Why you used these RLOs?
    - Why the articles and resources in RLOs were important to use?
- Would you recommend the RLOs to other people after graduation in clinical areas?
    - To whom you recommended RLOs?
    - Why had you recommended RLOs to other people?
- What other resources from internet you used to gain knowledge for clinical practice?
    - What were these resources?
- Any general comments on using RLOs in clinical practice?

Table 5.1: Semi-structured interview questions

The process used telephone interviews with seven nursing graduates from different department and hospitals in Oman. There must be an adequate amount of time for RLOs as a new technology to be applied consistently, from the first implementation stage and diffused into the practice area (Gross et al., 2018). Therefore, the interviews took place one year after the nurses graduated from the critical care nursing program and emergency nursing program from 25/7/2019 till 10/9/2019. Each interview took approximately 30 minutes and was audiotaped, with participants' permission, and observance of confidentiality etc. (as discussed in the ethical consideration section). The results of the interview questions were explained in terms of major themes that appeared from the interview data analysed. In addition, the different RLOs used by the graduates were described.

5.2. Qualitative data analysis

5.2.1. Process

The researcher followed advice that interviewers who audio-record interviews should transcribe their contents as soon as possible after conducting the interview, writing any supporting comments noted during the interviews themselves or during transcription, while their memory of the session remains fresh (Lincoln and Guba, 1985). The transcripts were checked by the research supervisors, who agreed that the researcher should enter the data into Nvivo 12 software, was which used to organize the transcript data (Grbich, 2011). Thematic analysis (TA) was used to analyse the data and to identify the recurrent key themes, which were assigned codes. The coding process was discussed with supervisors, who affirmed the thematic categorizations. Subsequent analysis of codes led to their grouping under themes, which were

assigned relative importance according to TA analyses in relation to the phenomena under investigation (Nowell et al., 2017). TA is a popular method in qualitative research as it is flexible and accessible (Braun and Clarke, 2006). The process of transcription, insertion in Nvivo software (12), coding, and thematic analysis were reviewed by the supervisors of this study from UoN.

There are a different guideline showing the steps of TA. In this study the analytical approach used followed the guidelines of thematic analysis provided by Braun and Clarke (2006), which had clear steps of TA in six phases: familiarization with the data, generating initial codes, searching for themes, reviewing potential themes, defining and naming themes, and final analysis and producing the report. These steps are described in Table 5.2.

Table 5.2: The six phases of thematic analysis

Phase	Process
1. Familiarization with the data	The researcher listened to the audiotape carefully, and transcribed the recordings, then read and re-read the transcriptions to achieve data immersion, making notes when necessary to help the analysis while reading the data. It is important to read actively, analytically, and critically, and to start to think about what data mean. Common threads and patterns in the data can be noted initially in this phase.
2. Generating initial codes	This is the coding phase of TA. The systematic analysis of the process begins in this phase. Coding is done by summarizing a portion of data which stays close to the original content and assigns it meanings. Coding can be done manually, by highlighting data indicating patterns, or by a software program like Nvivo 12, tagging and naming the selected items in the data. These codes are relevant to answer the research question.
3. Searching for themes	In this phase the codes are grouped under themes that 'capture something important about the data in relation to the research question, and represent some level of patterned response or meaning within the data set' (Braun and Clarke, 2006, p. 82). Different codes are sorted into potential themes by starting to think of possible relationships between the codes and clustering them in themes. These are then organized into themes and subthemes, which can be done manually or using the software program.
4. Reviewing potential themes	This is considered a quality checking phase where the themes are recurrently reviewed in relation to the coded data and entire data set. Internal homogeneity and external heterogeneity are considered. In internal homogeneity the data within the theme need to be coherent and have a meaning. To achieve external heterogeneity the themes need to be obviously different from each other.
5. Defining and naming themes	In this phase the researcher has to have the ability to 'clearly state what is unique and specific about each theme' (Braun and Clarke, 2012, p. 66). The researcher defines the meaning of each theme and determines the information dimension captured by each. The name and definition of each theme is reviewed to ensure the clarity of the name and the definition.
6. Final analysis and producing the report	In this phase, the research offers a concise, logical, fluent, and clear descriptive analysis of the data, without repetition, building a meaningful and interesting account of the narrative story emerging within and across themes, pertinent to the research question.

Adopted from Braun and Clarke (2006)

5.2.2. Data trustworthiness

The researcher needed to establish reliability and internal and external validity within the data analysis in both the quantitative and qualitative research aspects. Reliability is the ability to replicate the research findings or methods and data collection tool to another study context using similar methods ((Patton, 2015). Internal validity concerns whether the study is investigating what it is supposed to be investigating, while external validity pertains to the extent to which the study findings are generalizable (Silverman, 2016). However, reliability and validity are mainly used in quantitative studies, and other terms with similar meanings are used in qualitative research. Instead of reliability and validity, for example, the term 'trustworthiness' was suggested by Lincoln and Guba (1985) for qualitative study. Trustworthiness is used to ensure the rigour of the data and that participants views are reflected accurately in the analysis (Connelly, 2016). Trustworthiness has four general types: credibility, transferability, dependability (Lincoln and Guba, 1985). These types are discussed below to demonstrate how trustworthiness is reflected in this study.

5.2.3. Credibility

According to (Tobin and Begley, 2004) credibility examines fit between the opinions of participants and their interpretation by the researcher. It can be examined by different activities such as prolonged engagement, member checking, triangulation, and peer debriefing (Nowell et al., 2017). These strategies have been applied to increase the credibility of the research.

Prolonged engagement refers to the intensive participation of the researcher in the research study context, to allow participants to become accustomed to the researcher, building rapport, familiarity, and trust (Krefting, 1991). The gained

trust enables the researcher to get in-depth data to explore phenomena comprehensively (Creswell and Clark, 2011). Prolonged engagement is assumed in this study due to the researcher being from the same country and culture as all participants. The researcher worked in the nursing school in which the participants received their nursing education. The researcher implemented the RLO intervention in HIHS and continued to communicate with staff and students to learn how they experienced its use it in their course. Besides, the researcher continued to follow the implementation process with the Institute administration, to facilitate the implementation for nursing students, and to communicate with staff and students if any technical support was needed during the implementation. The researcher also collected the data and interviewed the participants for this study.

Member checking is recommended to improve credibility, concerning the ability of the researcher to examine the data collection process to understand the participants' responses and interpret them appropriately to reach reliable results (Mason, 2018). This will be applied in this study by sending a summary of the findings to the participants before publication and dissemination.

Moreover, frequent peer debriefing with supervisors is recommended to reduce bias, especially for novice researchers (Morse, 2015). Continuous discussion of the methodology, analysis of the data, and interpretation with peers is recommended to widen the experience of the researcher relative to the ideas and experiences of others (Shenton, 2004). Peer debriefing in this study was applied by regular meetings with supervisors throughout the full process of the research study, in person, and by messages and emails. In addition, it should be noted that the supervisors specialize in a contextual background different

from the research's own. This proved massively supportive and helpful during the data analysis stage, when the supervisors raised doubts and questioned certain aspects to uncover obscure meanings in the analysis. This was an important stage of analysis, which ultimately enriched the findings of the study and showed the benefits of reflexivity.

5.2.4. Transferability

Transferability is degree to which the research findings can be transferred to other research contexts with similar phenomena (Silverman, 2016, Patton, 2015). It is equivalent to external validity in quantitative research (Silverman, 2016). Transferability can be achieved by describing in detail the characteristics of the original sample, setting, data collection process, and data analysis (Hadi and José Closs, 2016, Miles et al., 2014). It entails rich details about the research context and the pertinent theoretical paradigms in relation to the research study. The findings of the study ought to be reported with thick description, to facilitate assessment of the transferability of the findings to other settings (Miles et al., 2014). In this study, in-depth description of details of the study is presented with extensive details on the purposive sampling method used.

5.2.5. Dependability

Dependability relates to the consistency and stability of the research process over time (Korstjens and Moser, 2018). It can be described as equivalent to reliability in quantitative studies, whereby the research findings might be consistent when conducting a similar study in another setting (Lincoln and Guba, 1985). Dependability can be demonstrated through various strategies like external audit, triangulation, stepwise replication, member checking, peer

examination, and code-recode procedure (Krefting, 1991). In this study, dependability was applied thorough the supervision meetings, wherein the process of the data analysis was checked and discussed to reach the results. The analysis steps and process were discussed continuously with the supervisors and recorded in supervision meeting record. The supervisors checked the coding and recoding process with the researcher to ensure appropriate themes were produced from the data analysis. The finding of the analysis is reviewed frequently and continuously with the supervisors and with experts on RLOs in UoN.

In summary, the trustworthiness of the data was established in the study through appropriate measures to ensure credibility, transferability, and dependability, which maintained the reflexivity of the analysis process. The results of the data analysis are discussed in chapter 7.

5.3. Summary

The follow-up qualitative study used to explore the impact of RLOs in the clinical practice of the graduates. The qualitative study used to explore in depth knowledge for the reusability of RLOs in the practice area. This is the reusability of RLOs an important features especially as open education resources and transferred from one country to another. The sample size were seven graduates from clinical practice who graduated from ACCNP and ENP and used RLOs in their practice. The participants were interviewed by using semi-structured interview and the interview. Thematic analysis used to analyse the data. TA is a popular method in qualitative research as it is flexible and accessible (Braun and Clarke, 2006). The results of the qualitative study are discussed in Chapter 7. The following chapter presents the Q methodology findings.

Chapter 6

Q Methodology Findings

6.1. Introduction

This chapter describes the results of the by-person factor analysis done on 24 Q sorts collected at the Higher Institute of Health Specialities (HIHS) in Muscat, Oman, from March to May 2018. As mentioned in the previous chapter, PQM 2.35 was employed to analyse the data. First, the Q sorts were correlated, then the factors were extracted and rotated. This was followed by varimax rotations to facilitate the interpretation of each factor. Three factor solutions were determined through CFA to optimally fit the data about the participant's viewpoints.

Section 6.2 illustrates the three-factor solution, and section 6.4 discusses the factor narrative, where each factor is followed by its Q sort model. This Section presents factor narratives for the three factors (Traditionalist, Pragmatist, and Self-Regulator) and consensus statements.

6.2. Three-factor solution

As mentioned previously, three-factor solution was determined to be optimum for representing the viewpoints of participants in this study:

- Factor 1 explains 14% of study variance, significantly associated with seven participants.
- Factor 2 explains 11% of study variance, significantly associated with seven participants.

- Factor 3 explains 14% of study variance, significantly associated with six participants.

Factor 1 has 7 participants loaded in it (7/24, 29%), 7 participants loaded in Factor 2 (7/24, 29%), and 6 participants loaded in Factor 3 (6/24, 25%). 2 participants did not load on any factor, and 2 participants had confounded or mixed loadings, as previously mentioned in Chapter 4, which means in practice that some Q sorts could load significantly in more than one factor that are excluded. Table 6.1 shows the three factors and the participants load in each factor.

Table 6.1: Three factor solution participant loading

	No. participants loaded in factor	**Percentage**
Factor 1	7	29
Factor 2	7	29
Factor 3	6	25
confounding	2	8.3
Non-significant	2	8.3

6.3. Factor characteristics

Table 6.2 shows the degree of correlation between the three factors. According to Cohen's (1969) guidelines, which are widely used as benchmark values, 0.2-0.4 is considered small correlation, 0.5-0.7 is medium correlation, and 0.8 and above is large correlation. Using this guideline, Factors 1 and 2 have small correlation, Factors 1 and 3 have small correlation, and Factors 2 and 3 have small correlation. The correlations of the factors in Q methodology are shown in the factor narrative as consensus statements. Cohen's (1988) criteria of

interpretation of correlation coefficient are generally used, depending on the context and purposes. Table 6.3 shows the statistical characteristics of the three factors, indicating their strong reliability, as shown by the composite reliability scores of 0.960 to 0.966.

Table 6.2: Correlation between factor scores

	1	2	3
1	1.0000	0.3078	0.3347
2	0.3078	1.0000	0.3403
3	0.3347	0.3403	1.0000

Table 6.3: Characteristics of the three factors

	1	**2**	**3**
Number of participants	7	7	6
Composite reliability	0.966	0.966	0.960
Standard error of Z-factor scores	0.186	0.186	0.200

6.4. Factor narratives

The three factors will be described in this section by using the statements, along with their placement on the grid with the post-sort interviews. After each Q sort model of a factor, a narrative provides a holistic view of the factor. The factor narrative starts with distinguishing statements tables using the crib sheet system to facilitate the interpretation of factors (Watts and Stenner, 2012), showing the statements' placement (Q sort models for Factors 1-3, as shown in Figures 6.1-6.3 in the following subsections). The crib sheet ensures that every item in the factor is included, with none missed or overlooked. It

encourages a holistic view of the factor, to produce a genuinely comprehensive factor interpretation (Watts and Stenner, 2012). In addition, Table 6.5 shows distinguishing statements and particular Z scores, to show the differences indicating significance ($P < .05$; asterisk (*) indicates significance at $P < .01$) between factors, which facilitates interpretation.

6.4.1. Factor 1: Traditionalist

Figure 6.1 shows the Q sort model for Factor 1.

Strongly disagree												Strongly agree
-6	-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5	+6
43	21	42	6	44	5	29	27	26	17	19	16	25
37	38	11	34	31	33	13	35	15	40	20	24	2
	22	32	23	28	12	7	8	39	1	41	18	
			30	14	10	36	9	3	45			
						4						

Figure 6.1: Factor 1 Q sort model

(See Table 4.7 for statements)

Distinguishing statements for Factor 1

Table 6.4: Factor 1 crib sheet

No.	Statements	Rank
	Items ranked at +6	
25	The faculty members' supported the use of the RLOs	+6
	Items ranked higher in Factor 1 array than in other factor arrays	
16	I could manage viewing the videos (repeat a step, forward, etc.) easily	+5
24	I prefer to use RLOs on my own	+5
19	I can use RLOs if there is no one around to tell me what to do as I go	+4
20	Having the information available online at all times help me to catch up missed lectures/information	+4
17	When text was used "within" the videos, the font size was appropriate	+3
45	RLOs allows me to study in line with the outcomes of my course	+3
15	The design of the RLO was consistent and allowed easy navigation	+2
39	I will use RLOs on a regular basis in the future	+2
36	I have the knowledge necessary to use RLOs	0
	Items ranked lower in Factor 1 array than in other factor arrays	
7	Using RLOs for my course improved academic performance in that subject	0
8	Using RLO for my course increased my understanding of subject	+1
5	I can accomplish my learning tasks more quickly using RLO	-1
10	1 think that using RLO fits well with the way 1 like to study	-1
44	With RLOs I can take responsibility for my learning	-2
14	Using RLOs make my practice sessions more productive	-2
34	I enjoyed using RLOs to learn	-3
6	RLOs are as informative as the teacher	-3
11	I felt more engaged in learning using RLOs compared to traditional sessions	-4
21	I like the flexibility of RLOs, as I can learn anytime, anywhere	-5
22	I have no difficulty accessing RLOs	-5
	Items ranked at -6	
37	I have a lot of experience in the use of RLOs in my study	-6

In this factor the students disagree strongly with 'I have a lot of experience in the use of RLOs in my study' (#37, -6). They did not find RLOs as informative as teachers (# 6, -3), and they need faculty members to negotiate and clarify doubts with them. They felt more engaged in traditional sessions than learning using RLOs (#11, -4). This is supported by what students as following:

'Because I prefer to use books more, traditional ones' (S6)

'Because my type is not like reading like emm… reading from computer or screen… my type is to touch the things like books or something any materials can touch it' (S13)

Therefore, factor described as traditionalist, whereby people learn through the tradition methods of teaching. Learning is teacher centred where the instructor delivers materials through lectures. Books are considered the primary resources for learning the content and assessment which is the written examination (Gupta, 2011). Students valued face-to-face education and had limited experience of online learning. In the first factor, the participants fall under the category of traditionalist learners, where learning is passive process. They need teachers to act as facilitators to help them to be active and involved in the learning process.

Factor 1 (Traditionalist) is defined by seven participants from an Adult Critical Care Nursing Program (ACCNP) and Emergency Nursing Program (ENP). These participants include two males and five females, aged between 27-31 years old, five of them are between 27-30, and two of them are between 31-32. They have 5-10 years' experience in nursing.

In comparing Factor 1 with the other factors as seen in Table 6.5, 16 statements differentiate it from the other two factors (at $p<0.05$), with 13 of the statements significant at $p<0.01$. It is clear from crib sheet (Table 6.4), the participants in this factor strongly agreed with statement (# 25, +6), that the faculty members supported the use of the RLOs, and student comments also supported their ranking of these statements in this factor.

> *'Actually, they are the ones who told us about the website, without which we will not know how to use it and to access it'* (S1)
>
> '*yes, I agree… the faculty members were recommending strongly to use the RLOs during our class, and because of the faculty members I used RLOs… And that's why I agree where it says that "my teacher advised me to use RLOs"*' (S15)
>
> *'Yeah… Because they have the same feedback that RLOs is beneficial… and helpful and it is good to go through it' (S9)*
>
> *'Yeah… because … emm… the faculty members' supported the use of RLOs… they also… emm, remind us of using it each time… they introduced RLOs with support… and in future I think we will use it regularly'* (S10)

They agreed that they could easily manage viewing the videos (repeat a step, forward, etc.) (# 16, +5). They agreed that design of the RLO was consistent and allowed easy navigation (# 15, +2). This suggests that some features of RLOs were acknowledged by the students in this group. One of the features of RLOs that this group appreciates is the navigation in each RLO, they could navigate the information in the RLOs easily. In addition, they agreed that the text used 'within' the videos, including the font size, was appropriate (#17, +3). The students expressed their agreement that the text within the video supported their understanding of the topic. They benefitted from visualization of the video and reading the text to enhance their knowledge while they watched the video. They agreed strongly that the use of different materials (audio, video, text, and pictures) enhanced their learning (#2, +6).

> *'I like the variety in the RLOs, video and text… I like the audio explanation of the video… it has good learning materials, so I strongly agree with it'* (S7)

> *'as I mentioned there is a different type… emm… for example if you are such person who likes audio, you can get if, you like visual it is also there… emm… so it is different technique'* (S9)

The group in Factor 1 prefers to use RLOs on their own and RLOs help them to catch their missed lectures and information (# 24, +5, # 20, +4) as supplementary resources related to lectures. They can use RLOs autonomously, without direct instruction, and they have the knowledge necessary to use RLOs (# 19, +4, # 36, 0). They think that RLOs allow them to study in line with course outcomes (# 45, +3).

'yes I agree… if I study or search, especially if there is a video, I like to do it by myself, and this is helping me to concentrate… For example… I sometimes go to a room and study myself… this is me' (S15)

'it supports our learning and also support… including the drugs, especially in our speciality… and so it has a lot of things that we can use it in our study and it helps us to read our assignment… so it's helpful…' (S6)

This is as well clear in the statement (#39, +2) where they agreed in using the RLOs regularly basis in the future as support from the faculty members. They agreed that they used RLOs because their teacher advise them to do so (#26, +2)

'*Yeah… because, aa… the faculty members supported the use of RLOs… they also remind us of using it each time… they introduced RLOs with support… and in future I think we will use it regularly'* (S10)

However, they did not find RLOs as informative as teachers (# 6, -3), and they need faculty members to negotiate and clarify doubts with them.

'But emm… although the benefit which is with RLOs and it is… emm… strongly agree with this application, but it cannot be emm… as informative as a teacher… because with a teacher we have to negotiate… we have to clarify more doubts because emm… but with this I cannot emm… question, I have only to get the information' (S7)

They felt more engaged in traditional sessions than (Factor 1, Traditionalist) learning using RLOs (#11, -4).

> *'Yeah, I told because it is not that much simple according to me… because I am not using those… because I prefer to use books more, traditional ones'* (S6)

> *'Because my type is not like reading like emm… reading from computer or screen… my type is to touch the things like books or something any materials can touch it and feel it, the e-learning… most of seeing things so my type concerning learning things from the books more than from the screen'* (S13)

The responsibility for learning within this group might need human facilitators most of the time, and the students in this group disagreed with statement that they can take responsibility for their learning with RLOs (#44, -2). They explain the reason behind it that they need to interact with faculty members while they are taking learning process, this is evidence by the statement of the student S7:

> *'I cannot interact with it,, I think it is sharing the responsibility, between me and faculty members, I need their guidance to learn'*

The students in this group felt that their way of study could be different from using technology like RLOs. They think that using RLOs might not fit with their way of study (#10, -1), including different ways like listening to teachers and taking notes. Students in this group mentioned reading books as well, which they think are more reliable to gain information. One student mentioned this clearly in the narrative data.

'because not everything is there… and I think the books are more reliable than the internet, through the publishing of books. And what is on the internet will not go through the same process for books, that's why books are more reliable' (S13)

The limited experience with this type of learning such as RLOs could explain why students in this factor as mentioned above prefer mainly to use traditional ways of learning. Therefore, these students disagree strongly with 'I have a lot of experience in the use of RLOs in my study' (#37, -6).

'we do not have this system here, we just started to use it, so I do not have much experience about it' (S9)

The participants did not agree on the flexibility of RLOs, enabling them to use it anytime, anywhere (#21, -5). This is because they felt there was no technical support to solve difficulties when using RLOs (#32, -4). They also agreed that they have difficulties while accessing RLOs from the Institute (# 22, -5). They expressed that the internet speed in the Institute did not support them to open some RLOs there.

"here… emm… I like that I can study anytime… but not anywhere… I think it is because of the internet connection, and I am not carrying my laptop all the time, and I like to study anytime… and I like to use my phone… some of the RLOs are not opening in the phone… and in some places there is no WiFi… so it will affect my learning…" (S15)

In addition, they did not enjoy using RLOs to learn (# 34, -3). Enjoyment of using RLOs was undermined by internet connection issues, which was clear from the

following quote, indicating that students enjoyed RLOs, but the weak WiFi frustrated them.

> *'the RLOs are enjoyable… its technology, so I prefer it, and I enjoyed watching the videos… I did not agree, emm, the… internet was weak sometimes… the video will disappear in between'* (S15)

The experience of enjoyment differs relative to personal preferences. For instance, as mentioned previously and reiterated in the following example, some students preferred reading paper books rather than learning from screens.

> *'my type is not like reading like emm… reading from computer or screen … my type is to touch the things like books or something, any materials where you can touch it and feel it, the e-learning… mostly its' seeing things, so my type concerning learning, I prefer things from books more than from the screen'* (S13)

Also they were hesitant if using RLOs for their course improved academic performance in that subject and disagree that using RLO for their course increased their understanding of subject (#7, 0). In addition, they disagree that using RLOs make their practice sessions more productive (#14, -2).

> *'Would like to see some details… Not sure if RLO help to increase my knowledge... I do not think help in assessment result'* (S15)

In summary, it was clear that the type of learner in this factor influenced the adoption of RLOs. Students described as traditionalists learners in this group

needed faculty members to support their learning and they enjoyed reading books more than working on screen like computers as described by participants. However, they agreed that RLOs could improve their learning and they had positive views about it, which motivated them to use the RLOs. Different barriers were identified as preventing them from the adoption of RLOs, such as lack of technological support, time, experience, and training. In addition, low-speed of WiFi was identified as a common barrier by most students.

Table 6.5: Distinguishing statements for Factor 1

Statements	Factor 1	Factor 2	Factor 3
# 25 The faculty members supported the use of the RLOs	+6 (1.85*)	2 (0.55)	-1 (-0.09)
# 16 I could manage viewing the videos (repeat a step, forward, etc.) Easily	+5 (1.47*)	-5 (-1.99)	1 (0.38)
# 24 I prefer to use RLOs on my own	+5 (1.50*)	0 (0.12)	-3 (-0.56)
# 19 I can use RLOs if there is no one around to tell me what to do as I go	+4 (1.35*)	-2 (-0.56)	2 (0.64)
# 17 When text was used “within” the videos, the font size was appropriate	+3 (0.97*)	-3 (-0.90)	-1 (-0.04)
# 15 The design of the RLO was consistent and allowed easy navigation	+2 (0.66*)	-3 (-0.77)	-4 (-1.31)
# 26 I use RLOs because my teacher advised me to do so	2 (0.80*)	6 (1.70)	-3 (-0.81)
#39 I will use RLOs on a regular basis in the future	2 (0.63)	-1 (-0.19)	0 (0.03)
#27 People (colleagues/students) who are important to me think that I should use RLOs	1 (0.05*)	4 (1.07)	-5 (-1.51)
#29 The overall quality of the RLOs was excellent	0 (-0.17*)	-4 (-0.99)	3 (0.71)
# 5 I can accomplish my learning tasks more quickly using RLO	-1 (-0.28)	0 (0.31)	3 (0.74)
# 44 With RLOs I can take responsibility for my learning	-2 (-0.51*)	1 (0.33)	2 (0.40)
# 6 RLOs are as informative as the teacher	-3 (-0.75)	-1 (-0.19)	4 (1.02)
# 34 I enjoyed using RLOs to learn	-3 (0.86*)	1 (0.43)	4 (1.25)
# 11 I felt more engaged in learning using RLOs compared to traditional sessions	-4 (-1.08*)	2 (0.65)	5 (1.45)
#21 I like the flexibility of RLOs, as I can learn anytime, anywhere	-5 (-1.42*)	6 (1.58)	5 (1.29)

(* indicates significance at p<0.01; Z-scores are shown next to ranked scores)

6.4.2. Factor 2: Pragmatist

Figure 6.2 shows the Q sort model for Factor 2.

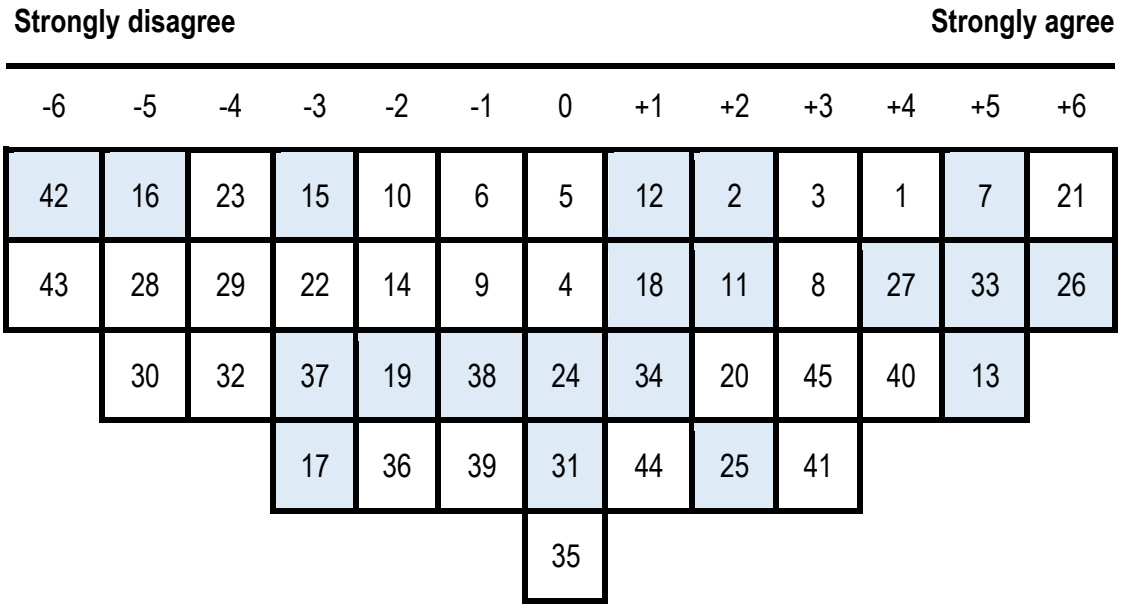

Figure 6.2: Factor 2 Q sort model

(See Table 4.7 for statements)

Distinguishing statements for Factor 2

Table 6.6: Factor 2 crib sheet

No.	Statements	Rank
	Items ranked at +6	
26	I use RLOs because my teacher advised me to do so	+6
21	I like the flexibility of RLOs, as I can learn anytime, anywhere	+6
	Items ranked higher in Factor 2 array than in other factor arrays	
7	Using RLOs for my course improved academic performance in that subject	+5
13	Using RLOs allow me to apply my knowledge more quickly in practical sessions	+5
33	I have appropriate technology to use RLOs	+5
27	People (colleagues/students) who are important to me think that I should use RLOs	+4
1	RLOs enable me to understand the topics	+4
40	If the RLOs available in other subject I will use them	+4
3	The assessments at the end of each RLOs were useful	+3
8	Using RLO for my course increased my understanding of subject	+3
12	RLO enhances my effectiveness in utilizing drugs information in practical sessions	+1
31	Guidance was available to me when using RLOs	0
38	The use of RLOs has become a habit for me	-1

Table 6.6: Factor 2 crib sheet (cont.)

	Items ranked lower in Factor 2 array than in other factor arrays	
2	The use of different presentation materials (audio, video, text, pictures) enhanced my learning	+2
9	Using RLOs in my course are helpful in preparing for quizzes	-1
39	I will use RLOs on a regular basis in the future	-1
19	I can use RLOs if there is no-one around to tell me what to do as I go	-2
17	When text was used “within” the videos, the font size was appropriate	-3
23	RLOs are compatible with other technologies I use	-4
29	The overall quality of the RLOs was excellent	-4
28	Using RLOs in my program gives it more prestige	-5
16	I could manage viewing the videos (repeat a step, forward, etc.) easily	-5
30	The orientation and training I received on how to use the RLO was sufficient	-5
	Items ranked at -6	
42	My age affects my ability to use RLOs	-6

In this factor the student felt that they like the flexibility of RLOs, as they can learn anytime, anywhere (#21, +6). They also agreed that using RLOs in their course improved academic performance in the subject (#7, +5). They strongly agreed that used RLOs because their teacher advised them to do so (#26, +6). Therefore, the students in this factor are open to experimenting with novel concepts and practices where they perceive them as potentially useful. They seek to learn innovative improvements and apply them experimentally to determine their worth. Such people are affected by learning of new solutions and are more likely to try them out. They have confidence in applying things they think will work. They have less patience and caution than traditionalists and are often averse to consultations and protracted discussions. Pragmatists

basically seek the most expedient solutions to problems, and improvements to their practices and challenges they encounter (Honey and Mumford, 1982).

Factor 2 (Pragmatist) involves participants from a ACCNP and ENP, comprising two males and five females aged 30-37, with five between 30-33 years old, and two aged 36 and 37. These participants had 6-17 years of nursing experience.

In comparing Factor 2 with the other Factors as seen in Table 6.7, 22 statements differentiate it from the other two Factors (at $p<0.05$) with 15 of the statements significant at $p<0.01$. This factor is described as pragmatist, unlike in Factor 1 (traditionalist).

The student in this factor perceived usefulness of RLOs a driver of use. It is clear from the crib sheet shown in Table 6.6 that students found that using RLOs for their course improved their academic performance in subjects having RLOs (#7, +5). Similar to Factor 1 and 3, they thought RLOs enabled them to understand the topics (#1, +4). In addition, it helped them in their course by increasing their understanding of the subject (# 8, +3).

> *'I think using technology would help us to improve and learn. Especially when you are a student of critical care, where it needs more concentration. I think the technology would facilitate the difficult topics'* (S2)
>
> *'I felt the way the RLOs are created is more understandable… the video and text were helpful'* (S12)

RLOs were perceived as technologies offering learning benefits as well improving learning outcomes, including in terms of examinations, as they were used by some participants to revise for exams.

'yes, it was helpful, even for research I got some information, which helped me in the exam' (S1)

In addition, the participants agree that the assessments at the end of each RLOs were useful (#3, +3).

'I like the revision of the topic… and I need to go back to it again' (S18)

'I like the assessment in each RLO… because it is at the end… and gives a review about what was explained in the previous slides of the video or the text, and it gives me a hint if there is any points I need to review, to grasp the information more' (S12)

'it has video and text… and assessment… there are pictures to illustrate the information… emm… it increased the understanding' (S17)

'I agree… because RLOs using different types will not emm you not feel boring, it will change and it will break the boring border, so it will be more interesting, and you feel more concentration when you are changing, and the opposite when using one method, you reach a time when you will be not interested' (S13)

In this factor the students thought that their practice knowledge was enhanced by using RLOs. They agreed that using RLOs allow them to apply their knowledge more quickly in practical sessions (# 13, +5).

'yeah… emm… because as I said, when you see the video and the interaction of the medication… It increases the

understanding… so we can easily relate it to the practical, and how it can affect the patients, and it will stick in my mind' (S17)

'Because these RLOs can save time, if I could have the information in short time and anywhere, also it would work in the phone, so need to search for computer or laptop in practice we are busy, no time to go to books and after work, no time to read, because we are with children the life is very fast… I think we need something fast and easy to help the lifestyle nowadays. And because I am working in ICU… I cannot concentrate on so many things, I need to see my patients first Therefore, something easy and factual would help to find the information… It would be better' (S2)

They also agreed that RLO enhances their effectiveness in utilizing drugs information in practical sessions (# 12, +1).

'As I said, when you see the video and the interaction of the medication… It increases the understanding, so we can easily relate it to the practical and how it can affect the patient, and it will stick in my mind' (S17)

Unlike the participants in Factor 1, the participants in this factor like the flexibility of RLOs, enabling them to learn anytime, anywhere (# 21, +6), and they agreed having the information available online at all times helped them to catch-up on missed lectures/information (#20, +2). Students acknowledged the flexibility of RLOs, as it can be used anytime, anywhere, facilitating making up some missing lectures.

'Usually, I tried to concentrate in our lectures… but … but still I have to search for specific information or extra information… and found these videos are useful….and I think it will help to catch missed lectures' (S12)

'For the book in library you have a certain time, but in the internet you can get it anytime, so you can access the website, so it is flexible … you can use it anywhere' (S1)

'I agree because anytime, anywhere… I can use my phone and learn' (S18)

The ease of use of RLOs was considered a very important feature according to its high ranking by students, especially with regard to being able to use it on their phones. The drivers in this factor to use RLOs that can be used in the phone facilitate it usability in clinical areas, as mentioned by S19.

'I like the advantage of the website and the e-learning so can access… if I am at the Institute, or home, or the department in the clinical… also through the laptop or the phone' (S19)

The students agreed on the benefits of RLOs, but they still needed their teachers to support them to use it. Therefore, they agreed that guidance was available to them when using RLOs (# 31, 0). However, they thought the orientation and training they received on how to use RLOs was insufficient (#30, -5).

'I felt … emm… maybe I need more training… however, emm… I think I will use it more frequently' (S17)

they used RLOs because they were advised to do so by their teachers (#26, +6) and people who are important to them (colleagues/students) considering it important that they should use them (#27, +4). Hence, they disagreed that can use RLOs if there is no-one around to tell them what to do as they go on (#19, -2).

> *'Actually, they are the ones who told us about the website, without which we would not know how to use it and to access it'* (S1)

Although the students in this factor are similar to students in Factor 1 regarding their essential need for faculty members to teach and guide them in the learning process, they also have some autodidactic self-learning characteristics and can learn some things autonomously.

> *'because it… reflects the self-learning… emm… so if I want to search for any information… I will access it by myself… and search… and that helps me to review the information anytime'.* (S12)

In addition, they agreed that they have appropriate technology to use RLOs (# 33, +5). In addition, they agreed more than the participants in Factor 1 and 2 that If the RLOs available in other subject I will use them and the use of RLOs has become a habit for me (#38, -1).

> *'We have new smart technology, so you can open the website anywhere'* (S19)

> *'I think it will be a habit for me… I use it in several time'* (S38)

However, they believed that text (font) used within the video was not appropriate (#17, -3) but they liked the idea of having text within the video.

'I felt the way the created RLOs are more understandable… the video and text were helpful' (S12)

However, like Factor 1, they think that RLOs are not compatible with other technologies they use (#23, -4). Unlike Factor 1, they could not manage viewing the videos (repeat a step, forward, etc.) easily (#16, -5). This is especially with going back to the main menu of the RLOs, whereby students described that, after opening the RLOs, in order to go back they had to open the website of the RLOs again, which left them feeling it was difficult to manage the viewing of the video. They ranked the use of different presentation materials (audio, video, text, pictures) enhanced their learning lower than Factor 1 and 3 (# 2, +2) and they did not think that using RLOs in their course are helpful in preparing for quizzes (#9, -1). In addition, they disagreed that the overall quality of the RLOs was excellent (#29, -4), and disagree that they will use RLOs in regular basis in the future (#39, -1); as explained by the following participant attributing this to the poor quality of internet connection in the Institute.

'I do not disagree totally with the statement, but it was difficult when there was no internet' (S2)

The participants in this group disagree using RLOs in the program gives it more prestige (#28, -5).

'Because I feel it is normal to use a website in learning It is not a fancy thing to learn from website' (S2)

In summary, Factor 2 showed that RLOs help students in their learning and gaining knowledge. The drivers and barriers in this factor are different according to different student views, but most felt that RLOs supported them in the

theoretical class and in the clinical sessions. They acknowledged the positive features of RLOs, like reusability and shortness. They had positive experiences of using different RLOs, like those for Heart Failure and research. However, there were some barriers to their use, including internet connection issues.

Table 6.7: Distinguishing statements for Factor 2

Statements	Factor 1	Factor 2	Factor 3
# 26 I use RLOs because my teacher advised me to do so	2 (0.80)	6 (1.70*)	-3 (-0.81)
# 13 Using RLOs allow me to apply my knowledge more quickly in practical sessions	0 (-0.07)	5 (1.29*)	-2 (-0.49)
#33 I have appropriate technology to use RLOs	-1 (-0.31)	5 (1.15*)	-2 (-0.54)
# 7 Using RLOs for my course improved academic performance in that subject	0 (-0.07)	5 (1.11*)	1 (0.38)
#27 People (colleagues/students) who are important to me think that I should use RLOs	1 (0.05)	4 (1.07*)	-5 (-1.51)
# 11 I felt more engaged in learning using RLOs compared to traditional sessions	-4 (-1.08)	2 (0.65*)	5 (1.45)
# 2 The use of different presentation materials (audio, video, text, pictures) enhanced my learning	6 (1.76)	2 (0.63*)	6 (1.90)
# 25 The faculty members' supported the use of the RLOs	6 (1.80)	2 (0.55)	-1 (-0.09)
# 34 I enjoyed using RLOs to learn	-3 (-0.86)	1 (0.43*)	4 (1.25)
# 18 Overall, I believe that it is easy to use RLOs to support my learning	5 (1.37)	1 (0.33*)	6 (1.46)
# 12 RLO enhances my effectiveness in utilizing drugs information in practical sessions	-1 (-0.31)	1 (0.32)	-2 (-0.38)
#31 Guidance was available to me when using RLOs	-2 (-0.56)	0 (0.27)	-2 (-0.34)

Table 6.7: Distinguishing statements for Factor 2 (cont.)

Statements	Factor 1	Factor 2	Factor 3
# 24 I prefer to use RLOs on my own	5 (1.50)	0 (0.12)	-3 (-0.56)
# 38 The use of RLOs has become a habit for me	-5 (-1.52)	-1 (0.01*)	-5 (-1.49)
# 6 RLOs are as informative as the teacher	-3 (-0.75)	-1 (-0.19)	4 (1.02)
# 19 I can use RLOs if there is no-one around to tell me what to do as I go	4 (1.35)	-2 (-0.56*)	2 (0.64)
# 15 he design of the RLO was consistent and allowed easy navigation	2 (0.66)	-3 (-0.77)	-4 (-1.31)
# 37 I have a lot of experience in the use of RLOs in my study	-6 (-1.54)	-3 (-0.81)	-4 (-1.47)
#17 When text was used “within” the videos, the font size was appropriate	3 (0.97)	-3 (-0.90*)	-1 (-0.04)
# 29 The overall quality of the RLOs was excellent	0 (-0.17)	-4 (-0.99*)	3 (0.71)
#16 I could manage viewing the videos (repeat a step, forward, etc.) easily	5 (1.70)	-5 (-1.99*)	1 (0.38)
# 42 My age affects my ability to use RLOs	-4 (-1.06)	-6 (-2.68*)	-6 (-1.66)

(* indicates significance at p<0.01; Z-scores are shown next to ranked scores)

6.4.3. Factor 3: Self-regulator

Figure 6.3 shows the Q sort model for Factor 3. Table 6.9 shows the distinguishing statements for Factor 3, based on the significance of P <. 05. The asterisk (*) indicates a significance at P <. 01.

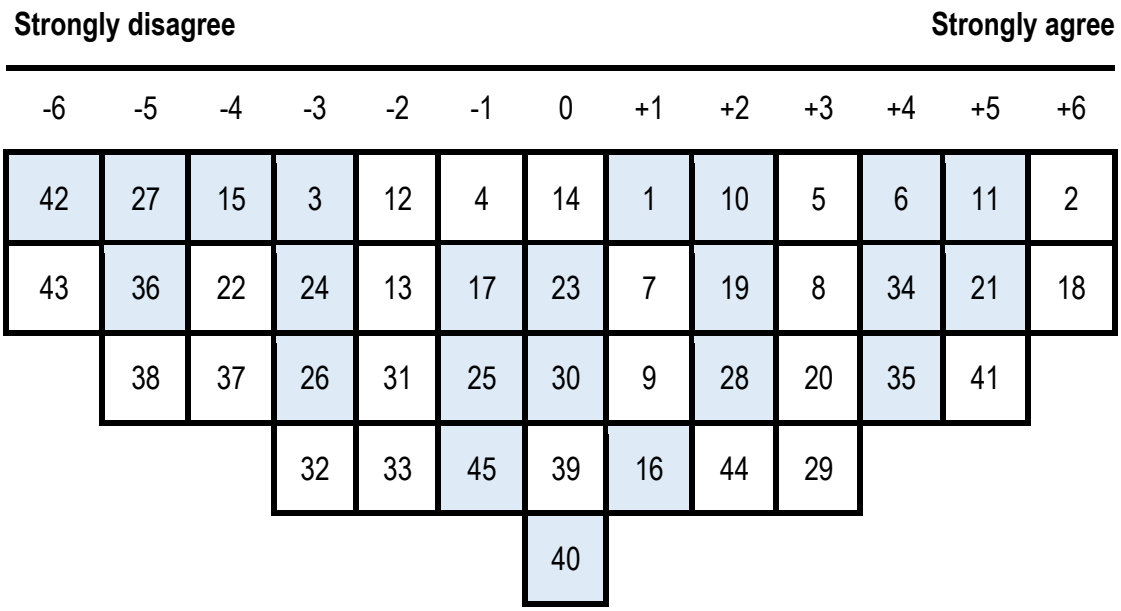

Figure 6.3: Factor 3 Q sort model

(See Table 4.7 for statements)

Distinguishing statements for Factor 3

Table 6.8: Factor 3 crib sheet

No.	Statements	Rank
	Items ranked at +6	
2	The use of different presentation materials (audio, video, text, pictures) enhanced my learning	+6
18	Overall, I believe that it is easy to use RLOs to support my learning	+6
	Items ranked lower in Factor 3 array than in other factor arrays	
11	I felt more engaged in learning using RLOs compared to traditional sessions	+5
41	I will recommend others to use RLOs	+5
34	I enjoyed using RLOs to learn	+4
35	RLOs held my interest	+4
6	RLOs are as informative as the teacher	+ 4
5	I can accomplish my learning tasks more quickly using RLO	+3
8	Using RLO for my course increased my understanding of subject	+3
29	The overall quality of the RLOs was excellent	+3
10	1 think that using RLO fits well with the way I like to study	+2
28	Using RLOs in my program gives it more prestige	+2
44	With RLOs I can take responsibility for my learning	+2
9	Using RLOs in my course are helpful in preparing for quizzes/tests/examination	+1
23	RLOs are compatible with other technologies I use	0
30	The orientation and training I received on how to use the RLOs was sufficient	0

*Table 6.8: Factor 3 crib sheet**Error! Reference source not found.** statements (cont.)*

	Items ranked lower in Factor 3 array than in other factor arrays	
38	I will use RLOs on a regular basis in the future	0
39	If the RLOs available in other subject I will use them	0
25	The faculty members supported the use of the RLOs	-1
45	RLOs allow me to study in line with the outcomes of my course	-1
12	Using RLOs allow me to apply my knowledge more easily in practical sessions	-2
13	Using RLOs allow me to apply my knowledge more quickly in practical sessions	-2
24	I prefer to use RLOs on my own	-3
26	I use RLOs because my teacher advised me to do so	-3
3	The assessments at the end of each RLOs were useful	-3
15	The design of the RLO was consistent and allowed easy navigation	-4
27	People (colleagues/students) who are important to me think that I should use RLOs	-5
36	I have the knowledge necessary to use RLOs	-5
	Items ranked at -6	
42	My age affects my ability to use RLOs	-6
43	My gender effects my ability to use RLOs	-6

The self-regulator, highly autonomous learner thus appears in Factor 3, and unlike their counterparts grouped under Factors 1 and 2, they are more engaged in learning by using RLOs instead of traditional sessions (# 11, +5). Unlike Factor 1, they think that RLOs are as informative as teachers (#6, +4). They would recommend others to use RLOs and they like to use it with others (#41, +5). Overall, they believe that it is easy to use RLOs to support their learning (#18, +6).

Self-regulated learners are identified by different models in the literature, but it is commonly agreed they utilize their cognitive, physical, behavioural, and motivational abilities to achieve their goals by planning their action toward their success, and they are self-directed learners with different ways to control their learning (Kizilcec et al., 2017).

Factor 3 (Self-regulator) is defined by six participants, three male and three female, aged 27-38, with 4-18 years of nursing experience. In comparing Factor 3 with the other Factors as seen in Table 6.9, 23 statements differentiate it from the other two Factors (at $p<0.05$) with 19 of the statements significant at $p<0.01$. This factor is described as self-regulation. Unlike Factor 1, they think that RLOs are as informative as teachers (#6, +4).

> *'I think, as I mentioned this point earlier, that it has a lot of different ways to teach, like conversation videos, and then they would do something similar to presentation with videos, which is really nice'* (S14)

> *'yes… I agree, it is informative, because it will explain, you can see the video and read the text and catch the information, and we are in adult learning… so can learn by ourselves. So it is good as a teacher'* (S21)

It is clear from crib sheet in Table 6.8 that the salient difference between Factor 3 and the preceding factors is that participants in this one did not depend on others (particularly teachers) for their learning. As mentioned previously, they control their learning, and they disagree that they used RLOs merely because

they were advised to by the faculty members (#26, -3). They are influenced to use RLOs by themselves and they have their intrinsic motivation to motivate them to use RLOs, so they strongly disagree that they use them because people (colleagues/students) who are important to them think that they should (# 27, -5).

> *'it's not others influencing, or directing you to use, for example to… to use other things, this is from your initiatives and from your personality. If you have initiative, of course this you will do it by yourself, you do not need others to push you to do it, especially for your learning and also for your benefit, but as I told you, if you are depending on others all the time you are not going to build your own decision, you are not going to build… even your success, all you are going to do depends on others'* (S8)

In addition, they agree that with RLOs they can take more responsibility for their learning (#44, +2).

> *'I agree to it because I liked how, how like it provided a lot of information and things which I didn't know before, some stuff which I think I wouldn't get from other lectures, so I think it is accessible… I can enter it whenever I want, so it makes me more responsible'* (S14)

When the self-regulating learners controlled their learning, they were more motivated toward the use of learning to achieve their goals. The students utilized RLOs and enjoyed using them to learn (#34, +4), believing it to be in their interests (#35, +4).

'I enjoyed it so much, I like to use technology at home, especially my smart phone, I am enjoying it, so even if I am in my bed, or anywhere, it is easy to use, I like it' (S21)

Furthermore, as result of intrinsic motivation to use RLOs, they would recommend others to use RLOs and they like to use it with others (#41, +5) as described by S23 and S21 in the following:

'I feel that others should know about it, it is better than YouTube… as it has written text and visuals' (S23)

'Others do not know about it… So when we tell them they will use it and benefit from it… because it is nice, if it is in another subject… I will use it emm… and in RLOs there are different subjects and I use them' (S21)

Unlike students in Factors 1 and 2, they think that using RLOs fits well with the way they like to study (#10, +2). This shows that these students prefer to learn through technology like RLOs.

'I think this way attracts student to learn, especially nowadays, so this attracted me to learn' (S22)

Although they disagreed that the assessment at the end of each RLOs were useful (#3, -3), unlike Factor 2 they agreed that using RLOs was helpful in preparing for the quizzes (#9, +1). They believed that RLOs increased their understanding of the subject (#8, +3) similarly to Factor 2.

'*there is a section in assessment… emm this is at the end of RLOs… it is good after the video… it will prepare me… emm and support and encourage me to study for the exam'* (S21)

The effort expectancy (Venkatesh et al., 2012) as ease of use in the feature of RLOs ranked very highly in this factor as a driver to use RLOs. Overall, students believe that it is easy to use RLOs to support their learning (#18, +6)

> *'It was easy and you can open the site anytime, anywhere' (S23)*
>
> *'What I have noticed is that the video text and assessment are good and reachable all the time'* (S22)

The performance expectancy (Venkatesh et al., 2003) was also considered a very important driver to use RLOs in this factor, which is the effect of RLOs in students' learning. Unlike Factor 1 and 2, they agree that that can accomplish their learning tasks more quickly using RLOs (#5, +3).

> *'It helped me … like……to understand the some emm topic of the half-life of the drug, and also, I think… I mean… Heart Failure'* (S23)

In addition, authentication of the information on the internet in this factor was an important driver to use RLOs:

> *'I saw the information about the drugs, for me if I want it very fast and cannot Google it, I cannot trust just any website, but this website, the drug is there and it is approved academically, so I can trust it and get the information, so I will go for it'* (S14)

They also felt using RLOs in the adult critical care nursing program is prestigious (#28, +2), but they explained this in terms of the quality of RLOs and the information being on the internet, but not for any particular institution or organization.

'Because it depends on the information and… emm… also depends on the quality of the information, not from the institution' (S21)

'I think it is prestige and something new, it is something innovative and it would really enhance learning' (S14)

The flexibility of RLOs worked as a driver to use in this factor. Participants liked the flexibility of RLOs, enabling them to learn anytime, anywhere (#21, +5), and the brevity of RLO utilization was also noted.

'I agree with this because as you know… it is flexible for me… I can use it any time and and anywhere' (S8)

'It is … what I want to say about the time… as you know it is short… so it is not long… if it is long I think I will not see all of it' (S8)

As in Factors 1 and 2, the design and features of RLOs in Factor 3 comprised a driver, with students agreeing strongly that the use of different presentation materials (audio, video, text, and pictures) enhanced their learning (#2, +6).

'I think this way attract students to learn, especially nowadays. This attracted me to learn' (S22)

'The design and the video helped us. It caches the eye and presents different materials, which attracts students to learn' (S21)

Different from Factor 2 and Factor 1, students in Factor 3 agreed that the overall quality of the RLOs was excellent (# 29, +3).

'the overall the quality of RLOs is excellent, that is what I have noticed – that the video text and assessment are good and reachable all the time' (S22)

In Factor 3 students agreed that the RLOs are excellent, however they need time to use it more, although they thought it would be difficult to undergo training because of their existing academic time pressure (S21):

'I agree it is an excellent program, it only needs time for students to know about it in depth, as we have time pressure in… in our study…but from the beginning, my view is that the RLOs are excellent'

Indeed, lack of training and lack of faculty members' support to use RLO was expressed by students as a cause of hesitation to use RLOs, despite the orientation and training they received (# 30, 0, #25, -1).

'the teacher… they support the use of RLOs emm… this is from beginning… but… I think I need guidance how to use it … because it is the first time to use' (S14)

As mentioned in the above extract, this was the first time for participants to use RLOs, and most (though not all) felt they lacked sufficient knowledge to use RLOs effectively (#36, -5) due to a lack of experience using RLOs in their studies (#37, -4).

Although in this factor the RLOs were seen as compatible with other technologies (#23, 0), They were not sure if they will use RLOs on a regular basis in the future (# 38, 0) or if the RLOs available in another subject I will use them (#39, 0). In addition, they found the design of RLO was not consistent and

difficult to navigate (#15, -4). The students explained that this was because of the internet connection issue. They could use RLOs when there was internet availability, but not when they had an insufficiently strong connection.

> *'I faced some technological difficulties… using RLOs, for example I tried to use it with my phone, because normally emm… but… I use my phone more than my laptop, and I could not access some videos, I could not access – some videos were not possible able to open… and sometimes it is the net… I think there is no internet to open some videos'* (S14)

Evaluating the content of RLOs, participants in this factor thought that some information needed to be added, like the details of some medications used in critical care areas, which explains why they did not agree that RLOs allow them to study in line with the outcomes of their course (#45, -1).

> *'I think it is a really nice tool, I really loved the design of RLO. Ah, the only point is that it didn't have enough information… the way it gives information is in a really easy way, sometimes conversation, sometimes videos and I really like that'* (S14)

> '*when I entered last time searching for medications… it was so easy…how it explained about that medication, how to… administer the medication, so it was going with the objectives of my ACLS course, but I think more information is needed'* (S22)

In explaining their negative responses to statements about RLOs in the practice session RLOs allow them to apply their knowledge more easily in practical sessions (#12, -2), using RLOs allows them to apply their knowledge more

quickly in practical sessions (#13, -2) students noted that it helps, but they think demonstration of the skill in practice sessions would be more useful.

> *'It helps in practice session, As I… I mentioned previously… that we are working in critical care, anything short and fast like RLOs help us… we do not have time to read long articles in the clinical area… this one will help… especially in the clinical'* (S8)

In summary, Factor 3 found that students are self-regulated and have the initiative to use the RLOs. Drivers of RLOs use include self-motivation, and they do not rely on others in their learning process. They acknowledge RLOs and thinks they are beneficial for the course. On the other hand, barriers explored from their viewpoints include lack of training, time, in-depth information, and focus on critical care nursing. In addition, they found that RLOs are beneficial in clinical education as they are short and specific, but they prefer live demonstrations in clinical contexts to support their learning.

Table 6.9: Distinguishing statements for Factor 3

Statements	Factor 1	Factor 2	Factor 3
# 11 I felt more engaged in learning using RLOs compared to traditional sessions	-4 (-1.08)	2 (0.65)	5 (1.45*)
# 34 I enjoyed using RLOs to learn	-3 (-0.86)	1 (0.43)	4 (1.25*)
# 35 RLOs held my interest	1 (0.13)	0 (0.04)	4 (1.24*)
# 6 RLOs are as informative as the teacher	-3 (-0.75)	-1 (-0.19)	4 (1.02*)
# 29 The overall quality of the RLOs was excellent	0 (-0.17)	-4 (-0.99)	3 (0.71*)
# 10 I think that using RLO fits well with the way I like to study	-1 (-0.49)	-2 (-0.32)	2 (0.66*)
# 19 I can use RLOs if there is no-one around to tell me what to do as I go	4 (1.35)	-2 (-0.56)	2 (0.64*)
#28 Using RLOs in my program gives it more prestige	-2 (-0.75)	-5 (-1.11)	2 (0.61*)
#16 I could manage viewing the videos (repeat a step, forward, etc.) easily	5 (1.70)	-5 (-1.99)	1 (0.38*)
# 1 RLOs enable me to understand the topics	3 (1.07)	4 (1.05)	1 (0.27*)
# 40 If the RLOs available in other subject I will use them	3 (1.05)	4 (1.02)	0 (0.09*)

Table 6.9: Distinguishing statements for Factor 3 (cont.)

Statements	Factor 1	Factor 2	Factor 3
# 23 RLOs are compatible with other technologies I use	-3 (-0.81)	-4 (-0.94)	0 (0.05*)
# 30 The orientation and training I received on how to use the RLO was sufficient	-3 (-0.90)	-5 (-1.36)	0 (0.02*)
#17 When text was used "within" the videos, the font size was appropriate	3 (0.97)	-3 (-0.90)	-1 (-0.04*)
# 25 The faculty members supported the use of the RLOs	6 (1.80)	2 (0.55)	-1 (-0.09)
#45 RLOs allows me to study in line with the outcomes of my course	3 (0.82)	3 (0.78)	-1 (-0.11)*
# 24 I prefer to use RLOs on my own	5 (1.50)	0 (0.12)	-3 (-0.56)
# 26 I use RLOs because my teacher advised me to do so	2 (0.80)	6 (1.70)	-3 (-0.81*)
# 3 The assessments at the end of each RLOs were useful	2 (0.43)	3 (0.93)	-3 (-0.85*)
# 15 he design of the RLO was consistent and allowed easy navigation	2 (0.66)	-3 (-0.77)	-4 (-1.31)
#27 People (colleagues/students) who are important to me think that I should use RLOs	1 (0.05)	4 (1.07)	-5 (-1.51*)
# 36 I have the knowledge necessary to use RLOs	0 (-0.14)	-2 (-0.38)	-5 (-1.52*)
# 42 My age affects my ability to use RLOs	-4 (-1.06)	-6 (-2.68)	-6 (-1.66)

(* indicates significance at p<0.01; Z-scores are shown next to ranked scores)

6.5. Consensus statements

Figure 6.4 shows the Q sort model for consensus statements. Consensus statements are statements agreed upon among participants characterized as belonging to all three factors (Ramlo, 2015). Table 6.10 shows the consensus statements for the three factors.

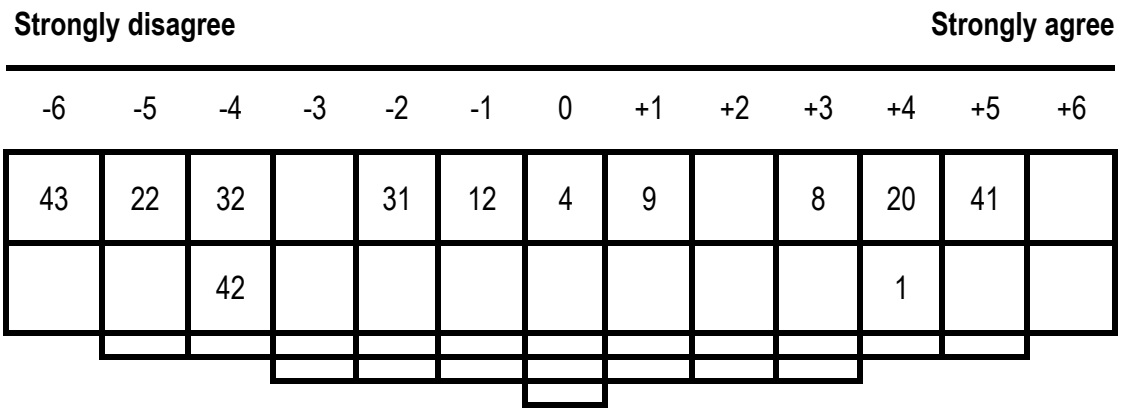

Figure 6.4: Consensus statements Q sort model

Table 6.10: Consensus statements

Statements	Factor 1	Factor 2	Factor 3
# 1 RLOs enable me to understand the topics	4	5	2
# 4 Having a professional narrator commenting on the steps in the videos helped me pronounce the terms	0	-2	-1
# 8 Using RLOs for my course increased my understanding of the subject	1	3	3
# 9 Using RLOs in my course are helpful in preparing for quizzes/tests/examinations	1	0	3
# 20 Having the information available online at all times helps me to catch up missed lectures/information	4	2	4
# 22 I have no difficulty accessing RLOs	-5	-3	-3
# 31Guidance was available to me when using RLOs	-2	-1	-3
# 32 Technical support was available to solve difficulties when using RLOs	-4	-5	-4
# 41 I will recommend others to use RLOs	3	5	5
# 42 My age affects my ability to use RLOs	-4	-6	-6
# 43 My gender affects my ability to use RLOs	-6	-6	-6

Despite the differences distinguishing the three factors, as discussed in the preceding factor narratives, there is clearly a wide area of agreement, with statements ranked according to the same Q sort method. The “agreed” statements provide insight into issues for all participants. In the three factors, there is an agreement that the RLOs have different agreed drivers. The effort expectancy is clearly seen as a driver, with students valuing the free effort of using RLOs. They agreed that having RLOs online make it easy to use them anytime, anywhere.

> *‘I believe it is beneficial, and I like that we can use it anytime, anywhere’* (S9)

Students that agree having the information ubiquitously available online at all times helps them to catch up missed lectures/information (#20)

> *‘I feel it is … having it all the time helpful for the students… even though if I am not a student anymore and I am a staff member, it will be every easy to use it and gain the information again when I need it, and I can use information in research and update myself*’ (S3)

The performance expectancy statements clearly achieved consensus, with students agreeing that the use of RLOs would have an outcome on their learning. They agreed that RLOs enable them to understand the topic (#1), and using it in the course increased their understanding if the subject (#8)

> *‘I agreed because, I feel it increased my emm understanding of some pharmacology concepts’* (S16)

In addition, they agreed that using RLOs in the course was helpful in preparing

for quizzes/tests/examinations (#9). This drove them to agree to recommend RLOs others to use them (#41)

> *'it contains valuable information and I will teach them how to use it'* (S1)

In all three factors the students disagreed that age and gender (#42, #43) could affect the ability to use RLOs.

> *'Age has nothing to do the ability… emm… to use any program. The education, whether you are young or old… like … emm… the age would not affect the education from technology'* (S10)

> *'I do not think that age will affect my ability to use RLOs… I do not think it is age… I think it is the knowledge and the background of each of us'* (S15)

> '*Whether you are … female… or male… nothing to do with technology… I do not think gender will affect the use of RLOs'* (S24)

The students sometimes have difficulty to access RLOs because of the internet connection, which was widely expressed. Also, they need technical support to solve the challenges they experience when using RLOs (#32). Some students requested guidance on how to use RLOs (#31) and their view was that guidance on the RLOs website would be helpful for them. In addition, they disagreed about having a professional narrator commenting on the steps in the videos helping them to pronounce the word.

6.6. Discussion of findings

This section discusses the findings of factor analysis based on the thematic results. The first factor is traditionalist, the second is pragmatism, and the third is the self-regulated learner. These factors, as discussed previously, relate to the results of the viewpoints of postgraduate nursing students on the adoptions of RLOs within their course in ACCNP and ENP in Oman. Themes of the factors are summarized in Table 6.11 and discussed in detail in the following sections.

Table 6.11: Thematic analysis

	Drivers	Barriers
Traditionalist		
	Learning objects attributes (RLOs integration, RLOs features (good size text with attractive font, easy navigation) Access RLOs any time (flexibility)	Students' preference (prefer traditional way of learning) Students' belief about the trustworthiness of the e-learning Could not use it anywhere because of slow WiFi Technical problems
Behavioural element	They like the flexibility of RLOs (anywhere and anytime) This group was keen to use RLOs on a regular basis in the future	
	Culture (high power distance) needs faculty members' guidance Core nature of nursing (interaction and high levels of social engagement N.B. Hesitant about whether RLOs improved their academic performance or made their practice sessions more productive.	
	Pragmatist	
	Perceived usefulness (improved their academic performance in subjects, increase their understanding) Perceived ease of use Media attributes of RLO Enjoyment Interesting	RLOs features (navigation, especially by returning to the main menu of the RLO, font in the text of RLOs was not appropriate Technical problem (difficult in downloading some videos, some videos need Flash and they are not working, sometimes poor WiFi Lack of technical support
	Culture (high power distance) can use RLOs by themselves but still they need faculty members' guidance Collectivist cultures Core nature of nursing (interaction and high levels of social engagement	
Behavioural element	They found RLOs could increase their understanding of the subjects, they like the flexibility of the RLOs (can be used anywhere and anytime) They will recommend others to use RLOs They evaluated details of RLOs like font size	

Table 6.11: Thematic analysis (cont.)

	Self-Regulator	
	Students' preference (prefer technology and to use their phone) Sense of control Self-motivation Perceived usefulness Perceived ease of use Enjoyment Interesting Media attributes of RLOs Quality of the RLOs	Lack of training and support Technical problem (some videos need Fash and they are not working, sometime poor WiFi)
	Content matched the level of the course	
Behavioural element	They like the features of RLOs, they likes the flexibility of RLOs and they also like the quality of RLOs. They will recommend others to use RLOs They will use RLOs for different subjects They recommend adding different RLOs like ECG	
	Theme: Consensus	
	Using RLOs online any time Enabled them to understand topic Help them to catch with missed classes Help to prepare for exams Age and gender do not affect the use of RLOs	Sometimes weak WiFi Technical support Need guidance

6.6.1. Factor 1: Traditionalist

This theme showed how some postgraduate nursing students from ACCNP and ENP view the RLOs. In this theme, the participants felt that face-to-face contact with faculty members' support cannot be substituted by RLOs; this is a somewhat surprising finding, indicating that it cannot be assumed that

technology can be uncritically diffused in the learning process in higher education. The surprising element is that most of the students in this factor were 'millennials' (born between 1988 and 1993), who are assumed to display non-linear preferences and to use technologies readily and dynamically (Mangold, 2006). Although they accept and use RLOs, students highly value face-to-face learning opportunities, and regardless of their positive views of RLOs and they are not ready to relinquish conventional teaching methods (Bloomfield and Jones, 2013).

Another important finding was that the students felt more engaged in traditional sessions than learning using RLOs. They explained that they 'cannot interact with it' and they 'need faculty members' guidance to learn' (S7). While it should be noted that e-learning technologies and general technology usage among learners has increased dramatically over the past decade, these perceptions are similar to the findings of Blake (2009) and Akhtar-Danesh et al. (2009), who explored nursing educators' perceptions of simulation-based learning as e-learning applications in nursing education. They found that nursing staff could be described as 'traditionalist' and were not enthusiastic about technology. This possibly relates to the core nature of nursing itself rather than pedagogy *per se*, social interaction is essential to nursing, apparently including nursing education as well as practice (Farrell and Mcgrath, 2001). Indeed, the nursing profession is characterized by particularly high levels of social engagement, which is considered the philosophical heart of nursing, reflecting the importance of human contact to develop inter-professional relationship for learning process, indeed, as patient advocates, this is also essential to the modern advanced nursing paradigm.

More pedagogical implications of traditionalist views among students were attributed by Sowan and Idhail (2014) to students preferring traditional methods of learning in which they tend to be responsible for only a specified amount of clearly defined reading or learning activities. Another explanation of this result is that students are simply averse to innovative pedagogical techniques in e-learning, Jokinen and Mikkonen (2013) reported that teachers working with e-learning environments witnessed how puzzling students found new teaching methods, and they were reluctant to use new learning methods. It has also been suggested that students and educators feel more secure in teacher-centred approaches, with students having a more passive role (O'Flaherty and Phillips, 2015). Lymn et al. (2008) cautioned that the most successful e-learning applications are those used to support and supplement traditional face-to-face teaching, and not to replace it.

Windle and Wharrad (2010) showed that students got higher results when RLOs replaced traditional teaching, but the type of e-learning was highly instrumental. This was clear in a study by Kohan, Soltani and Mojtahedzadeh et al. (2017) to explore the challenges and barriers of virtual learning among 23 postgraduate students of medical sciences. The results showed that information overload and lack of focus on learning because of long lectures were the main barriers. Therefore, they recommended keeping e-learning focused on course objectives and making them short. It is very important that RLOs be designed according to the objectives of course, and be made short, which encourages reusability and more utilization in different times and situations.

Participants in this theme used RLOs and found them useful to enhance their knowledge and to support their learning by using videos and different materials, affirming the results of previous studies by Keefe and Wharrad (2012) and Redmond et al. (2018). Participants had positive attitudes towards using RLOs by themselves, 'especially if there is a video' (S15), which further supports the conclusions of Bath-Hextall et al. (2011) and Kelly et al. (2009) who found that a sense of control over learning is considered important to nursing students, enabling them to cope with busy curricula items like critical care and emergency nursing programs (Windle et al., 2011).

In addition, they were positive about RLO features such as good-sized text with attractive fonts, managed video viewing, and easy navigation within each RLO. Being able to access materials again later if lectures were missed was evaluated as highly positive, and this result was similarly confirmed in previous studies (Bloomfield and Jones, 2013, Windle et al., 2011, Bath-Hextall et al., 2011, Blake, 2009, Kelly et al., 2009) which reported that students highly valued using RLOs as a supplement for traditional methods, consolidating classroom teaching and aiding revision.

The students in this study could identify their learning preferences, which relate to the different ways they prefer to collect, process, and organize information for the purpose of retention and understanding. Preferences for learning include learning by listening, seeing, doing, or mixing these modalities (Carmona, Castillo and Millan, 2007). The traditionalists felt that they were more likely to like to 'touch things like books' and read from books in their learning process, compared to using computer screens, and they felt that they 'prefer to use books more'. The consideration of the importance of the reliability of books was

particularly emphasized in the current study, with students considering them more trustworthy than internet sources. Students attributed this belief to the publishing process of books, which they felt conferred more authority. This result might be explained by the fact that the students in this study were not involved in the process of creating the RLOs, which is a very important step in RLO creation. Consultation with and involvement of students in RLO design is recommended to ensure that content is appropriate, and that the user experience is customized to be perceived as easy to use, and easy to use in fact, which mainly depends on the RLO interface (Khan et al., 2019, Windle et al., 2011, Lymn et al., 2008).

It was surprising that, despite their preference for traditional learning formats, students in this group were keen to use RLOs on a regular basis in the future, as it was supported by the faculty members (as explained by them). This could be culturally explained in terms of power distance in the Hofstede Model, whereby high power distance in Oman's culture facilitates top-down decision making, and students are eager to follow teachers' orders (Albugami and Ahmed, 2016). This is not to say that students did not accept RLOs of their own volition, but their own preferences of learning were superseded by their cultural conditioning in following the adaptation of technology in their learning process.

Another cultural dimension in Oman which could affect the acceptance of RLOs within this group of students is uncertainty avoidance, which is the extent to which the society lives in fear of unknown and ambiguous situations (Hofstede, 1991). Within this group of students, there was clearly a preference for the use of books, as such learners are familiar with this traditional learning resource and associated methodology. For them, using recent technological resources

for learning was unfamiliar, which increased their uncertainty about the utilization of RLOs. Similar findings were reported in Saudi Arabia by Albugami and Ahmed (2016). Students with high uncertainty avoidance require extensive guidance and simple design to decrease their uncertainty.

Within this group of students, some disagreed with the flexibility of RLOs, and they would 'like to study anytime, but not anywhere' (S15); this outcome is contrary to previous studies, which found that RLO flexibility is evaluated highly positively (Bath-Hextall et al., 2011, Windle et al., 2011, Blake, 2010). In addition, they did not enjoy using RLOs during their study. This is explained by technological problems encountered by students when using RLOs, such as difficulty accessing RLOs because of slow Wi-Fi speed. Technical problems can be a major challenge to web-based e-learning, including RLOs (Bloomfield and Jones, 2013, Blake, 2010, Kelly et al., 2009, Lymn et al., 2008).

The results of this study show that students were hesitant about whether RLOs improved their academic performance or made their practice sessions more productive. This highlights that RLOs will not enhance the learning experience of students on their own, rather they must be developed and integrated within digital pedagogies of active learning and collaboration, in order to have effective impacts on student learning (Pomerantz and Brooks, 2017).

In summary, this study found that e-learning is accepted positively among traditionalists, but this is affected by cultural factors pertaining to high power distance rather than their own learning preferences. Students needed the faculty members to support their learning and guide them to the utilization of RLOs. Other studies anticipated that the millennial generation of digital natives would prefer e-learning, but this study found that there are still many

traditionalist students who prefer to learn using traditional methods. This finding is a pertinent reminder that technological literacy and the availability of e-learning do not necessarily mean that e-learning and technological tools are the innate preference of learners. Students identify their own learning preferences, which is important to bear in mind while creating web-based e-learning. The lack of technological support was also mentioned as a barrier to the use of RLOs among this group.

6.6.2. Factor 2: Pragmatist

This theme pertains to pragmatist views of RLOs within the learning process. Unlike Factor 1 (Traditionalist), in this factor the students found that RLOs improved their academic performance and enabled them to understand the topics. Windle et al. (2011) compared students' results in pre- and post-intervention assessments to determine the effectiveness of RLOs with module assessment and a multiple-choice paper. For each cohort the results of questions related to chemistry were isolated and analysed, then aggregate data was compared with previous annual cohorts. The results revealed that the number of students answering chemistry equations correctly increased significantly. Overall, all studies showed that RLOs have positive impacts on students' knowledge (Rad et al., 2015). The use of RLOs was particularly effective in increasing student understanding of pharmacological concepts (Lymn et al., 2008).

In this theme students explain that RLOs helped them in their examinations, similar to the results of Redmond et al. (2018). In their study, students reported that the use of RLOs helped both to gain and retain knowledge of difficult subject material. In addition, they are a useful method to consolidate learning

(Blake, 2009). Moreover, students strongly agreed on the media attributes of RLO, enjoying the flexibility to study anytime and anywhere. Some of these important factors are reported in other studies (Windle et al., 2011, Lymn et al., 2008). The brevity of RLOs was highly evaluated by the students, and they were not considered 'boring', as mentioned by (Wharrad et al., 2011) each individual RLO did not require more than 15 minutes to complete. This made the RLOs flexible, and they could be used at work (e.g., during placements in busy ICUs), class, or at home. The flexibility of RLOs was agreed by students to be useful in facilitating the application of knowledge in their practice sessions, corroborating similar findings reported by (Windle et al., 2011). Studies have found that e-learning tools can be effective for practice learning (Blake, 2010, Atack and Rankin, 2002).

The 'assessment in each RLO' (S18) and multimedia used in RLO, especially video and the text, were reviewed positively by students. They explained that video and text increased their understanding. Students used RLOs on their phones, which shows that they can be used effectively without the need for direct support (Windle et al., 2011). The students in this theme, similar to those associated with Factor 1, felt that faculty members' support was needed, including some guidance how to use RLOs. In addition, they used it because of the advice of faculty members and their colleagues. This result may be explained, as mentioned previously, by the fact that interaction and social engagement are considered as the heart of learning process, particularly for nursing (Farrell and Mcgrath, 2001).

Another possible explanation for this is that which is similar Factor 1 (traditionalist) from Hofstede Model (1991) pertaining to the cultural implications

in the acceptance of technology. Albugami and Ahmed (2016), found that students from collectivist cultures (as in Arab countries) required a system to support teamwork and social interaction. The high power distance, with a relatively authoritarian top-down approach, would also be conducive to RLOs adoption when proposed and recommended by teachers. This is related to the cultural context of Oman, whose collectivist Arab society has a high power distance (Hofstede, 1991). Students in Oman are prone to follow their teachers, whom they see as role models, who need to be respected. Also, they like to do things together, and to work and study in groups. Consequently, they preferred to use RLOs in group, and to use the RLOs like their peers did.

One unanticipated finding related to students' evaluation of the detailed features of RLOs. They found the font in the text of RLOs was not appropriate. The navigation was considered frustrating, especially by returning to the main menu of the RLOs. The students strongly agreed that they sometimes could not view videos, and they found using multiple presentation materials unhelpful. Technical difficulties and challenges are clear in this study's results. Barriers to using RLOs could be addressed, including poor Wi-Fi connection to view some videos. This inconsistency may be due to the absence of direct technical support while using RLOs in the programs, similar to the results of Creedy et al. (2007). Chan (2010) conducted a survey about student perceptions of what makes educational videos good: the results showed that content, loading time, and high-resolution videos were the top characteristics for learners. In addition, students value and demand high-quality downloading of educational content (Hansen, 2011, Roshier et al., 2011). Hence, tackling the technical difficulties supports the acceptance of e-learning among students.

In summary of the discussion of this theme, students in this group were similar to their Factor 1 counterparts in requiring the support of their teachers in using RLOs. The interaction between teachers and students was seen as an important element in the learning process. However, the students accepted RLOs positively, perceiving them as interesting tools to learn. The details of RLOs were evaluated by students in this group, and several features of RLOs were identified as drivers of use, especially flexibility (anywhere, anytime use), multimedia, clear video, and short time duration of activities. Participants perceived that RLOs allowed them to apply their knowledge in practice (Roshier et al., 2011). The perceived barriers to RLO use among this group were clear: lack of technical support, and navigation problems.

6.6.3. Factor 3: Self-regulator

Factor 3 relates to students not depending on others (teachers or peers) for their learning, preferring to control their own learning journey. Such students are described as self-regulator learners (SRLs), who are self-motivated and more autonomous in the learning process (Zimmerman, 2008). They are more engaged in learning by using RLOs instead of traditional sessions (Wang et al., 2013). SRLs have more active and continuous engagement in the learning process (Sun and Rueda, 2012, Liang and Tsai, 2006), which is reflected in a high level of confidence and ability to manage their own learning process. SRLs in this study believed that they could take responsibility for their learning and they were intrinsically motivated to use e-learning. Windle et al. (2011) suggested that this could be attributed to a sense of control felt by students over their learning, which predisposes them to more autonomous e-learning methods, including RLOs.

SRLs in this study found using RLOs to be interesting and enjoyable. Enjoyment may be because of easy access (Redmond et al., 2018), and a range of multimedia features, including text, images, and interactive elements, which enhance engagement with RLOs (Keefe and Wharrad, 2012). This is also supported by Mayer's cognitive theory of multimedia learning, which states that words and graphics are more conducive to learning than mere text or graphics by themselves as long as there is no cognitive overload (Mayer, 2009). Hence, self-control appears to enhance the acceptance of RLOs, but it is not one of the constructs of UTAUT2, which purports to indicate technology acceptance. Therefore, this result indicates a deficit in UTAUT2 to explain the acceptance of RLOs.

Participants in this group found RLOs flexible, and usable anytime, anywhere, which is aligned with self-directed and self-managed learning (Kelly et al., 2009, Windle and Wharrad, 2010). Blake (2009) found that RLOs are valued by SRLs because of their flexibility and fitting in with their time. This because it they are short, based on single learning objective, and do not demand a large time commitment (Blake, 2009). This result also supported the idea of Windle et al. (2011), who highlighted that the flexibility and portability of RLOs make them easy to use without the need for direct support, causing them to be very highly valued by students (unlike the learners under Factor 1 in this study, who complained of the lack of technical support). In UTAUT2, effort expectancy (ease-of-use) is the indicator of acceptance among students in this group.

The defining characteristic of these students was that they like technology, and prefer to learn using technological methods, which are more attuned with the ways in which they prefer to learn. Galanek et al. (2018) found that technology

is ubiquitous in the lives of most students, such as using their phone most of the time, thus they are predisposed to e-learning materials that can be reviewed and open on their phones. The students in this study believed that RLOs supported their learning and attracted them to learn. Redmond et al. (2018) found that RLOs provoked some critical reflection by students and motivated them to desire further learning. This has been explained in the literature in terms of the activities in which students engage in e-learning, and the results of these activities are significant for learning, supporting the student learning process (Redmond et al., 2018). In addition, Hanson (2015) who found that e-learning approach made students more engaged in their learning and increased their knowledge of drug mechanisms of action and interactions. Hence, moving beyond the traditional way of teaching to increasingly adopt e-learning has been identified as an effective way to engage and enhance student learning (Ferreri and O'Connor, 2013).

By supporting their learning, students believe that RLOs help them in quizzes. Bloomfield and Jones (2013) also found that graduate first-year pre-registration nursing students found that e-learning was useful and important in their revision and preparation for assignments. This result may be explained by the fact that one important advantage of e-learning is that student can repeatedly interact with concepts until they achieve mastery (Khan et al., 2019, Cooke et al., 2012). Moreover, students in this study believed that RLOs increased their understanding. Similar to other studies (Blake, 2010, Bagley and Johnson, 2007), participants reported that the use of RLOs supported their knowledge retention and increased their understanding. Lymn et al. (2008) showed that RLOs increased student understanding of pharmacological concepts. In

UTAUT2, performance expectancy relates to RLOs assistance in accomplishing work tasks among these students.

As result of using RLOs, SRLs felt they could accomplish their learning tasks more quickly, and they agreed that RLOs were as informative as traditional teaching. This result is interesting in relation to the short time taken by students to understand RLOs, indicating the informative efficiency of the latter, which manifests their intended attributes. Student strongly agreed that 'seeing the video' (S21) and 'reading the text and catching the information' (S21) were very useful. Using video (Arguel and Jamet, 2009) and breaking information into smaller parts, enable students to control their learning process and make it more informative and active (Wong et al., 2009, Mayer et al., 2005). Similar results were reported by Bloomfield and Jones (2013), who found that students considered video content to be the most helpful feature of RLOs. In addition, Lymn et al. (2008) found that most students agreed or strongly agreed with statements affirming the usability and media attributes of RLOs, and the value of different RLO components.

Students under Factor 3 also acknowledged the high quality of the UoN RLOs as an e-learning educational solution. They thought that the overall quality of the RLOs and their informational content was excellent. According to Ozkan and Koseler (2009), learner satisfaction with e-learning is strongly and positively affected by the quality of the e-learning information itself. The validity of resources is considered among the factors that could facilitate technology adoption (Gagnon et al., 2012). The students in this group described RLOs as 'innovative' (S14), affirming Blake's (2010) finding that students described e-learning as a 'revolution in education'. In addition, students in this group held

positive attitudes toward RLO-based e-learning and said they would use it if it existed in other subjects.

An interesting issue with regard to culture was that the students did not think that the use of technology is related to gender; they thought that both genders could use the technology effectively, and both genders accepted technology in the same way. According to the Hofstede Model's Masculinity vs. Femininity dimension, societies construct gendered roles relating to 'masculine' and 'feminine' traits, associated with distinguished gender roles (such as males being more inclined toward individualism and technological tasks, and females being more concerned with collectivism and interpersonal processes) (Hofstede, 1991). This was not manifest in Omani students' views on technology use in this study.

Although the perceived acceptance of RLOs and the drivers of its use were clear for students under Factor 3, a number of barriers were also addressed, consistent with previous studies, including a lack of training and support (Gagnon et al., 2012, Blake, 2009). These were also identified by the other Factor groups. Technical difficulties could be a barrier to using e-learning and could inhibit use of innovative pedagogical technologies (Moule et al., 2010). For this group, this barrier could be engendered by a lack of experience in using particular RLOs e-learning tools. The design of RLOs was not consistent, and students sometimes found it difficult to navigate and use RLOs on their phones. Hence, technological support can support students to focus on their learning and content for their study while using technology (Akhtar-Danesh et al., 2009).

In addition, clarified information is needed to highlight critical care contents in associated RLOs. In Blake's (2010) study, students reported pedagogical

expectations and ensuring that content matched the level of the course. There is also a need for skills demonstration, especially skills related to critical care and emergency nursing, but the academic knowledge in RLOs can be applied in practice. As mentioned previously, involving students in the design process ensures that the detail and granularity of content is appropriately laid out, and that the RLO interface and user experience is efficiently optimized to support learning goal achievement (Khan et al., 2019). This might be maintained in designing RLOs through the ASPIRE process (which is explained in Chapter 1), as this is central to the quality of the RLOs and the design, plus the involvement of users (Williams et al., 2015, Bath-Hextall et al., 2011, Lymn et al., 2008).

In summary of the discussion of this theme, the most interesting finding was that these students like technology and they prefer to learn using technological solutions, which accord with the learning goals and styles of SRLs. They consequently accepted RLOs positively. Control of learning objectives was seen as the main factor in their acceptance of RLOs. Several features of RLOs work as drivers of their use, including flexibility (can be used anywhere and anytime), multimedia, clear video, and short time duration for tasks. The human factor of motivation to accept RLOs is a major driver within this group. The RLOs were supportive of their learning, and they understood the topics better with RLOs. RLOs were felt to be particularly supportive of quizzes and revision tasks. Overall, they found that RLOs are an excellent tool to support their learning.

However, barriers were also identified among participants under Factor 3, similar to those identified for their peers under Factors 1 and 2. The main barrier

was the lack of technological support and lack of training, which have also been highlighted by previous studies. A lack of experience in working with specific applications such as RLOs was considered an associated barrier. The details of content of critical care and emergency nursing need to be considered when creating RLOs for speciality programs.

6.6.4. Consensus statements

Effort expectancy comprises a form of driver. Venkatesh et al. (2003) defined it as the level of ease connected with the use of the system, or the amount of effort required to utilize it. Effort expectancy strongly influences behavioural intention. RLOs were appreciated as being discernibly effort-free. Moreover, there was consensus amongst participants that the online availability of RLOs rendered them not only easy to use, but also obtainable at any time and accessible in any location (Bloomfield and Jones, 2013, Windle et al., 2011, Bath-Hextall et al., 2011).

The generation of RLOs serves to expand the range of materials available to teaching staff and learners. Moreover, RLOs also support more learner-centred environments, not least when amalgamated with university systems, lectures and tutorials, and web pages. Thus, RLOs permit students to select not only the level of input they require, but also the mode of delivery. Specifically, RLOs can comprise video extracts, activities, and assessment. Moreover, RLOs are amenable to providing learning in small parcels of information, which can then be linked together (Redmond et al., 2018).

Students agreed that having required learning resources and information ubiquitously available online at all times helps them to catch up missed lectures/information. Performance expectancy statements clearly achieved

consensus, with students agreeing that the use of RLOs would have an outcome on their learning. Effort expectancy involves expectations regarding the extent to which engagement with a technology is anticipated to require to utilization of specified level of effort. RLOs invariably have an impact on the learning outcomes of all students (Bloomfield and Jones, 2013). Thus, in the current study, student participants were required to consider the degree to which RLOs might influence their learning outcomes. This process of evaluation ultimately generated effort expectancy statements, which revealed that the students generally agreed that the adoption of RLOs possessed the potential to help their learning outcomes. Specifically, it was considered that RLOs had the capacity to assist students in their comprehension of some subject matter, and it is consequently possible to postulate that RLOs can serve to increase knowledge (Khan et al., 2019, Cooke et al., 2012).

Most students agree that they would recommend RLOs to others. Recommendation to others comprises a commercially and academically effective tool for RLO designers. The reason for RLOs recommendation effectiveness arises from the fact that information in recommendations arises from sources that are familiar to recipients (Rouleau et al., 2019). In this respect, the information is imbued with a level of trustworthiness and value (Lawn et al., 2017).

Students disagreed about having a professional narrator commenting on the steps in the videos helping them to pronounce the word. Professional narrators are likely to be more expeditious in their approach and can ultimately end up supporting learning. Moreover, the utilization of professional services for narration can ensure continuity of delivery over a series of different videos.

Whilst such advantages were clearly recognized by some student participants (Lamphon, 2020), other student participants failed to accept the proposition that professional commentary on videos is helpful as a means of commenting on the steps contained within the video in order to help them learn how to pronounce different words. The fundamental concept behind the universal learning design is to introduce flexibility into the teaching materials and methods (Redmond et al., 2018).

In all three factors the students disagreed that age and gender could affect the ability to use RLOs. There are multiple potential determinants which affect the extent to which individuals are able to utilize RLOs. Resistance to RLO adoption can result from users experiencing difficulty integrating the technology into learning objectives. In addition, previous gaming experience and learner preferences have an impact. In the context of the current research, participants could agree that age and gender do not affect the use of technology, affirming the findings of Ladan (2018).

Students cited numerous technical difficulties that they encountered while using RLOs (e.g., internet connection issues, non-smooth running of some videos, some videos needing flash programs to run, requiring downloads that were not always possible). Technical difficulties are an intrinsic, fundamental barrier to using e-learning, and could inhibit the use of innovative pedagogical technologies (Moule et al., 2010). For this group, this barrier could be engendered by a lack of experience in using particular RLOs e-learning tools. The design of RLOs was not consistent, and students sometimes found it difficult to navigate and use RLOs on their phones. Hence, technological

support can support students to focus on their learning and content for their study while using technology (Akhtar-Danesh et al., 2009).

6.7. Summary

This chapter presented the results of Q methodology study exploring drivers of and barriers to adopting reusable learning objects by postgraduate nursing students in Oman, to improve their knowledge, skills, and confidence. The novel aspect of this study is that the fact that participants were professional learners already working in practice (while they are “postgraduate nursing students” from a pedagogical perspective, they are qualified registered nurses working in real clinical settings). This addresses the serious dearth of studies on postgraduate education bridging the transition into practice. In addition, this is first study to explore the transposition of RLOs developed in a one national cultural context (the UK) to Oman, to explore the barriers and drivers of RLOs. Hence, this study adds in-depth knowledge about the adoption of reusable learning objects from a different country, and the different barriers and drivers found are different from other studies, adding to conceptual knowledge of related issues.

Q analysis revealed three factors with consensus statements. Participants’ views in each factor grouping are summarized below. Factor 1 (traditionalist) participants believe that RLOs can be used with the advice and support of faculty members. The traditional way of education is seen as important, with face-to-face education, and they had limited experience of using different forms, such as RLOs. However, the attractive design of RLOs was acknowledged in this factor, along with belief in the flexibility of the tool, and ease of use. Factor 2 (pragmatism) participants believe that RLOs are crucial tools for learning, and should be used with the support of the faculty members. The students believe

that RLOs support the learning process in the theory class and practice sessions. Thus, RLOs support the application of knowledge in practice more quickly.

Factor 3 (self-regulated) participants were similar to those of Factors 1 and 2 in acknowledging the design of RLOs, but the students in this factor believed in the pedagogical value of RLOs. Students believed in their responsibility and initiatives in using RLOs. RLOs authentication was seen as very important, in terms of the type of knowledge and related resources being recognized and reliable. Consensus statements included the reusable nature of RLOs, being considered in all factors, with students appreciating their use and having the intention to continue using them and to recommend them to others. Technical support and difficulty to access to RLOs were noted as barriers, and they expressed a need for guidance and technical support, due to their limited knowledge and experience of using technology in learning. Weak Wi-Fi was a persistently bemoaned problem that acts as a barrier to the use of RLOs in the Institute. Finally, age and gender were not viewed as instrumental in the ability to use RLOs in all factors.

This study found that performance expectancy and effort expectancy in UTAU2 framework could indicate the use of RLOs with ACCNP and ENP students in Oman. However, the were a deficit in UTAUT2 framework in indicating the acceptance of RLOs in relation to self-control. Hence self-control needs to be considered when studying adoption of technology. The drivers and barriers of using and reusing RLOs in clinical practice are explored in the following chapter, which discusses the findings of the qualitative study.

Chapter 7

Findings of Qualitative Study

7.1. Overview

Interviews were conducted with seven graduates from the critical care nursing program and emergency nursing program working in clinical settings who agreed to participate to complete a telephone interview. As mentioned previously, eight graduates signed the consent forms to participate in the study, but one withdrew before the end of data collection. Therefore, seven graduates were recruited and their data was subsequently analysed. These graduates represented 29% of the total sample in the first phase of the study. They were working in different areas in Oman. They comprised four females and three males. Demographic data and a summary on the reuse of RLO are shown in Table 7.1. The interviews resulted in identifying the main theme, the impact of RLOs on the clinical practice of nursing graduates.

Table 7.1: Demographic data and summary of RLO reuse

#	Reuse or not	If yes, which RLO used	Other internet resources
25	Yes	1. Research RLO 2. Half-Life of Drug RLO 3. Hand hygiene 4. Heart failure	Google
26	No		1. Google 2. Google scholar 3. Moh website
27	Yes	1. Portfolio RLO 2. Bioavailability RLO 3. Half-Life of Drug RLO	1. Google 2. Moh website
28	Yes	1. Hand hygiene RLO 2. Patient safety RLO	Not mentioned
29	Only to participate in the study	1. Osmosis-diffusion RLO	1. Google 2. Youtube
30	Yes	1. Half-Life of Drug RLO 2. Reflection RLO	Not mentioned
31	Yes	1. Infection control RLO (hand hygiene) 2. Patient safety RLO 3. Referencing RLO	Not mentioned

7.2. Impact of RLOs on clinical practice

This theme illuminated the graduates' perceptions about the reuse of RLOs and their impact on their clinical practice. Reusability is one of the most obvious characteristics of RLOs. It is defined with regard to RLOs in terms of 'any digital resources that can be reused to support learning' (Wiley, 2002, p. 6) and it is considered that the most important aspect of RLO is its 'digital nature, purpose

in learning, and potential for reuse' (Becksford and Metko, 2018, p. 2). Reusability, as mentioned in Chapter 1, can be horizontal or vertical. Horizontal reusability focuses on how subject-specific the learning object is (Khoo, Chaudhry and Butdisuwan et al., 2010), while vertical reusability relates to using learning objects at more than one educational level (Currier and Campbell, 2005).

In this study, the participants reused RLOs at different levels in their clinical areas, which could be considered as vertical reusability, while reusability within different subjects is horizontally reusability. The seven participants reported reusing different RLOs in clinical settings at different times, and several RLOs for a number of reasons. It should be noted that the participants reused RLOs which were different from those implemented in the first part of this study. They used the following RLOs: Research, Half-Life of Drug, Hand Hygiene, Heart Failure, Portfolio, Bioavailability, Patient Safety, Osmosis-Diffusion, Reflection, Infection Control, and Referencing. Table 7.2 shows the RLOs used by graduates in their clinical practice.

Table 7.2: RLOs used as result of implementation of pharmacology RLOs in the first part of this study by graduates in clinical practice

RLO	Description
Research RLO	The Research RLO consisted of a number of RLOs that participants reported using, designing a questionnaire, meta-analysis, qualitative and quantitative research, RCTs, types of qualitative research, EBP, 'why critique research?', and probability associated with inferential statistics
Half-Life of Drug RLO	To understand the half-life of drugs and its relationship with volume of distribution and clearance
Hand hygiene RLO	This RLO demonstrates the steps of hand hygiene in clinical practice through streaming video clips, and it includes interactive self-assessment quizzes
Heart failure RLO	This RLO explains the pathophysiology of heart failure, its treatment, and nursing management
Portfolio	It is RLO to 'To identify what a portfolio is, why they are used and to identify some pieces of material that may be used to support claims for learning and development'
Bioavailability	This RLO is an introduction to the concept of the bioavailability of the drug
Patient safety	Different RLOs in patient safety
Osmosis-diffusion	Explaining the difference between the processes of diffusion and osmosis, and introducing the concepts of concentration gradients and tonicity
Reflection	The reflection process is described in this RLO
Referencing	This resource outlines the information that is required to accurately reference for the Harvard Referencing scheme

The reusability of RLOs in clinical practice is a fundamental indicator of their impact on the latter. Therefore, as this theme involves the perceptions of participants on the impact of RLOs on clinical practice, the Kirkpatrick Model (explained in detail in Chapter 2) was used to evaluate its impact. It can be seen from the results that participants reused the RLOs in clinical practice, as clearly revealed in their comments and the field survey on the RLOs website. As

mentioned in Chapter 2, the Kirkpatrick Model has been critically analysed and has gained support over time as one of the most recognized and influential models. It been extended by others to look at the higher levels of the impact of training and educational programs. This is due to its logical framework to examine results and impacts at the individual and organization levels (Kirkpatrick and Kirkpatrick, 2016). Therefore, this model was chosen to evaluate the impact of RLOs on the clinical practice of graduates of the critical care and emergency nursing programs in Oman. The impact will be evaluated by Kirkpatrick's (1967) evaluation framework of four levels (reaction, learning, behaviour, and results) (Kirkpatrick and Kirkpatrick, 2016).

7.2.1. Level 1: Reactions

Reactions pertains to trainees' responses to the program and how much they are satisfied (Kirkpatrick and Kirkpatrick, 2005). It is also 'the degree to which participants find the training favourable, engaging, and relevant to their jobs' (Kirkpatrick and Kirkpatrick, 2016, p 17).

From the analysis of the interviews, it is clear that the participants used RLO again in the clinical practice, as is clear from the reuse of RLOs by seven participants.

> *'I am always reading the half-life of the drug'* (G27)
>
> *'I am using RLOs all the time'* (G31)
>
> *'I used Research RLOs… help me to understand the statistics'* (G25)
>
> *'Yes I used in between, Hand Hygiene and Heart Failure RLOs'* (G25)

As expressed by (G31) in the following quote, they reused RLOs because they were related and relevant to their job:

> *'it is specific to health providers and some topics related to the nursing role'*

This graduate reused the Bioavailability RLO to get information as the RLOs provided clear information, however, the participant mentioned that not all the information needed was listed in the RLOs, and the opening of the RLO was problematic. The information in the RLOs could lead to the reusability of its information.

> *'Also I used Bioavailability once… in the clinical [practice]… it took time to open, but I could get the information'* (G27)

The participants used Osmosis-Diffusion RLO and found the information in it to be understandable as described by graduate 29 in the following quote

> '*the last link I opened for this study is Osmosis-Diffusion RLO… it was clear and simple… the colour used is appropriate… the video was clear as well… and… I like the examples used in this video to make it understandable'* (G29)

However, one participant did not reuse RLOs in clinical practice due to a lack of time in clinical areas.

> *'I do not have time when I am in the hospital, and I do not think I read much when I am out of my work'* (G26)

In summary, there was evidence of Level 1 reaction (Kirkpatrick Model) to the RLOs from the postgraduate nurses. The graduates were satisfied with the

RLOs, as they reused them again in clinical practice. They found them relevant and related to their clinical practice, which encouraged them to reuse RLOs.

7.2.2. Level 2: Learning

This level indicates how much the participants have learned and retained from the training program. It concerns learning knowledge and skills relevant to participants (Kirkpatrick and Kirkpatrick, 2016). For this study, the graduates used RLOs during their study and in the clinical areas after graduation. They agreed that the knowledge and skill gained from RLOs led them to understand different concepts related to their specialties in clinical areas.

> *'I have just a small situation… I am always reading the half-life of the drug… and I remember the information I gained from the video of the RLO'* (G27)

Moreover, graduate 28 mentioned that RLO was supportive in academic and clinical areas. This was explained with specialty-specific information.

> *'Actually the RLO helped me in my study and again… because containing good information… one of the values of RLO is Hand Hygiene… it is simple… and useful for all the staff'* (G28)

Other participants explained that through RLOs they could find information that they were searching for.

> *'From my use of RLOs… now I understand where to find the information'* (G25)

The participants mentioned that the RLOs are used in clinical practice to update their knowledge of the relevant topics related to their clinical specialties.

'I am using RLO all the time because it's useful for updating my knowledge and skills by new studies, which are relevant to our clinical practice' (G31)

Graduates used Research RLO to understand statistics, as described in the following quote.

'I used Research RLO… help me to understand the statistics… as I need it to understand some numbers in the articles… I used it as evidence-based practice' (G25)

Linking to the above, the reuse of RLOs used to gain knowledge can help graduate to understand evidence-based practice that could support patient care in critical care areas.

Three graduates reused half-life of drug many times and expressed that it was one of their favourites, as it was clear and simple, while giving very important information related to their clinical duties. This RLO increased their knowledge and they remembered that they could use it anywhere and anytime.

'I am always reading the half-life of the drug… and I remember the information I gained from the video of the RLO… this video was very clear… and most of the time you can refer to it and open it… it's one of my favourites' (G27)

Hand Hygiene RLO was used by graduates in clinical practice as it demonstrated a principal skill that has a clear guideline followed by most of the departments of health services in practice.

'Actually, the RLO helped me in my study and again… because containing good information… one of the values of RLO is Hand Hygiene… it is simple… and useful for all the staff' (G28)

'I used it to go back to the RLO and used it to see the RLO in Infection Control and Patient Safety, as I mentioned previously…' (G31)

Linking to the above issues mentioned by the participants, they used the RLO to update their knowledge resources by searching for the articles attached to the RLOs. Therefore, they are looking for improved skills and updated knowledge as well in the RLO.

'Yes, I used in between, Hand Hygiene and Heart Failure RLOs… I returned back to them… This time I only tried to find the articles attached to these videos as resources… As I think they will be updated… and have more resources' (G25)

Therefore, it is clear that the graduates used RLOs to gain the required the knowledge and skills for practice. This level shows that the learning levels of the Kirkpatrick Model are achieved, according to the analysis of the interviews of the seven graduates.

7.2.3. Level 3: Behaviour

Behaviour in this context concerns 'the degree to which participants apply what they learned during training when they are back on the job' (Kirkpatrick and Kirkpatrick, 2016). Recommendations and suggestions to improve the program could be considered a way of changing behaviour on the use of RLOs in clinical practice. This shows the level of confidence of the participant in their utilization

of RLOs, which directly reflect their behaviour to apply what they learnt from course and apply it to clinical practice (Kirkpatrick and Kirkpatrick, 2016). The interview participants revealed that they utilized several RLOs that differed from those they used in their academic training, when they used 11 Pharmacology RLOs, as mentioned previously (Table 1.4). However, after their graduation and in their clinical areas they reused the different RLOs mentioned above (Table 7.1). The utilization of RLOs in clinical areas manifests nursing graduates being able to implement evidence-based practice, which is reassuring for the nursing program in general. Their ability was evident from numerous statements, a selection of which is presented below:

> *'For example in practice I used RLO… in… Portfolio'* (G27)
>
> *'I used RLO… I used additional RLO… for example Infection Control, Patient Safety and Referencing'* (G31)
>
> *'I used Research RLO… help me to understand the statistics, and yes I used in between, Hand Hygiene and Heart Failure RLOs… I returned back to them'* (G25)
>
> *'I used it because now I am kept in health and safety section and I am searching for topics about Patient Safety'* (G28)

This can be explored through the participants' statements describing RLOs in terms of being from a valid and authoritative source, the UoN, which increased one participants' confidence in the dissemination of Hand Hygiene to others.

> *'It is similar to the steps of Hand Hygiene in the hospital… there is a video… I checked it and then I showed it to the staff… I could open it in Salalah… the video was clear and simple… I used it for*

all the staff in critical area… and… and I mean because I remembered it is from a valid place, which is a known university… I returned to it and it gave me the confidence to show it to the staff… and this is a few months ago… not now' (G28)

Other participants used RLO as a source of knowledge, which increased their confidence to present a topic to their colleagues in clinical contexts. One participant presented the reflection RLO to ICU staff:

'I used RLOs… this time… I mean sometime in break time… through my phone, I remember looking to the… Reflection… I took this in critical care course… I explained Reflection to my colleagues in the unit… it's me and one of the staff… there is a small, short discussion each week in the ICU for the staff for small period… where each one of us discusses about a topic around nursing care…' (G30)

The participants found that Heart Failure RLO related to their profession and increased their knowledge about heart failure. Graduate 25 mentioned that she returned to this RLO for a revision. Reviewing the pathophysiology of a disease condition in nursing practice is considered a main concept to understand the disease treatment and nursing care.

Participants used the Patient Safety RLO when they performed new roles in their clinical practice. Showing behavioural change and how confident they were to deploy RLOs in their new roles.

'I used it because now I am kept in health and safety section and I searching about the topics about Patient Safety…' (G28)

In addition, a participant recalled using the Referencing RLO to support his writing of a research proposal to apply for higher study.

> *'I used RLO… I used additional RLO… for example Infection Control, Patient Safety, and Referencing… I am applying for my MSc, so I referred back to the Referencing RLO to reference my research proposal'* (G31)

The behaviour of the participants in the utilization of the RLOs reflected that these graduates increased their use of the RLO in clinical areas because of the training program they had received during their studies. This showed that the behavioural level of the Kirkpatrick Model could be achieved in the clinical areas of the participants.

11 students from Oman in 2018 gave feedback on the RLOs using the optional feedback survey attached to each RLOS (Appendix 8). Their feedback showed that they would recommend the RLOs to others, and they perceived it to be a helpful tool. The analysis of interviews also showed that the participants would recommend RLO to others either from the same field, like nursing, or different fields in other colleges, like Muscat College (Higher College of Technology).

> *'I recommended the RLO to the staff in ICU, we have staff going abroad for their study… I recommended RLO to them… and advise them to use the Research RLO'* (G28)

> *'I told my friend about it in Muscat college…the research RLOs as they do study research subject in their college'* (G31)

'I recommended the RLO to the staff in ICU, we have staff going abroad for their study… I recommended RLO to them… and advise them to use the Research RLO' (G28)

Here the participants mentioned also recommending RLOs to other staff going to study abroad, supporting Level 3 of the model. Furthermore, other participants showed the staff how they could use RLOs.

'I recommended RLO to the staff in ICU… I showed them the page and how they can use it… in the nursing station there are computers connected to the internet, and the website can be opened directly' (G30)

In addition, graduate 31 would recommend the RLOs be taught to other staff members who are candidates to be in critical care nursing programs and emergency nursing programs in the higher institute of health specialities.

'Yes, I recommended the RLO to my colleagues at work… especially the candidates who are going to take courses in the Institute, and I mentioned to them that they can open it anytime and anywhere… its worthy to have a look' (G31)

In addition, as mentioned above, in this level in the Kirkpatrick Model is measured to get recommendations from trainees to improve the program. In this study most participants articulated their recommendations for the RLOs very clearly. They also recommended some ideas to improve RLOs and what subjects could gain from RLO in their work in critical areas. The participants mentioned different recommendations for RLOs for improvement or creating new RLOs, which could support nursing care in clinical practice. This is shown

in their appraisal of the RLOs themselves and how much it helped them which reflect the change behaviour of using RLOs in the clinical practice.

> *'I think also in practice we need something called Bundle Branch to be as RLO… this is now as well in ICU… like nutrition bundle branch and make it as RLOs… it would then be easy to understand and be applicable to critical areas… Bundle branch is the care with guideline for the patient… like how much you can rise the bed for the patient… what are the priorities drug for the ICU patients… Like anticoagulant medications… By the way, making the bundle branch in RLOs makes work easy for the staff… whereby staff can reuse it, and for example there is no dietician staff to manage the nutrition of ICU patients during the period… and to add a point… these guidelines are not there… I suggest to make this guideline and put it as an RLO'* (G26)

Participants 26 in the above statement suggesting having some specific nursing care guideline to be created as an RLO where nurses could use it anywhere and anytime during their clinical practice. Graduate 27 in the following statement recommended that speciality topics be added to the RLOs, like information about the burn and its management and treatment, whereby the RLO could be short and clearer to understand.

> *'I am working in critical are (burn unit) and I need some information about the burn… for I feel some videos about the treatment of burn patient could be made as an RLO… so something short, fast, and understandable for the staff in the burn unit'* (G27)

'Specifically RLO… RLO… like… managing the burn… and also the treatment in general… they can explain the tool to measure the burn… how to descript burn… or the depth of the wound… which is sometimes difficult to assess… also the management of burns with children… rehabilitation… when to start… what I like about RLO… is that it is short… and you can use it anytime and anywhere… especially the videos… were very clear and understandable… so my suggestion is to make some RLOs for the burn unit as well' (G27)

Other participants recommended having information about the safety of ventilated patients as an RLO, and thought of the reliability and the validity of the information as very crucial to the nursing staff, as they are dealing with critical care patients. This this is clear in the following quote:

'RLO in clinical… it is always the staff… in ICU, dealing with ventilator… putting some information about ventilator or the safety of ventilated patient in ICU… as RLO is good… because RLO is easy and short, clear, and attractive… Also making some topics of ICU in the RLO will help staff to use something valid and reliable and… I think like CVP… it is a very common procedure in ICU' (G25)

Although these participants were mainly working in critical areas, they recommended having some procedures considered as the foundation of nursing care to be RLOs. Returning to the foundation of nursing care for them is very important, as they described.

'For the clinical practice… it is like any critical area… the simple information needed for the staff… make RLOs on any procedure in the nephrology unit… for the staff… maybe about the ethics of kidney transplantation' (G30)

One participant recommended adding different features to the RLOs which he considered important to the learning process. He recommended adding an alarm system to show any update in the RLOs. For example, if any article, or new information, or new RLOs are uploaded, this could be flagged up for the attention of participants.

'from my side… I think that RLO needs to have an alarm system… like other programs… so it will be an application can be download on the phone… and if there is any new information… or new update… or new article added… it will send a message to me… like a sign in the application… there is a message to be sent… so it will flash in the phone showing the new update' (G31)

In conclusion, the utilization of RLOs in clinical areas is considered an indicator of achieving this level of evaluation of the training program in this study.

7.2.4. Level 4: Result

This level evaluates the ultimate impacts of an educational or training program (Reio, Rocco, Smith etal; 2017). As described by many authors (Maddineshat, Hashemi, Besharati et al., 2018), the measurement of Level 4 could be difficult, as it often entails both clinical and financial outcomes. In some organizations, the results can be measured, for example through increased productivity and sales, or reduced accident and lower turnover. It is also agreed in most studies

that this level is challenging and difficult to measure (Praslova, 2010). Therefore, Level 4 is beyond the scope of this study, as the aim here is to evaluate RLOs as a learning tool for educational reasons, not for commercial purposes.

7.3. Summary

The participants reused the RLOs in different times with different RLOs other than pharmacology RLOs used in their course when they were students. These RLOs are Research, Half-Life of Drug, Hand Hygiene, Heart Failure, Bioavailability Osmosis-Diffusion, Patient Safety, Portfolio, Reflection, and Referencing. The reuse of RLO is essential features that support learning. Therefore, the reusability of RLO could impact the learning skill of the participants in the clinical area. The impact of RLOs on clinical practice for participants was vibrant, based on the reuse of RLOs by graduates deployed in clinical areas after they graduated from the adult critical care nursing program and the emergency nursing program. The reuse of different RLOs in clinical practice supports its impact in clinical areas. Participants used RLOs to update their skills, to revise their knowledge, to train in other skills like Hand Hygiene, and to distribute knowledge among other staff in nursing. They recommended the use of RLOs to others.

7.4. Discussion of the findings

This section discusses the results on the impact of RLOs on the nursing graduates' clinical practice in Oman. The discussion is presented in detail following the findings, in accordance with the Kirkpatrick Model, in three levels: reaction, learning, and behaviour.

7.4.1. Reaction

As mentioned previously, the reaction is the response of the trainees toward the training program. In this section participants reused the RLO again in the clinical areas one year after their graduation from the ACCNP and ENP program. The results showed that the participants reused RLOs in clinical practice. This may be explained by the fact that specific attributes of RLOs act as drivers for use. This finding was also reported by Lymn et al. (2008), who evaluated the use of RLOs by nurse prescription students. Pharmacology RLOs introduced during the course were assessed again after one year from graduation, and they found that nurse prescribers were still using RLOs.

The reuse of such technology is encouraged by making it a part of nursing learning objectives (which is a primary attribute of RLOs). This was clear in the study done in Qatar by Dalhem (2014) to explore the impact of e-learning in nursing. The results showed that there was a positive impact of integrating e-learning in the clinical practice. However, the usage of e-learning was low relative to the vast offer of 2,500 courses from different specialities, like business, marketing, and finance. Moreover, these courses could be of long duration, and difficult for busy nurses to follow. However, in the current study, graduates used several RLOs related to their clinical practice area and their continuous education development.

The findings showed that Omani culture is generally conducive to learners accepting e-learning if the prerequisite environment, learning context, and facilities are provided. This is very clear in the current study, as the graduates continued to use the RLOs in clinical areas, deciding autonomously which

RLOs to use and working independently to find the knowledge that applies to their clinical areas (Lee and Lin, 2013).

Several authors have suggested that the traditional style of teaching and learning in clinical instruction is increasingly out-dated, and that e-learning is a appropriate strategy for lifelong learning, as it has the nature of flexibility in education and learning (Gormley et al., 2009, Kokol et al., 2006). E-learning considers opportunities to learn with flexibility through the internet, finding different facilities for learning and the use of open education resources such as RLOs (Moule et al., 2010). Such types of learning could influence the attitude of sharing knowledge, which is an essential element of e-learning (Levy, 2006). It is also very clear from the results of this study that graduates recommended the use of RLOs to their colleagues and friends. This result may be explained by the fact that e-learning occurs through the reflection of workplace learning, which could be viewed as constructive e-learning (Gulati, 2008).

Holmes and Garder (2006) described this as communal constructivism, whereby each member contributes to others' learning resources, by learning with and from others, if the environment and learning context is similar. The atmosphere and learning context seems vital to reuse the training program. Using RLOs by graduates in clinical practice showed that the environment was appropriate for use, and the learning context is necessary to achieve the learning outcome of each graduate (Hamtini, 2008). It is very crucial to remember that the appropriate environment and learning context is critically to the effectiveness of learning with RLOs, and these essential attributes determine the acceptability of RLOs among busy professionals like critical care and emergency nurses.

The communal constructive aspect was very clear in this study, with the graduates recommending the RLOs to their colleagues in the same field of work, and different people from other institutions. This obviously indicates that the graduates were satisfied with RLOs, and found it related to their work (Yu, Chen, Yang et al., 2007), which encouraged them to reuse it in their clinical practice areas. There are several reasons that could explain this, such as the quality of the content (Laís Machado et al., 2015), flexibility (Knapp and Byers, 2008), time efficiency, supporting self-directed learning (Rouleau et al., 2019), and generally facilitating continuing education for nurses working in clinical areas (Lam-Antoniades et al., 2009). The results showed that graduates identified some technical difficulties while using RLOs, including in downloading some videos, not being able to open some RLOs, and difficulties in navigation. This finding was also reported by Lawn et al. (2017).

This study found that RLO reusability was demonstrated by different reasons, mentioned above. Despite this study using UTAUT2 to explore the adoption and use of RLOs, it is been found from the finding of the qualitative study that there is a deficit in UTAUT2 to indicate the acceptance of reusability of RLOs within postgraduate education.

7.4.2. Learning

This level indicates how much the trainees learned from the training program. The current study explored participants' confidence to use RLOs in their learning. They agreed that knowledge gained from RLOs led them to understand concepts related to their specialities, consistent with Landrum (2020), who found that students' confidence to use online leaning is related to the perceived usefulness of the online learning resource itself. Hence, students

in the current study perceived the usefulness of the RLOs which inspire confidence in their utilization to achieve learning goals. Lymn et al. (2008) also found that UK students perceived RLOs to be supportive tools in learning, and their participants positively agreed that knowledge gained from RLOs could be used in future practice. This suggests that RLOs as a learning tool have an impact on graduates' understanding of scientific concepts in pharmacology, such as the half-life of the drug and applied also to this group of post-graduate in Oman (as in the current study).

These results reflect those of a meta-analysis of Cooke et al. (2012), who also found e-learning could increase students' knowledge and skills more than traditional instructor-led methods. Elgie et al. (2010), also found that e-learning improved the knowledge of nurses in an emergency preparedness course. This seems to be consistent with other research which found that cognitive knowledge increased by e-learning, by comparing pre-test and post-test results (Cardoso, Moreli, Braga et al., 2012). A similar study was conducted in Iran by Rad et al. (2015) among medical students in clinical areas to evaluate the effects of RLOs on the anatomy subject. A university created 14 RLOs related to different parts of human anatomy. The results showed that students were interested in using RLOs, which had positive effects on improving learning human anatomy and increasing their knowledge in this subject.

The current study found that graduates gained knowledge from using RLOs, as they remembered the knowledge needed, because they repeatedly watched the videos or otherwise used the RLOs. This was explained by Beeckman et al. (2008) in terms of e-learning having the flexibility to allow each individual learner to study in their own time and place, suitable for them, which supports their

repetition of training and increases their knowledge. Another important finding was that the Hand Hygiene RLOs applied to all staff nurses as a universal precaution, demonstrated to them in the ICU department. A similar finding in the literature noted that nurses using e-learning intervention perceived positive outcomes including gaining knowledge related to universal precautions, such as IV injections (Härkänen et al., 2016, Bloomfield et al., 2008). Another study (Williams et al., 2009) evaluated the impact of e-learning simulation using videos to teach undergraduate nursing students, concluding that this strategy supports the learning process and has an effect in clinical practice. In the current study, the graduates used RLOs to understand statistics in research to support their understanding of research articles and improve their knowledge in evidence-based practice (Rouleau et al., 2019). Thus, gaining the benefits from technology is a related to the performance expectancy construct in UTAUT2, whereby people can accept technology when they perceive that it will help them, as explained in Chapter 3.

7.4.3. Behaviour

The behaviour level considers the degree to which participants apply what they learn from program in their clinical practice. It is the manifestation of actions that reflect working by using RLOs and can include recommending some suggestions to improve the program. It is imperative to mention that this study was among very few studies in nursing education and nursing clinical practice to explore the impact of e-learning in terms of at RLOs in the third level of Kirkpatrick's model (Rouleau et al., 2019). The negligence of this level is acknowledged and explained by Kirkpatrick and Kirkpatrick (2006, p. 83):

'I believe that Level 3 is the forgotten level. Lots of time, energy, and expense are put into levels 1 and 2 by training professionals because these are the levels that they have the most control over. Executives are interested in level 4, and that is as it should be. That leaves Level 3 out there on its own with no one really owning it'.

Studies also explained that the barriers to utilizing the higher level of the model are complexity of analysis, lack of support, cost, time constraints, and not being familiar with the higher-level process to evaluate (Phillips, 2003b). These barriers have been identified in both healthcare and business studies (Hill, 1999, Twitchell, 1997). However, nowadays, these barriers have been reduced by the advent of computers, which created a generally faster pace of business, e-learning and online events with easy access. This is alongside the modernization of the workplace environment and learning landscape, which has facilitated the evaluation of a training program in each organization. Therefore, this level has been evaluated in this study

The findings in the current study at this level revealed that participants reused RLOs by themselves and utilized different RLOs according to their needs in clinical areas. This was similar to the score data indicating that 10-20% of reuse globally was reported by clinicians accessing materials from healthcare-related websites (WHO, 2016). What is surprising is that the participants did not require staff support to guide them in the use of RLOs, unlike when they were in the course of ACCNP and ENP one year previously. This result may be explained by the fact that participants have more intrinsic motivation to use RLOs in their clinical areas as actual practising clinical nurses. This intrinsic motivation is

actualized by the attributes of RLOs (flexibility of anytime, anywhere use and time efficiency). Flexibility is essential for clinical nurses to accommodate education within their busy lifestyles, which is considered a driver to use RLOs independently. This also reflects the results of ownership of the learning task (Redmond et al., 2018). Hence the hedonic motivation construct of UTAUT2 as mentioned in Chapter 3 could affect RLOs acceptance in clinical practice among graduates in Oman.

This facilitates self-regulated learning, which could increase the motivation to use RLOs. Several studies also reported that engagement in e-learning among learners is useful and has positively affected engagement and retention of learning (Morton et al., 2016, Hammarlund et al., 2015, Parry et al., 2007). Another possible explanation for this is that different RLOs used by participants related to clinical areas show that RLOs have diversities of subjects, which could cover some essential areas of nursing education and nursing clinical practice more than only the speciality (Dalhem, 2014).

Learning outcomes are aligned with purposeful activities and assessment tasks, as mentioned previously. RLOs are designed to cover learning outcomes aligned with general and specific objectives and outcomes of health professional work, as supported by numerous studies (Redmond et al., 2018, Keefe and Wharrad, 2012, Windle et al., 2011, Lymn et al., 2008). Authentication of information (whereby students trust the contents and the information in the program) could be a reason for using RLOs in their practice, which showed that they apply what they are learning to practice areas (Lawn et al., 2017). This study showed that trust is an important driver of use and reuse of RLOs, which needs to be added to the construct of indicating the adoption,

acceptance and reuse of technology. Trust is not a construct in UTAUT2, hence there is a deficit in this framework to indicate the reusability of RLOs in such contexts.

There are, however, other possible explanations for why graduates may become familiar with RLOs. This could reflect that the participants became more confident about using RLOs and changed their behaviour toward using e-learning in their clinical areas (Beeckman et al., 2008). Changing behaviour and being more confident in using e-learning was also noted by Cottrell and Donaldson (2013) in their exploration of the opinions of registered nurses on the use of e-learning for blood transfusions. They measured the perceptions of registered nurses on the impact of e-learning in clinical practice. They found that the e-learning content stimulated the nurses' high-order thinking, which led them to reflect on their clinical practice. They also took more responsibility to achieve their own personal learning objectives in clinical areas.

Another quantitative study by Lee et al. (2007) of 36 physicians and nurses, to evaluate the efficiency of an instructional video to teach the insertion of intra-osseous needles in children, showed that e-learning videos improve the way of implementing the skill concerning the specific procedure very significantly. Similarly, 93% of participants in an online course implemented among nurse practitioners working in palliative care in the US reported that their practice changed as a result of the program (Letizia and Jones, 2012).

Besides, there are studies in technology like simulation measuring the impact of this type of technology in the skill of undergraduate nursing students in clinical practice. These studies found that simulation affects the psychomotor skill of students positively (Nash and Harvey, 2017, Fluharty et al., 2012,

Sportsman et al., 2011, Berg et al., 2010). However, the limitation of simulations is that they require a huge budget and number of staff to work in different stations. Moreover, simulation cannot be reused unless repetitive classes are prepared for it (Nash and Harvey, 2017).

Another important finding was that students suggested improvement to the RLO tools by creating different RLOs specific to critical care and emergency nursing, like the mechanical ventilator topic and burn management (Roberts and Windle, 2017). They also called for adding some RLOs concerning the foundation of nursing care crucial to all nurses in all departments, including critical care areas, like the procedure of insertion nasogastric tube. Other graduates suggested added improvements to the website of RLOs, by adding an alarm system to notify users of updates such as new RLOs, or updates in resources on the website itself. This is consistent with data obtained in Cottrell and Donaldson (2013) study, which found that some future learning is needed by nurses practising in clinical areas.

7.4.4. Results

'The degree to which targeted outcomes occur as a result of the training and the support and accountability package' (Kirkpatrick and Kirkpatrick, 2016). As mentioned previously, Level 4 of the Kirkpatrick Model is beyond the scope of this study, as the aim here is to evaluate RLO as a learning tool for educational reasons, not for commercial purposes. However, it is vital to mention that the outcome for Level 4 in education in nursing could be measured by the impact of e-learning on their continuous educational development by getting access to e-learning, especially as free or open education resources like RLOs. This was identified as a relevant aspect by Williams et al. (2009) in relation to e-learning

such as video teaching strategy, where students can benefit from watching the video as many times as necessary, and whenever necessary, freely. Similarly, a positive outcome was reported by nurses using e-learning education as a low-cost method in nursing education (Brunero et al., 2012, Knapp and Byers, 2008).

Level 4 is considered the highest level of Kirkpatrick's evaluation model. The outcome for Level 4 in education in nursing could be measured by the impact of clinical practice learning on patient outcomes and change in organizational practice in nursing education through technology, which could contribute to patient outcomes (Yardley and Dornan, 2012).

7.5. Summary

In this chapter, the finding showed the impacts of RLOs in clinical practice of graduates of ACCNP and ENP in Oman. Therefore, as this theme involves the perceptions of participants on the impact of RLOs clinical practice, the four-level Kirkpatrick Model was used, which evaluates impacts on: reaction, learning, behaviour, and result. In reaction, the analysis showed that graduates used RLOs and recommended them to others. In learning, the results showed that graduates apply the knowledge to their clinical practice. In the behaviour level, graduates reused several RLOs independently, and suggested different improvements. Level 4 was beyond the objectives of this study, but it is recommended to measure Level 4 by measuring the impact of any training program in nursing education by evaluating the impact of this program in patient outcome, and the cost of this training, which could affect its usability.

In addition, from the results of this study deploying UTAUT2, effort expectancy, performance expectancy, and hedonic motivation work as indicators of the use of RLOs. However, there is a deficit in the framework to indicate the acceptance of reusability of RLOs. Hence, the next chapter presents the integration of Q methodology and qualitative study findings to discuss the reusability of RLOs and drivers of and barriers to reusability in postgraduate education in Oman.

Chapter 8

Final Discussion and Conclusion

The aim of the study was to explore the drivers of and barriers to the adoption of RLOs in postgraduate nursing programmes in Oman to improve the knowledge, skills and confidence of students. This was achieved by introducing RLOs to postgraduate students in Oman and discovering their views and opinions about the new innovative idea and how this new teaching strategy could enhance their learning. The objectives were the following:

1. To explore postgraduate nursing students' views on the factors influencing RLO adoption in Oman and their use in clinical practice by using Q methodology.
2. To gain an understanding of the drivers of and barriers to using and reusing RLOs at the Higher Institute of Health Specialities (HIHS) in Oman.

Technology is not a panacea in and of itself, and technology-led innovations in education that do not consider the educational needs of users are unlikely to be effective. Learner needs and adaptability can affect students' readiness and capacity to participate in the meaningful use of technology. The studies reviewed indicate that attitudes about the use of technology can directly affect the intention to use it, and this is related to barriers arising from the costs, compatibility, technical issues, and organisational culture, all of which need to be evaluated from the outset during planning in order to successfully integrate technology into the curriculum. The e-learning paradigm encompasses the

latest advanced technological solutions for higher education that can support nursing education, facilitating learning through lifelong professional development, stimulating active learning, computer confidence, flexibility and creative rather than traditional instruction.

With e-learning solutions, students enjoy proceeding in their own time, downloading materials and performing activities as needed (Holland et al., 2013, Kelly et al., 2009). The ability to use e-learning resources anytime and anywhere is incredibly supportive for higher education and is valued by students (Yeoh and Wee, 2017, Oztürk and Dinç, 2013, Gerdprasert et al., 2011, Blake, 2010, Lymn et al., 2008). However, there are challenges in the practical application of e-learning solutions and in the evaluation of their effectiveness in promoting learning outcomes, which remains generally unclear, although empirical studies have demonstrated the efficacy of some particular cases (Sowan and Idhail, 2014, Oztürk and Dinç, 2013, Lu et al., 2013). Chapter 1 of this study highlighted that e-learning could be applied using OERs. This is one of the possible advantages for global nursing education, and this study explored some of their advantages and disadvantages. For example, major challenges include a lack of time management skills, negative attitudes toward group assignments, psychological stress (Sowan and Jenkins, 2013), technological problems (especially slow Wi-Fi), too much content, lack of knowledge about how to use WebBoard and inadequate instruction (Gerdprasert et al., 2009). It is important to explore related challenges in the context of planning OER adoption in Oman, which is the focus of this thesis. This study explored the adoption of OERs in the form of RLOs, a type of e-learning characterised by small, granular e-learning resources, which usually

deploy multimedia resources for learner engagement ‘in a visual and interactive learning experience’ (Windle and Wharrad, 2010, p. 244). The rationale for utilising RLOs is that they are an evidence-based intervention with attributes that support utilisation in nursing education (Williams et al., 2015, Bath-Hextall et al., 2011)

Chapter 1 also highlighted the challenges in nursing education in Oman and the need to move to advanced e-learning technology, such as RLOs, to support nursing education and meet the increasing generational need for current and future nursing students to utilise such technology.

The reviewed literature in Chapter 2 revealed that e-learning is clearly valuable to nursing education but that successful e-learning interventions require time and resources for production. Some existing e-learning interventions include ready-made OERs that are accessible for use in education. However, there is a dearth of evidence demonstrating the effective adoption of these resources across cultures, being used in different contexts from those for which they were originally intended. Thus, this study offers evidence of the successful adoption and transfer of e-learning RLOs from a Western to an Arab country, with the mediation of UTAUT2 and Hofstede’s (1991) Culture Model, which facilitated and guided the exploration of the drivers of and barriers to adopting RLOs in Oman in postgraduate nursing education.

Q methodology in Chapter 4 and UTAUT2 and the Culture Model in Chapter 3 provide a novel approach to understand the adoption of RLOs in nursing education in Oman. A discussion of the findings of Q methodology was presented in Chapter 6, and a discussion of the findings of the qualitative analysis were reported in Chapter 7. The current study used sequential mixed

methods, collecting and analysing data with Q methodology (through Q sort and Q factor analysis) and qualitative semi-structured interviews with thematic analysis. This chapter discusses the synthesis and integration of the findings, identifies the strengths and limitations of this research and the impact of COVID-19 and highlights the implications of the study.

8.1. Integration of Q methodology and qualitative study findings

The Q methodology and qualitative research inquiry demonstrate that the students accepted RLOs and used and reused them during their studies and after their graduation, as discussed in the following section on reusability in theoretical classes and clinical practice in the context of RLO adoption in an Omani postgraduate nursing programme. Thus, it is suggested from the current study that there are many factors that determine the reusability of RLOs from one context to another.

The current study used UTAUT2 and the Culture Model. From the integration of the findings of the Q methodology and the qualitative study, it was found that some factors were common across both models, while others differed according to culture, which could influence RLO reusability in Oman. In addition, the qualitative study indicated that there is a deficit in UTAUT2 to indicate the acceptance of reusability of RLOs within postgraduate education. Consequently, the current study proposed a variant UTAUT2 representing factors specifically influencing reuse acceptance of technology across cultures: TRAM. The development of TRAM is from the integration of the findings of current study, where the factors as drivers and barriers from Q methodology with the impact of RLOs on graduates in qualitative study showed that Omani

nursing students reported some factors similar to UTAUT2 and the Culture Model to accept and reuse RLOs, while some factors were different.

UTAUT2 suggests that seven core constructs are direct determinants of technology acceptance (behavioural intention) and use (behaviour) – performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, habit and price value – with age, gender and experience acting as moderators. The current study used UTAUT2 along with the Culture Model (Hofstede Model, 1991), which classified culture into four dimensions: individualism vs. collectivism, masculinity vs. femininity, power distance and uncertainty avoidance, as explained in Chapter 3.

The findings showed that different constructs influence the acceptance of RLOs, which are placed in both UTAUT2 and the Culture Model. These constructs from both models explore the reusability of RLOs in Oman and how the reusability was manifest in the use of RLOs transferred from the UK (University of Nottingham) to Oman. The results also indicated the possibility of reusability of RLOs by students and graduates in theoretical classes and clinical practice, which to the knowledge of the researcher is a pioneering exploration of the reusability of RLOs in Oman after transferring RLOs from the UK.

From the Q methodology and qualitative study results, a variant model was developed to conceptualise the reusability acceptance of RLOs in Oman. This variant model considers both technology acceptance and the factors that enhance the reusability of RLOs in Oman. This is considered a distinguishing difference between UTAUT2 and the Culture Model and the variant TRAM built in this study, suggesting the factors influencing the acceptance of reusability of RLOs as OERs. The reusability of RLOs was consequently determined in the

current study after the adoption of RLOs in Oman within postgraduate nursing programmes.

Therefore, the findings from Q methodology and qualitative study in the current study indicate that TRAM (Figure 8.1) has external and internal factors that influence the reuse of RLOs in Oman. The external factors are intrinsic to the resources, namely, effort expectancy, performance expectancy, trust in resources and institutional reputation. The internal factors are related to the learner or the re-user, which are hedonic motivation, self-control and culture. As mentioned previously, TRAM differs from UTAUT2 in looking at reusability acceptance, which might be the result of the adoption and acceptance of technology. Hence, the reusability of RLOs is presented and followed by discussion of TRAM.

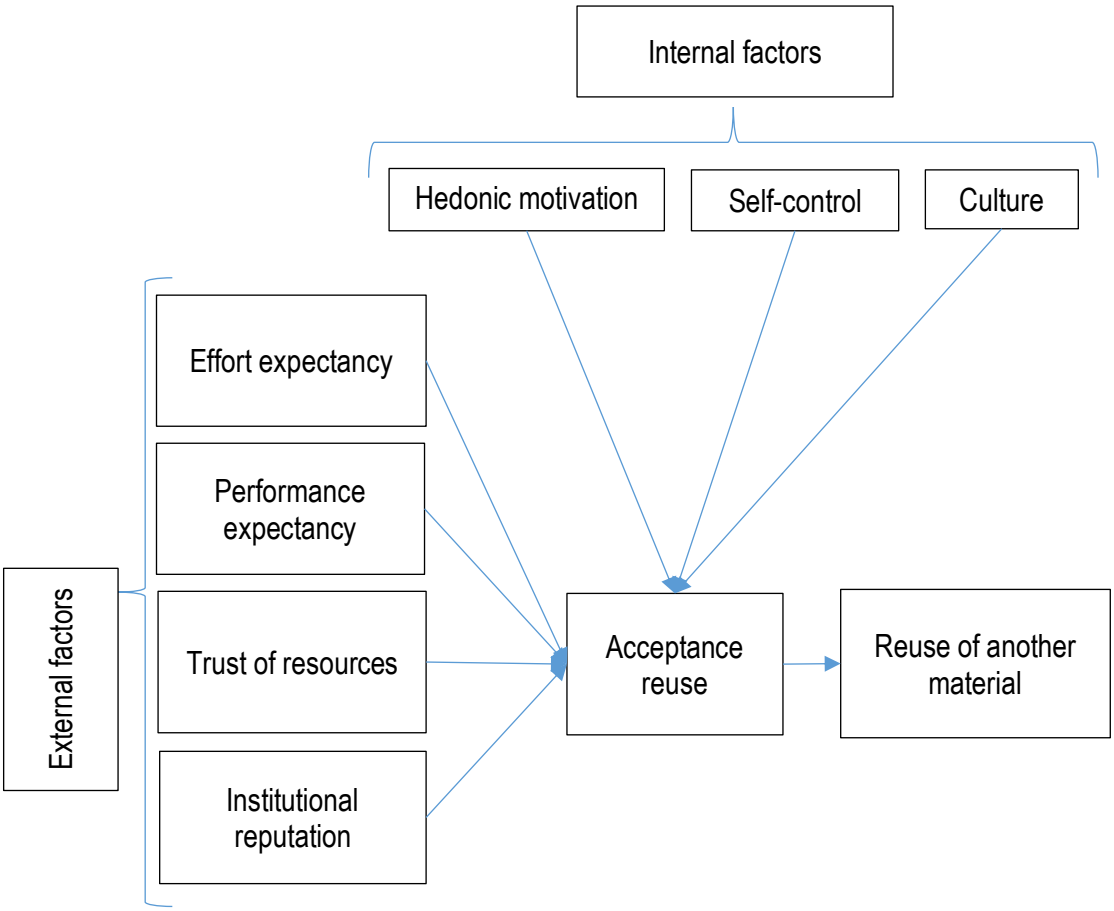

Figure 8.1: Technology reuse acceptance model (TRAM)

8.2. Reusability of RLOs

RLOs engage the learner in an interactive learning experience in which the learner has flexibility in how they use, access, share, and reuse resources (Khan et al., 2019), promoting flexible and autonomous learning (Shafrir, 2020) as described in current study by (S14)

> *I think it is accessible… I can enter it whenever I want, so it makes me more responsible'*

From the current study's result, despite the identified challenges facing students while using RLOs, they are generally accepted in Oman and the students were

motivated to use them because of their attributes, flexibility, and interactivity, which increased their engagement in the learning process. This was shown in the current study in the findings of Q methodology and qualitative study, wherein participants said that the consider RLOs to be good learning materials, as described in Factor 1 in Q methodology, as in the following excerpts:

> *'I like the variety in the RLOs, video and text… I like the audio explanation of the video… it has good learning materials, so I strongly agree with it'* (S7)

> *'as I mentioned there is a different type… for example, if you are such person who likes audio, you can get if, you like visual it is also there… so it is different technique'* (S9)

In addition, some participants cited the flexibility of RLOs in Q methodology (Factor 2):

> *'I agree because anytime, anywhere… I can use my phone and learn'* (S18)

> *'I like the advantage of the website and the e-learning so can access… if I am at the Institute, or home, or the department in the clinical… also through the laptop or the phone'* (S19)

Moreover, the environment and implementation process is supported by the use of RLOs in line with the national Vision 2040 in Oman (described in Chapter 1), and policy to enhance the use of innovation and e-learning in education. The acceptance of RLOs and its features enhanced the reusability of RLOs in clinical practice, and had positive effects among graduates in clinical practice

as shown in the results of the qualitative study, where graduates of the nursing program reused RLOs in the clinical areas:

> *'I am using RLO all the time'* (G31)
>
> *'Yes I used in between, Hand Hygiene and Heart Failure RLOs'* (G25)

Reuse is a crucial feature of RLOs (Kammerlocher, Couture, Sparks et al., 2011). It is assumed that uptake and adoption of educational technology in teaching will be faster if teachers reuse educational resources developed by other teachers rather than 'reinventing the wheel'. In the current study, the nursing institute used RLOs without creating them, and students used different RLOs created in a different country, adopted according to the nursing curriculum, which is similar to some topics of the UK nursing curriculum. This is clear evidence of teachers and students being able to use RLOs created by different institutions for different learning contexts. Moreover, Lamphon (2020) in Saudi Arabia used RLOs created in the UK, with teachers in undergraduate nursing institutes using 5 RLOs that were found to save time for teachers, who were generally satisfied with RLOs and used them in the nursing curriculum.

Reuse has been highly associated with e-learning, as the digital format allows many users to access the same resources without compromising access for others or infringing on copyright and intellectual protection considerations if there is an open licence (Wills and Pegler, 2016). Reusability also reduces costs, as created RLOs with high quality and reusability accrue cost savings over time due to frequent reuse by different groups (e.g., subsequent year cohorts in nursing programs). Hence, reusability can support learning in theoretical classes, and (importantly)

reusable RLOs can also support lifelong learning, especially in clinical practice. The following section discusses the reuse of RLOs in theory classes and clinical practice, as deduced from the findings of factors in Q methodology and qualitative research.

8.2.1. Reuse of RLOs in theoretical learning

Evidence of reusability in the current study is clear, as the students reused the RLOs in their class. They also recommended them for others in their course and their peers in different nursing institutions. The Q methodology results revealed that the students used RLOs for revision and to catch up on missed classes. According to Williams et al. (2015), RLOs are of the greatest benefit to students in the revision process. While this is mainly related to examination preparation in the educational context, the same factor should be useful for continuous professional development among nurse practitioners, facilitating the implementation of EBP, and an underlying aim of RLO adoption in nursing education in Oman (including from the policy perspective) is for nursing graduates to carry e-learning forward into their professional practice, as discussed previously. This was clear in Q methodology findings, such as the following:

> *'I feel it is … having it all the time helpful for the students… even though if I am not a student anymore and I am a staff member, it will be every easy to use it and gain the information again when I need it, and I can use information in research and update myself'* (S3)

This is an EBP implication of this research, indicating that students were looking forward to update their knowledge in the clinical areas while dealing with patients through using RLOs. The Q methodology results also indicated that students used and reused RLOs in their study, including different available RLOs from those implemented in the study (pharmacology RLOs). They used research RLOs to review for their exams, which shows that RLOs can be used in different subjects within the same group, which was clear in Factor 2 where students said:

> *'yes it was helpful, even for research I got some information, which helped me in the exam'* (S1)

The graduate recommended RLOs to other students in different institutions, including non-nursing areas which shown in the qualitative study findings where graduate said:

> *'I told my friend about it in Muscat college…the research RLO as they do study research subject in their college'* (G31)

Participants thus exhibited both vertical and horizontal use of RLOs. This was because the RLOs were viewed positively by students and were found to have positive impacts on their learning process. The RLOs themselves have considerable longevity, and it is recommended that in order to maximize their potential impact, it is important that staff and students know that they are there, and that they are used. For this reason, ongoing dissemination (even if just via email reminders), particularly at the beginning of each academic year, will be important to ensure reuse and sustainability (Ramirez-Montoya, 2020)

8.2.2. Reuse of RLOs in clinical practice

Health professionals are required to remains abreast of the latest clinical developments in their specialist fields, driving EBP and adhering to updated policies and guidelines. Nurses must continue their education as practitioners, improving their knowledge and skills, and adapting to changes in their work environment (Sin and Bliquez, 2017). All nurses have a professional responsibility and motivation to continue their lifelong learning (Lahti et al., 2014). Studies indicated that lifelong learning has escalated, and it is a developing trend (Qalehsari, Khaghanizadeh and Ebadi, 2017). Nursing professionals will continue their learning after pre-registration in nursing education and will apply lifelong learning to develop their knowledge and skills or update their knowledge, skills, and attitudes, to enhance nursing practice to improve the quality of care they provide (Gallagher, 2007). Continuing education in nursing could be divided into degree/certificate courses and non-degree/certificate courses. Studies found that online course delivery supports the nursing profession and nurses are satisfied with online learning as it is a time-efficient way for them to develop their skills while performing their normal clinical roles, as busy practitioners, enabling ubiquitous access at any time. The evidence for this in the findings of the current study included a student in Factor 2 in the Q methodology results who said:

> *'because these RLOs can save time, if I could have the information in short time and anywhere, also it would work in the phone, so need to search for computer or laptop in practice we are busy, no time to go to books and after work, no time to read, because we are with children the life is very fast… I think we need*

something fast and easy to help the lifestyle nowadays. And because I am working in ICU… I cannot concentrate on so many things, I need to see my patients first Therefore, something easy and factual would help to find the information… It would be better' (S2)

This also saves on costs for healthcare systems that utilize OERs effectively. Chapter 1 describes how e-learning can facilitate lifelong learning in this regard. The qualitative results of current study indicated that graduates continued to use RLOs and found it fitting for their learning process. They described the RLOs as flexible resources that they can use at their convenience with regard to time and place. Beckett (2020) explored the concept of e-learning and nurses' perceptions of its value for engaging with lifelong learning and continuing professional development (CPD). The results showed that nurses strongly agreed that e-learning supports their CPD, and they found it relevant to their clinical practice.

Within lifelong learning and training in nursing education, graduates in the current study used RLOs to train new registered nurses in nursing skills where they used it with other staff in the clinical areas. This is to benefit from freely available quality resources, which are trusted and peer-reviewed, which save time and effort in training (Lamphon, 2020). This was clear in the qualitative study findings, where a graduate said:

'It is similar to the steps of Hand Hygiene in the hospital… there is a video… I checked it and then I showed it to the staff… I could open it in Salalah… the video was clear and simple… I used it for all the staff in critical area… and… and I mean because I

remembered it is from a valid place, which is a known university… I returned to it and it gave me the confidence to show it to the staff… and this is a few months ago… not now' (G28)

Despite the identified barriers faced by students in using RLOs in the current study, especially the internet connection issues, the Q methodology results revealed overwhelmingly positive impacts that clearly supported reuse in clinical practice after graduation. RLOs in general cover diverse subjects, including essential areas of nursing education and clinical practice with application in multiple specialities (Dalhem, 2014).

RLO reusability in theory and clinical practice remind us that these students and graduates work with technology very dynamically, and institutions should work to emphasize e-learning advantages, especially in emergency situations like COVID-19 (Adedoyin and Soykan, 2020, Slimi, 2020). New users of technology will comprise 70% of workers by 2025 (Deloitte, 2014) and they will ultimately comprise the largest living generation. They are characterized by great skill and acceptance of technological solutions (Ghazizadeh, Peng, Lee et al., 2012) being considered digital natives as they attained maturity subsequent to the ICT revolution of the 1990s, followed by the e-solutions revolution of the 2000s, given a fillip by smartphone proliferation, social media, and e-commerce (Rodríguez, Ferron, Shamas et al., 2014).

This great technological readiness is even more pronounced among the new generation, 20% more of whom browse YouTube every day compared to old generation. In Q methodology consensus statements, findings indicated student agreement that age and gender do not affect the use of RLOs, and

nowadays everybody can use technology. Thus due to the new generations' familiarity with all forms of technology, and instructors need to adapt their teaching methods to this new reality in order to connect with them as well as to avoid disconnection from their students, in order to facilitate effective learning (OECD, 2016). However, despite familiarity with new technology, the current study also found that some students still needed training to use RLOs independently, which was a clear finding of Factor 1 of Q methodology. Hence, continuous training could be required to enhance the utilization of e-learning in nursing education (Regmi and Jones, 2020).

While the results of this study cannot be generalized for all students, the reusability of RLOs has a positive impact on postgraduate students in classes and among graduates in clinical areas. The attributes of RLOs supporting reusability foster acceptance among postgraduate nursing students in Oman; it can be said that RLOs reusability drives acceptance in Oman. In addition, it is important to remember that new generations work easily with technology, which is inherently user-friendly and easy-to-use, which warrants changes in the strategy of teaching to include more e-learning components to foster the learning process. The findings of current study in Q methodology and qualitative results indicate that graduates continued to use RLOs and found it fitting for their learning process. This demonstrates the successful adoption and transferral of RLOs from the UK to Oman, and their acceptance, use, and reuse. The reusability of RLOs, as mentioned previously is enhanced by external factors and internal factors of TRAM.

8.3. External factors

The type of resources like RLOs and the evidence base demonstrating their quality are crucial in the adoption of e-learning in nursing education, as explained in Chapters 1 and 2. The external factors are mostly related to the resources and the quality of resources used in online learning. In the current study the external resources can be seen in the intervention, which were RLOs adopted from the UoN for nursing students in Oman. These factors are similar to UTAUT2 factors and others, as confirmed by the study findings. In UTAUT2, the acceptance of e-learning intervention depends largely on performance expectancy (PE) and effort expectancy (EE).

PE is how far the system helps end users achieve their goals, whereas EE is the degree of ease associated with e-learning (ease of use) (Venkatesh et al., 2003, 2012). PE and EE are from UTAUT2 and support the results of this study. They are included in TRAM as influences for the acceptance of reuse. Other external factors resulting from this study are different from UTAUT2, specifically the trust in resources and reputation of the originating institution. These factors are presented in the following subsections.

8.3.1. Performance expectancy (PE)

PE was a driver of RLOs acceptance among postgraduate students in Oman, and it was found to influence RLOs reuse in clinical areas among graduates. As mentioned previously, RLOs features and contents enabled students to achieve their objectives. RLOs supported their understanding of some concepts of pharmacology through the text and narrated video resources. Moreover, RLOs were found to increase students' knowledge and support their exam revision, particularly for their research examination. Bloomfield (2013) also

found that graduate first-year pre-registration nursing students found that e-learning was useful and important in their revision and preparation for assignments. This result may be explained by the fact that one important advantage of e-learning is that students can repeatedly interact with concepts until they achieve mastery (Khan et al., 2019, Cooke et al., 2012). Other studies (Blake, 2010, Bagley and Johnson, 2007) reported that the use of RLOs supported learners' knowledge and increased their understanding. Lymn et al. (2008) showed that RLOs increased student understanding of pharmacological concepts in particular. Similarly, in this study students believed that RLOs increased their understanding, as reflected in the following quotes:

> *'yes it was helpful, even for research I got some information, which helped me in the exam'* (S1)
>
> *'I like the assessment in each RLO… because it is at the end… and gives a review about what was explained in the previous slides of the video or the text, and it gives me a hint if there are any points I need to review, to grasp the information more'* (S12)
>
> *'it has video and text… and assessment… there are pictures to illustrate the information… emm… it increased the understanding'* (S17)

This was particularly related to pharmacology learning. Students of all three factor groups found that RLOs use helped them to understand pharmacology concepts. They found RLOs useful to enhance their knowledge, which they perceived to be helpful in examinations and quizzes. Participants also believed that RLOs supported their learning and attracted them to learn. This enhances

the reusability of RLOs, and students used the Pharmacology RLOs in the current study in clinical areas and found it to be beneficial:

> *'I have just a small situation… I am always reading the Half-Life of Drugs… and I remember the information I gained from the video of the RLO'* (G27)

Gaining information from RLOs increased student use and also reuse in their clinical practice, to revise the information needed. Thus e-learning was found to be supporting graduate learning in clinical areas (Bloomfield and Jones, 2013). Hence, moving beyond the traditional way of teaching to increasingly adopt e-learning has been identified as an effective way to engage student in learning (Ferreri and O'Connor, 2013).

While students could gain knowledge and information from RLOs, the results of Q methodology showed that students required in-depth information to be added to RLOs, as they think that some information is too general, and they would like to have specific knowledge related to critical care nursing specialities:

> *'when I entered last time searching for medications… it was so easy…how it explained about that medication, how to… administer the medication, but I think more information is needed'* (S22)

In addition, the graduates in the finding of qualitative study recommended to have in-depth knowledge about the information in critical care nursing which could support their clinical practice.

> *'I am working in critical are (burn unit) and I need some information about the burn… for I feel some videos about the*

treatment of burn patient could be made as an RLO… so something short, fast, and understandable for the staff in the burn unit' (G27)

This reflects changing behaviour of students and graduates as per the Kirkpatrick Model, reflected in the results of the qualitative study, which is accepting RLOs and reuse it in clinical areas. According to TRAM, RLOs usability and benefits to graduates are the key to graduate reuse of them. These benefits should not be specific to small groups, and could be shared according to the specialities of each group. Therefore, RLOs developers need to develop medical information and in-depth knowledge support for nurses in their clinical areas, which can be used and reused by other healthcare staff, such as physicians and physiotherapists. It must be ensured that materials are fit for purpose, to guarantee reuse by nurses and across professional groups (Wharrad and Windle, 2010).

8.3.2. Effort expectancy (EE)

RLOs were found to be easy to use, with students explaining that they were able to access materials again later if lectures were missed. This feature on RLOs was evaluated positively by students, affirming previous studies (Bloomfield and Jones, 2013, Windle et al., 2011, Bath-Hextall et al., 2011, Kelly et al., 2009). The features of being easy to use, particularly 'anytime, anywhere', enhance RLO reusability, as evidenced in Q methodology results, where most of students agreed that the RLOs were easy to use:

'I like the advantage of the website and the e-learning so can access… if I am at the Institute, or home, or the department in the clinical… also through the laptop or the phone' (S19)

> *'because these RLOs can save time, if I could have the information in short time and anywhere, also it would work in the phone, so need to search for computer or laptop in practice we are busy, no time to go to books and after work, no time to read, because we are with children the life is very fast… I think we need something fast and easy to help the lifestyle nowadays'* (S2)

In addition, the brevity of RLOs was highly valued by participants, which might enhance the reusability of RLOs, as reflected in Q methodology results:

> *'as you know it is short…so it is not long… if it is long I think I will not see all of it' and they were not considered 'boring'* (S8)

A point mentioned by Wharrad et al. (2011) is that each individual RLO in their study did not require more than 15 minutes to complete, which made the RLOs flexible, and they could be used at work (e.g., during placements in busy ICUs), class, or at home. The flexibility of RLOs was agreed by students to be useful in facilitating the application of knowledge in their practice sessions. The multimedia used in RLOs, especially video and the text, were reviewed positively by students. They explained that video and text increased their understanding. Students used RLOs on their phones, which shows that they can be used effectively without the need for direct support (Windle et al., 2011).

Students in the current study used the RLOs for exams and quizzes, benefitting from their high-quality assessment and feedback features, which allowed learners to gauge their performance and thus reinforce their learning, increasing their confidence and understanding of subjects to achieve course outcomes (Sinclair, Levett-Jones, Morris et al., 2016). The timing of feedback

is essential; the immediacy that can be provided by e-learning programs embeds learning at the time of delivery and prevents learner frustration (Shute, 2008).

Clear, specific, and meaningful feedback is needed to facilitate further learning. Immediate feedback is more effective than delayed feedback in terms of both retaining correct information and correcting wrong answers (Sinclair et al., 2016). It also affords greater knowledge retention, confidence, and the ability to identify and comprehend why responses may have been incorrect in the first instance. The RLOs in current study delivered immediate feedback in the assessment sections, which encouraged learners to use and reuse them, functioning as a driver of usability in Oman. However, some studies reported frequent criticism on RLOs feedback, with learners complaining that insufficient feedback is available due to RLOs being short and self-contained, which some users find limiting (Bath-Hextall et al., 2011).

Despite the RLOs being easy to use, and being usable anywhere, anytime; the usability and re-usability could be reduced due to difficulty in navigating in the general website. Moreover, despite the RLOs being open resources, some participants had difficulty in locating them if the search did not contain ‘Helm Open’ or RLOs. They were not easily discoverable. Most of the students did not know about the availability of RLOs in the website, and RLOs did not appear as suggestion for knowledge resources in search engines like Google. For example, many students highlighted that ‘metabolism’ would not appear in RLOs unless written with ‘liver’ and ‘drug’ metabolism, as revealed from Q methodology.

Being able to find RLOs is a core determinant of RLO reusability, and algorithms to facilitate searching and listing of sought items should be improved to avoid a overabundant returns for basic searching of digital repositories (to return the most relevant content to users), which would inhibit reuse due to increased efforts expectancy and reduced perceived usefulness (Bath-Hextall et al., 2011, Sanz et al., 2010). Students in current study had some recommendations to improve this RLO feature. Making the RLOs repository more searchable might involve looking at the meta-data attached to each RLO, and general terms for pharmacology might need to be added (Sinclair et al., 2013).

RLOs are of varying quality, as found from the literature review, and while the results of the current study which showed the general acceptance of RLOs in Oman, some RLOs still posed barriers in their design. Q methodology indicated that three RLOs had been developed using Flash technology which meant some participants could not open these (without downloading Flash plug-in on their computers). These RLOs did not open in Oman for postgraduate nursing students. Difficulty in opening RLOs, or the impossibility of opening them, *ipso facto* reduces their usability and prevents reusability, potentially discouraging students from using RLOs in general. This is a technical problem that needs to be solved by the developers to support end users of RLOs by designing RLOs with a view to the widest possible use given available computer resources among users.

Flash is a now obsolete technology, which is a considerable barrier to many OERs developed using this platform (Sinclair et al., 2016). Technology platforms going obsolete is an ongoing problem – other examples are Authorware and Shockwave (old systems used to download games and

multimedia) which have been terminated, and which pose increasing difficulties due to a lack of hardware and software support. Nowadays many alternative solutions can be found with the proliferation of smart devices and the homogenization of operating system functionalities.

In the new milieu, interactive content has moved to platforms such as HTML5 Canvas and Web GL. RLOs designers must thoroughly test their products on different devices and browsers, making sure there are plugins for non-standard technologies. HTML5 has heralded a solution to some of these problems as it is a common language providing some of the features lost when Flash disappeared, although it does not allow everything that Flash did. In addition, digital training resources created by old technology like Authorware, Shockwave, and Flash required upgrading (Wharrad, Windle and Taylor, 2021).

8.3.3. Trust in resources

Trust "is as a feeling of certainty that a person or thing will not fail and is often based on inconclusive evidence" (Montague, Kleiner and Winchester, 2009, p. 628). Other RLOs usability and reusability drivers identified from participants in the current study included the authentication of e-learning resources. Because the deployed RLOs were developed by a respected university, the participants felt that the website and contents could be trusted, and that the information was evidence-based. This was clear from the finding reported in Chapter 6

, where a student said:

> *'I saw the information about the drugs, for me if I want it very fast and cannot Google it, I cannot trust just any website, but this*

website, the drug is there and it is approved academically, so I can trust it and get the information, so I will go for it' (S14)

This displayed awareness among postgraduate students of the importance of information reliability, which is an important nursing skill related to EBP implementation in real critical care delivery. Student mentioned that they trusted the RLOs as resources for the information they needed, and this profoundly affected their e-learning acceptance. This was clear in a graduate's response in the qualitative study findings:

'I am using RLO all the time because it's useful for updating my knowledge and skills by new studies, which are relevant to our clinical practice' (G31)

'I cannot trust just any website, but this website, the drug is there and it is approved academically, so I can trust it and get the information, so I will go for it' (S14).

With regard to trust, participants alluded to its particular importance concerning certain subjects covered by the RLOs, especially pharmacology and research skills. Students found that the RLOs matched the contents of their study and supported them to understand specific aspects (Lymn et al., 2008).

'It is specific to health providers and some topics related to the nursing role' (G31)

While trust is essential to the usage-associated features of e-learning, the most instrumental aspect of e-learning *per se* in achieving learning outcomes is the academic content, which "is the heart of e-learning" (Leeuw, Westerman,

Nelson et al., 2016, p. 8). The fundamental goal of e-learning design is to deliver content, and designers must avoid the pitfall of making e-learning technology for the sake of using a new technology. The use of e-learning can be beneficial in education if it is implemented with appropriate pedagogical sensitivity to the learning context and learners' needs; it is not good in and of itself, and technology-led innovations in education that do not take account of the educational needs of users are unlikely to be effective. The e-learning content in the context of nursing education needs to be updated and appropriate for EBP to foster reusability (Sinclair et al., 2016).

In the current study, Q methodology and qualitative findings revealed that participants agreed that RLOs helped them in their study and had an impact on their practice in clinical areas, however they suggested having more RLOs related to critical care and emergency nursing care, such as the particular topic of how to read an electrocardiogram (ECG), which records the electrical signal from patient hearts, to check for different heart conditions. Qualitative results revealed that participants also recommended having some RLOs in nursing foundation care, like demonstration of nasogastric tube insertion; some explained that these procedures are very important and they find themselves needing to revise their knowledge of related procedures to support new staff nurses in clinical areas. In Blake's (2010) study, students reported pedagogical expectations and ensuring that content matched the level of the course is very crucial in speciality nursing programs like ACCNP and ENP.

One of the greatest challenges facing healthcare professionals today is the effective and efficient management of an ever-increasing amount of clinical-related health information. A crucial dimension of that challenge is to ensure

that pertinent information is accessible at times during decision making, including planning nursing education as well as clinical care. Open online resources like RLOs have the potential to address that challenge by bringing the most relevant information directly to the point of care. For nurses, providing valuable information through convenient electronic sources may address some of the barriers that inhibit their access to and clinical use of new and pertinent research (Scurlock-Evans, Upton and Rouse, 2017, Doran, Haynes, Kushniruk et al., 2010).

EBP utilizing different knowledge resources is imperative for optimum patient care and safety. EBP execution entails that healthcare professionals have the academic and clinical skills to apply the outcomes of published research, in conjunction with clinical expertise and in accord with patient values and preferences (Albarqouni, Hoffmann, Glasziou et al., 2018). In the EBP process, nursing professionals must search the data bases and online resources to acquire the knowledge and information needed to apply in practice, with the skills to identify and operationalize trustworthy and reliable evidence (Horntvedt, Nordsteien, Fermann et al., 2018). It is an core nursing skill and responsibility to practise using the latest research evidence in EBP to provide effective and safe care (NMC, 2018).

Related to this, nursing curriculums ought to incorporate such evidence and actively disseminate EBP, and this has been acknowledged by national policies and educational institutions (Scurlock-Evans et al., 2017, Stevens, 2013, Moch et al., 2010). Aside from educating nursing students in the best current practice *per se*, this helps to establish and EBP culture and practice among nurses that they can carry on into their clinical practice (White and Winstanley, 2010, Warne

and McAndrew, 2009). This ultimately helps improve EBP implementation and healthcare services in general (Scurlock-Evans et al., 2017, Young et al., 2015, Moch et al., 2010).

In line with the EBP imperative in nursing education and practice, the pharmacology RLOs used in this study, which were prolifically alluded to by participants in numerous contexts mentioned previously, were specially chosen as OERs of high quality, designed using the ASPIRE framework. RLOs developed in UoN have been selected for this study based on empirical evidence, whereby many studies showed that the RLOs are effective, peer-reviewed, and effective based on the ASPIRE Framework (Figure 1.1) (Williams et al., 2015, Bath-Hextall et al., 2011, Lymn et al., 2008).

8.3.4. Institutional reputation

Organizations increase their credibility by strategically managing their online reputations relative to target consumers, offering relevant information, making them a trusted source of information. Reputation cannot be created instantly, rather it requires a history of engagement and organizational experience, including concerning e-learning. For example, the UoN has a history of experience in creating, developing e-learning resources, and evidence-based practice in developing e-learning resources. Buisness (2019) analysed global industry data, surveying over 2000 potential users of e-learning in the UK and USA, finding that the vast majority (87%) considered organizational reputation for online service provision to be moderately important, while only 1% considered reputation unimportant.

The reputation of UoN in making OERs related to healthcare, and directly dealing with appropriate nursing knowledge and practice, also increased

student and graduate reuse of RLOs. Hence the reputation and experience of the developers in developing OER for users is considered necessary to enhance the reuse of resources.

8.4. Internal factors

8.4.1. Hedonic motivation

Moreover, the current study revealed that all students in the three factors had hedonic motivation, which is a construct in UTAUT2, and which was found to be critical in influencing RLO reutilization. The enjoyment and interest of using RLOs, especially by Factor 2 and Factor 3 students, was clearly influential in hedonic motivation to use RLOs:

> 'I enjoyed it so much, I like to use technology at home, especially my smart phone, I am enjoying it, so even if I am in my bed, or anywhere, it is easy to use, I like it' (S21)

Hedonic motivation in this context is defined as the pleasure involved in using technology, associated with entertainment-related sensations during use of e-learning technologies, which has been found to increase technology adoption (Brown and Venkatesh, 2005). However, despite acknowledgement of its essential role (Garrison and Kanuka, 2004), it has only recently begun to be explored in depth (El-Masri and Tarhini, 2017). It is demonstrably instrumental as a predictor of behavioural intention to use technology (Nguyen et al., 2014, Arumugam and Yahya, 2013). In Lebanon (an Arab country), Masa'deh, Tarhini, Bany Mohammed et al. (2016) found that hedonic motivation positively affected university learners' intention to use e-learning.

Motivational features can sometimes be rewards or fun activities; however, they are not effective unless they achieve learning outcomes and instructional goals (Fazamin, Haji Ali, Saman et al., 2015). Student engagement in e-learning is essential in RLO use, which is determined by user perception, a key aspect of successful e-learning, regardless of application (Cruz-Benito et al., 2015, Attfield et al., 2011). User engagement is a key concept in designing user-centred online resources. It refers to the quality of the user experience, emphasizing the positive aspects of the interaction, and in particular the phenomena associated with the enjoyment of using technology (Ryan and Deci, 2011).

This definition is motivated by the observation that successful technologies are not just *used*, but are *engaged with* (Attfield et al., 2011) The positive effect of technology could relate to the emotional experience associated with the technological interaction. For example, O'Brien and Toms (2008) found that a lack of fun can act as a barrier to use online resources, and that fun during a webcast can draw the user in. Jennings (2000) argued that affective experiences are intrinsically motivating and that, in relation to engagement on the web, an initial affective hook can induce a desire for exploration or active discovery. In current study this was clear from what students said, as in the findings of Q methodology:

> ‘As I mentioned there is a different type… for example if you are such person who likes audio, you can get if, you like visual it is also there… … so it is different technique’ (S9)

> ‘I felt the way the RLOs are created is more understandable… the video and text were helpful’ (S12)

> ‘Usually I tried to concentrate in our lectures… but … but still I have to search for specific information or extra information… and found these videos are useful….and I think it will help to catch missed lectures’ (S12)

> ‘I agree… because RLOs using different types and will not feel bored, it will change and it will break the boring border, so it will be more interesting, and you feel more concentration when you are changing, and the opposite when using one method, you reach a time when you will be not interested’ (S13)

> ‘For the book in library you have a certain time, but in the internet you can get it anytime, so you can access the website, so it is flexible … you can use it anywhere’ (S1)

> ‘I feel that others should know about it, it is better than YouTube… as it has written text and visuals’ (S23)

In the current study, the students reported that they enjoyed using RLOs and they were intrinsically motivated, as discussed in Chapter 6, and mentioned above. While all were engaged in using RLOs, this was clearest among Factor 3 students, ranked the statement of engagement (I felt more engaged in learning using RLOs compared to traditional sessions) as very high (+5). The benefit of RLOs and its features which result in enjoyment and engagement encouraged students to reuse it again to revise for their exams. This is again related in engagement characteristics whereby people remember enjoyable, useful, engaging experiences and want to repeat them. This aspect of engagement refers to the likelihood of remembering an experience and the

willingness to repeat it (Attfield et al., 2011). Engagement also relates to a users' willingness to recommend an experience to others, their perceptions of whether an experience met their expectations of being "successful" or "worthwhile", and whether they would recommend it to others (Silpasuwanchai, Ma, Shigemasu et al., 2016).

8.4.2. Self-control

Another driver of RLO reuse according to TRAM was that students in this study liked control over their learning, which predisposes them to more autonomous e-learning methods, including RLOs. Specifically, Factor 3 students liked having more control over their learning, as they were more self-motivated and autonomous in the learning process (Zimmerman, 2008).

> 'It's not others influencing, or directing you to use, for example to… to use other things, this is from your initiatives and from your personality. If you have initiative, of course this you will do it by yourself, you do not need others to push you to do it, especially for your learning and also for your benefit, but as I told you, if you are depending on others all the time you are not going to build your own decision, you are not going to build… even your success, all you are going to do depends on others' (S8)

Self-control could be a factor of their intrinsic motivation to reuse RLOs. Blake (2009) found that RLOs are valued by SRLs because of their flexibility, and fitting in with their time, which is aligned with self-directed and self-managed learning (Kelly et al., 2009). Self-directed learning is a process whereby individuals assume more responsibility for their learning, taking the initiative to learn with or without the help of others, recognizing their learning needs to

achieve their goals (Zydney, Hai-Jew, Renninge et al., 2012). RLOs could lead students to self-directed learning and let them have more independence, increasing their confidence as learners (Lamphon, 2020), and subsequently as nursing practitioners.

Technology is often seen as a disruptive force in education, including disrupting existing hierarchies, because it places an increased level of control in the hands of learners. Learners are empowered to find resources (particularly open resources) for themselves, and also choose when and where to access these. This can diffuse power from tutors, and this can be quite difficult to accept for many teachers, especially in a strongly hierarchical system. Nurse education and nursing generally is a hierarchical system, and power relations in HE in Oman are particularly hierarchical, which implies latent resistance to disruptive technology adoptions.

Despite this, self-control in Q methodology and qualitative study findings could enhance the reusability of RLOs in the theoretical classes and clinical practice. The students felt they could understand their needs and search for information in their own time, as required. In addition, students and graduates could also evaluate RLOs and give their recommendations of how they could be improved for postgraduate nursing education. Hence as RLOs supported these features, they were reusable in the results of this study.

8.4.3. Culture

The environment around the students and graduates could affect the adoption of e-learning. The environment in any system includes the cultural and socio-economic factors and policy affecting the context (Kocken et al., 2019, Damschroder et al., 2009). RLO acceptance is fundamentally affected by the cultural environment. Hofstede (1991) considered the interaction of culture with organisational processes, particularly acceptance of change, to comprise a form of software of the mind, and he constructed a taxonomy to study differences between prevailing national cultures. Cultural constructions affect the ways in which people perceive and attach value to different priorities, and consequently the way they behave in social and organisational environments. Individuals may embody varying layers of culture and the importance of particular dimensions may vary over time, or in relation to different concepts and issues. The cultural layers he identifies span national, regional, ethnic, religious, linguistic, socio-economic, gender, organisational and individual dimensions.

Previous literature identified overlapping aspects that vary according to the intervention and the context. Systematic literature reviews (Musch, 2019, Schloemer and Schröder-Bäck, 2018b) found that some of these aspects are the local and organisational setting, coordination players and implementation process, policy and legalisation and health care system and services factors. These aspects could affect the intervention in different ways in different contexts. In the current study, the following environmental aspects were found to influence the acceptance of reusability of RLOs in Oman: local and organisational setting and the implementation of RLOs in ACCNP and ENP

curriculums. Understanding the political milieu in Oman is important when interpreting how the environment in an educational organisation can be expected to respond in the adoption and reuse of an intervention like RLOs from different contexts.

Oman's collectivist culture, as described in Chapter 1, was manifest in participants influencing each other's use of RLOs, which is related to social influence in UTAUT2. This result is similar to that reported by Wu (Wu et al., 2016), who investigated the use of e-learning with a sample of 284 participants from China. They found that China's collectivist culture led to social influence being a strong predictor of behaviour intention to use e-learning. Therefore, social influence was found in the current study to be a driver to use RLOs, as reflected in the following quotes:

> *'Yes, I agree… the faculty members were recommending strongly to use the RLOs during our class, and because of the faculty members I used RLOs… And that's why I agree where it says that "my teacher advised me to use RLOs'* (S15)

> 'yeah… Because they have the same feedback that RLOs are beneficial… and helpful, and it is good to go through it' (S9)

> 'yeah… because … emm… the Faculty supported the use of RLOs… they also… emm, reminding us of using it each time… they introduced RLOs with support… and in future I think we will use it regularly' (S10)

Culture was particularly effective for Factor 1 (traditionalist) and Factor 2 (pragmatist) students, who have expectations of high power distance, which

refers to how society values hierarchical relationships and respect for authority. High power distance cultures, such as Oman, are characterised by more respect for authority and age and are accepting of organisational hierarchies (Zhang, 2013). Thus, the students in the current study are accustomed to high power distance, which was reflected in their need for faculty members' guidance to utilise e-learning. Even among Factor 3 participants (self-regulators), cultural issues like social engagement and interactions with colleagues were valuable to the learning process. Cultural attributes like power distance, as previously mentioned, could present barriers as well as drivers of e-learning, relating to many factors, such as the implementation process and how e-learning affects the progress of students in their studies.

8.4.3.1. Local and organizational setting

The adoption and transfer of an intervention to different contexts from the original one for which it was intended depends on the local and organisational setting, which could include aspects such as organisational structure and practice, organisational culture and readiness to implement the intervention (e-learning). This section discusses the current education strategy in Oman and how RLOs contribute to the needs of higher education in Oman. In addition, it discusses students', faculty members' and management's awareness and readiness to use and reuse RLOs.

From the findings of the current study, while students accepted RLOs, they mentioned that this was the first time they had used this type of e-learning, having only previously used online learning resources for communication (email), Google and YouTube. This was clear from the qualitative findings, which revealed that graduates reused different RLOs not initially provided by

the current study, as mentioned in Table 7.1 (e.g., the research, patient safety and reflection RLOs), which they personally got to know and found to be beneficial for their practice. However, they also continued to use Google and YouTube. Despite that, students believed that they needed quality online resources, which was related to the factor identified in this study of an emphasis on trust in RLOs, which was enhanced by knowing they were produced by a high-ranked university (UoN) (ARWU, 2020).

As RLOs and OERs in general were basically unfamiliar to students, they had low awareness of these concepts. Based on the experience of the researcher as a faculty member in the same institute of nursing in Oman, there is also low awareness about OERs among faculty members. The lack of knowledge about these resources is an intrinsic barrier to e-learning use, as discussed in Chapter 1. Tlili et al. (2020) studied OERs in Arab countries, but with only three participants from Oman, the general lack of knowledge about OERs was clear. Previous studies specified that the level of awareness of OER repositories is the main specific barrier (Hassall and Lewis, 2017). The current study highlights the lack of awareness of OERs as a major environmental factor among both students and staff.

This is important, as students and graduates in the current study highlighted the importance of e-learning in their education, and that they could potentially obtain great benefits from OERs in their learning due to their general skill in technology. As learners, the new generation has demands and expectations that call for educational organisations to rethink their teaching strategies and the way that changes can be designed to suit the ongoing development of education worldwide (Ossiannilsson and Creelman, 2012).

Hence, to meet the needs of current and future generations of students and keep pace with technological developments with a spirit of openness to innovation and to achieve the goals of Vision 2040, which encourages innovation in general and the utilisation of e-learning in particular, current teaching practice needs to be reconsidered in light of current challenges facing nursing education in Oman. Nursing education is facing several other fundamental challenges, including a shortage of faculty members, time pressures, the need for increased numbers of nursing graduates and the challenges of facilitating pedagogical change to enable students to be independent, self-directed learners (and to subsequently be equipped for continuous professional development), increasing their flexibility and responsiveness to deal with unexpected crises, such as COVID-19. To confront these challenges, alternative resources and changes in teaching strategy need to be considered. Technology utilisation needs to be improved by supporting the technological infrastructure in Oman, especially by improving internet connectivity, as well as by increasing awareness of OERs across educational organisations. Most importantly, with regard to this study's findings, technology should be embedded in the nursing curriculum as a natural part of the learning process. Introducing RLOs in Oman is essential to move towards a flexible, innovative learning strategy, maintaining its use sustainably over the long term by considering reusability. E-learning resources, such as RLOs, will work incredibly well in crisis situations like the current COVID-19 scenario, which terminated conventional educational delivery and prevented clinical placements (Dhawan, 2020).

8.4.3.2. Implementation of RLOs in ACCNP and ENP curriculum

According to Schloemer and Schröder-Bäck (2018), the adoption and implementation of interventions includes intervention assessment. Implementation and adoption is defined as entering a change or renewal (Barwick et al. (2005). Implementation is a process with different concerns and different aspects (Musch, 2019). The implementation process of RLOs was informed by the need of nursing education in Oman to adopt RLOs with the agreement and ethical approval of the MoH, to process the current research and to implement the RLOs in postgraduate nursing education in Oman and explore drivers and barriers of implanting RLOs within postgraduate nursing education. The results of this study thus contribute to the development of e-learning in Oman. Also, the agreed of the management of the ACCNP and ENP and faculty members was secured for the implementation, as discussed in Chapter 4. While these latent conditions are conducive to successful implementation, some interconnected processes are also necessary for execution. This starts with the planning phase, when the behaviour and task allocation of various stakeholders must be incorporated in the change project (Schloemer and Schröder-Bäck, 2018b, Fleuren et al., 2014, Musch, 2019, Cambon et al., 2012, Damschroder et al., 2009, Greenhalgh et al., 2004, Barwick et al., 2005). The implementation process in Chapter 4 in current study included top management support (related to the cultural characteristics discussed previously) and facilitating condition (which is a construct in UTAUT2).

- **Top management support**

Top management support includes advocacy and ongoing contributions to the implementation process, to enhance the implementation or indeed to decide to reject it, if it is found to be unhelpful for the organization (Gustafson et al., 2003, Cambon et al., 2012). In the early stage of the process, the plan to implement RLOs in the nursing institute was communicated through the ethical approval committee, and it was approved for implementation by processing the research in the institute itself. Approval from the MoH means that direct communication was enhanced between the researcher and the institutional faculty members. Therefore, in the first stage, the researcher communicated the implementation of the process to the faculty members and explained the plan to include RLOs within the curriculum. Documents explaining information about RLOs and guidelines on using them were sent to the faculty members, and training was given to faculty members on how to use the RLOs. This step was undertaken to present RLOs as an innovation, enabling target users to become familiarized with them and to understand their importance and potential benefits for their teaching strategy and the learning process (Musch, 2019). Involving faculty members in the implementation process introduced an element of consultation and sensitivity which could reduce latent resistance to change. The concerns of staff were ameliorated by explaining where each RLO fit in the curriculum, where it would be introduced, how it would be included in the timetable, and how it could enhance the self-directed learning of students. This step was important in the early implementation process and led to increased awareness of the management team, increasing their engagement and receptivity to the change (Rogers, 2003).

Management team engagement involves appropriate personnel in the implementation process and facilitates the utilization of the intervention in an integrated educational strategy, with associated training in social marking activities and different similar activities. Ignoring involvement of team members in the implementation process is a common cause of failure in organizational innovations, due to a lack of awareness of change benefits (Pronovost, Berenholtz and Needham, 2008). It is crucial in the early stage of the implementation process to select certain key leaders as bridges to help disseminate the change among the general target user population, considering their feedback and needs to calibrate the innovation for optimum acceptance and effectiveness in the target context (Stouten, Rousseau and De Cremer, 2018). Change leaders or champions work as pioneering users of the innovation, being actively involved and consulted in the process, and they subsequently become change advocates and drivers among their peers in the wider rollout (Gustafson et al., 2003, Greenhalgh et al., 2004).

- **Facilitating condition**

The availability of resources is essential for intervention adoption, including consideration of cost, duration, equipment, and human resources which considered as facilitating conditions for the implementation process of the intervention (Cambon et al., 2012, Fleuren et al., 2014). The implementation process of adopting e-learning in Oman was appropriate, and it had been implemented for four months before the data collection process began. Participants had been oriented and trained to use RLOs in the ACCNP and ENP nursing programs. In addition, the RLOs were added as a reference to the resources in the curriculum to use RLOs. Students were actively encouraged

to use RLOs in directed study hours in the course timetable. However, it should be acknowledged that the time taken in the implementation process is very important.

Despite participants accepting the RLOs, and using and reusing them according to the results of the Q methodology and qualitative study, it should be remembered that this was the first time participants were involved in e-learning, and learning in a different way from traditional class or laboratory simulation formats. Therefore, from the perspective of the researcher, despite the implementation process being appropriate, students may need more time to understand the benefits of e-learning; the time allocated in the ACCNP and ENP curriculums needs to be reviewed to provide enough time for students to learn from e-learning.

It might be recommended to change or adjust the curriculum environment to sustain and maintain e-learning in the educational process, because ‘to be successful, e-learning must be integrated into the curriculum, treated not simply as a delivery medium but as an environment that supports learning’ (Frehywot et al., 2013, p. 11). As mentioned previously, the adoption of e-learning relies on the population and the intervention, both of which are fashioned by the environmental context and resource availability, which play a huge role in the usability and reusability of RLOs.

It is very important to have a prerequisite infrastructure to support e-learning implementation, and the availability of computers and IT experts was essential in the current study, providing ubiquitous any-time access of e-learning resources for students. Despite the sustainability of financial support for technology education in Oman, there is a shortage in expertise in developing

quality online resource, therefore the sharing of RLOs would create a cooperation between organizations with more skill and expertise in e-learning (e.g., the UoN, in the context of RLOs for nursing education) and Omani institutions, which can lead to sustainable reusable e-learning resources on a cost-effective basis.

A pervasive resource issue reported in this study was the technical problem of poor internet connectivity and slow Wi-Fi connection, which lead to technical difficulties in downloading some RLO videos. Students associated with all identified factors in Q methodology agreed in consensus statements in Q methodology that the slow Wi-Fi connection must be considered and addressed to improve and facilitate their e-learning experience. Technical support is an important part of implementing successful e-learning strategy, with implications in terms of financial and human investment, and needed infrastructure like Wi-Fi. Without supporting the innovation and interventions like e-learning the implementation may seem successful initially, but will most likely not be sustainable over the long term (Frehywot et al., 2013).

8.5. Reuse of other materials

In the TRAM framework it is suggested that OER adoption may be associated with the reuse of other OER materials. The findings of the current study revealed that as they gradually accepted the adoption of RLOs, both students and graduates found that they used and reused them in their theoretical class and in their practical areas of work.

Q methodology and qualitative behavioural factor analysis results affirm that RLOs are accepted when students and graduates agree on their reusability and

variety, indicating possibilities to reuse e-learning resources. This was reflected in Q methodology Factor 1, where students were keen to use RLOs on a regular basis in the future, and Factor 2, where students agreed that they would recommend that others to use RLOs. They also evaluated the details of RLOs like font size. Factor 3 students agreed that they would recommend others to use RLOs, and that they would use them for different subjects, and they recommended adding different RLOs like ECG. Qualitative results concerning the behavioural element showed that graduates reused RLOs in their clinical areas and recommended them to people in other universities for research. They also used other websites for learning. Hence from both the behavioural elements of Q methodology and qualitative study it is clear that students were prepared to reuse online learning materials.

Essentially, the point is that if the students and graduates found that using OERs is beneficial to their studies, and they would strive to increase their knowledge and awareness of it, and could be driven to use a greater variety of materials. This is also highly significant in higher educational institutions where users reuse OERs and intend to use diverse materials that have basically been developed by *"detailed educational metadata that better meets the users' needs; for example, the suggested use of content, its duration, pedagogy, target audience or learning goals"* (Santos-Hermosa, Ferrer & Abadal, 2017, p. 113). The UN Educational, Scientific and Cultural Organization (UNESCO) is a strong proponent of the advantages of OER, which it regards as highly valuable to raising the standards of education globally, being considered a tool that contributes significantly to "inclusive and equitable quality education and promote lifelong learning opportunities for all" (United Nations, 2015).

Fundamentally, OERs can greatly help to level the playing field between students from different cultures, socio-economic backgrounds, and wealth levels, as all students can freely access these materials to benefit their learning. According to Atkins, Seely Brown and Hammond (2007), increasing the level of knowledge globally is a hugely positive course of action. They believe that the sharing and reusing knowledge and information via OERs can make a highly significant contribution to enhancing teaching, learning, and research throughout the world; however, they caution that financial, cultural, technological, and other barriers can negatively impact any drive to increase the numbers of users of OERs (Atkins et al., 2007). In addition, it has been argued that neo-colonialism in OER disseminates the views of producing countries across the world, in a potentially toxic one-way relationship, rather than reciprocal collaboration (Cobb, 2018).

The onset of the COVID-19 global pandemic saw a large growth in the use of OERs, as students and educators were increasingly compelled to seek information that they could freely access from their homes and there was also an increase in use of QERs by lecturers, who had to move to online teaching (Mukhtar, Javed, Arooj etal; 2020). However, one issue that has arisen is that the complexity of the language used in English OERs is proving to be a barrier to users of the resource who do not have English as their first language (Rets et al., 2020). However, this was not a barrier in current study, as English is the medium of instruction in nursing programs in Oman, and students are required to have high levels of English proficiency prior to enrolment. This is the basis of continuous collaboration between Oman nursing institutions and other institutions from the UK and USA.

Hence, as mentioned in the TRAM framework, if users are aware of OERs and their benefits for them, and they are easy to use, facilitating their needs and goal achievement, they will tend to reuse different OER materials, thus achieving the fundamental objective of OERs.

8.6. Recommendations

As mentioned previously, the results of the current study revealed that RLOs are accepted and adopted by postgraduate nursing students and are reused by the graduates of the same program in their clinical areas. Additionally, the RLOs had a positive effect on the learning process and in clinical practice. However, some recommendations were formulated based on the findings to be considered in the ASPIRE framework for the development and design of RLOs, mainly to facilitate adoption relative to learner needs, conditioned by cultural contexts. These recommendations could also be useful for OER development of e-learning to support education within the health profession. The specific recommendations are:

- To peer review and evaluate RLOs and check their usability for students and staff in context. Including international peer review in the developing process of RLOs would add a new dimension of experience, perspective, and knowledge, and maximize RLOs adoption and reusability worldwide.
- To create a variety of RLOs tailored to support the varying skills of different end users nationally and internationally. For example, for nursing learning in the current study, participants recommended creating some RLOs dealing with procedures in the foundation of nursing care, like nasogastric procedure, which is important for both undergraduate and postgraduate nursing education.

- To update RLOs resources according to high-standard international and national resources, which increases RLOs' credibility.
- To update some RLOs to make sure they work within the international system (meta-data) of technology, which makes RLOs more accessible for other international students.
- Increase the awareness about the OERs and e-learning through workshops and events, including top management, faculty members, and students, which will give a flavour of mixing stakeholders in the education system and increase understanding of other stakeholders' perspectives, as well as sharing experiences of e-learning.
- Make training program for the stakeholders (students and faculty members) how to find an OERs and how could utilize it in their program.
- Organize workshop and conferences about the copyright and open licences of OERs.
- With institutional support, encourage collaboration between departmental staff to facilitate OER, like library, IT, and faculty members, as well as students.
- Increase opportunities for individual faulty members in institutes to lead collaboration between the Oman context and other international contexts like the UK (specifically the UoN in the context of this research), to collaborate in designing and developing e-learning solutions that can be amended and adjusted as needed to facilitate sustainable adoption, enabling updates according to the needs of learners and programs. This would support the international accreditation process and encourage collaboration with expert organizations in the creation of OERs.

- Collaboration with expert organizations in the creation of OERs mandates professional development for both faculty members and students to have a hand in developing activities to create RLOs that are effective in learning the knowledge and skills needed to create OERs, and disseminating the best practices for designing courses and activities (especially with regard to the effective use of open multimedia content).
- Improve the technological infrastructure in nursing educational institutes, particularly by providing high-speed internet access.
- OERs need to be advertised by experts outside of their primary context, to increase usability and improve e-learning design to suite different groups in different contexts. The effective marketing of OERs is crucial to increase awareness and educate organizations, students, and faculty members about expected benefits and effects in the learning process.

To sum up, the findings reveal that the RLO intervention was accepted by postgraduate nursing students in Oman. This is because RLOs used in current study were OERs, of good quality, from trusted resources and reusable. However, there were some aspects and issues in RLOs that should be considered, such as updating resources in the context of EBP, and focusing on some topics related to the foundations of nursing care and speciality nursing programs in critical and emergency nursing care. Technical issues include allocating RLOs as resources that can be accessed easily through web search engines.

8.7. UTAUT2 and Hofstede Culture Model

In this study, RLO acceptance was related to three factors identified by Q methodology, and the qualitative phase explored the impact of RLOs in clinical areas. This analysis to explore the acceptance reuse of OER in Oman was conceptualized within the variant framework from UTAUT2 and Hofstede Culture Model. With regard to TRAM, performance expectancy (PE) and effort expectancy (EE) as key indicators of RLOs adoption and reuse in Oman, and usefulness and ease of use were recurrent factors in the usability and acceptance of RLOs in theory classes and in clinical areas. This study thus underscores the importance of PE and EE as important determinants of adoption, reuse in clinical practice, corroborating previous literature (Venkatesh et al., 2011, Holden et al., 2012). Some features of the models are more important and more predictive than others in this study. This was clear in the previous discussion of TRAM.

Hedonic motivation (HM) also works as a driver of use and reuse of OERs like RLOs, whereby students and graduates were motivated to use RLOs due to their desire for self-control and self-directed study. RLOs offered them independency to learn anytime and anywhere, with their choice of what they want to learn (within the intrinsic parameters of the nursing program).

The main barriers to RLO use were identified as technological support and slow Wi-Fi. This pertains to facility condition (FC) in the UTAUT2, which was recurrently flagged as a barrier in this study. Students also requested more training and guidance in using of RLOs, disagreeing with statement (#22) *I have no difficulty accessing RLOs*, statement (#31) *Guidance was available to me*

when using RLOs, and statement (#32) *Technical support was available to solve difficulties when using RLOs.*

Gender, an important dimension of UTAUT2 and Hofstede's Culture Model, did not show any significant impacts in RLO acceptance. All students in the current study agreed that gender did not interfere in their use of RLOs, and they did not believe that gender would affect their use of RLOs. All students strongly disagreed with statement (#43) *My gender affects my ability to use RLOs*. This result is different from other studies saying that technology effects differ by gender (Bacon and Stocking, 2004, Huryk, 2010).

The three factors in the current study do not consider gender as factor that influence the acceptance of RLOs, contrary to the general expectation that gender affects the acceptance and use of technology (Ladan, 2018), which could be related to generational factors among newer millennials and Generation Z (less gender-based differences in technology use), which is beyond the scope of the current study but which could be an interesting avenue of e-learning research moving forward. Thus, it is important to review the place of gender factors in the UTAUT2 model in future research.

Hofstede's (1991) Culture Model was used to identify three cultural factors affecting RLO acceptance in Oman. Students accepted the RLOs culturally, and there was no cultural barrier to using RLOs, partly due to the high power distance driving adoption as per the policy of Vision 2040. The collectivist nature of Omani culture was manifest in the current study in students preferring to work in groups and being influenced by their peers and teachers in the use of RLOs (Albugami and Ahmed, 2016). However, uncertainty avoidance was relatively high, as manifest in students requiring more support and training in e-learning,

especially for Factor 1 and Factor 2 students, and this was also revealed in the consensus statements.

To sum up this section, one of the most significant things is to discuss the value of the different elements of these models. This study's use of UTAUT2 and Hofstede's Culture Model provided a beneficial lens to study RLO usability according to population, intervention and culture factors in e-learning adoption and use. RLOs were accepted and reused in theory and in clinical areas in this study, because of the discussed factors.

8.8. Impact of COVID-19 on the current study

COVID-19 public health policy responses during 2020 entailed social distancing and other strict guidelines implemented to reduce the transmission of the virus and to save lives, thus online learning became an emergency solution in most academic contexts, including Oman (Osman, 2020). While the current study was in the writing-up stage, having been begun on the assumption and empirically observed reality that e-learning was tentative in Oman's education system, the COVID-19 pandemic resulted in online learning becoming an emergency and compulsory medium in primary, secondary, and higher education in Oman. Despite the challenges faced in the beginning of the implementation of online learning and some barriers which were similar to the findings of the current study, like poor WiFi, online learning was found to be an expedient alternative to enable the continuation of education at all levels in the country.

A qualitative study done by Slimi (2020) during COVID-19 in Oman at the International Maritime College and Mjan College with 164 participants from

teaching staff and students showed that despite the novelty of e-learning for both teachers and learners, the ensuing challenges galvanized the adoption of innovative teaching and learning techniques. A large majority of participants reported that they found the experience agreeable, and that it empowered them to advance their learning self-efficacy, including communication, IT, and problem-solving skills, as well as learner autonomy. Nevertheless, major challenges exist in terms of slow WiFi, and some barriers were noted in terms of some learners' dependence, low autonomy, and poor cooperation in complying with the e-learning regime. These barriers were found during emergency of COVID-19 and need to be revaluated in the coming months and years to determine the long-term prospects and impacts of online learning on student learning in Oman.

Indeed, there is a need for continuous assessment to address the impact of online learning in the learning process of students and identify the new barriers that faced e-learning during COVID-19, and whether there will be a reusability of this emergency online learning in the return to normality (traditional pedagogical methods). Implementation was similar to traditional learning, mainly constituted as virtual classrooms at specific times, with specific assessment and exams at specific times, thus there are fundamental questions on the flexibility of this online learning manifestation in terms of ease of use and performance expectancy.

Moreover, some researchers referred to the COVID-19 related online learning milieu as 'emergency remote teaching' due to the dearth of the quality associated with formal e-learning pedagogy, built cautiously to serve the learning process of students (Adedoyin and Soykan, 2020). Despite the debate

around the online learning associated with COVID-19, Oman had its first experience of widespread online emergency teaching, which could predispose teachers and learners to more acceptance and reusability of e-learning nationwide (Osman, 2020). This reaffirms the current study's findings of general readiness of Omani students and their acceptance of e-learning.

8.9. Strengths and limitations

8.9.1. Strengths

To the researcher's knowledge, this is the first study conducted in Oman to explore the adoption of RLOs among postgraduate nursing students. As explained in Chapter 2, the reviewed literature demonstrates that Western countries like the UK are more familiar with producing and using e-learning solutions such as RLOs than the target context of Oman, and including e-learning in nursing education as a support strategy is very important. The technological revolution and global changes to healthcare services and education mean that Oman's nursing education must seize the opportunity to benefit from advanced technology and internet tools, including interactive, multimedia, and web-based learning programs to drive professional and health service development. Pedagogically, RLOs adoption is a supportive strategy for postgraduate nursing education to facilitate the understanding of difficult topics. Despite with the benefits of RLOs available as OERs, few studies have explored the adoption and transferability of e-learning from one context to other context with different cultures, particularly for the Arab World in general, and Oman in particular.

This is also a pioneering study in using UTAUT2 and Hofstede's (1991) Culture Model in conjunction with Q methodology to explore the drivers and barriers of

accepting RLOs in Arab countries, specifically in Omani postgraduate nursing education. The adopted methodology was appropriate and successful to understand the factors that work as drivers of RLO adoption in Oman. The use of both models facilitated the development of the concourse of the study, and was influential in the analysis and the interpretation of the findings. The literature review in Chapters 2 and 3 presented the rationale for the choice of these models and the importance of including them in acceptance of technology studies. These models give the opportunity to participants to identify their views about e-learning and allow them to explore the concept and its benefits. A rigorous process was followed to develop the Q statements, with a pilot study provided to participants with a refined set of statements derived from both models and interviews with experts, as described in Chapter 4.

The use of Q methodology within this study enabled discovery of participants views about e-learning adoption and use in theoretical class, which might not have been explicitly identified using other methods such as surveys or interviews (Barker, 2008). Though some of these methods could be used to explore subjectivity or attitudes, researchers have argued that the methods still pose challenges during data reduction (Barker, 2008, Ho, 2017). Q methodology provides a gestalt view, with the ability to uncover salient views about the adoption of e-learning in depth (Ladan, 2018). Using Q methodology made the views in the three factors visible and placed an emphasis the choice of the participants about the adoption of e-learning, and showed the similarities that all factors share when making these choices. Though these findings cannot be generalized beyond the participants, as the methodology intrinsically relies on a small number of participants whose responses are analysed in depth, this

comprises a strength in ascertaining and analysing variant perspectives in depth (Valenta and Wigger, 1997, Barker, 2008, Ho, 2017), as seen in the three factors that emerged from the analysis.

Another strength of using Q methodology is that participants were able to explain that they liked the way in which they could sort the Q statements in the Q grid. They felt it was different way of data collection from what they were used to previously, like surveys and interviews. They enjoyed sorting the Q statements and sorting their views in the Q grid. This important methodological discovery has not been mentioned in previous research, perhaps because its salience was due to it being the first time these participants had been exposed to this methodology.

Q methodology empowers participants to put forward their opinions on certain issues, which is particularly useful if they are working as part of a hierarchical system, which tends to inhibit efficient communication from subordinates, and between stakeholders of different hierarchical levels (Saiti and Stefou (2020). Those who are lower in the hierarchical pyramid may be reticent with regards to expressing their opinions, perhaps feeling that they may not be welcomed, taken seriously, or listened to by those higher up in the organizational hierarchy. This fear of being dismissed may cause the individual to keep their opinions to themselves. In cases such as this, the Q methodology can be highly valuable. By utilizing ranking statements, otherwise concealed views can be revealed, whereas participants may not have explored or expressed such data in interviews due to working in a hierarchical system (Zabala, Sandbrook and Mukherjee, 2018).

In the current study, the use of Q methodology provided the students with an opportunity to give their opinions through the statements given to them that are designed to express their views. These opinions were subsequently analysed at a deeper level with an interview that followed the sorting of the Q statements. According to Zabala et al. (2018), Q methodology enables many perspectives to be understood, and the structured nature of the process is relatively straightforward. However, the researchers also cautioned that both the interpretation of results and the clarification of points if the participants have questions entails the risk of a certain degree of subjectivity. Some other issues that may arise when dealing with the Q methodology include unreliability due to typically using a small sample, difficulty in understanding participants, the requirement for the researcher to justify numerous decisions throughout the process, and the time-consuming nature of conducting the post-sort interviews.

Overall, however, the Q methodology is increasing in popularity, and it allows researchers to better understand the diverse viewpoints of participants. Fundamentally, the Q methodology could facilitate the discovery of some in-depth issues and enable the exploration of views that might not be discovered through conducting the interviews alone. For this reason, its importance and recognition continue to grow in contemporary research.

The qualitative wing of the study explored the impact of RLOs on the graduates in their clinical areas one year after their graduation from ACCNP and ENP. To the knowledge of the researcher, this is the first study conducted in Oman to explore the effects of RLOs in nursing. Also, it is one of a limited number of studies exploring the impact of e-learning in nursing related to Level 3 of Kirkpatrick's (1967) framework, whereby the behavioural impact of e-learning

concerns “the degree to which participants apply what they learned during training when they are back on the job” (Kirkpatrick and Kirkpatrick, 2016). As mentioned in the literature review, only one study was found to measure the impact of e-learning on nursing in Level 3 of Kirkpatrick’s framework (Lymn et al., 2008). Using qualitative study for “deep understanding of the particular” (Domholdt, 1993) facilitated in-depth understanding of the impact of RLOs in clinical areas among the graduates, and to determine the long-term, sustained effects of the intervention after the implementation during the first phase (Creswell and Clark, 2011). In addition, this is one of a limited number of studies that evince the reusability of RLOs in clinical areas of nursing practice, adding to RLO reusability literature concerning nursing education, particularly with regard to the adoption of RLOs from Western to Arab countries with different environment and culture.

Using Q methodology and qualitative inquiry enhanced the quantity and quality of the findings on e-learning, thereby enriching the literature. E-learning studies are commonly criticized for their methodological weakness, but this study’s use of very rigorous Q statements to validate exploration of the acceptance of RLOs mitigates such critiques and supports nursing EBP. The integration of findings from Q methodology and qualitative study led to understanding the main factors of international e-learning adoption and exploration of cultural impacts. One of the strengths was the development of TRAM, which showed the factors influencing the use and reuse of RLOs in nursing education.

8.9.2. Limitations

The limitations of each part of the study are discussed in depth in Chapters 4 and 5. The main limitation of this study was its use of only one form of OER –

RLOs created at one university and transferred to one nursing institute in Oman. Another limitation is that that the current study identified the main gatekeepers as policy makers rather than learners. In addition, the current study did not actually look at the effectiveness of learning at all (e.g., in terms of academic outcomes in test scores).

Regarding the methodological rationale, this section summarizes and spotlights the major limitations of this study, with a view to interpreting its implications and formulating recommendations for further inquiries. A methodological limitation of the study included participant complaints about the time needed to conduct the Q sort during the data collection process, despite participants reporting that they enjoyed the process of sorting Q statements in the Q grid. This could be challenging because no participants had previously experienced or even heard of this methodology prior to the fieldwork of this study. It was important to briefly explain the methodology before participants undertake Q-sorting. Similar findings have been reported concerning Q methodology in other studies (Ladan, 2018).

The underlying limitation of this study is related to the fact that it is a doctoral research, with limited resources available for data collection within a limited timeframe, and the relatively limited sample size and scope of the study limit the generalizability of its conclusions. Involving different institutes of nursing in Oman over a longer timeframe would allow more in-depth understanding of e-learning adoption and its impacts in clinical areas in nursing; longitudinal studies of impacts among nursing practitioners during their clinical careers are urgently needed in this regard and will be possible after more extensive e-learning application in nursing education in the coming years.

8.10. Implications

The current study has wider implications for nursing education in general in terms of theoretical class and clinical practice, and for continuous professional education in clinical practice for registered nurses and other healthcare professionals. There are also implications and recommendations for future research arising from the findings of this study.

8.10.1. In education in theory and clinical practice

The main implication of the current study is that well-designed e-learning RLOs (OERs) can be effectively transferred from one Western country (the UK) to one Arab country (Oman), and the acceptance of RLOs in postgraduate nursing education in Oman. Despite the small sample of this study, which limits the generalizability of the findings, the study has wider implications in higher education that support innovation and support the utilization of advanced technology in Oman and similar countries. This contributes and adds to knowledge and evidence of technology acceptance in higher education.

The target context (Oman) benefits from using RLOs in the curriculum, which could directly enhance learner experience in the utilization of technology in e-learning, which offers prospects for the wider diffusion of e-learning in Oman, especially in nursing education. The RLOs support the continuous professional development of students, graduates, and faculty members due to their unique design, with interactive and multimedia resources that meet diverse user needs. The enjoyment and utility of RLOs for users drive user engagement and use, thus increasing learners' competence in using e-learning education effectively, which facilitates the education process, and increases the variety of available resources in education.

The experience gained from adopting RLOs is not limited to students and nurse educators, but includes organizational management and decision makers, with implications for legislation, regulation, and curriculum design. This can help provide facilities and resources to implement RLOs and set regulations for the implementation process. In addition, in the target context of Oman, it is planned to adopt similar technology as per national development strategy, thus it is important to understand the role of behavioural intention to accept and use technology through using a technology model and Culture Model to explore drivers of and barriers to adopt e-learning (RLOs) in higher education. Thus, the current study offers insights for other researchers and policymakers to understand the transferability and adoption of e-learning from other cultural contexts.

Both the target context (Oman) and primary context (UK) can benefits from sharing information in nursing education and increased collaboration between organizations in higher education. This a crucial implication of RLOs as OER. OER approaches are sustainable and interesting to stakeholders through trust development, exchanging different ideas in early collaborative preparation, and making partnerships across different cultures with different languages, which helps facilitate international collaboration (Nascimbeni et al., 2016). OERs like well-designed RLOs certainly have the potential to increase cost effectiveness by recycling and reuse, which could make e-learning a sustainable approach (McGreal, 2011, Littlejohn and Pegler, 2015).

For the primary context (UK), the creators and developers of RLOs would benefit from exploring the usability of RLOs in-depth from another context with different culture and different language. The current study adds to their

evidence on the usability and the reusability of RLOs in nursing education, including (but not limited to) the studied Pharmacology and Research RLOs, which could support higher education students in other non-UK contexts. This would increase the reputation of RLO developers (UK) and their organization (HELM) which descried in Chapter 1. In addition, it helped the developers of RLOs to improve their resources, including the particular issue of converting software from working by Flash to using HTML5. Consequently, RLOs that did not work in Oman previously could work in future.

For the target context (Oman) the benefits include improved information for decision-makers about best practice, a higher likelihood of implementation of successful policies and programs, and more efficient use of e-learning resources like RLOs (Schlomer and Schroder-Back, 2018).

Importantly, clinical healthcare can benefit from the current study indirectly by receiving better trained nurses, with improved research and learning skills to implement EBP, which ultimately improves patient outcomes. As discussed in Chapter 1, appropriate teaching strategies positively contribute in the preparation of nurses and support them in their continuous professional development, which enhances their knowledge, skills, and confidence in providing high-quality nursing care.

8.10.2. Recommendations for future research

This section provides recommendations resulting from the findings of this research study to inform future research.

The three factors which resulted from this study could be explored by quantitative research studies using surveys across larger participant population within the study area. Besides that, the findings from the study about the most relevant themes that influence nursing student's adoption and use of e-learning could be integrated as survey questions. This could identify the spread of what the students and graduates see as the most contributing theme from the two models used in this study for a wider population in nursing education. It is also recommended to explore the effect of RLOs with different participants, like undergraduate nursing students and other health professionals, like pharmacy students.

As this study explored the adoption and acceptances of pharmacology RLOs and their application in clinical areas on postgraduate nursing in Oman, it is recommended to quantitatively investigate the impact of advanced skill RLOs on nursing students and nurses in the clinical areas. This study explored graduates' perceptions at Level 1 (reaction), Level 2 (learning), and Level 3 (behaviour) of the Kirkpatrick (1967) framework using semi-structured interviews, providing evidence of RLOs acceptance in Oman, and identifying the impacts of the RLOs on nursing knowledge, skills, and confidence. Therefore, measuring Level 3 (behaviour) and Level 4 (result) through longitudinal pre- and post- comparisons, using objective tools and measures (like OSCE) for nurses' competencies in clinical areas, might provide rigorous evidence of the impacts of e-learning in clinical practice. Finally, it is important

for any future study on adoption and use to have a clear report on the *reusability* of OERs such as RLOs, to support the other countries to understand the reusability of these tools and how they can help in practice in terms of adoption and reusability tactics, to effectively build the knowledge and skill of students with EBP pedagogical solutions.

8.11. Conclusion

This thesis contributes original theoretical knowledge on e-learning adoption in nursing education, and it has created a new model for guiding OER adoption, TRAM. This is the first research exploring the adoption of RLO open education resources developed in the UK (at the UoN) for pharmacology in postgraduate nursing education in Oman using the Q methodology and follow-up qualitative study. The study found that RLOs were adopted and accepted (used and reused) in a different context from the original one addressed in RLO development, and the resources are considered a valuable aid in nursing education in the target context.

Nursing education is facing different long-term challenges, including increased patient admissions, staff shortages, decreased clinical placement opportunities for nursing students to apply their knowledge and skills, and shortage of faculty members in speciality programs such as critical care and emergency nursing programs. Traditional teaching methods can lack consistency and flexibility and cannot accommodate diverse student learning needs. Despite all the challenges facing the nursing education worldwide, technological innovations can contribute effectively to facilitate the learning process of nursing and save time and money in the process. Innovative ways to support nursing education are required to maximize the efficiency of resource utilization and make sure

that nursing students acquire the prerequisite knowledge and skills needed for clinical practice, and on-going professional development throughout their careers. The literature showed that e-learning offers innovative solutions to support nursing education in different ways.

Adopting RLOs as e-learning in Oman from the UK is considered an innovative way to enhance the teaching strategy and support nursing education in Oman. The findings from this study showed that students and graduates in Oman accepted RLOs as a supplementary and complementary learning strategy, offering a flexible, asynchronous teaching-learning environment. Postgraduate students and graduates trusted RLOs and other e-learning resources provided by well-known organizations and valued and used them effectively. Understanding the drivers and barriers of adopting RLOs in Oman, could contribute effectively to achieving the objectives of Oman Vision 2030 through saving time and money while providing high-quality and well-designed e-learning solutions that support higher education. The current study also enhances understanding of the main factors for implementation of e-learning through the UTAUT2 and the Hofstede Culture Model. This contributes to the literature on RLOs as an e-learning solution for nursing education in general, as well as that particularly concerned with Oman.

This study's findings evidence the reusability of RLOs and how they can be used vertically and horizontally in education to save time and costs. Also, the current study showed how RLOs could positively affect nursing clinical practice and nurses' professional development. The integration of the findings from Q methodology and qualitative study showed that the drivers and barriers of RLO adoption in Oman in relation to the UTAUT2 and Culture Model fundamentally

depend on students' acceptance of RLOs. RLOs are interventions in themselves, and the environment surrounding the students supported the acceptance of RLOs in this study. The TRAM framework, an adaptation of the UTAUT2 model, developed in the current study showed that external and internal factors can affect RLO reusability in Oman, and in similar cultural contexts.

E-learning is considered a fundamental new paradigm to harness the benefits of new technologies in the educational process, surmounting the challenges faced by nursing education and higher education in general, especially in crisis situations of the kind witnessed during the COVID-19 pandemic. E-learning must be actively and constructively embraced to offer effective education for nursing students to meet the needs of current and future students, and the populations they will serve throughout their professional lives.

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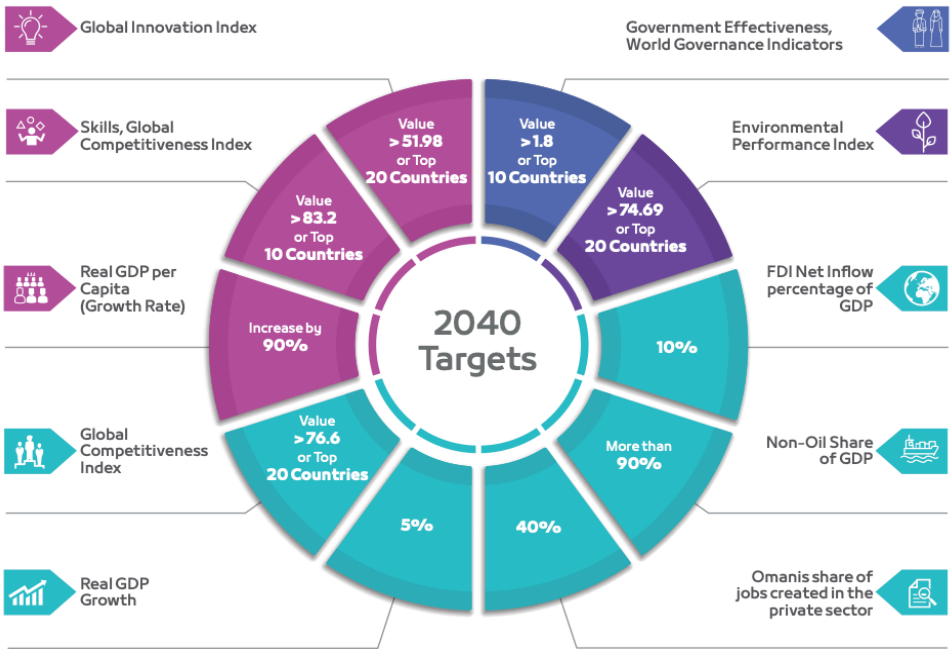
Appendix 1: Oman Vision 2040 Indicators

Our Vision

Oman: Joining the World's Developed Countries



Main Oman 2040 Vision Indicators

Source: OMANUNA (2020)

Appendix 2: Approval from University of Nottingham Research Ethics Committee (I)

University of Nottingham
UK | CHINA | MALAYSIA

Email: FMHS-ResearchEthics@nottingham.ac.uk

Faculty of Medicine & 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

24 November 2017

Asiya AL-Hasni
PhD Student Nursing Studies
C/o Professor Heather Wharrad
Professor of e-Learning and Health Informatics,
Room B53, School of Health Sciences
Queen's Medical Centre Campus
Nottingham University Hospitals
Nottingham
NG7 2UH

Dear Asiya AL-Hasni

Ethics Reference No: 150-1710 – **please always quote**	
Study Title: Drivers and barriers to adopting RLOs by postgraduate nursing students in Oman to improve their knowledge, skill and confidence.	
Short Title: Factors affecting the acceptance of reusable learning objects in nursing education.	
Chief Investigator/Supervisor: Professor Heather Wharrad, Professor of e-Learning and Health Informatics, Nursing.	
Lead Investigators/student: Asiya AL-Hasni, PhD Nursing Studies.	
Other Key Investigators: Professor Heather Wharrad, Professor of e-Learning and Health Informatics	
Type of Study: PhD Student project, overseas, Q methodology	
Proposed Start Date: 01/01.2018	**Proposed End Date:** 31/03/2018 3 mths
No of Subjects: 24	**Age:** 18+years
School: Health Sciences	

The Committee considered this application at its meeting on 20 October 2017 and the following documents were received:

- FMHS REC Application form and supporting documents version 1.0: 24.10.2017

These were reviewed and the study has been given a favourable opinion.

A favourable opinion is given on the understanding that:

1. 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.

2. Copies of Approval/Permission letters from the Oman Specialized Nursing Institute Muscat/Oman are submitted for the records.

3. The protocol agreed is followed and the Committee is informed of any changes using a notice of amendment form (please request a form).

4. The Chair is informed of any serious or unexpected event.

University of Nottingham
UK | CHINA | MALAYSIA

5. An End of Project Progress Report is completed and returned when the study has finished (Please request a form).

Yours sincerely



Professor Ravi Mahajan
Chair, Faculty of Medicine & Health Sciences Research Ethics Committee

Appendix 3: Approval from University of Nottingham Research Ethics Committee (II)

University of Nottingham
UK | CHINA | MALAYSIA

Faculty of Medicine & Health Sciences Research Ethics Committee
Faculty Hub
Room E41, E Floor, Medical School
Queen's Medical Centre Campus
Nottingham University Hospitals
Nottingham, NG7 2UH
Email: FMHS-ResearchEthics@nottingham.ac.uk

11 June 2019

Asiya AL-Hasni
PhD Student Nursing Studies
C/o Professor Heather Wharrad
Professor of e-Learning and Health Informatics,
Room B53, School of Health Sciences
Queen's Medical Centre Campus
Nottingham University Hospitals
Nottingham
NG7 2UH

Dear Asiya AL-Hasni

Ethics Reference No: 150-1710 **– please always quote**	
Study Title: Drivers and barriers to adopting RLOs by postgraduate nursing students in Oman to improve their knowledge, skill and confidence.	
Short Title: Factors affecting the acceptance of reusable learning objects in nursing education.	
Chief Investigator/Supervisor: Professor Heather Wharrad, Professor of e-Learning and Health Informatics, Nursing.	
Lead Investigators/student: Asiya AL-Hasni, PhD Nursing Studies.	
Other Key Investigators: Professor Heather Wharrad, Professor of e-Learning and Health Informatics	
Type of Study: PhD Student project, overseas, Q methodology	
Proposed Start Date: 01.01.2018	**Proposed End Date:** 30/09/2019
No of Subjects: 24	**Age:** 18+years

Thank you for notifying the Committee of amendment no 1: 10.06.2019 as follows:

- To conduct a follow up interview to investigate the effect of their use of RLOs in their clinical practice.

and the following documents were received:

- FMHS REC Notice of amendment form and supporting documents no 1: 10.06.2019

These were reviewed and the study amendment no 1: 10.06.2019 has been given a favourable opinion. A favourable opinion is given on the understanding that:

1. 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.
2. Copies of Approval/Permission letters from the Oman Specialized Nursing Institute Muscat/Oman are submitted for the records.
3. An End of Project Progress Report is completed and returned when the study has finished (Please request a form).

Yours sincerely

Professor Ravi Mahajan
Chair, Faculty of Medicine & Health Sciences Research Ethics Committee

Appendix 4: Approval from Sultanate of Oman Ministry of Health Research Ethics Committee

Sultanate of Oman
Ministry of Health
Directorate General of Planning and Studies

سلطنة عمان
وزارة الصحة
المديرية العامة للتخطيط والدراسات

Ref. : MoH/DGPS/CSR/PROPOSAL_ APPROVED/8/2018 ..... الرقم :

Date : 11.3.2018 ..... التاريخ :

..... الموافق :

Asiya Said Al-Hasni
Principal Investigator

Study Title: Drivers and barriers to adopting reusable learning objects by postgraduate nursing students in Oman to improve their knowledge, skill and confidence
Proposal ID: MoH/CSR/17/6627

After compliments,

We are pleased to inform you that your research proposal **"Drivers and barriers to adopting reusable learning objects by postgraduate nursing students in Oman to improve their knowledge, skill and confidence"** has been approved by the Research and Ethical Review & Approval Committee, Ministry of Health.

On completion of the study, you are required to provide a copy of the final report within 2 months to the Centre of Studies and Research.

Regards,

Dr. Ahmed Mohamed Al-Qasmi
Director General of Planning and Studies
Chairman, Research and Ethical Review & Approval Committee
Ministry of Health, Sultanate of Oman.

Cc
Day file

P.O. Box : 393, Postal Code: 100, Muscat E-mail: dg.plan@moh.gov.om ص.ب : ٣٩٣، الرمز البريدي : ١٠٠

Appendix 5: Participant Information Sheet

Participant Information Sheet

1/4/2018

Title of Study: Drivers of and barriers to adopting RLOs by postgraduate nursing students in Oman to improve their knowledge, skill and confidence

Name of Researcher(s): Asiya AL Hasni, postgraduate research student; Professor Heather Wharrad; Dr Richard Windle.

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. One of our team will go through the information sheet with you and answer any questions you have. Talk to others about the study if you wish. Ask us if there is anything that is not clear.

What is the purpose of the study?

The purpose of this study is to explore the adoptation of multimedia open educational resources (OERs) across different countries through examining the acceptance of multimedia Reusable Learning Objects (RLOs) in the form of OERs created in the UK to education in the Omani nursing context.

Why have I been invited?

You are being invited to take part because you have used pharmacology RLOs from UoN. We are inviting 24 participants like you to take part.

Do I have to take part?

It is up to you to decide whether or not to take part. If you do decide to take part you will be given this information sheet to keep and be asked to sign a consent

form. If you decide to take part you are still free to withdraw at any time and without giving a reason.

What will happen to me if I take part?

You will be involved in the research for one hour and half only. You will be asked to rank a set of statements according to those you most agreed with and those you most disagreed with about the pharmacology RLOs. After ranking the statements, the researcher will interview you for 20 minutes, interview are conducted to explore the reasons behind your choice of sorting

Expenses and inconvenience allowance

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.

What are the possible disadvantages and risks of taking part?

There will be no risk on participation on this project. 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.

What are the possible benefits of taking part?

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 nursing education, to what extend nursing students are accepting the open educational resource in their study. This will be the first study of its kind to look at the issues specifically within the context of Oman. 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.

Will my taking part in the study be kept 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 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. Any information about you which leaves the institution will have your name and address removed (anonymized) and a unique code will be used so that you cannot be recognized from it.

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.

We would also like to seek your consent so that the data may be stored and used in possible future research during and after 7 years– this is optional (please indicate you agree to this on the consent form).

What will happen if I don't want to carry on with the study?

Your participation is voluntary and you are free to withdraw at any time, without giving any reason.

What will happen to the results of the research study?

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 study (from pilot to the conclusion of the main study) in appropriate scientific journal in open access journals for wider coverage, poster and oral presentations in Oman 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.

Who is organizing and funding the research?

This research is being organized by the University of Nottingham and is being funded by the Ministry of Higher Education in Oman.

Who has reviewed the study?

All research in the University of Nottingham is looked at by independent group of people, called a Research Ethics Committee, to protect your interests. This study has been reviewed and given favourable opinion by the Faculty of Medicine & Health Sciences (FMHS) Research Ethics Committee.

What if there is a problem?

If you have a concern about any aspect of this study, you should contact the Chief investigator e-mail:

Heather.Wharrad@nottingham.ac.uk or richard.windle@nottingham.ac.uk

The full contact details of the research team are given at the end of this information sheet. If you remain unhappy and wish to complain formally, you should then contact the FMHS Research Ethics Committee Administrator, c/o The University of Nottingham, Faculty PVC Office, B Floor, Medical School, Queen's Medical Centre Campus, Nottingham University Hospitals, Nottingham, NG7 2UH. E-mail: louise.sabir@nottingham.ac.uk.

Further information and contact details

Investigators	Name	Emails
Principle investigators	Asiya Al Hasni	Asiya.AlHasni@nottingham.ac.uk
Chief investigators details	Professor Heather Wharrad	Heather.Wharrad@nottingham.ac.uk
	Dr Richard Windle	Richard.windle@nottingham.ac.uk

Appendix 6: Q Statements

Q statements

The research title: Drivers of and barriers to adopting RLOs by postgraduate nursing students in Oman to improve their knowledge, skill and confidence.

Total Statements: 45

Consider your use of RLOs, sort the following statements on how you agree or disagree with them:

1. RLOs enable me to understand the topics
2. The use of different presentation materials (audio, video, text, pictures) enhanced my learning
3. The assessments at the end of each RLOs were useful
4. Having a professional narrator commenting on the steps in the videos helped me pronounce the terms
5. I can accomplish my learning tasks more quickly using RLO
6. RLOs are as informative as the teacher
7. Using RLOs for my course improved academic performance in that subject
8. Using RLO for my course increased my understanding of subject
9. Using RLOs in my course are helpful in preparing for quizzes/tests/examination
10. 1 think that using RLO fits well with the way 1 like to study
11. I felt more engaged in learning by using RLOs as compared to traditional sessions

12. Using RLOs allow me to apply my knowledge more easily in practical sessions
13. Using RLOs allow me to apply my knowledge of drugs more quickly in practical sessions
14. Using RLOs make my practice sessions more productive
15. The design of the RLO was consistent and allowed easy navigation
16. I could manage viewing the videos (repeat a step, forward, etc.) easily
17. When text was used “within” the videos, the font size was appropriate
18. Overall, I believe that it is easy to use RLOs to support my learning.
19. I can use RLOs if there was no one around to tell me what to do as I go
20. Having the information available online at all times help me to catch up missed lectures/information
21. I like the flexibility of RLOs as I can learn anytime and anywhere
22. I have no difficulty accessing RLOs
23. RLOs are compatible with other technologies I use
24. I prefer to use RLOs on my own
25. The faculty members’ supported the use of the RLOs
26. I use RLOs because my teacher advise me to do so
27. People (colleagues/students) who are important to me think that I should use RLO.
28. Using RLOs in my program gives it more prestige
29. The overall quality of the RLOs was excellent
30. The orientation and training I received on how to use the RLO was sufficient
31. Guidance was available to me when using RLOs

32. Technical support was available to solve difficulties when using RLOs
33. I have appropriate technology to use RLOs
34. I enjoyed using the RLOs to learn
35. RLOs held my interest
36. I have the knowledge necessary to use RLOs
37. I have a lot of experience in the use of RLOs in my study
38. The use of RLOs has become a habit for me
39. I will use RLOs on a regular basis in the future
40. If the RLOs available in other subject I will use them
41. I will recommend others to use RLOs
42. My age effects my ability to use RLOs
43. My gender effects my ability to use RLOs
44. With RLOs I can take responsibility for my learning
45. RLOs allows me to study in line with the outcomes of my course

Appendix 7: PQM Results

PQMethod2.35 RLOsomanpostgradute PAGE 1
Path and Project Name: C:\PQMethod/rlosoman Oct 24 18

Correlation Matrix Between Sorts

SORTS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1 1732pg	100	19	55	21	-15	9	14	31	11	7	28	32	-8	23	3	15	29	25	11	-1	1	3	33	45
2 2633pg	19	100	21	-16	-18	-26	10	11	6	4	-7	17	-21	-15	4	13	41	-8	23	-15	-8	1	14	33
3 31031pg	55	21	100	13	23	4	27	43	15	28	32	43	22	28	16	34	55	16	36	-10	12	38	38	28
4 4830pg	21	-16	13	100	24	26	-4	28	34	16	32	10	35	47	23	33	6	12	1	-7	-6	-9	15	15
5 51032pg	-15	-18	23	24	100	23	51	9	41	63	0	13	50	36	51	27	23	7	34	7	17	24	9	19
6 6728pg	9	-26	4	26	23	100	19	7	35	49	30	24	57	19	42	31	-26	9	4	-2	-3	14	25	6
7 71131pg	14	10	27	-4	51	19	100	17	33	55	-2	34	28	26	32	38	12	11	22	11	24	35	24	25
8 8428pg	31	11	43	28	9	7	17	100	13	15	40	11	17	44	19	45	43	7	27	-18	40	52	36	24
9 9728pg	11	6	15	34	41	35	33	13	100	59	10	23	40	40	31	34	22	20	26	-14	-15	6	32	32
10 10729pg	7	4	28	16	63	49	55	15	59	100	1	38	48	33	54	54	15	19	34	-6	0	13	25	33
11 11628pg	28	-7	32	32	0	30	-2	40	10	1	100	34	25	44	12	38	8	9	18	8	16	20	39	9
12 12630pg	32	17	43	10	13	24	34	11	23	38	34	100	9	22	33	46	25	33	13	-3	-11	13	3	34
13 131030pg	-8	-21	22	35	50	57	28	17	40	48	25	9	100	26	38	30	-3	-12	6	-23	10	24	15	-1
14 14527pg	23	-15	28	47	36	19	26	44	40	33	44	22	26	100	30	73	15	7	11	2	23	25	52	19
15 15830pg	3	4	16	23	51	42	32	19	31	54	12	33	38	30	100	45	20	7	16	7	15	37	18	19
16 161030pg	15	13	34	33	27	31	38	45	34	54	38	46	30	73	45	100	25	6	8	-2	14	34	50	14
17 171233pg	29	41	55	6	23	-26	12	43	22	15	8	25	-3	15	20	25	100	1	43	0	15	35	21	28
18 181233pg	25	-8	16	12	7	9	11	7	20	19	9	33	-12	7	7	6	1	100	50	23	1	8	-1	26
19 19526pg	11	23	36	1	34	4	22	27	26	34	18	13	6	11	16	8	43	50	100	27	24	24	17	37
20 20736pg	-1	-15	-10	-7	7	-2	11	-18	-14	-6	8	-3	-23	2	7	-2	0	23	27	100	25	18	16	-10
21 21728pg	1	-8	12	-6	17	-3	24	40	-15	0	16	-11	10	23	15	14	15	1	24	25	100	75	38	1
22 22829pg	3	1	38	-9	24	14	35	52	6	13	20	13	24	25	37	34	35	8	24	18	75	100	47	1
23 23838pg	33	14	38	15	9	25	24	36	32	25	39	3	15	52	18	50	21	-1	17	16	38	47	100	-1
24 241737pg	45	33	28	15	19	6	25	24	32	33	9	34	-1	19	19	14	28	26	37	-10	1	1	-1	100

PQMethod2.35 RLOsomanpostgradute PAGE 2
Path and Project Name: C:\PQMethod/rlosoman Oct 24 18

Unrotated Factor Matrix

	Factors			
SORTS	1	2	3	4
1 1732pg	0.3774	-0.4886	0.1724	0.1051
2 2633pg	0.0783	-0.4293	0.1274	-0.0461
3 31031pg	0.6067	-0.4133	0.1168	0.1941
4 4830pg	0.3336	0.0601	0.0038	0.1191
5 51032pg	0.5066	0.4164	0.1422	-0.2649
6 6728pg	0.3619	0.3952	0.1272	-0.0600
7 71131pg	0.5304	0.1776	0.0262	-0.2618
8 8428pg	0.5512	-0.1377	0.0099	0.5048
9 9728pg	0.5221	0.1399	0.0168	-0.2357
10 10729pg	0.6510	0.2672	0.0575	-0.4959
11 11628pg	0.4306	-0.0370	0.0000	0.3484
12 12630pg	0.4849	-0.2277	0.0308	-0.2074
13 131030pg	0.3986	0.4807	0.1953	0.0124
14 14527pg	0.6217	0.2102	0.0362	0.3262
15 15830pg	0.5615	0.3012	0.0728	-0.1868
16 161030pg	0.7029	0.1665	0.0236	0.1404
17 171233pg	0.4366	-0.3977	0.1069	0.0449
18 181233pg	0.2645	-0.1966	0.0222	-0.3143
19 19526pg	0.4976	-0.2657	0.0435	-0.2941
20 20736pg	0.0286	0.0376	0.0019	-0.0343
21 21728pg	0.2938	0.1080	0.0105	0.2992
22 22829pg	0.5271	0.0786	0.0061	0.2581
23 23838pg	0.5555	0.1059	0.0102	0.3731
24 241737pg	0.4195	-0.3855	0.0996	-0.3145
Eigenvalues	5.4302	1.9619	0.1707	1.6719
% expl.Var.	23	8	1	7

Cumulative Communalities Matrix

	Factors 1 Thru			
SORTS	1	2	3	4
1 1732pg	0.1425	0.3812	0.4109	0.4219
2 2633pg	0.0061	0.1904	0.2067	0.2088
3 31031pg	0.3680	0.5388	0.5525	0.5902
4 4830pg	0.1113	0.1149	0.1149	0.1291
5 51032pg	0.2566	0.4300	0.4502	0.5204
6 6728pg	0.1310	0.2872	0.3034	0.3070
7 71131pg	0.2813	0.3128	0.3135	0.3820
8 8428pg	0.3038	0.3228	0.3229	0.5777
9 9728pg	0.2726	0.2922	0.2925	0.3480
10 10729pg	0.4238	0.4952	0.4985	0.7444
11 11628pg	0.1854	0.1868	0.1868	0.3082
12 12630pg	0.2351	0.2870	0.2879	0.3309
13 131030pg	0.1589	0.3900	0.4282	0.4283
14 14527pg	0.3866	0.4308	0.4321	0.5384
15 15830pg	0.3153	0.4061	0.4114	0.4463
16 161030pg	0.4941	0.5218	0.5224	0.5421
17 171233pg	0.1907	0.3488	0.3602	0.3623
18 181233pg	0.0699	0.1086	0.1091	0.2079
19 19526pg	0.2476	0.3182	0.3201	0.4066
20 20736pg	0.0008	0.0022	0.0022	0.0034
21 21728pg	0.0863	0.0980	0.0981	0.1876
22 22829pg	0.2778	0.2840	0.2840	0.3506
23 23838pg	0.3086	0.3198	0.3199	0.4591
24 241737pg	0.1760	0.3246	0.3346	0.4335
cum% expl.Var.	23	31	32	38

PQMethod2.35 RLOsomanpostgradute
Path and Project Name: C:\PQMethod/rlosoman

Factor Matrix with an X Indicating a Defining Sort

	Loadings		
QSORT	1	2	3
1 1732pg	−0.1258	0.5604X	0.2851
2 2633pg	−0.1812	0.4116X	−0.0184
3 31031pg	−0.0060	0.5737	0.5095
4 4830pg	0.1604	0.0766	0.3117
5 51032pg	0.7017X	0.0421	0.1543
6 6728pg	0.4963X	−0.0862	0.2130
7 71131pg	0.5497X	0.2177	0.1611
8 8428pg	−0.0461	0.2050	0.7304X
9 9728pg	0.5065X	0.2324	0.1731
10 10729pg	0.8019X	0.2940	0.0686
11 11628pg	0.0314	0.1197	0.5411X
12 12630pg	0.2444	0.4930X	0.1444
13 131030pg	0.5402X	−0.1476	0.2943
14 14527pg	0.3082	0.0354	0.6647X
15 15830pg	0.6100X	0.1192	0.2442
16 161030pg	0.4239	0.1714	0.5757
17 171233pg	−0.0128	0.5279X	0.2876
18 181233pg	0.1965	0.3959X	−0.0777
19 19526pg	0.2758	0.5611X	0.0843
20 20736pg	0.0579	−0.0030	−0.0046
21 21728pg	0.0726	−0.0415	0.4241X
22 22829pg	0.2060	0.1095	0.5440X
23 23838pg	0.1779	0.0632	0.6507X
24 241737pg	0.1762	0.6332X	0.0073
% expl.Var.	14	11	14

Factor Scores with Corresponding Ranks

No.	Statement	No.	Factors 1		2		3	
1	RLOs enable me to understand the topics	1	1.07	9	1.05	7	0.27	20
2	The use of different presentation materials (audio, v	2	1.76	2	0.63	14	1.90	1
3	The assessments at the end of each RLOs were useful	3	0.43	16	0.93	9	-0.85	36
4	Having a professional narrator commenting on the step	4	-0.22	25	0.06	24	-0.22	29
5	I can accomplish my learning tasks more quickly using	5	-0.28	26	0.31	21	0.74	11
6	RLOs are as informative as the teacher	6	-0.75	34	-0.19	28	1.02	8
7	Using RLOs for my course improved academic performanc	7	-0.07	21	1.11	5	0.38	18
8	Using RLO for my course increased my understanding of	8	0.34	17	0.67	12	0.88	9
9	Using RLOs in my course are helpful in preparing for	9	0.08	19	-0.16	27	0.36	19
10	1 think that using RLO fits well with the way 1 like	10	-0.49	29	-0.32	31	0.66	13
11	I felt more engaged in learning by using RLOs as comp	11	-1.08	40	0.65	13	1.45	3
12	Using RLOs allow me to apply my knowledge more easily	12	-0.31	27	0.32	20	-0.38	31
13	Using RLOs allow me to apply my knowledge more quickl	13	-0.07	22	1.29	3	-0.49	32
14	Using RLOs make my practice sessions more productive	14	-0.67	32	-0.24	30	0.20	21
15	The design of the RLO was consistent and allowed easy	15	0.66	14	-0.77	34	-1.31	39
16	I could manage viewing the videos (repeat a step, for	16	1.70	3	-1.99	43	0.38	17
17	When text was used ìwithinî the videos, the font size	17	0.97	11	-0.90	37	-0.04	26
18	Overall, I believe that it is easy to use RLOs to	18	1.37	5	0.33	19	1.46	2
19	I can use RLOs if there was no one around to tell me	19	1.35	6	-0.56	33	0.64	14
20	Having the information available online at all times	20	1.14	8	0.56	15	0.85	10
21	I like the flexibility of RLOs as I can learn anytime	21	-1.42	41	1.58	2	1.29	4
22	I have no difficulty accessing RLOs	22	-1.43	42	-0.90	36	-1.29	38
23	RLOs are compatible with other technologies I use	23	-0.81	35	-0.94	38	0.05	23
24	I prefer to use RLOs on my own	24	1.50	4	0.12	23	-0.56	34
25	The faculty has supported the use of the RLOs	25	1.80	1	0.55	16	-0.09	27
26	I use RLOs because my teacher advise me to do so	26	0.80	13	1.70	1	-0.81	35
27	People (colleagues/students) who are important to me	27	0.05	20	1.07	6	-1.51	42
28	Using RLOs in my program gives it more prestige	28	-0.75	33	-1.11	41	0.61	15
29	The overall quality of the RLOs was excellent	29	-0.17	24	-0.99	40	0.71	12
30	The orientation and training I received on how to use	30	-0.90	37	-1.36	42	0.02	25
31	Guidance was available to me when using RLOs	31	-0.56	31	0.27	22	-0.34	30
32	Technical support was available to solve difficulties	32	-1.07	39	-0.97	39	-1.27	37
33	I have appropriate technology to use RLOs	33	-0.31	28	1.15	4	-0.54	33
34	I enjoyed using the RLOs to learn	34	-0.86	36	0.43	17	1.25	6
35	RLOs held my interest	35	0.13	18	0.04	25	1.24	7
36	I have the knowledge necessary to use RLOs	36	-0.14	23	-0.38	32	-1.52	43
37	I have a lot of experience in the use of RLOs in my s	37	-1.54	44	-0.81	35	-1.47	40
38	The use of RLOs has become a habit for me	38	-1.52	43	0.01	26	-1.49	41
39	I will use RLOs on a regular basis in the future	39	0.63	15	-0.19	29	0.03	24
40	If the RLOs available in other subject I will use the	40	1.05	10	1.02	8	0.09	22
41	I will recommend others to use RLOs	41	1.15	7	0.86	10	1.27	5
42	My age effects my ability to use RLOs	42	-1.06	38	-2.68	45	-1.66	44
43	My gender effects my ability to use RLOs	43	-1.84	45	-2.39	44	-2.23	45

Factor Scores with Corresponding Ranks

No.	Statement	No.	Factors 1		2		3	
44	With RLOs I can take responsibility for my learning	44	-0.51	30	0.33	18	0.40	16
45	RLOs allows me to study in line with the outcomes of	45	0.82	12	0.78	11	-0.11	28

Correlations Between Factor Scores

	1	2	3
1	1.0000	0.3078	0.3347
2	0.3078	1.0000	0.3403
3	0.3347	0.3403	1.0000

PQMethod2.35 RLOsomanpostgradute
Path and Project Name: C:\PQMethod/rlosoman

Factor Scores -- For Factor 1

No.	Statement	No.	Z-SCORES
25	The faculty has supported the use of the RLOs	25	1.800
2	The use of different presentation materials (audio, video,	2	1.763
16	I could manage viewing the videos (repeat a step, forward,	16	1.699
24	I prefer to use RLOs on my own	24	1.502
18	Overall, I believe that it is easy to use RLOs to suppor	18	1.374
19	I can use RLOs if there was no one around to tell me what t	19	1.351
41	I will recommend others to use RLOs	41	1.154
20	Having the information available online at all times help m	20	1.141
1	RLOs enable me to understand the topics	1	1.069
40	If the RLOs available in other subject I will use them	40	1.049
17	When text was used ìwithinî the videos, the font size was a	17	0.965
45	RLOs allows me to study in line with the outcomes of my cou	45	0.817
26	I use RLOs because my teacher advise me to do so	26	0.802
15	The design of the RLO was consistent and allowed easy navig	15	0.659
39	I will use RLOs on a regular basis in the future	39	0.633
3	The assessments at the end of each RLOs were useful	3	0.431
8	Using RLO for my course increased my understanding of subje	8	0.342
35	RLOs held my interest	35	0.132
9	Using RLOs in my course are helpful in preparing for quizze	9	0.083
27	People (colleagues/students) who are important to me think	27	0.046
7	Using RLOs for my course improved academic performance in t	7	-0.075
13	Using RLOs allow me to apply my knowledge more quickly in p	13	-0.075
36	I have the knowledge necessary to use RLOs	36	-0.135
29	The overall quality of the RLOs was excellent	29	-0.173
4	Having a professional narrator commenting on the steps in t	4	-0.220
5	I can accomplish my learning tasks more quickly using RLO	5	-0.279
12	Using RLOs allow me to apply my knowledge more easily in pr	12	-0.306
33	I have appropriate technology to use RLOs	33	-0.308
10	1 think that using RLO fits well with the way 1 like to stu	10	-0.487
44	With RLOs I can take responsibility for my learning	44	-0.509
31	Guidance was available to me when using RLOs	31	-0.557
14	Using RLOs make my practice sessions more productive	14	-0.667
28	Using RLOs in my program gives it more prestige	28	-0.746
6	RLOs are as informative as the teacher	6	-0.748
23	RLOs are compatible with other technologies I use	23	-0.807
34	I enjoyed using the RLOs to learn	34	-0.856
30	The orientation and training I received on how to use the R	30	-0.895
42	My age effects my ability to use RLOs	42	-1.065
32	Technical support was available to solve difficulties when	32	-1.068
11	I felt more engaged in learning by using RLOs as compared t	11	-1.078
21	I like the flexibility of RLOs as I can learn anytime and a	21	-1.422
22	I have no difficulty accessing RLOs	22	-1.433
38	The use of RLOs has become a habit for me	38	-1.516

PQMethod2.35 RLOsomanpostgradute
Path and Project Name: C:\PQMethod/rlosoman

Factor Scores -- For Factor 1

No.	Statement	No.	Z-SCORES
37	I have a lot of experience in the use of RLOs in my study	37	-1.545
43	My gender effects my ability to use RLOs	43	-1.842

Factor Scores -- For Factor 2

No.	Statement	No.	Z-SCORES
26	I use RLOs because my teacher advise me to do so	26	1.700
21	I like the flexibility of RLOs as I can learn anytime and a	21	1.581
13	Using RLOs allow me to apply my knowledge more quickly in p	13	1.287
33	I have appropriate technology to use RLOs	33	1.151
7	Using RLOs for my course improved academic performance in t	7	1.108
27	People (colleagues/students) who are important to me think	27	1.074
1	RLOs enable me to understand the topics	1	1.055
40	If the RLOs available in other subject I will use them	40	1.020
3	The assessments at the end of each RLOs were useful	3	0.927
41	I will recommend others to use RLOs	41	0.859
45	RLOs allows me to study in line with the outcomes of my cou	45	0.784
8	Using RLO for my course increased my understanding of subje	8	0.675
11	I felt more engaged in learning by using RLOs as compared t	11	0.653
2	The use of different presentation materials (audio, video,	2	0.635
20	Having the information available online at all times help m	20	0.557
25	The faculty has supported the use of the RLOs	25	0.550
34	I enjoyed using the RLOs to learn	34	0.430
44	With RLOs I can take responsibility for my learning	44	0.328
18	Overall, I believe that it is easy to use RLOs to suppor	18	0.327
12	Using RLOs allow me to apply my knowledge more easily in pr	12	0.316
5	I can accomplish my learning tasks more quickly using RLO	5	0.314
31	Guidance was available to me when using RLOs	31	0.274
24	I prefer to use RLOs on my own	24	0.122
4	Having a professional narrator commenting on the steps in t	4	0.055
35	RLOs held my interest	35	0.040
38	The use of RLOs has become a habit for me	38	0.011
9	Using RLOs in my course are helpful in preparing for quizze	9	-0.158
6	RLOs are as informative as the teacher	6	-0.188
39	I will use RLOs on a regular basis in the future	39	-0.190
14	Using RLOs make my practice sessions more productive	14	-0.241
10	1 think that using RLO fits well with the way 1 like to stu	10	-0.323
36	I have the knowledge necessary to use RLOs	36	-0.376
19	I can use RLOs if there was no one around to tell me what t	19	-0.558
15	The design of the RLO was consistent and allowed easy navig	15	-0.769
37	I have a lot of experience in the use of RLOs in my study	37	-0.814
22	I have no difficulty accessing RLOs	22	-0.898
17	When text was used ìwithinî the videos, the font size was a	17	-0.899
23	RLOs are compatible with other technologies I use	23	-0.938
32	Technical support was available to solve difficulties when	32	-0.969
29	The overall quality of the RLOs was excellent	29	-0.994
28	Using RLOs in my program gives it more prestige	28	-1.105
30	The orientation and training I received on how to use the R	30	-1.359
16	I could manage viewing the videos (repeat a step, forward,	16	-1.989

PQMethod2.35 RLOsomanpostgradute
Path and Project Name: C:\PQMethod/rlosoman

Factor Scores -- For Factor 2

No.	Statement	No.	Z-SCORES
43	My gender effects my ability to use RLOs	43	-2.389
42	My age effects my ability to use RLOs	42	-2.678

Factor Scores -- For Factor 3

No.	Statement	No.	Z-SCORES
2	The use of different presentation materials (audio, video,	2	1.904
18	Overall, I believe that it is easy to use RLOs to suppor	18	1.460
11	I felt more engaged in learning by using RLOs as compared t	11	1.454
21	I like the flexibility of RLOs as I can learn anytime and a	21	1.291
41	I will recommend others to use RLOs	41	1.266
34	I enjoyed using the RLOs to learn	34	1.253
35	RLOs held my interest	35	1.240
6	RLOs are as informative as the teacher	6	1.022
8	Using RLO for my course increased my understanding of subje	8	0.882
20	Having the information available online at all times help m	20	0.855
5	I can accomplish my learning tasks more quickly using RLO	5	0.742
29	The overall quality of the RLOs was excellent	29	0.711
10	1 think that using RLO fits well with the way 1 like to stu	10	0.655
19	I can use RLOs if there was no one around to tell me what t	19	0.644
28	Using RLOs in my program gives it more prestige	28	0.608
44	With RLOs I can take responsibility for my learning	44	0.401
16	I could manage viewing the videos (repeat a step, forward,	16	0.381
7	Using RLOs for my course improved academic performance in t	7	0.377
9	Using RLOs in my course are helpful in preparing for quizze	9	0.359
1	RLOs enable me to understand the topics	1	0.269
14	Using RLOs make my practice sessions more productive	14	0.202
40	If the RLOs available in other subject I will use them	40	0.090
23	RLOs are compatible with other technologies I use	23	0.046
39	I will use RLOs on a regular basis in the future	39	0.032
30	The orientation and training I received on how to use the R	30	0.023
17	When text was used ìwithinî the videos, the font size was a	17	-0.040
25	The faculty has supported the use of the RLOs	25	-0.094
45	RLOs allows me to study in line with the outcomes of my cou	45	-0.109
4	Having a professional narrator commenting on the steps in t	4	-0.217
31	Guidance was available to me when using RLOs	31	-0.341
12	Using RLOs allow me to apply my knowledge more easily in pr	12	-0.377
13	Using RLOs allow me to apply my knowledge more quickly in p	13	-0.495
33	I have appropriate technology to use RLOs	33	-0.537
24	I prefer to use RLOs on my own	24	-0.556
26	I use RLOs because my teacher advise me to do so	26	-0.811
3	The assessments at the end of each RLOs were useful	3	-0.848
32	Technical support was available to solve difficulties when	32	-1.266
22	I have no difficulty accessing RLOs	22	-1.288
15	The design of the RLO was consistent and allowed easy navig	15	-1.310
37	I have a lot of experience in the use of RLOs in my study	37	-1.466
38	The use of RLOs has become a habit for me	38	-1.491
27	People (colleagues/students) who are important to me think	27	-1.509
36	I have the knowledge necessary to use RLOs	36	-1.524

PQMethod2.35 RLOsomanpostgradute
Path and Project Name: C:\PQMethod/rlosoman

Factor Scores -- For Factor 3

No.	Statement	No.	Z-SCORES
42	My age effects my ability to use RLOs	42	-1.656
43	My gender effects my ability to use RLOs	43	-2.233

Descending Array of Differences Between Factors 1 and 2

No.	Statement	No.	Type 1	Type 2	Difference
16	I could manage viewing the videos (repeat a step, forward,	16	1.699	-1.989	3.688
19	I can use RLOs if there was no one around to tell me what t	19	1.351	-0.558	1.908
17	When text was used ìwithinî the videos, the font size was a	17	0.965	-0.899	1.864
42	My age effects my ability to use RLOs	42	-1.065	-2.678	1.613
15	The design of the RLO was consistent and allowed easy navig	15	0.659	-0.769	1.428
24	I prefer to use RLOs on my own	24	1.502	0.122	1.380
25	The faculty has supported the use of the RLOs	25	1.800	0.550	1.250
2	The use of different presentation materials (audio, video,	2	1.763	0.635	1.128
18	Overall, I believe that it is easy to use RLOs to suppor	18	1.374	0.327	1.047
39	I will use RLOs on a regular basis in the future	39	0.633	-0.190	0.822
29	The overall quality of the RLOs was excellent	29	-0.173	-0.994	0.820
20	Having the information available online at all times help m	20	1.141	0.557	0.584
43	My gender effects my ability to use RLOs	43	-1.842	-2.389	0.548
30	The orientation and training I received on how to use the R	30	-0.895	-1.359	0.464
28	Using RLOs in my program gives it more prestige	28	-0.746	-1.105	0.360
41	I will recommend others to use RLOs	41	1.154	0.859	0.295
9	Using RLOs in my course are helpful in preparing for quizze	9	0.083	-0.158	0.241
36	I have the knowledge necessary to use RLOs	36	-0.135	-0.376	0.241
23	RLOs are compatible with other technologies I use	23	-0.807	-0.938	0.131
35	RLOs held my interest	35	0.132	0.040	0.092
45	RLOs allows me to study in line with the outcomes of my cou	45	0.817	0.784	0.033
40	If the RLOs available in other subject I will use them	40	1.049	1.020	0.029
1	RLOs enable me to understand the topics	1	1.069	1.055	0.014
32	Technical support was available to solve difficulties when	32	-1.068	-0.969	-0.098
10	1 think that using RLO fits well with the way 1 like to stu	10	-0.487	-0.323	-0.164
4	Having a professional narrator commenting on the steps in t	4	-0.220	0.055	-0.275
8	Using RLO for my course increased my understanding of subje	8	0.342	0.675	-0.332
14	Using RLOs make my practice sessions more productive	14	-0.667	-0.241	-0.425
3	The assessments at the end of each RLOs were useful	3	0.431	0.927	-0.496
22	I have no difficulty accessing RLOs	22	-1.433	-0.898	-0.535
6	RLOs are as informative as the teacher	6	-0.748	-0.188	-0.560
5	I can accomplish my learning tasks more quickly using RLO	5	-0.279	0.314	-0.593
12	Using RLOs allow me to apply my knowledge more easily in pr	12	-0.306	0.316	-0.622
37	I have a lot of experience in the use of RLOs in my study	37	-1.545	-0.814	-0.731
31	Guidance was available to me when using RLOs	31	-0.557	0.274	-0.832
44	With RLOs I can take responsibility for my learning	44	-0.509	0.328	-0.837
26	I use RLOs because my teacher advise me to do so	26	0.802	1.700	-0.898
27	People (colleagues/students) who are important to me think	27	0.046	1.074	-1.028
7	Using RLOs for my course improved academic performance in t	7	-0.075	1.108	-1.183
34	I enjoyed using the RLOs to learn	34	-0.856	0.430	-1.286
13	Using RLOs allow me to apply my knowledge more quickly in p	13	-0.075	1.287	-1.362
33	I have appropriate technology to use RLOs	33	-0.308	1.151	-1.459
38	The use of RLOs has become a habit for me	38	-1.516	0.011	-1.528

PQMethod2.35 RLOsomanpostgradute
Path and Project Name: C:\PQMethod/rlosoman

Descending Array of Differences Between Factors 1 and 2

No.	Statement	No.	Type 1	Type 2	Difference
11	I felt more engaged in learning by using RLOs as compared t	11	-1.078	0.653	-1.731
21	I like the flexibility of RLOs as I can learn anytime and a	21	-1.422	1.581	-3.003

PQMethod2.35 RLOsomanpostgradute
Path and Project Name: C:\PQMethod/rlosoman

PQMethod2.35 RLOsomanpostgradute
Path and Project Name: C:\PQMethod/rlosoman

Descending Array of Differences Between Factors 1 and 3

No.	Statement	No.	Type 1	Type 3	Difference
24	I prefer to use RLOs on my own	24	1.502	-0.556	2.058
15	The design of the RLO was consistent and allowed easy navig	15	0.659	-1.310	1.969
25	The faculty has supported the use of the RLOs	25	1.800	-0.094	1.894
26	I use RLOs because my teacher advise me to do so	26	0.802	-0.811	1.613
27	People (colleagues/students) who are important to me think	27	0.046	-1.509	1.555
36	I have the knowledge necessary to use RLOs	36	-0.135	-1.524	1.389
16	I could manage viewing the videos (repeat a step, forward,	16	1.699	0.381	1.317
3	The assessments at the end of each RLOs were useful	3	0.431	-0.848	1.280
17	When text was used ìwithinî the videos, the font size was a	17	0.965	-0.040	1.005
40	If the RLOs available in other subject I will use them	40	1.049	0.090	0.959
45	RLOs allows me to study in line with the outcomes of my cou	45	0.817	-0.109	0.926
1	RLOs enable me to understand the topics	1	1.069	0.269	0.800
19	I can use RLOs if there was no one around to tell me what t	19	1.351	0.644	0.706
39	I will use RLOs on a regular basis in the future	39	0.633	0.032	0.601
42	My age effects my ability to use RLOs	42	-1.065	-1.656	0.591
13	Using RLOs allow me to apply my knowledge more quickly in p	13	-0.075	-0.495	0.420
43	My gender effects my ability to use RLOs	43	-1.842	-2.233	0.392
20	Having the information available online at all times help m	20	1.141	0.855	0.286
33	I have appropriate technology to use RLOs	33	-0.308	-0.537	0.229
32	Technical support was available to solve difficulties when	32	-1.068	-1.266	0.198
12	Using RLOs allow me to apply my knowledge more easily in pr	12	-0.306	-0.377	0.071
4	Having a professional narrator commenting on the steps in t	4	-0.220	-0.217	-0.003
38	The use of RLOs has become a habit for me	38	-1.516	-1.491	-0.026
37	I have a lot of experience in the use of RLOs in my study	37	-1.545	-1.466	-0.079
18	Overall, I believe that it is easy to use RLOs to suppor	18	1.374	1.460	-0.086
41	I will recommend others to use RLOs	41	1.154	1.266	-0.112
2	The use of different presentation materials (audio, video,	2	1.763	1.904	-0.141
22	I have no difficulty accessing RLOs	22	-1.433	-1.288	-0.144
31	Guidance was available to me when using RLOs	31	-0.557	-0.341	-0.216
9	Using RLOs in my course are helpful in preparing for quizze	9	0.083	0.359	-0.276
7	Using RLOs for my course improved academic performance in t	7	-0.075	0.377	-0.452
8	Using RLO for my course increased my understanding of subje	8	0.342	0.882	-0.540
23	RLOs are compatible with other technologies I use	23	-0.807	0.046	-0.853
14	Using RLOs make my practice sessions more productive	14	-0.667	0.202	-0.869
29	The overall quality of the RLOs was excellent	29	-0.173	0.711	-0.885
44	With RLOs I can take responsibility for my learning	44	-0.509	0.401	-0.910
30	The orientation and training I received on how to use the R	30	-0.895	0.023	-0.918
5	I can accomplish my learning tasks more quickly using RLO	5	-0.279	0.742	-1.021
35	RLOs held my interest	35	0.132	1.240	-1.108
10	1 think that using RLO fits well with the way 1 like to stu	10	-0.487	0.655	-1.142
28	Using RLOs in my program gives it more prestige	28	-0.746	0.608	-1.354
6	RLOs are as informative as the teacher	6	-0.748	1.022	-1.770
34	I enjoyed using the RLOs to learn	34	-0.856	1.253	-2.109

PQMethod2.35 RLOsomanpostgradute
Path and Project Name: C:\PQMethod/rlosoman

Descending Array of Differences Between Factors 1 and 3

No.	Statement	No.	Type 1	Type 3	Difference
11	I felt more engaged in learning by using RLOs as compared t	11	-1.078	1.454	-2.532
21	I like the flexibility of RLOs as I can learn anytime and a	21	-1.422	1.291	-2.713

PQMethod2.35 RLOsomanpostgradute
Path and Project Name: C:\PQMethod/rlosoman

Descending Array of Differences Between Factors 2 and 3

No.	Statement	No.	Type 2	Type 3	Difference
27	People (colleagues/students) who are important to me think	27	1.074	-1.509	2.583
26	I use RLOs because my teacher advise me to do so	26	1.700	-0.811	2.511
13	Using RLOs allow me to apply my knowledge more quickly in p	13	1.287	-0.495	1.782
3	The assessments at the end of each RLOs were useful	3	0.927	-0.848	1.775
33	I have appropriate technology to use RLOs	33	1.151	-0.537	1.688
38	The use of RLOs has become a habit for me	38	0.011	-1.491	1.502
36	I have the knowledge necessary to use RLOs	36	-0.376	-1.524	1.148
40	If the RLOs available in other subject I will use them	40	1.020	0.090	0.930
45	RLOs allows me to study in line with the outcomes of my cou	45	0.784	-0.109	0.893
1	RLOs enable me to understand the topics	1	1.055	0.269	0.786
7	Using RLOs for my course improved academic performance in t	7	1.108	0.377	0.731
12	Using RLOs allow me to apply my knowledge more easily in pr	12	0.316	-0.377	0.693
24	I prefer to use RLOs on my own	24	0.122	-0.556	0.678
37	I have a lot of experience in the use of RLOs in my study	37	-0.814	-1.466	0.652
25	The faculty has supported the use of the RLOs	25	0.550	-0.094	0.644
31	Guidance was available to me when using RLOs	31	0.274	-0.341	0.616
15	The design of the RLO was consistent and allowed easy navig	15	-0.769	-1.310	0.541
22	I have no difficulty accessing RLOs	22	-0.898	-1.288	0.391
32	Technical support was available to solve difficulties when	32	-0.969	-1.266	0.297
21	I like the flexibility of RLOs as I can learn anytime and a	21	1.581	1.291	0.290
4	Having a professional narrator commenting on the steps in t	4	0.055	-0.217	0.273
44	With RLOs I can take responsibility for my learning	44	0.328	0.401	-0.073
43	My gender effects my ability to use RLOs	43	-2.389	-2.233	-0.156
8	Using RLO for my course increased my understanding of subje	8	0.675	0.882	-0.208
39	I will use RLOs on a regular basis in the future	39	-0.190	0.032	-0.221
20	Having the information available online at all times help m	20	0.557	0.855	-0.297
41	I will recommend others to use RLOs	41	0.859	1.266	-0.406
5	I can accomplish my learning tasks more quickly using RLO	5	0.314	0.742	-0.428
14	Using RLOs make my practice sessions more productive	14	-0.241	0.202	-0.443
9	Using RLOs in my course are helpful in preparing for quizze	9	-0.158	0.359	-0.517
11	I felt more engaged in learning by using RLOs as compared t	11	0.653	1.454	-0.801
34	I enjoyed using the RLOs to learn	34	0.430	1.253	-0.823
17	When text was used ìwithinî the videos, the font size was a	17	-0.899	-0.040	-0.859
10	1 think that using RLO fits well with the way 1 like to stu	10	-0.323	0.655	-0.978
23	RLOs are compatible with other technologies I use	23	-0.938	0.046	-0.984
42	My age effects my ability to use RLOs	42	-2.678	-1.656	-1.022
18	Overall, I believe that it is easy to use RLOs to suppor	18	0.327	1.460	-1.133
35	RLOs held my interest	35	0.040	1.240	-1.199
19	I can use RLOs if there was no one around to tell me what t	19	-0.558	0.644	-1.202
6	RLOs are as informative as the teacher	6	-0.188	1.022	-1.210
2	The use of different presentation materials (audio, video,	2	0.635	1.904	-1.269
30	The orientation and training I received on how to use the R	30	-1.359	0.023	-1.382
29	The overall quality of the RLOs was excellent	29	-0.994	0.711	-1.705

PQMethod2.35 RLOsomanpostgradute
Path and Project Name: C:\PQMethod/rlosoman

Descending Array of Differences Between Factors 2 and 3

No.	Statement	No.	Type 2	Type 3	Difference
28	Using RLOs in my program gives it more prestige	28	-1.105	0.608	-1.714
16	I could manage viewing the videos (repeat a step, forward,	16	-1.989	0.381	-2.370

PQMethod2.35 RLOsomanpostgradute
Path and Project Name: C:\PQMethod/rlosoman

Factor Q-Sort Values for Each Statement

No.	Statement	No.	Factor Arrays 1	2	3
1	RLOs enable me to understand the topics	1	3	4	1
2	The use of different presentation materials (audio, video,	2	6	2	6
3	The assessments at the end of each RLOs were useful	3	2	3	-3
4	Having a professional narrator commenting on the steps in t	4	0	0	-1
5	I can accomplish my learning tasks more quickly using RLO	5	-1	0	3
6	RLOs are as informative as the teacher	6	-3	-1	4
7	Using RLOs for my course improved academic performance in t	7	0	5	1
8	Using RLO for my course increased my understanding of subje	8	1	3	3
9	Using RLOs in my course are helpful in preparing for quizze	9	1	-1	1
10	1 think that using RLO fits well with the way 1 like to stu	10	-1	-2	2
11	I felt more engaged in learning by using RLOs as compared t	11	-4	2	5
12	Using RLOs allow me to apply my knowledge more easily in pr	12	-1	1	-2
13	Using RLOs allow me to apply my knowledge more quickly in p	13	0	5	-2
14	Using RLOs make my practice sessions more productive	14	-2	-2	0
15	The design of the RLO was consistent and allowed easy navig	15	2	-3	-4
16	I could manage viewing the videos (repeat a step, forward,	16	5	-5	1
17	When text was used ìwithinî the videos, the font size was a	17	3	-3	-1
18	Overall, I believe that it is easy to use RLOs to suppor	18	5	1	6
19	I can use RLOs if there was no one around to tell me what t	19	4	-2	2
20	Having the information available online at all times help m	20	4	2	3
21	I like the flexibility of RLOs as I can learn anytime and a	21	-5	6	5
22	I have no difficulty accessing RLOs	22	-5	-3	-4
23	RLOs are compatible with other technologies I use	23	-3	-4	0
24	I prefer to use RLOs on my own	24	5	0	-3
25	The faculty has supported the use of the RLOs	25	6	2	-1
26	I use RLOs because my teacher advise me to do so	26	2	6	-3
27	People (colleagues/students) who are important to me think	27	1	4	-5
28	Using RLOs in my program gives it more prestige	28	-2	-5	2
29	The overall quality of the RLOs was excellent	29	0	-4	3
30	The orientation and training I received on how to use the R	30	-3	-5	0
31	Guidance was available to me when using RLOs	31	-2	0	-2
32	Technical support was available to solve difficulties when	32	-4	-4	-3
33	I have appropriate technology to use RLOs	33	-1	5	-2
34	I enjoyed using the RLOs to learn	34	-3	1	4
35	RLOs held my interest	35	1	0	4
36	I have the knowledge necessary to use RLOs	36	0	-2	-5
37	I have a lot of experience in the use of RLOs in my study	37	-6	-3	-4
38	The use of RLOs has become a habit for me	38	-5	-1	-5
39	I will use RLOs on a regular basis in the future	39	2	-1	0
40	If the RLOs available in other subject I will use them	40	3	4	0
41	I will recommend others to use RLOs	41	4	3	5
42	My age effects my ability to use RLOs	42	-4	-6	-6
43	My gender effects my ability to use RLOs	43	-6	-6	-6
44	With RLOs I can take responsibility for my learning	44	-2	1	2

PQMethod2.35 RLOsomanpostgradute
Path and Project Name: C:\PQMethod/rlosoman

No.	Statement	No.	Factor Arrays 1	2	3
45	RLOs allows me to study in line with the outcomes of my cou	45	3	3	-1

Variance = 11.156 St. Dev. = 3.340

PQMethod2.35 RLOsomanpostgradute
Path and Project Name: C:\PQMethod/rlosoman

Factor Q-Sort Values for Statements sorted by Consensus vs. Disagreement (Variance across Factor Z-Scores)

			Factor Arrays		
No.	Statement	No.	1	2	3
32	Technical support was available to solve difficulties when	32	-4	-4	-3
4	Having a professional narrator commenting on the steps in t	4	0	0	-1
41	I will recommend others to use RLOs	41	4	3	5
9	Using RLOs in my course are helpful in preparing for quizze	9	1	-1	1
8	Using RLO for my course increased my understanding of subje	8	1	3	3
22	I have no difficulty accessing RLOs	22	-5	-3	-4
43	My gender effects my ability to use RLOs	43	-6	-6	-6
20	Having the information available online at all times help m	20	4	2	3
12	Using RLOs allow me to apply my knowledge more easily in pr	12	-1	1	-2
37	I have a lot of experience in the use of RLOs in my study	37	-6	-3	-4
39	I will use RLOs on a regular basis in the future	39	2	-1	0
31	Guidance was available to me when using RLOs	31	-2	0	-2
14	Using RLOs make my practice sessions more productive	14	-2	-2	0
1	RLOs enable me to understand the topics	1	3	4	1
44	With RLOs I can take responsibility for my learning	44	-2	1	2
5	I can accomplish my learning tasks more quickly using RLO	5	-1	0	3
45	RLOs allows me to study in line with the outcomes of my cou	45	3	3	-1
23	RLOs are compatible with other technologies I use	23	-3	-4	0
40	If the RLOs available in other subject I will use them	40	3	4	0
7	Using RLOs for my course improved academic performance in t	7	0	5	1
10	1 think that using RLO fits well with the way 1 like to stu	10	-1	-2	2
18	Overall, I believe that it is easy to use RLOs to suppor	18	5	1	6
35	RLOs held my interest	35	1	0	4
2	The use of different presentation materials (audio, video,	2	6	2	6
30	The orientation and training I received on how to use the R	30	-3	-5	0
36	I have the knowledge necessary to use RLOs	36	0	-2	-5
42	My age effects my ability to use RLOs	42	-4	-6	-6
29	The overall quality of the RLOs was excellent	29	0	-4	3
38	The use of RLOs has become a habit for me	38	-5	-1	-5
28	Using RLOs in my program gives it more prestige	28	-2	-5	2
6	RLOs are as informative as the teacher	6	-3	-1	4
33	I have appropriate technology to use RLOs	33	-1	5	-2
3	The assessments at the end of each RLOs were useful	3	2	3	-3
13	Using RLOs allow me to apply my knowledge more quickly in p	13	0	5	-2
17	When text was used ìwithinî the videos, the font size was a	17	3	-3	-1
25	The faculty has supported the use of the RLOs	25	6	2	-1
19	I can use RLOs if there was no one around to tell me what t	19	4	-2	2
15	The design of the RLO was consistent and allowed easy navig	15	2	-3	-4
24	I prefer to use RLOs on my own	24	5	0	-3
34	I enjoyed using the RLOs to learn	34	-3	1	4
26	I use RLOs because my teacher advise me to do so	26	2	6	-3
11	I felt more engaged in learning by using RLOs as compared t	11	-4	2	5
27	People (colleagues/students) who are important to me think	27	1	4	-5
21	I like the flexibility of RLOs as I can learn anytime and a	21	-5	6	5

PQMethod2.35 RLOsomanpostgradute
Path and Project Name: C:\PQMethod/rlosoman

			Factor Arrays		
No.	Statement	No.	1	2	3
16	I could manage viewing the videos (repeat a step, forward,	16	5	-5	1

Factor Characteristics

	Factors		
	1	2	3
No. of Defining Variables	7	7	6
Average Rel. Coef.	0.800	0.800	0.800
Composite Reliability	0.966	0.966	0.960
S.E. of Factor Z-Scores	0.186	0.186	0.200

Standard Errors for Differences in Factor Z-Scores

(Diagonal Entries Are S.E. Within Factors)

Factors	1	2	3
1	0.263	0.263	0.273
2	0.263	0.263	0.273
3	0.273	0.273	0.283

PQMethod2.35 RLOsomanpostgradute
Path and Project Name: C:\PQMethod/rlosoman

Distinguishing Statements for Factor 1

(P < .05 ; Asterisk (*) Indicates Significance at P < .01)

Both the Factor Q-Sort Value (Q-SV) and the Z-Score (Z-SCR) are Shown.

			Factors					
			1		2		3	
No.	Statement	No.	Q-SV	Z-SCR	Q-SV	Z-SCR	Q-SV	Z-SCR
25	The faculty has supported the use of the RLOs	25	6	1.80*	2	0.55	-1	-0.09
16	I could manage viewing the videos (repeat a step, forward,	16	5	1.70*	-5	-1.99	1	0.38
24	I prefer to use RLOs on my own	24	5	1.50*	0	0.12	-3	-0.56
19	I can use RLOs if there was no one around to tell me what t	19	4	1.35*	-2	-0.56	2	0.64
17	When text was used ìwithinî the videos, the font size was a	17	3	0.97*	-3	-0.90	-1	-0.04
26	I use RLOs because my teacher advise me to do so	26	2	0.80*	6	1.70	-3	-0.81
15	The design of the RLO was consistent and allowed easy navig	15	2	0.66*	-3	-0.77	-4	-1.31
39	I will use RLOs on a regular basis in the future	39	2	0.63	-1	-0.19	0	0.03
27	People (colleagues/students) who are important to me think	27	1	0.05*	4	1.07	-5	-1.51
29	The overall quality of the RLOs was excellent	29	0	-0.17*	-4	-0.99	3	0.71
5	I can accomplish my learning tasks more quickly using RLO	5	-1	-0.28	0	0.31	3	0.74
44	With RLOs I can take responsibility for my learning	44	-2	-0.51*	1	0.33	2	0.40
6	RLOs are as informative as the teacher	6	-3	-0.75	-1	-0.19	4	1.02
34	I enjoyed using the RLOs to learn	34	-3	-0.86*	1	0.43	4	1.25
42	My age effects my ability to use RLOs	42	-4	-1.06	-6	-2.68	-6	-1.66
11	I felt more engaged in learning by using RLOs as compared t	11	-4	-1.08*	2	0.65	5	1.45
21	I like the flexibility of RLOs as I can learn anytime and a	21	-5	-1.42*	6	1.58	5	1.29

PQMethod2.35 RLOsomanpostgradute
Path and Project Name: C:\PQMethod/rlosoman

Distinguishing Statements for Factor 2

(P < .05 ; Asterisk (*) Indicates Significance at P < .01)

Both the Factor Q-Sort Value (Q-SV) and the Z-Score (Z-SCR) are Shown.

			Factors					
			1		2		3	
No.	Statement	No.	Q-SV	Z-SCR	Q-SV	Z-SCR	Q-SV	Z-SCR
26	I use RLOs because my teacher advise me to do so	26	2	0.80	6	1.70*	-3	-0.81
13	Using RLOs allow me to apply my knowledge more quickly in p	13	0	-0.07	5	1.29*	-2	-0.49
33	I have appropriate technology to use RLOs	33	-1	-0.31	5	1.15*	-2	-0.54
7	Using RLOs for my course improved academic performance in t	7	0	-0.07	5	1.11*	1	0.38
27	People (colleagues/students) who are important to me think	27	1	0.05	4	1.07*	-5	-1.51
11	I felt more engaged in learning by using RLOs as compared t	11	-4	-1.08	2	0.65*	5	1.45
2	The use of different presentation materials (audio, video,	2	6	1.76	2	0.63*	6	1.90
25	The faculty has supported the use of the RLOs	25	6	1.80	2	0.55	-1	-0.09
34	I enjoyed using the RLOs to learn	34	-3	-0.86	1	0.43*	4	1.25
18	Overall, I believe that it is easy to use RLOs to suppor	18	5	1.37	1	0.33*	6	1.46
12	Using RLOs allow me to apply my knowledge more easily in pr	12	-1	-0.31	1	0.32	-2	-0.38
31	Guidance was available to me when using RLOs	31	-2	-0.56	0	0.27	-2	-0.34
24	I prefer to use RLOs on my own	24	5	1.50	0	0.12	-3	-0.56
38	The use of RLOs has become a habit for me	38	-5	-1.52	-1	0.01*	-5	-1.49
6	RLOs are as informative as the teacher	6	-3	-0.75	-1	-0.19	4	1.02
19	I can use RLOs if there was no one around to tell me what t	19	4	1.35	-2	-0.56*	2	0.64
15	The design of the RLO was consistent and allowed easy navig	15	2	0.66	-3	-0.77	-4	-1.31
37	I have a lot of experience in the use of RLOs in my study	37	-6	-1.54	-3	-0.81	-4	-1.47
17	When text was used ìwithinî the videos, the font size was a	17	3	0.97	-3	-0.90*	-1	-0.04
29	The overall quality of the RLOs was excellent	29	0	-0.17	-4	-0.99*	3	0.71
16	I could manage viewing the videos (repeat a step, forward,	16	5	1.70	-5	-1.99*	1	0.38
42	My age effects my ability to use RLOs	42	-4	-1.06	-6	-2.68*	-6	-1.66

)istinguishing Statements for Factor 3

(P < .05 ; Asterisk (*) Indicates Significance at P < .01)

Both the Factor Q-Sort Value (Q-SV) and the Z-Score (Z-SCR) are Shown.

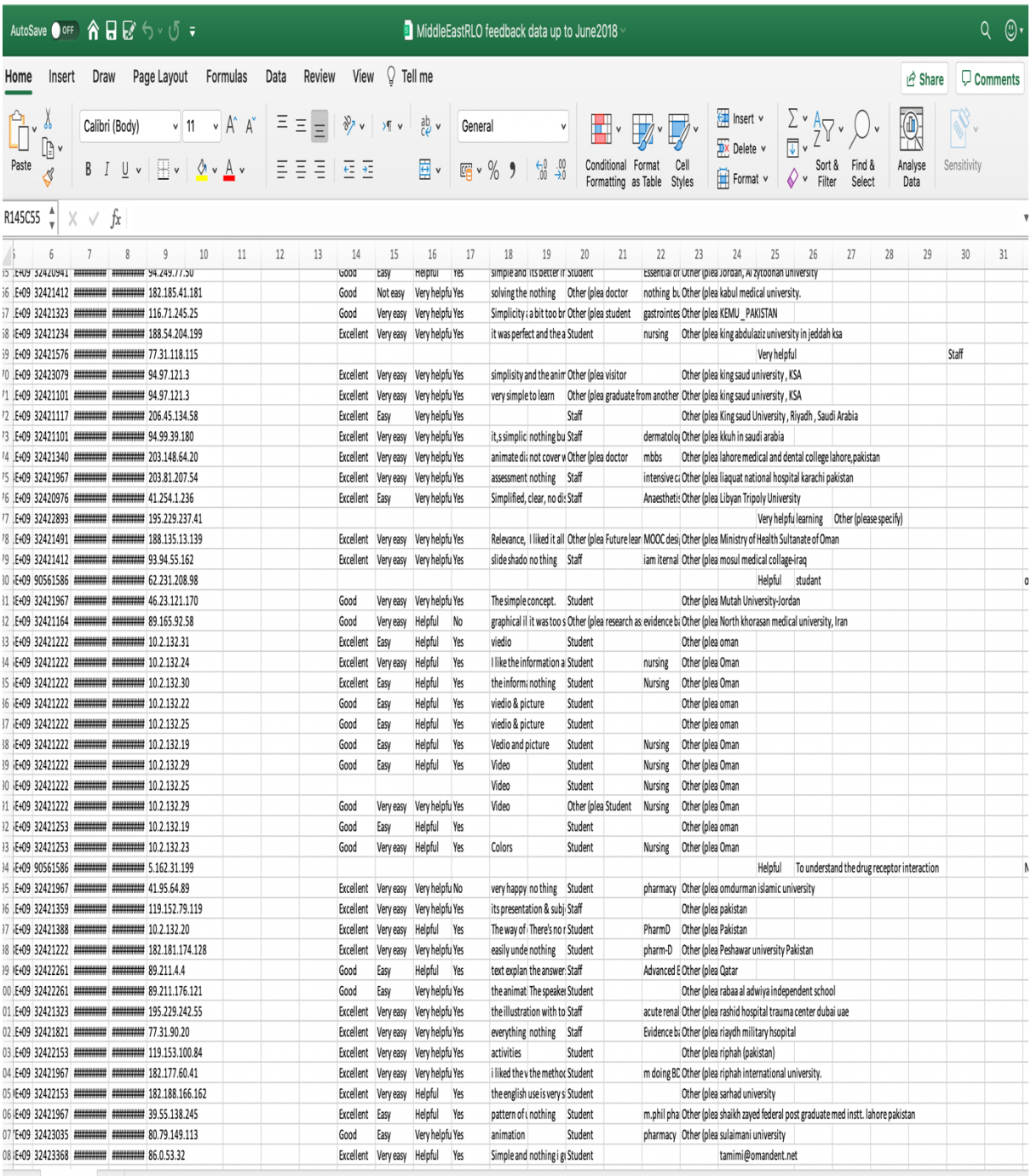
			Factors					
			1		2		3	
No.	Statement	No.	Q-SV	Z-SCR	Q-SV	Z-SCR	Q-SV	Z-SCR
11	I felt more engaged in learning by using RLOs as compared t	11	-4	-1.08	2	0.65	5	1.45*
34	I enjoyed using the RLOs to learn	34	-3	-0.86	1	0.43	4	1.25*
35	RLOs held my interest	35	1	0.13	0	0.04	4	1.24*
6	RLOs are as informative as the teacher	6	-3	-0.75	-1	-0.19	4	1.02*
29	The overall quality of the RLOs was excellent	29	0	-0.17	-4	-0.99	3	0.71*
10	1 think that using RLO fits well with the way 1 like to stu	10	-1	-0.49	-2	-0.32	2	0.66*
19	I can use RLOs if there was no one around to tell me what t	19	4	1.35	-2	-0.56	2	0.64*
28	Using RLOs in my program gives it more prestige	28	-2	-0.75	-5	-1.11	2	0.61*
16	I could manage viewing the videos (repeat a step, forward,	16	5	1.70	-5	-1.99	1	0.38*
1	RLOs enable me to understand the topics	1	3	1.07	4	1.05	1	0.27*
40	If the RLOs available in other subject I will use them	40	3	1.05	4	1.02	0	0.09*
23	RLOs are compatible with other technologies I use	23	-3	-0.81	-4	-0.94	0	0.05*
30	The orientation and training I received on how to use the R	30	-3	-0.90	-5	-1.36	0	0.02*
17	When text was used ìwithinî the videos, the font size was a	17	3	0.97	-3	-0.90	-1	-0.04*
25	The faculty has supported the use of the RLOs	25	6	1.80	2	0.55	-1	-0.09
45	RLOs allows me to study in line with the outcomes of my cou	45	3	0.82	3	0.78	-1	-0.11*
24	I prefer to use RLOs on my own	24	5	1.50	0	0.12	-3	-0.56
26	I use RLOs because my teacher advise me to do so	26	2	0.80	6	1.70	-3	-0.81*
3	The assessments at the end of each RLOs were useful	3	2	0.43	3	0.93	-3	-0.85*
15	The design of the RLO was consistent and allowed easy navig	15	2	0.66	-3	-0.77	-4	-1.31
27	People (colleagues/students) who are important to me think	27	1	0.05	4	1.07	-5	-1.51*
36	I have the knowledge necessary to use RLOs	36	0	-0.14	-2	-0.38	-5	-1.52*
42	My age effects my ability to use RLOs	42	-4	-1.06	-6	-2.68	-6	-1.66

Consensus Statements -- Those That Do Not Distinguish Between ANY Pair of Factors.

All Listed Statements are Non-Significant at P>.01, and Those Flagged With an * are also Non-Significant at P>.05.

			Factors					
			1		2		3	
No.	Statement	No.	Q-SV	Z-SCR	Q-SV	Z-SCR	Q-SV	Z-SCR
4*	Having a professional narrator commenting on the steps in t	4	0	-0.22	0	0.06	-1	-0.22
8	Using RLO for my course increased my understanding of subje	8	1	0.34	3	0.67	3	0.88
9*	Using RLOs in my course are helpful in preparing for quizze	9	1	0.08	-1	-0.16	1	0.36
12	Using RLOs allow me to apply my knowledge more easily in pr	12	-1	-0.31	1	0.32	-2	-0.38
20	Having the information available online at all times help m	20	4	1.14	2	0.56	3	0.85
22	I have no difficulty accessing RLOs	22	-5	-1.43	-3	-0.90	-4	-1.29
32*	Technical support was available to solve difficulties when	32	-4	-1.07	-4	-0.97	-3	-1.27
41*	I will recommend others to use RLOs	41	4	1.15	3	0.86	5	1.27
43	My gender effects my ability to use RLOs	43	-6	-1.84	-6	-2.39	-6	-2.23

Appendix 8: Middle East RLO feedback (UoN)



5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31				
35	E+09	32420941	[redacted]	[redacted]	94.249.77.50				Good	Easy	Helpful	Yes	simple and its better if		Student		Essential or	Other (plea	Jordan, Al Zytoonah University												
36	E+09	32421412	[redacted]	[redacted]	182.185.41.181				Good	Not easy	Very helpfu	Yes	solving the nothing		Other (plea	doctor	nothing bu	Other (plea	kabul medical university.												
37	E+09	32421323	[redacted]	[redacted]	116.71.245.25				Good	Very easy	Very helpfu	Yes	Simplicity i	a bit too br	Other (plea	student	gastrointes	Other (plea	KEMU _PAKISTAN												
38	E+09	32421234	[redacted]	[redacted]	188.54.204.199				Excellent	Very easy	Very helpfu	Yes	it was perfect and the a		Student		nursing	Other (plea	king abdulaziz university in jeddah ksa												
39	E+09	32421576	[redacted]	[redacted]	77.31.118.115															Very helpful					Staff						
40	E+09	32423079	[redacted]	[redacted]	94.97.121.3				Excellent	Very easy	Very helpfu	Yes	simplisity and the anim		Other (plea	visitor		Other (plea	king saud university , KSA												
41	E+09	32421101	[redacted]	[redacted]	94.97.121.3				Excellent	Very easy	Very helpfu	Yes	very simple to learn		Other (plea	graduate from another		Other (plea	king saud university , KSA												
42	E+09	32421117	[redacted]	[redacted]	206.45.134.58				Excellent	Easy	Very helpfu	Yes			Staff			Other (plea	King saud University , Riyadh , Saudi Arabia												
43	E+09	32421101	[redacted]	[redacted]	94.99.39.180				Excellent	Very easy	Very helpfu	Yes	it,s simplic	nothing bu	Staff		dermatolo	Other (plea	kkuh in saudi arabia												
44	E+09	32421340	[redacted]	[redacted]	203.148.64.20				Excellent	Very easy	Very helpfu	Yes	animate di	not cover v	Other (plea	doctor	mbbs	Other (plea	lahore medical and dental college lahore,pakistan												
45	E+09	32421967	[redacted]	[redacted]	203.81.207.54				Excellent	Very easy	Very helpfu	Yes	assessment	nothing	Staff		intensive c	Other (plea	liaquat national hospital karachi pakistan												
46	E+09	32420976	[redacted]	[redacted]	41.254.1.236				Excellent	Easy	Very helpfu	Yes	Simplified, clear, no di		Staff		Anaesthetis	Other (plea	Libyan Tripoly University												
47	E+09	32422893	[redacted]	[redacted]	195.229.237.41															Very helpfu	learning	Other (please specify)								
48	E+09	32421491	[redacted]	[redacted]	188.135.13.139				Excellent	Very easy	Very helpfu	Yes	Relevance,	I liked it all	Other (plea	Future lear	MOOC desi	Other (plea	Ministry of Health Sultanate of Oman												
49	E+09	32421412	[redacted]	[redacted]	93.94.55.162				Excellent	Very easy	Very helpfu	Yes	slide shado	no thing	Staff		iam iternal	Other (plea	mosul medical collage-iraq												
50	E+09	90561586	[redacted]	[redacted]	62.231.208.98															Helpful	studant									
51	E+09	32421967	[redacted]	[redacted]	46.23.121.170				Good	Very easy	Very helpfu	Yes	The simple concept.		Student			Other (plea	Mutah University-Jordan												
52	E+09	32421164	[redacted]	[redacted]	89.165.92.58				Good	Very easy	Helpful	No	graphical il	it was too s	Other (plea	research as	evidence ba	Other (plea	North khorasan medical university, Iran												
53	E+09	32421222	[redacted]	[redacted]	10.2.132.31				Excellent	Easy	Helpful	Yes	viedio		Student			Other (plea	oman												
54	E+09	32421222	[redacted]	[redacted]	10.2.132.24				Excellent	Very easy	Helpful	Yes	I like the information a		Student		nursing	Other (plea	Oman												
55	E+09	32421222	[redacted]	[redacted]	10.2.132.30				Excellent	Easy	Helpful	Yes	the inform	nothing	Student		Nursing	Other (plea	Oman												
56	E+09	32421222	[redacted]	[redacted]	10.2.132.22				Good	Easy	Helpful	Yes	viedio & picture		Student			Other (plea	oman												
57	E+09	32421222	[redacted]	[redacted]	10.2.132.25				Good	Easy	Helpful	Yes	viedio & picture		Student			Other (plea	oman												
58	E+09	32421222	[redacted]	[redacted]	10.2.132.19				Good	Easy	Helpful	Yes	Vedio and picture		Student		Nursing	Other (plea	Oman												
59	E+09	32421222	[redacted]	[redacted]	10.2.132.29				Good	Easy	Helpful	Yes	Video		Student		Nursing	Other (plea	Oman												
60	E+09	32421222	[redacted]	[redacted]	10.2.132.25								Video		Student		Nursing	Other (plea	Oman												
61	E+09	32421222	[redacted]	[redacted]	10.2.132.29				Good	Very easy	Very helpfu	Yes	Video		Other (plea	Student	Nursing	Other (plea	Oman												
62	E+09	32421253	[redacted]	[redacted]	10.2.132.19				Good	Easy	Helpful	Yes			Student			Other (plea	oman												
63	E+09	32421253	[redacted]	[redacted]	10.2.132.23				Good	Very easy	Helpful	Yes	Colors		Student		Nursing	Other (plea	Oman												
64	E+09	90561586	[redacted]	[redacted]	5.162.31.199															Helpful	To understand the drug receptor interaction									
65	E+09	32421967	[redacted]	[redacted]	41.95.64.89				Excellent	Very easy	Very helpfu	No	very happy	no thing	Student		pharmacy	Other (plea	omdurman islamic university												
66	E+09	32421359	[redacted]	[redacted]	119.152.79.119				Excellent	Very easy	Very helpfu	Yes	its presentation & subj		Staff			Other (plea	pakistan												
67	E+09	32421388	[redacted]	[redacted]	10.2.132.20				Excellent	Very easy	Helpful	Yes	The way of	There's no r	Student		PharmD	Other (plea	Pakistan												
68	E+09	32421222	[redacted]	[redacted]	182.181.174.128				Excellent	Very easy	Very helpfu	Yes	easily unde	nothing	Student		pharm-D	Other (plea	Peshawar university Pakistan												
69	E+09	32422261	[redacted]	[redacted]	89.211.4.4				Good	Easy	Helpful	Yes	text explan	the answer	Staff		Advanced E	Other (plea	Qatar												
70	E+09	32422261	[redacted]	[redacted]	89.211.176.121				Good	Easy	Very helpfu	Yes	the animat	The speake	Student			Other (plea	rabaa al adwiya independent school												
71	E+09	32421323	[redacted]	[redacted]	195.229.242.55				Excellent	Very easy	Very helpfu	Yes	the illustration with to		Staff		acute renal	Other (plea	rashid hospital trauma center dubai uae												
72	E+09	32421821	[redacted]	[redacted]	77.31.90.20				Excellent	Very easy	Very helpfu	Yes	everything	nothing	Staff		Evidence ba	Other (plea	riaydh military hospital												
73	E+09	32422153	[redacted]	[redacted]	119.153.100.84				Excellent	Very easy	Very helpfu	Yes	activities		Student			Other (plea	riphah (pakistan)												
74	E+09	32421967	[redacted]	[redacted]	182.177.60.41				Excellent	Very easy	Very helpfu	Yes	i liked the v	the metho	Student		m doing BC	Other (plea	riphah international university.												
75	E+09	32422153	[redacted]	[redacted]	182.188.166.162				Excellent	Very easy	Helpful	Yes	the english use is very s		Student			Other (plea	sarhad university												
76	E+09	32421967	[redacted]	[redacted]	39.55.138.245				Excellent	Easy	Helpful	Yes	pattern of	nothing	Student		m.phil pha	Other (plea	shaikh zayed federal post graduate med instt. lahore pakistan												
77	E+09	32423035	[redacted]	[redacted]	80.79.149.113				Good	Easy	Very helpfu	Yes	animation		Student		pharmacy	Other (plea	sulaimani university												
78	E+09	32423368	[redacted]	[redacted]	86.0.53.32				Excellent	Very easy	Helpful	Yes	Simple and	nothing i g	Student				tamimi@omandent.net												

Appendix 9: UTAUT

