
KNOWLEDGE AND SKILLS TRANSFER AMONGST DIAGNOSTIC RADIOGRAPHERS AND STUDENTS: EXPERIENCES FROM THE PUBLIC HEALTHCARE PROFESSIONALS IN THE FREE STATE

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DECLARATION OF INDEPENDENT WORK

I, JASON CLINT WASSERMAN, student number #####, hereby declare that this research project submitted to the Central University of Technology, Free State for the degree Master of Radiography, is my independent work; and complies with the Code of Academic Integrity, as well as other relevant policies, procedures, rules and regulations of the Central University of Technology, Free State; and has not been submitted before to any institution by myself or any other person in fulfilment (or partial fulfilment) of the requirements for the attainment of any qualification.

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TABLE OF CONTENTS

	Page
Dedication.....	i
Acknowledgements	ii
Glossary of terms	iv
List of abbreviations and acronyms	vii
Executive summary	viii

CHAPTER 1: OVERVIEW OF THE STUDY

1.1	Introduction.....	1
1.2	Background and rationale.....	3
1.3	Problem statement	5
1.4	Research question.....	6
1.5	Aim and objectives	6
1.5.1	Aim of the study	6
1.5.2	Objectives of the study.....	6
1.6	Demarcation and scope of the study	6
1.7	Philosophical assumption underpinning the study	7
1.7.1	Ontological assumptions	8
1.7.2	Epistemological assumptions.....	9
1.7.3	Axiological assumptions.....	9
1.8	Research approach to theory development.....	9
1.9	Researcher position statement.....	12
1.10	Methodological design strategy	13
1.11	Study population.....	14
1.12	Overview of research methods and tools	14
1.13	Introduction to trustworthiness.....	15
1.14	Ethical considerations.....	15
1.14.1	Privacy, anonymity and confidentiality	16
1.14.2	Justice.....	17
1.14.3	Autonomy	17
1.14.4	Beneficence	17
1.14.5	Consent.....	18
1.14.6	Non-maleficence	18
1.14.7	Permission and approval.....	18
1.15.	Chapter layout of the dissertation	19
1.16	Conclusion.....	20

TABLE OF CONTENTS

	Page
CHAPTER 2: LITERATURE REVIEW	
2.1 Introduction.....	22
2.2 Knowledge and skills transfer in healthcare professions	22
2.3 Knowledge and skills transfer in diagnostic radiography	23
2.4 Enablers of knowledge and skills transfer in healthcare professions.....	24
2.5 Barriers to knowledge and skills transfer in healthcare professions	28
2.6 Conceptual framework.....	30
2.7 Conclusion.....	34
CHAPTER 3: METHODOLOGY	
3.1 Introduction.....	35
3.2 Research design.....	35
3.3 Target population.....	36
3.4 Sample size and sampling protocol	37
3.4.1 Recruitment of participants	38
3.4.2 Inclusion and exclusion criteria	39
3.4.3 Context of research participants	39
3.5 Research tools.....	41
3.5.1 Semi-structured interviews	41
3.5.2 Fieldnotes	42
3.5.3 Reflective journal	42
3.6 Pilot study.....	42
3.7 Data collection methods	44
3.8 Data analysis.....	45
3.8.1 Data saturation.....	45
3.8.2 Information power and contextualisation.....	46
3.8.3 Literature control	47
3.8.4 Reflexive thematic analysis.....	47
3.8.4.1 Step 1: Familiarise yourself with the data.....	48
3.8.4.2 Step 2: Generate initial codes	48
3.8.4.3 Step 3: Review and revise codes and categories.....	49
3.8.4.4 Step 4: Search for themes	49
3.8.4.5 Step 5: Define focus areas and name themes	50
3.8.4.6 Step 6: Review focus areas and themes.....	50

TABLE OF CONTENTS

	Page
3.8.5 Triangulation in qualitative research	51
3.9 Trustworthiness	52
3.9.1 Credibility	53
3.9.2 Dependability	53
3.9.3 Transferability	54
3.9.4 Confirmability	54
3.10 Conclusion.....	54

CHAPTER 4: RESULTS AND DISCUSSION OF FINDINGS

4.1 Introduction.....	55
4.2 Description of participants	55
4.3 Summary of data collection methods.....	56
4.4 Summary of data analysis	57
4.5 Thematic layout of findings.....	57
4.6 Focus area: Enablers for knowledge and skills transfer	60
4.6.1 Theme 1: Safe and conducive working environment	60
4.6.2 Theme 2: Personal attributes	63
4.6.3 Theme 3: Preferred methods for learning	68
4.7 Focus area: Barriers to knowledge and skills transfer	71
4.7.1 Theme 4: Communication and supervision challenges	72
4.7.2 Theme 5: Personal and interpersonal factors	76
4.7.3 Theme 6: Workplace pressures and adaptation challenges.....	78
4.8 Focus area: Solutions for knowledge and skills transfer.....	83
4.8.1 Theme 7: Professional development and engagement.....	83
4.8.2 Theme 8: Student placement strategies.....	86
4.9 Conclusion.....	88

CHAPTER 5: CONTRIBUTION OF THE STUDY

5.1 Introduction.....	89
5.2 Purpose of infographics.....	89
5.2.1 Design of the infographic	90
5.3 Conceptual framework and the infographic	93
5.4 Distribution of the infographic	97
5.5 Conclusion.....	98

TABLE OF CONTENTS

	Page
CHAPTER 6: CONCLUSIONS, RECOMMENDATIONS AND LIMITATIONS	
6.1 Introduction.....	99
6.2 Summary of findings.....	99
6.2.1 Research objectives.....	100
6.2.2 Conclusive findings	100
6.3 Recommendations.....	102
6.4 Limitations	103
6.5 Further research	104
6.6 Conclusion.....	105
Personal reflection on the research	107
BIBLIOGRAPHY	108

LIST OF FIGURES

	Page
Figure 1.1 Outline of the inductive research approach to the study.	11
Figure 1.2 Ethical process to obtain approval and relevant permission for the study.....	19
Figure 1.3 Outline of dissertation chapters.	20
Figure 2.1 Categorisation of techniques into primary methods and learning support.....	27
Figure 2.2 Learning transfer conceptual framework adapted from Yasin et al. (2014).....	31
Figure 3.1 Steps involved in the reflexive thematic analysis.	48
Figure 3.2 Triangulation of qualitative data in the current study.....	52
Figure 4.1 Interconnected focus areas and themes in relation to the research topic.	58
Figure 4.2 Interconnectedness of the research question and objective in relation to the focus areas and themes.....	59
Figure 4.3 Enablers for knowledge and skills transfer between qualified and student radiographers.....	60
Figure 4.4 Factors contributing to a safe and conducive working environment.....	61
Figure 4.5 Personal attributes contributing to knowledge and skills transfer.....	64
Figure 4.6 Preferred methods for learning to enhance knowledge and skills transfer.....	69
Figure 4.7 Barriers to knowledge and skills transfer between qualified and student radiographers.....	72
Figure 4.8 Codes identified as communication and supervision challenges.	73
Figure 4.9 The personal and interpersonal factors acting as barriers to knowledge and skills transfer.	77
Figure 4.10 Workplace pressures and adaptation challenges.	79
Figure 4.11 Solution to address barriers to knowledge and skills transfer.	83
Figure 4.12 Professional development and engagement.....	84
Figure 4.13 Student placement strategies.	87
Figure 5.1 University teaching approaches versus clinical environment teaching approaches.	91
Figure 5.2 Initiatives to close the gap between qualified radiographers and students.	91
Figure 5.3 Infographic developed from the research findings.	92
Figure 5.4 Enablers for knowledge and skills transfer.....	94
Figure 5.5 Barriers to knowledge and skills transfer.	95
Figure 5.6 Solutions for knowledge and skills transfer.	96
Figure 5.7 Distribution of the infographic (photographed by the research supervisor).	97

LIST OF TABLES

	Page
Table 2.1 The key factors influencing knowledge transfer.	25
Table 2.2 Difficulties of using theory in clinical settings.	29
Table 2.3 Factors influencing knowledge and skills transfer.	32
Table 2.4 Learning transfer theory and the application to the current study.	34
Table 3.1 Research design and methods for the current study.	36
Table 3.2 Summary of the target population.	37
Table 3.3 Summary of the sample of participants.	38
Table 3.4 Summary of inclusion and exclusion criteria applied during the study.	39
Table 3.5 Characteristics of the participants.	40
Table 3.6 Models of saturation and their principal foci in the research process.	45
Table 3.7 Data saturation ratio of the study.	46
Table 6.1 Recommendations for knowledge and skills transfer in the clinical environment.	103
Table 6.2 Recommendations for future research.	105

LIST OF APPENDICES

	Page
Appendix A	Member checking letter 119
Appendix B	Fieldnotes 121
Appendix C	Reflective journal 122
Appendix D	Participant information document 123
Appendix E	Consent to participate in the research 125
Appendix F	Research Ethics Committee approval letter 126
Appendix G	Free State Province Department of Health approval letter 127
Appendix H	Head of Department of Clinical Imaging Sciences approval letter 128
Appendix I	Institutional Planning and Quality Enhancement approval letter 131
Appendix J	Head of Department of Clinical Sciences approval letter 132
Appendix K	Semi-structured interview schedule 133
Appendix L	Thematical development 135
Appendix M	Research site visit A 136
Appendix N	Research site visit B 137
Appendix O	Research site visit C 138
Appendix P	Research site visit D 139
Appendix Q	Curriculum vitae of the second coder 140
Appendix R	Second coder confidentiality letter 141
Appendix S	Second coder confirmation letter 142
Appendix T	Coding report 144
Appendix U	Turnitin similarity report 160
Appendix V	Declaration of technical and editorial assistance 161

DEDICATION

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A close-up photograph of a vibrant red rose, with its petals showing intricate textures and deep red hues, serving as the background for the quote.

*Ken Hom in alles wat
jy doen en Hy sal jou
die regte pad laat loop.*

SPREUKE 3:6

LiefGodGrootliks.wordpress.com

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GLOSSARY OF TERMS

Barriers are differences in values, behaviours and attitudes that can create significant conflict in the workplace (Hashemiparast, Negarandeh & Theofanidis, 2019).

Clinical environment is a supervised healthcare environment, such as hospitals or clinics, where students apply theoretical knowledge in practical scenarios, gaining hands-on experience and developing their professional skills (Flott & Linden, 2016).

Clinical education is a formal supervised experiential learning programme concentrating on the development and application of patient-/client-centred skills and professional practices. It is intended for students to receive important, relevant clinical experience and abilities, engage in modern practice and demonstrate competency (Cantatore, Crane & Wilmoth, 2016).

Clinical training is a structured, mandatory component of radiography education that integrates theoretical knowledge with practical experience through supervised participation in radiographic procedures, enhancing students' technical, patient care and communication skills, as required by the Health Professions Act No. 56 of 1974 (Council on Higher Education, 2013; Republic of South Africa, 1974; South African Qualifications Authority, 2015).

Community service radiographer is a diagnostic radiographer who has obtained their qualification and performs radiographic procedures under the supervision of an independent practitioner radiographer (Health Professions Council of South Africa, 2016).

Conceptual framework provides researchers with a theoretical foundation to guide their work, outlining the relationships between fundamental concepts that underpin a specific phenomenon (Polit & Beck, 2018).

Data saturation occurs when the researcher has identified all the possible codes in the data and no new codes emerge from the data (Saldaña, 2021).

Diagnostic radiographers are highly qualified professionals responsible for integrating patient history, clinical data and imaging protocols during radiographic examinations (Sethole, Mshunqane & Kekana, 2023)

Diagnostic radiography is a specialised medical discipline that applies various imaging techniques, such as X-rays, computed tomography (CT), magnetic resonance imaging (MRI) and mammography, to capture internal body images for diagnosing diseases, abnormalities or injuries (Hutchison, 2024).

Enablers are organisational mechanisms for continually fostering knowledge; they can encourage knowledge development, safeguard knowledge, and promote knowledge sharing within an organisation (Chelagat, Onyango, Kokwaro & Rice, 2019).

Independent practitioner is defined as a health practitioner (i.e., radiographer) who performs a recognised health profession without the supervision of another health practitioner (i.e., radiographer) (Health Professions Council of South Africa, 2016).

Knowledge comprises facts, competence and skills gained via experience or education, and through theoretical or practical exposure in a particular field (Kluge & Gronau, 2018).

Learning transfer conceptual framework is a structured model that explains how knowledge and skills are transferred from one context to another, considering factors such as trainee characteristics, training design, work environment and learning spaces. It integrates theories and models to guide research and improve practical application (Yasin, Nur, Ridzwan, Bekri, Arif, Mahazir & Ashikin, 2014).

Learning transfer theory is a theory that explores how knowledge, skills and behaviours acquired in one context can be effectively applied in another. It examines factors that enable or obstruct this transfer, emphasising the role of experiences, contexts and reflective practices in facilitating meaningful learning outcomes (Kirshner & Whitson, 1997; Kolb, 1984).

Qualified radiographer is a diagnostic radiographer registered with the Health Professions Council of South Africa as an independent practitioner (Health Professions Council of South Africa, 2016).

Reflexive thematic analysis is a qualitative data analysis method that aims to identify, analyse and interpret patterns and themes within the data. It involves iterative coding, reflexive engagement with and systematic organising of the data to uncover insights from participant experiences (Saldaña, 2021).

Research theory refers to a systematic framework that helps to explain, predict, or understand phenomena. It provides a foundation for designing research, guiding the collection and interpretation of data (Saunders, Lewis & Thornhill, 2019). In the context of the study's inductive approach, theory emerges by analysing data and identifying patterns rather than being based on pre-existing frameworks. This approach was particularly useful for the exploratory component of the study, where the goal was to generate new insights and build understanding in real-world contexts (Clark, Foster, Sloan & Bryman, 2021).

Skills are the practical applications of specific knowledge and expertise necessary for performing complex actions, tasks and processes (Bakhshi, Downing, Osborne & Schneider, 2017).

Student radiographer is a diagnostic radiography student who performs radiography procedures under the supervision of an independent practitioner radiographer (Health Professions Council of South Africa, 2016).

Triangulation of data in qualitative research involves using multiple sources or methods of data collection to gain a more comprehensive understanding of a phenomenon (Natow, 2019).

Work-integrated learning is educational programmes that integrate theoretical learning with practical work experience in real-world settings, such as clinical placements or internships (Saifan, Aburuz & Masa'deh, 2015). In radiography, work-integrated learning involves students applying their classroom knowledge and skills in the clinical environment under the supervision of qualified radiographers (Council on Higher Education, 2011).

Workplace learning involves activities that take place within the workplace environment (Newton, Billett, Jolly & Ockerby, 2009). In radiography, workplace learning encompasses the ongoing learning and professional development that radiographers engage in while working in the clinical environment (Council on Higher Education, 2011).

LIST OF ABBREVIATIONS AND ACRONYMS

CHE	Council on Higher Education
CUT	Central University of Technology
DoH	Department of Health
FSDoH	Free State Department of Health
HoD	Head of Department
HEI	Higher Education Institution
HPCSA	Health Professions Council of South Africa
HSREC	Health Science Research Ethics Committee
IPQE	Institutional Planning and Quality Enhancement
n	sample size
N	population size
NdoH	National Department of Health
POPIA	Protection of Personal Information Act
WCDoH	Western Cape Department of Health
WIL	work-integrated learning
WPL	workplace learning

EXECUTIVE SUMMARY

In the context of diagnostic radiography in South Africa, the effective transfer of knowledge and skills between diagnostic radiographers and students is crucial for professional development and patient care. However, understanding the factors influencing this transfer is limited within the profession. The primary aim of this study was to investigate the factors affecting knowledge and skills transfer between diagnostic radiographers and students. The objectives were to describe and explore these factors in depth, differentiate between barriers and enablers, propose potential solutions, and develop an infographic as a tool for raising awareness and promoting effective knowledge and skills transfer in the clinical environment.

A qualitative, exploratory-descriptive and contextual research design was used. Semi-structured interviews were conducted with 15 participants, including qualified radiographers, student radiographers and community service radiographers. The qualitative data obtained were analysed using reflexive thematic analysis to identify key focus areas and themes.

The identified key focus areas for knowledge and skills transfer were enablers, barriers and possible solutions. The enablers included a safe and conducive working environment, personal attributes and preferred methods for learning. The study highlighted themes such as communication and supervision challenges, personal and interpersonal factors, workplace pressures and adaptation challenges as barriers. Participants emphasised professional development, and engagement and student placement strategies as possible solutions to overcome barriers obstructing knowledge and skills transfer. The themes and their respective codes underscored the complex interplay between training characteristics, training design, learning spaces and work environment factors in facilitating or impeding effective knowledge and skills transfer in the clinical environment.

Based on the study's findings, the researcher views the potential solutions suggested by the participants as recommendations to possibly enhance the knowledge and skills transfer process. These recommendations include the need for training on mentoring, the use of seminars to improve personal skills, active engagement between qualified radiographers and students, initiatives to bridge the gap between students and qualified radiographers, structured student-radiographer clinical environment introduction sessions, increasing the number of clinical training sites and addressing the limited number of student placements in hospitals. The study used an infographic to explain to qualified radiographers and students these factors that influence knowledge and skills transfer between them. Future research should explore multicentre studies across universities, investigating knowledge and skills transfer in private practice settings, the development of a model that facilitates effective knowledge and skills

transfer, and preceptor training on knowledge and skills transfer strategies for qualified radiographers in the clinical environment.

A key limitation of this study was the data collection occurring at a single university and three public sector hospitals, which limited the diversity of insights and excluded perspectives from lecturers, radiologists and private practice settings. Additionally, the researcher's involvement in conducting and analysing the interviews, as well as the study's focus on one week of data collection, might have introduced biases and restricted in-depth participant engagement. In conclusion, the study provides diagnostic radiographers and students with a platform to voice their experiences, offering valuable insights into the enablers, barriers and possible solutions to overcome barriers to knowledge and skills transfer, which can possibly improve clinical training.

Keywords: barriers; challenges; clinical training; community service radiographers; diagnostic radiography; enablers; infographic; knowledge and skills transfer; public healthcare sector; qualified radiographers; solutions; student radiographers; work environment; work-integrated learning; workplace learning

CHAPTER 1

OVERVIEW OF THE STUDY

"Education is not the filling of a vessel, but the lighting of a fire".

William Butler Yeats

1.1 Introduction

A qualified radiographer in South Africa is registered with the Health Professions Council of South Africa (HPCSA) as an independent practitioner who performs radiographic procedures without supervision. In comparison, a community service radiographer is a radiographer who performs radiography procedures under the supervision of an independent practitioner otherwise known as a qualified radiographer. Student radiographers are HPCSA-registered and defined as radiographers in training who practice under the supervision of an independent practitioner radiographer (Health Professions Council of South Africa, 2016). While this supervision is essential for clinical training, it can still present challenges in effectively transferring knowledge and skills among qualified and student groups within healthcare settings (Factor, Matienzo & Guzman, 2017).

Knowledge refers to facts, competence and skills gained through experience or education; it encompasses both theoretical and practical understanding of a field (Kluge & Gronau, 2018). In the context of radiography, radiographic knowledge is developed and refined through a combination of experience obtained during workplace learning (WPL) and formal education in a theoretical university setting (Council on Higher Education, 2011). Moreover, skills are the practical applications of specific knowledge and expertise necessary for performing complex actions, tasks and processes (Bakhshi, Downing, Osborne & Schneider, 2017). In radiography, these skills involve the hands-on application of radiographic knowledge, such as operating imaging equipment, positioning patients, and solving problems during radiographic procedures. Together, these skills are critical for producing high-quality images, ensuring patient safety and contributing to accurate diagnoses (Health Professions Council of South Africa, 2020).

Despite the importance of knowledge and skills in the healthcare environment, differences in work ethics and clinical outcomes among various healthcare professionals can lead to misunderstandings, ultimately placing a burden on health services (Crampton, Kehoe, Ellawala, Karunaratne & Tiffin, 2024). In the nursing profession, the transfer of knowledge and skills between independent practitioners and students in clinical settings has been widely explored. Arundell Sheehan and Peters (2024) reported that Australian midwives employ

strategies such as questioning, guided support, and real-patient teaching to facilitate effective knowledge and skills transfer. Similarly, [Lan, Zheng, Li, Xu and Lou \(2024\)](#) noted that although international nursing programmes equip students with essential theoretical knowledge, gaps persist in applying this knowledge in clinical practice. These gaps are often linked to barriers that hinder effective knowledge and skills transfer, such as inconsistent supervision, time constraints, limited opportunities for hands-on practice, and a disconnect between theory and practice. These barriers can significantly impact students' professional development and confidence. As [Kilty, Wiese, Bergin, Flood, Fu, Horgan, Higgins, Maher, O'Kane, Prihodova, Slattery, Stoyanov and Bennett \(2017\)](#) emphasised, clinical education forms the foundation of health science training, whether in nursing or radiography, and is essential for bridging theoretical learning with clinical competence.

According to Cantatore, Crane and Wilmoth (2016), clinical healthcare education refers to the training and education of healthcare professionals, such as radiographers and nurses in clinical settings. A clinical environment is a supervised healthcare environment, such as hospitals or clinics, where students apply theoretical knowledge in practical scenarios, gaining hands-on experience and developing their professional skills (Flott & Linden, 2016). This type of education aims to provide healthcare professionals with the knowledge and skills necessary to use hands-on learning experiences in real healthcare settings under the supervision of qualified professionals. The benefits of clinical healthcare education include improved patient outcomes and enhanced job performance (Salifu, Gross, Salifu & Ninnoni, 2019). Healthcare professionals who receive quality clinical education are better equipped to provide optimal patient care and are more confident in their abilities to deal with complex situations (Rothwell, Kehoe, Farook & Illing, 2021). However, a significant challenge remains in bridging the gap between theoretical knowledge and practical application (Paxton, 2019).

The gap between theoretical knowledge, as presented in the classroom and what students encounter in clinical settings where they receive practical skill training from qualified individuals, is one of the ongoing issues in Filipino nursing clinical education (Factor et al., 2017). Theoretical knowledge is a necessary complement to practise skill training in educational programmes (Saifan, Aburuz & Masa'deh, 2015). The combination of practical skill development and learned theoretical content enables students to gain the attitudes, abilities and knowledge to deliver optimal healthcare to patients (Salifu et al., 2019).

When a search of the literature was conducted between September 2022 and December 2024, no diagnostic radiography study was found that documented the factors influencing knowledge and skills transfer among diagnostic radiographers and student radiographers in the clinical environment (cf. Chapter 2). When the researcher consulted peers working at the same

hospital, qualified radiographers highlighted their lack of formal education on knowledge and skills transfer, particularly between qualified radiographers and students. These radiographers expressed discomfort in supervising students due to the absence of formal training in knowledge and skills transfer methods. This education gap not only affects the ability to effectively supervise and guide students but highlights the need for further research and exploration into best practices for knowledge transfer within the radiography profession (Martin, Kumar, Tian, Argus, Kondalsamy-Chennakesavan, Lizarondo, Gurney & Snowdon, 2022). Understanding the factors that contribute to successful knowledge transfer and identifying areas for improvement can significantly enhance teaching and learning in the clinical environment for both students and qualified radiographers.

Therefore, the researcher conducted a qualitative exploratory-descriptive and contextual study with the primary aim to investigate the influencing factors in knowledge and skills transfer among diagnostic radiographers and student radiographers. The objectives of the study included exploring and describing factors that affected the transfer of knowledge and skills between diagnostic radiographers and students, as well as differentiating between enablers of and barriers to transfer. Furthermore, the study proposed potential solutions to address the obstacles encountered by diagnostic radiographers and students. The main outcome of this study was to use an infographic explaining these factors to qualified radiographers and students that influence knowledge and skills transfer between them.

1.2 Background and rationale

Diagnostic radiography plays a crucial role in modern healthcare, involving a range of imaging techniques to capture detailed images of internal body structures (Hutchison, 2024). These procedures that use ionising radiation are requested by physicians to aid in the diagnosis and treatment of illnesses and injuries (Society of Radiographers, 2019). As outlined by Sethole, Mshunqane and Kekana (2023), diagnostic radiographers are highly qualified professionals responsible for integrating patient history, clinical data and imaging protocols during radiographic examinations.

The South African scope of practice for diagnostic radiographers defined by the Health Professions Council of South Africa (2020) comprises a wide range of responsibilities. These responsibilities, to mention a few, include supervision and mentoring, which play a crucial role in the education and training of radiography students. According to the South African Qualifications Authority (2015), supervision involves providing appropriate and relevant education, training and mentoring to integrate theory learned at Higher Education Institutions (HEIs) with actual clinical practice. This integration is vital, especially during clinical training,

which is a mandatory component for all radiography students in South Africa, as stipulated by the Health Professions Act No. 56 of 1974 (Republic of South Africa, 1974).

During clinical training, students engage in various radiographic examinations enhancing their patient care and communication skills under the supervision of a qualified diagnostic radiographer (Council on Higher Education, 2013). Clinical training plays an important role in radiography education, as it provides students with the opportunity to develop the knowledge and skills necessary to become competent radiographers (Council on Higher Education, 2013; South African Qualification Authority, 2015).

Engagement with clinical training does not end once a student obtains the relevant professional qualification. Once becoming a qualified diagnostic radiographer, there is an expectation to supervise students and transfer knowledge and skills to students, as outlined in the scope of practice by the Health Professions Council of South Africa (2020). However, in the researcher's opinion, the current South African undergraduate curriculum in diagnostic radiography lacks training and content concerning mentoring for the successful transfer of knowledge and skills during clinical training.

Recent studies continue to emphasise the critical role of effective clinical facilitation in nursing education. McDonald, Smith and Jones (2023) note that clinical facilitators are essential in helping nursing students achieve their learning objectives by offering clear guidance and fostering a transparent assessment environment. This support enables students to translate theoretical knowledge into practical skills, particularly within complex clinical settings. Similarly, Nel (2024) underscores the importance of structured guidance and encouragement in helping student nurses demonstrate professional values during clinical placements—an essential aspect of their professional development. Formal training programmes, such as the University of Melbourne's Clinical Facilitation course (2024), further highlight the need for specialised facilitation skills to enhance the learning experience. Without adequate hands-on exposure, many students struggle to grasp theoretical concepts and are unable to apply them effectively in clinical practice (Salah, Aljerjawy and Salama, 2018; Paxton, 2019). Without hands-on experience, many students find it difficult to comprehend theoretical concepts from merely reading a textbook, let alone apply these concepts into practice in a clinical setting (Salah et al. 2018; Paxton, 2019).

Kyei, Antwi, Bamfo-Quaicoe, and Offei (2015) argued that the transfer of knowledge and skills in diagnostic radiography is challenging in Ghana. These challenges negatively affect both qualified professionals and students. The authors identified several barriers to effective transfer of knowledge and skills, including a lack of training equipment, overcrowding in clinical

duty rooms without adequate monitoring, and a gap between practice and theory (Kyei et al., 2015).

Despite existing literature, there remains a significant gap in understanding the factors that influence knowledge and skills transfer in the diagnostic radiography profession in South Africa. Studies have highlighted challenges that impede effective knowledge transfer in clinical training. For example, Chelagat, Onyango, Kokwaro and Rice (2019) found that a lack of supportive organisational structures can hamper knowledge sharing by limiting opportunities for continuous learning and collaboration among practitioners. Similarly, Ma, Bai, Bai, Ma, Yang and Li (2018) stressed the importance of relationships between qualified practitioners and students, noting that poor rapport can obstruct the transfer of essential knowledge and skills. Rothwell et al. (2021) pointed out that inadequate clinical supervision, often due to time constraints or insufficient organisational support, creates barriers to effective learning for students. These findings underscore the need for research in the South African context to address the experiences of diagnostic radiographers and students concerning knowledge and skills transfer in clinical environments. By recognising these contributing factors, research has raised awareness that enables the profession to possibly enhance training of future radiographers and improve professional development (Salifu et al., 2019).

1.3 Problem statement

To effectively contribute to the professional development of future radiographers, it is essential to understand the factors influencing knowledge and skills transfer between qualified diagnostic radiographers and students in clinical environments. Research in other healthcare professions, such as nursing, has demonstrated that successful knowledge transfer plays a critical role in ensuring that students are well-prepared for clinical practice (Hashemiparast, Negarandeh & Theofanidis, 2019). However, limited resources and overcrowding in clinical training environments, along with the lack of formal education on knowledge and skills transfer methods in radiography, can hinder qualified professionals' ability to mentor and supervise students effectively (Chelagat et al., 2019).

The current South African undergraduate diagnostic radiography curriculum does not provide adequate training on effective knowledge and skills transfer practices. However, it is expected of qualified radiographers to supervise and mentor students in the clinical environment (Health Professions Council of South Africa, 2020). This gap, as highlighted by diagnostic radiographers in practice, raises concerns about the successful integration of theoretical knowledge into practical skills during clinical training (Martin et al., 2022). Furthermore, insufficient organisational support and poor rapport between qualified professionals and

students exacerbate the difficulty in effectively transferring essential knowledge and skills (Ma et al., 2018; Rothwell et al., 2021). Although knowledge and skills transfer in healthcare professions are reported on in the literature, limited studies include the radiography profession.

Given these challenges, this study investigated the factors affecting knowledge and skills transfer between diagnostic radiographers and students in the clinical environment.

1.4 Research question

The research question was: "What are the factors influencing knowledge and skills transfer between diagnostic radiographers and students in the clinical environment?"

1.5 Aim and objectives

The term *research aim* refers to a research study's overall goal or overarching purpose. Research objectives define what we expect a project to accomplish (Kumar, 2019). The aim and objectives of this study are elucidated below.

1.5.1 Aim of the study

The study aimed to investigate the factors that influence knowledge and skills transfer between diagnostic radiographers and students in the clinical environment.

1.5.2 Objectives of the study

The following objectives were formulated to achieve the stated aim:

- I. The study explored and described factors that influence knowledge and skills transfer between diagnostic radiographers and students in the clinical environment.
- II. The study distinguished between existing barriers and enablers for knowledge and skills transfer between diagnostic radiographers and students.
- III. Finally, the study endeavoured to develop an infographic to raise awareness among diagnostic radiographers and students about the factors that influence knowledge and skills in the clinical environment.

1.6 Demarcation and scope of the study

The study falls within the field of diagnostic radiography with a specific focus on knowledge and skills transfer in the clinical environment and not at HEIs. The study focused on factors that can be enablers and barriers for both knowledge and skills transfer. Data were collected in collaboration with one HEI rather than multiple HEIs offering radiography programmes with

different South African clinical departments. This decision was made due to limited resources, making it impractical to engage with multiple institutions.

The study was conducted in Hospital A (level II with 196 beds), Hospital B (level III with 936 beds) and Hospital C (level III with 1 200 beds). The study included students from one HEI that offers diagnostic radiography as a four-year undergraduate qualification. Students who graduate from this HEI are conferred a Bachelor's degree of Radiography in Diagnostics. Hospitals A, B, C and the HEI are located in the Free State province of South Africa.

Private practice radiographers were excluded since the researcher is more aware of and comfortable in the public healthcare sector. Placements of students in the private sector in relation to the university are few, and there are no community service diagnostic radiographers in private practice.

1.7 Philosophical assumption underpinning the study

A paradigmatic perspective is a unique framework or viewpoint within a particular academic field. This includes shared beliefs, fundamental assumptions, established theories, accepted research methods and core values. Such a perspective shapes how researchers perceive and investigate various topics, guiding their approaches to understanding and explaining subjects in their fields of study. Paradigmatic perspectives offer structured lenses through which researchers can examine and interpret data that ultimately contribute to the growth of knowledge in their academic disciplines (Cypress, 2017).

The philosophical assumptions of this study are based on the interpretivism paradigm. Interpretivism emphasises understanding the subjective interpretations and meanings that individuals attach to their social world within their natural state (Pervin & Mokhtar, 2022). In this study, the individuals involved were diagnostic radiographers, student radiographers and community service radiographers. Their social world encompassed the clinical environment, including interactions with colleagues, supervisors, patients and other healthcare professionals. This social world has been shaped by professional norms, organisational culture, interpersonal relationships and the broader healthcare system. Their natural context was their everyday work settings within healthcare facilities in South Africa, where they engage in clinical practice, teaching and learning activities related to diagnostic radiography.

Researchers following an interpretivism paradigm construct meaning and interpretations in line with the participants' perspectives (Polgar & Thomas, 2020). In this study, meaning was constructed and aligned with participants' perspectives through immersion in their experiences and viewpoints. During data collection, the researcher listened to participants' narratives,

allowing them to express their thoughts, feelings and interpretations regarding knowledge and skills transfer in diagnostic radiography. The themes developed from the participants' perspectives were accomplished through reflexive thematic analysis and an iterative approach. The researcher engaged in a process of deep reflection and immersion in the data, continually comparing emerging themes with participants' accounts to ensure alignment. This involved coding and categorising the data while constantly referring to participants' words and experiences. By sharing findings with participants after data were analysed through member checking (Appendix A), the researcher ensured that the interpretations remained trustworthy and true to their lived experiences and given narratives.

This choice of the interpretivism paradigm influenced the study's design, methods and how findings were analysed and interpreted, as noted by Polit and Beck (2018). The paradigm led to employing a qualitative study with an inductive approach, enabling the researcher to delve into the subjective experiences and perspectives of participants regarding knowledge and skills transfer in diagnostic radiography. This decision resulted in the use of semi-structured interviews as the chosen data collection method, facilitating an exploration of participants' viewpoints and lived experiences.

1.7.1 Ontological assumptions

An ontological assumption is a supposition concerning the nature of reality (Hudson & Ozanne, 1988). The researcher believes that reality can differ from person to person and is influenced by individuals' unique experiences and interactions. This ontological approach has a relativistic disposition where reality is only knowable through socially constructed meanings, and there is no single shared reality (Ritchie & Lewis 2003). This ontological assumption is known to determine the nature of the existence of a specific phenomenon (Chilisa & Kawulich, 2012). Gray (2018) asserted that it is essential to see the world from the participants' perspectives without separating their experiences from the broader context.

In this study, considering participants' experiences was important as it provided valuable insights into knowledge and skills transfer in diagnostic radiography. By examining the participants' experiences and interactions in the clinical environment, the researcher gained an understanding of the enablers and barriers to the knowledge and skills transfer process. This approach ensured that conclusions were grounded in the realities of diagnostic radiography practice, enhancing the relevance and applicability of the findings.

1.7.2 Epistemological assumptions

The researcher adopted a subjective epistemological approach, where knowledge is seen as dynamic and insights should be accumulated from various experiences (Saunders, Lewis & Thornhill, 2019). Knowledge should be created by combining different viewpoints (Polit & Beck, 2018). The study focused on collaboration and gaining an understanding of various participants' perspectives. Since the study involved a diverse group of participants, including diagnostic radiographers, community service radiographers and students, this notion allowed for the emergence of diverse viewpoints.

1.7.3 Axiological assumptions

Axiological assumptions refer to the researcher's beliefs, values and ethical perspectives that guide their conduct throughout the research process. These assumptions influence decisions regarding research topics, methodologies, data interpretation and dissemination of findings (Lincoln, Lynham & Guba, 2018). In this study, axiological assumptions played an important role in ensuring that ethical and transparent research was conducted. The researcher prioritised participants' rights, privacy and well-being throughout the study. This involved obtaining informed consent to participate in the study, maintaining confidentiality of sensitive information and ensuring that participants were treated with dignity and respect. Additionally, the researcher acknowledged and addressed any potential biases that might have influenced the research outcomes, by striving for objectivity and fairness in the data collection and the analysis thereof that followed. By adhering to these axiological assumptions, the study upholds the integrity and credibility of the research findings while promoting ethical research practices.

1.8 Research approach to theory development

The inductive approach, as outlined by Saunders et al. (2019), involves analysing specific observations or data to develop new theories or insights. It commences with collecting empirical data, often through qualitative research, without pre-existing theoretical frameworks. Researchers immerse themselves in the data, identifying patterns, themes and relationships. This approach is well-suited for exploratory research questions, allowing for the generation of new knowledge and a deeper understanding of complex phenomena by closely examining real-world contexts and experiences (Clark, Foster, Sloan & Bryman, 2021).

In this study, exploring the factors influencing knowledge and skills transfer between diagnostic radiographers and students in the clinical environment, the researcher opted for the inductive approach. Beginning with the collection of empirical data, the researcher delved into these factors without being constrained by pre-existing theoretical frameworks. Immersion in the data

allowed for the identification of emergent patterns, themes and relationships, to develop a broader understanding of the factors influencing knowledge and skills transfer. Given the exploratory nature of the research question, the inductive approach facilitated the generation of new knowledge and a deeper comprehension of those factors that impact knowledge and skills transfer.

Figure 1.1 illustrates how the inductive approach developed by Saunders et al. (2019) was applied in the study. The process was initiated with the research question, which focused on the factors influencing knowledge and skills transfer between diagnostic radiographers and students in the clinical environment. Participants were then recruited from the public healthcare sector in the Free State province and data were collected through semi-structured interviews. Reflexive data analysis (Saldaña, 2021) was applied to identify barriers and enablers to knowledge transfer. This inductive approach allowed the researcher to generate insights from the data, ultimately resulting in an infographic (cf. Chapter 5, Figure 5.3) on knowledge and skills transfer to raise awareness among diagnostic radiographers and students.

A cross-sectional study design was employed, which is a type of observational research where data is collected from a population or a sample at a specific point in time to examine the relationship between variables in its current state (Setia, 2016). In other words, researchers examine a phenomenon or a segment of the population at a single point in time, providing a "snapshot" of the situation (Wang & Cheng, 2020).

In this study, the cross-sectional design was used to investigate the factors influencing knowledge and skills transfer in diagnostic radiography. This approach permitted the researcher to collect data from diagnostic radiographers, community service radiographers and students at a specific moment in time. Furthermore, this approach offered a comprehensive "snapshot" of the factors influencing knowledge and skills transfer in clinical training sites. Moreover, the cross-sectional design enabled the researcher to collect the data efficiently within a relatively short period and further align the data analysis with the study's objectives and timeframe. Overall, the cross-sectional approach facilitates a thorough examination of knowledge and skills transfer dynamics in diagnostic radiography within a single research instance (Setia, 2016).

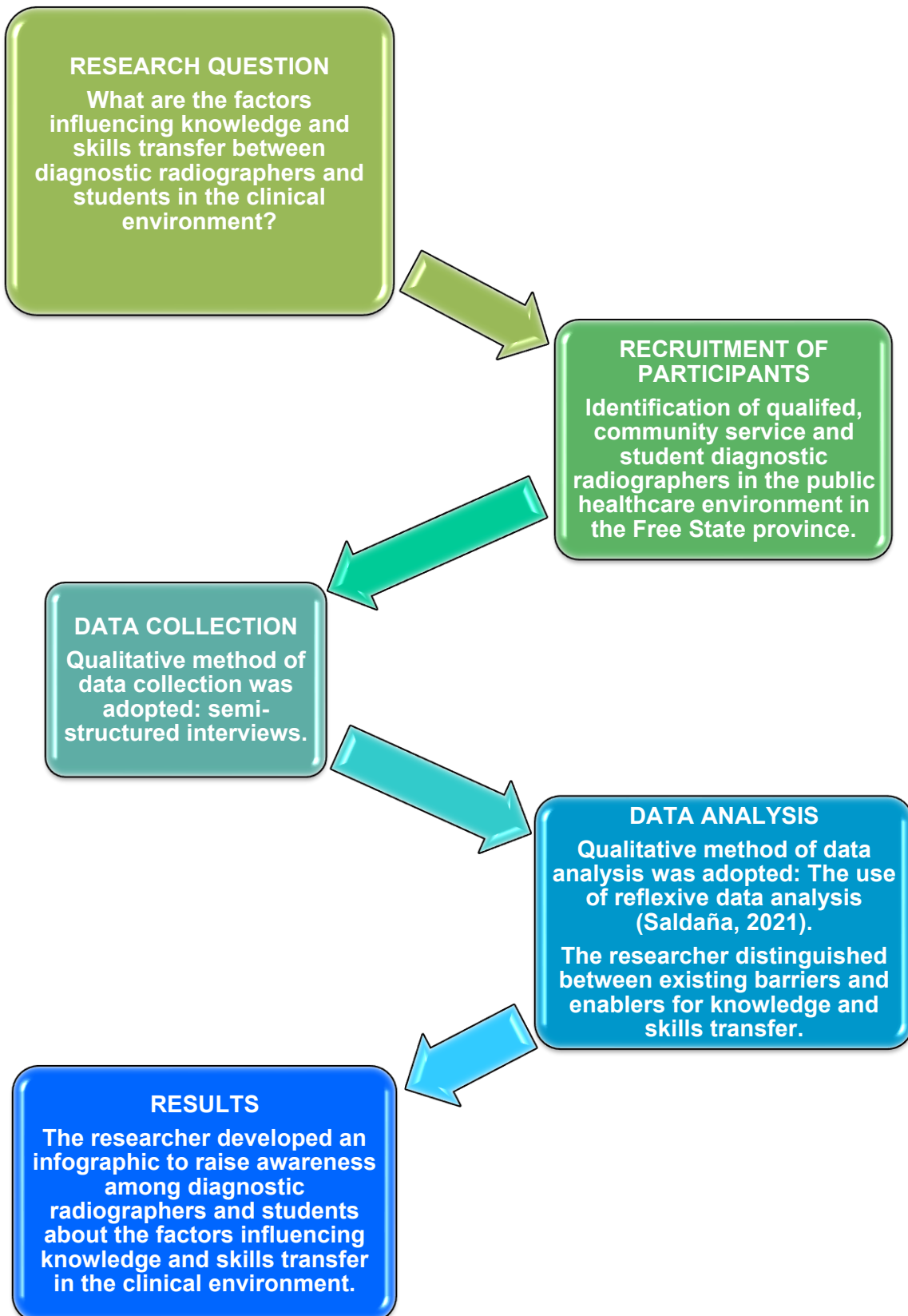


Figure 1.1. Outline of the inductive research approach to the study.

1.9 Researcher position statement

This section of the dissertation positions the researcher concerning the study and its participants. The researcher assumes multiple roles in this section; that of an individual, a diagnostic radiographer and a developing researcher. The structure of this position statement aligns with the criteria outlined by Preissle (2008). A position statement should encompass personal attributes, accomplishments, pertinent experiences related to the subject of study, viewpoints relevant to the participants, and an exploration of how attributes and experiences might shape, enhance or limit the study's findings (Preissle, 2008).

The researcher is a 24-year-old individual from Gelvandale, Port Elizabeth, in the Eastern Cape province of South Africa. He was raised in a middle-class family as the second of three siblings. Influenced by his grandmother, a professional nurse who stressed the value of obtaining qualifications, the researcher developed a passion for teaching and mentoring during high school. This passion led him to pursue diagnostic radiography, enrolling in the four-year Bachelor of Science degree program at the Cape Peninsula University of Technology (CPUT) in Cape Town, Western Cape province, South Africa. Motivated by his grandmother's legacy, he furthered his academic journey by registering for a master's degree at the Central University of Technology (CUT), Free State, in April 2023, aligning his research focus on knowledge and skills transfer with personal experiences as a student and diagnostic radiographer.

During his undergraduate education, the researcher completed his work-integrated learning (WIL) at Tygerberg Hospital in Cape Town. In 2022, he was employed as a community service radiographer at Khayelitsha Hospital in Cape Town. Currently, the researcher is employed as a Grade 1 Diagnostic Radiographer at Groote Schuur Hospital, Cape Town.

The researcher has gained experience in various imaging modalities and collaborated with healthcare professionals from different specialities. His professional development includes a passion for sharing knowledge and skills with peers and students, assisting during examinations, and providing support within his professional capacity. Reflecting on his journey, he recognised the lack of effective knowledge and skills transfer in the clinical environment in the training he received. He identified a developmental need within himself, which informed his research topic and focus.

As a developing researcher in diagnostic radiography, the approach is guided by a commitment to understanding and improving knowledge and skills transfer in the clinical environment. This commitment is rooted in a belief that enhancing these aspects will benefit student development and patient healthcare outcomes. With a combination of formal education and practical experience, the researcher considers himself well-equipped to contribute to the

field's body of knowledge, under supervision. The research focused on providing valuable insights into knowledge and skills transfer in the public healthcare setting, driven by a commitment to continuous learning and a passion for assisting the sick and facilitating student learning during clinical training.

1.10 Methodological design strategy

The research design of a study is an overarching approach chosen to combine the many components of the study cohesively and logically (Gray, 2018). A research design guides the researcher to appropriately address the research problem and formulate an informed answer to the research question (Gray, Grove & Sutherland, 2017). The research design should serve as a blueprint for data collection and analysis (Akhtar, 2016).

The research design of this study was a qualitative study with an exploratory-descriptive and contextual design. A qualitative investigation is conducted to obtain fresh insights into previously investigated phenomena or investigate phenomena for which little or no information is available (Gray, 2018). After exploring and gaining insight into the multiple, constructed realities of the participants regarding the phenomenon being studied, a qualitative research design aims to provide an in-depth, systematically interpreted description of the participants' social world (Polit & Beck, 2018). According to Mason and Dale (2011), a contextual research study describes how participants conceptualise their relationships in their environment. These authors further stated that the immediate environment in which participants find themselves and the tasks they are required to accomplish, act as stimuli for their behaviours and responses in these circumstances. It is this overall situation that must be analysed (Mason & Dale, 2011).

The study entailed the investigation of knowledge and skills transfer in the diagnostic radiography clinical environment. The research problem was approached using a qualitative research design to describe the social world (the radiography department). This study aimed to identify the factors influencing knowledge and skills transfer within this delicate relationship involving qualified radiographers, students and community service radiographers. The methods for investigating and describing these factors were examined. It was determined that a quantitative analytical approach, even with consideration of descriptive and/or exploratory approaches, would not have had the same benefit in this social-oriented study (Gray, 2018).

According to Gray et al. (2017), exploratory-descriptive techniques for qualitative inquiries address a social reality that necessitates a new strategy to solve a current issue or need by seeking the views of those most affected by the phenomenon. An exploratory study is employed when a researcher wants to investigate phenomena that are not well understood, where there is not much information regarding the nature of the phenomena, or to provide

preliminary insights, or 'hunches' about the phenomena of interest. Contextual research was deemed an appropriate method for this study, as it allowed for a detailed exploration of the knowledge and skills transfer among diagnostic radiographers and students in the public sector in the Free State. It also facilitated the identification of enablers and barriers that have impeded the knowledge and skills transfer process within the study's context.

1.11 Study population

The study focused on diagnostic radiographers, comprising fourth-year students at University A, community service radiographers and qualified radiographers in the Free State province. These groups were selected as they were the current workforce in the diagnostic radiography department at the time of the study. The detailed calculations of the target population size (N=107), sourced from the Head of Department (Radiography) at each hospital at the onset of data collection, are provided in Chapter 3, section 3.3, Table 3.2.

1.12 Overview of research methods and tools

The research methodology is the strategy or architectural design by which a researcher plots a problem-solving or problem-finding approach that informs the methods that will be employed to investigate a problem. The research methodology includes the research design and methods used to conduct a study to address the research questions, aims and objectives (Gray, 2018). The researcher used a qualitative study with an exploratory-descriptive and contextual research methodology using semi-structured interviews, fieldnotes and a reflective journal to investigate the knowledge and skills transfer among diagnostic radiographers and students in the clinical environment.

Semi-structured interviews were conducted to collect data from qualified, community service and student diagnostic radiographers. The researcher conducted interviews with 15 participants, consisting of seven (n=7) qualified radiographers, five (n=5) student radiographers, and three (n=3) community service radiographers. To address the limited number of community service radiographers in the population, with only three available, two less experienced qualified radiographers, one with three years and the other with nine years' experience in diagnostic radiography, were included to substitute for the community service role. The decision on the final number of participants was guided by data saturation. Recruitment and interviews continued until data saturation was achieved, as outlined in Chapter 3, section 3.8.1. The researcher was of the opinion that semi-structured interviews were deemed the most effective data collection method, as the interviews allowed for personal and confidential contact with interviewees to elicit sharing of sensitive challenges experienced

at work. This approach enhanced the richness of the datasets, ensuring that the research objectives were achieved.

Fieldnotes were systematically recorded during observations and interviews, capturing qualitative data and the researcher's observations and reflections. These notes provided insights into logistical arrangements, participants' initial reactions, language challenges and the researcher's evolving comfort and insights throughout the research process (Phillippi & Lauderdale, 2018). The fieldnotes are detailed in Appendix B. The fieldnotes were triangulated with the data generated by the semi-structured interviews presented in Chapter 3, section 3.5.2.

A reflective journal was maintained by the researcher throughout the study, documenting thoughts, observations and reflections on various experiences, efforts and events. This journal facilitated self-reflection, self-awareness and critical thinking, allowing the researcher to gain deeper insights into his thought processes, emotions and learning experiences (Bashan & Holsblat, 2017). The detailed reflective journal entries can be found in Appendix C. The reflective journal was triangulated with the semi-structured interviews' data and fieldnotes in Chapter 3, section 3.5.3.

1.13 Introduction to trustworthiness

Lincoln and Guba's (1985) trustworthiness model provides the qualitative research criteria, wherein the requirements of dependability, credibility, transferability, and confirmability must be achieved (Anney, 2014). The consistency of the semi-structured interviews was maintained by employing the same researcher and guide for each interview. The researcher's capacity to group information into themes and demonstrate connections to the interview questions served as a gauge of the trustworthiness of the data (Labuschagne, Nel, Nel & van Zyl, 2014). In Chapter 3, section 3.9, the trustworthiness of the study is discussed in more detail.

1.14 Ethical considerations

By considering the ethical aspects of the research, established ethical guidelines and structures, such as the Health Science Research Ethics Committee (HSREC) guide, the Helsinki Declaration (World Medical Association, 2013) and the National Department of Health (NDoH) (2024) Ethics in Health Research guidelines were consulted. The goal was to ensure that the research study was aligned with the ethical principles and standards set by reputable and recognised ethical bodies. A detailed explanation of the ethical considerations adhered to by the researcher is provided in the sections presented below (cf. sections 1.14.1 to 1.14.7).

1.14.1 Privacy, anonymity and confidentiality

The study did not require any personal information from the participants such as their names and surnames to ensure that their anonymity and privacy were protected. The interview participation permission letter clearly stated that completed interviews should not be shared or discussed with anyone other than the participants and the research team throughout the study. To ensure that no labour responsibilities were disrupted during work hours, the study was conducted when participants were free, or permission was granted by the Assistant Director at the respective hospitals to carry out the interviews during formal work hours.

The original hard copies of the interview notes were destroyed after being converted into digital format. The CUT institutional Protection of Personal Information Act (POPIA) compliant platform was used to store the voice recordings of the interviews, and any further copies were erased for security and confidentiality purposes.

The CUT institutional POPIA-compliant platform was also used to keep transcriptions of the voice recordings. To comply with data privacy regulations, all additional copies of the transcriptions and notes were destroyed. The CUT institutional POPIA-compliant platform was also used for any data coding or categorising, with the results being securely protected. All additional copies of the data were then erased for safety precautions. The signed consent documentation, completed in hard copy, is securely stored at the CUT Research Office. In compliance with institutional policies and ethical guidelines, these documents will be retained for a period of five years after the conclusion of the study, after which they will be destroyed.

The researcher was aware of the sensitive nature of the information being collected and all the responsibilities required for the research to be carried out securely and safely. To ensure that aligned data privacy was maintained and safeguarded, it was crucial to follow the correct policies and guidelines. **The privacy and confidentiality guidelines of the Helsinki Declaration (World Medical Association, 2013) were followed in this study.** To avoid unethical behaviour, all participants were treated with respect and equality. The POPIA legislation safeguarded these participants by enforcing the constitutional right to privacy while balancing it against competing rights and interests, particularly the right to information (South African Government, 2013). Participation in the study was voluntary, and participants were free to leave at any time without penalty. To avoid coercion, no financial compensation was offered to the participants during the recruitment process of the study.

1.14.2 Justice

The ethical principle of justice is defined as treating research participants impartially, fairly and appropriately while also protecting their privacy (Polit & Beck, 2018). Using a simple random sample approach, the principle of justice was applied in the research process. During recruitment, all eligible participants were given access to the participant information sheet and informed consent form (Appendices D and E). The researcher then confirmed with each participant that the interviews would be conducted ethically, which indicated that the integrity of the data collection process was respected.

When dealing with the participants' data, a unique identification number was allocated to each participant. None of their actual identifiable information was disclosed to anyone else or included in this dissertation.

1.14.3 Autonomy

The right of a participant to self-determination and self-governance is referred to as autonomy. It implies a participant's ability to make independent decisions (Burkhardt & Nathaniel, 2008). The autonomy of the participants was ensured by their voluntary provision of informed consent. Informed consent (Appendix D), according to the Belmont report, consisted of three major components: information, comprehension and voluntariness (Botma, Greeff, Makhado & Mulaudzi, 2022). It was therefore required of the researcher to discuss the research methods and protocols with each participant recruited for this study. During these discussions, the participants were granted the opportunity to ask questions to clarify any material supplied or information not understood. When a question was asked by a potential participant, the researcher answered honestly. English was the mode of learning in the healthcare clinical sector of the participants in this study. Therefore, informed consent was obtained in English, meaning that participants understood what was expected of them.

1.14.4 Beneficence

Beneficence indicates that a researcher should have promoted good outcomes and benefits. It further means to act in the best interests of the participants when they participate in a study (Flick, 2009). A balance between the risks and rewards of a study must be maintained. Moodley (2011) defined beneficence as the possible advantages of a research study to participants and society at large. While the participants in this study did not receive direct benefits, the semi-structured interviews provided a valuable platform for diagnostic radiographers and students to share their experiences related to knowledge and skills transfer with the researcher.

1.14.5 Consent

For a complete understanding of the study, participants had to first read the information document (Appendix D). Afterwards, they could ask any questions about the research, and the researcher would respond appropriately. If the participants were interested in participating in the study, they would sign the informed consent form (Appendix E), which they then returned to the researcher.

1.14.6 Non-maleficence

The principle of non-maleficence means to not cause harm to others (Beauchamp & Childress, 2019). This principle was adhered to by taking all necessary steps to avoid harm to participants. No physical or emotional harm was anticipated, as the study involved voluntary semi-structured interviews focused on experiences of knowledge and skills transfer. However, it was acknowledged that participants could potentially feel discomfort when reflecting on challenging workplace experiences. To mitigate this, participants were fully informed about the nature of the study, assured of confidentiality, and reminded of their right to withdraw at any time without penalty.

1.14.7 Permission and approval

The steps taken for ethical approval of the study are presented in Figure 1.2. The study was approved by the HSREC of the University of the Free State (UFS), with ethics clearance number UFS-HSD2023/0488/2908 (Appendix F). Subsequently, permission to conduct the study in public sector hospitals was granted by the Free State province Department of Health (FSDoH) (Appendix G).

As illustrated in Figure 1.2, permission for data collection was secured from the Heads of Radiology departments at Hospital A, Hospital B and Hospital C (Appendix H). Concurrently, approval for student participation was obtained from the Senior Director of Institutional Planning and Quality Enhancement (IPQE) of the CUT (Appendix I). After receiving consent from the IPQE, a request was made to the Dean of the Faculty of Health and Environmental Sciences, CUT, targeting students in the faculty as participants. Subsequently, permission to conduct the study was granted by both the Senior Director of the IPQE and the Dean of the Faculty, and a request for permission was sent to the Head of the Department of Clinical Sciences to collect data from the student cohort enrolled for the Radiography programme (Appendix J).

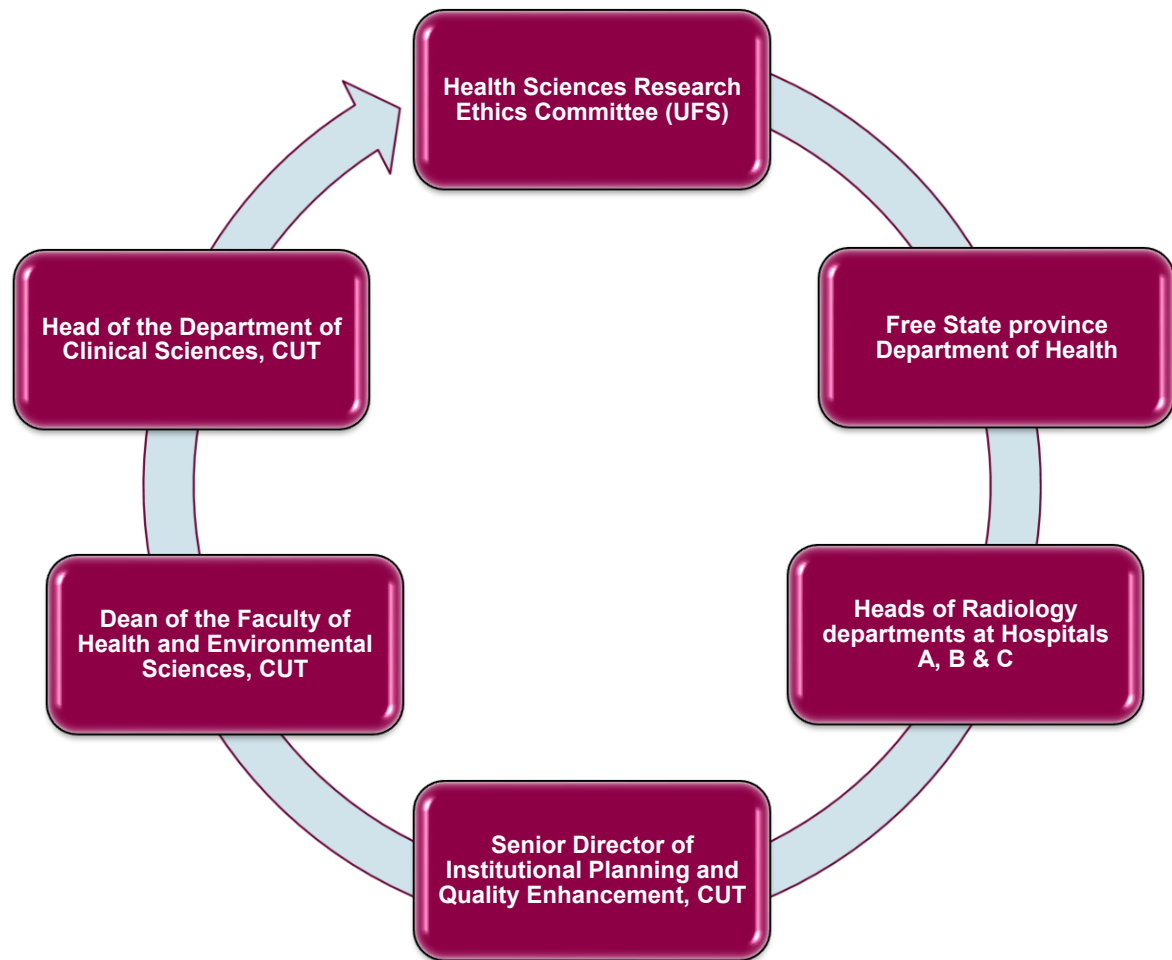


Figure 1.2. Ethical process to obtain approval and relevant permission for the study.

1.15 Chapter layout of the dissertation

Figure 1.3 provides a concise illustration of the chapter layout of the dissertation. This figure reflects the title of each chapter and a brief explanation of the specific chapter's content.

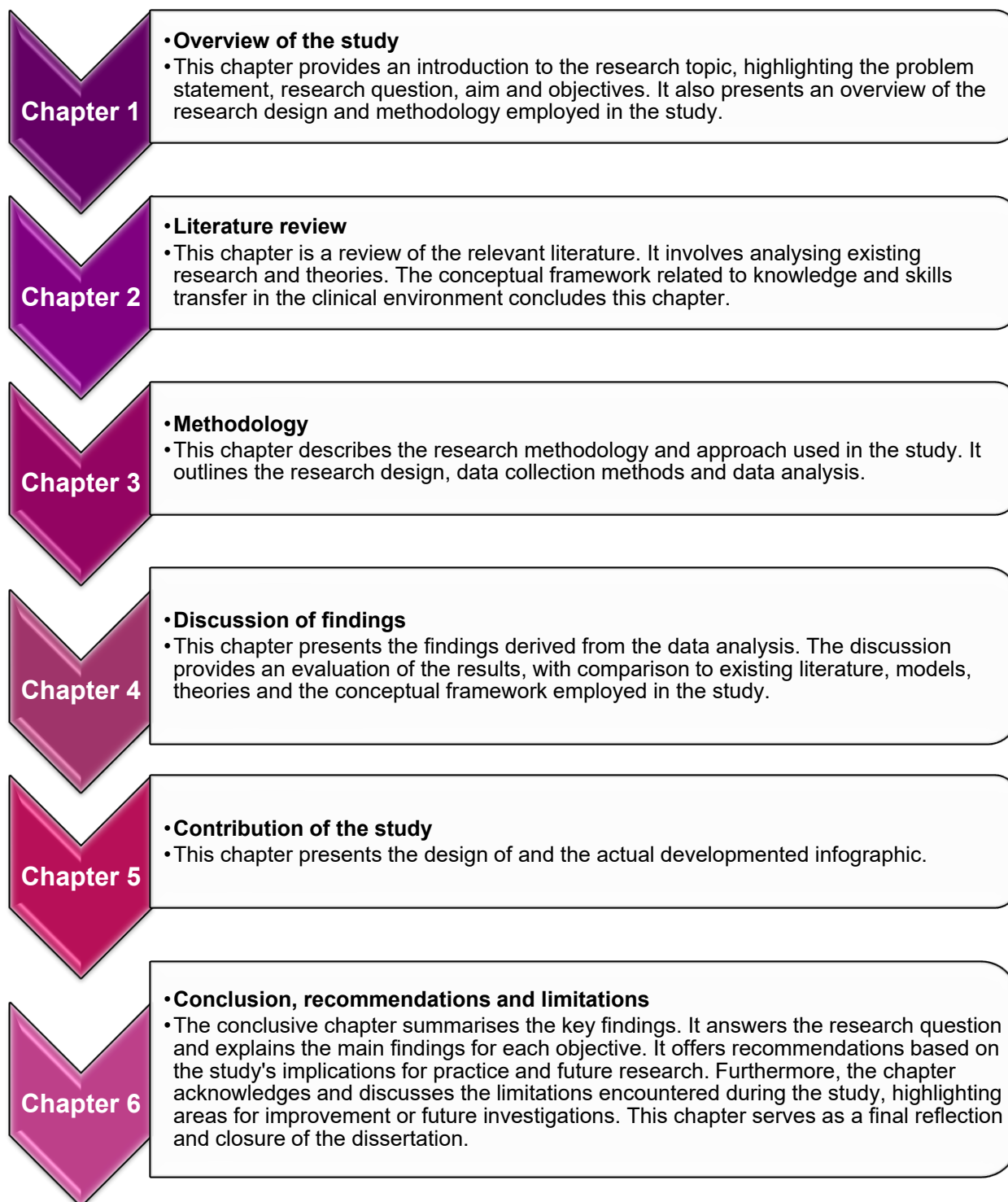


Figure 1.3. Outline of dissertation chapters.

1.16 Conclusion

In Chapter 1, the researcher introduced the investigation into the transfer of knowledge and skills between diagnostic radiographers and students. The primary purpose of this chapter was to provide readers with the context of the study and a brief overview of what to expect in the

upcoming chapters. Chapter 1 served as a foundation, setting the stage for the subsequent chapters, where the researcher will delve deeper into the details of this study, explore relevant literature, present the research methodology and findings, offering valuable insights into the transfer of knowledge and skills among diagnostic radiographers and students. Chapter 2 presents the literature review, where the researcher examined existing studies to gain an understanding of the theories and models underpinning knowledge and skills transfer in the clinical environment.

CHAPTER 2

LITERATURE REVIEW

"Live as if you were to die tomorrow. Learn as if you were to live forever."

Mahatma Gandhi

2.1 Introduction

For this study's literature review, the researcher explored the existing literature on knowledge and skills transfer. Understanding the factors, strategies and methods influencing this transfer process can assist in improving the effectiveness of knowledge and skills transfer in diagnostic radiography. By conducting a review of the currently available literature, the researcher aimed to gain an understanding of the theories and models that underpin knowledge and skills transfer. The accumulated body of scholarly work provided valuable insights for the identification of applicable theoretical variables used for the development of the conceptual framework of the study.

The academic databases and search engines used for the literature review included Google Scholar, Science Direct, PubMed and Semantic Scholar. Keywords used in the search for suitable publications and related material were "barriers," "enablers," "health professions education," "knowledge barriers," "knowledge transfer," "learning transfer," "radiography curriculum," "skill transfer" and "skills."

2.2 Knowledge and skills transfer in healthcare professions

Knowledge represents facts, competence and skills gained through experience or education, encompassing both theoretical and practical knowledge in a particular field (Kluge & Gronau, 2018). Equivalently, skills refer to the specific knowledge and expertise required to perform complex actions, tasks and processes (Bakhshi et al., 2017). Knowledge and skills transfer involves the interchange of knowledge and skills from one person to another (Factor et al., 2017).

The process of transferring knowledge and skills can be challenging, necessitating an understanding of individual preferences, group dynamics, and the ability to effectively communicate and convey information (Factor et al., 2017). Wen and Lin (2014) indicated that the benefits of investing in training and development might be limited when the acquired knowledge is not practically applied in specific work settings.

The transfer of skills is crucial for effective knowledge dissemination and professional development (Öhman, Alinaghizadeh, Kaila, Hult, Nilsson & Salminen, 2016). Ritchie, Parker

and Kirschner (2021) examined the transfer of skills in the context of implementation facilitation. Their study focused on how an expert facilitator imparts the necessary skills to support the execution of an evidence-based programme, tracking the progression from novice to expert facilitator. The findings highlighted 21 techniques used by the expert facilitator, categorised into primary methods and learning support. Primary methods included active and participatory approaches such as teaching, modelling, coaching, collaboration and providing consultation. Learning support comprised cognitive, psychosocial and structural strategies aimed at enhancing trainees' understanding, competence and overall effectiveness in implementing facilitation processes (Flott & Linden, 2016).

In the context of healthcare, an ongoing exchange of knowledge and skills occurs continuously among professionals (Flott & Linden, 2016). This cyclical exchange not only enhances the distinct capabilities of qualified individuals and students but also contributes to the overall improvement of clinical practices in healthcare organisations (Ma et al., 2018). This iterative cycle is vital in the clinical setting, as it involves cultivating practical proficiencies that are directly applicable to real-world scenarios (Woo & Li, 2020).

Radević, Dimovski, Lojpur and Colnar (2023) explored the role of knowledge transfer in enhancing the quality of healthcare services. The authors argued that continuous review and acquisition of new expertise are deemed necessary for a competitive edge and improved service quality (Radević et al., 2023). A negative correlation between a strictly hierarchical organisational structure and healthcare service quality was revealed, emphasising the limited effectiveness of such structures in the complex healthcare system. Trust was identified as a vital factor, influencing both knowledge transfer and the quality of healthcare services. The study highlighted the complementary nature of trust and knowledge transfer processes, emphasising their significance in achieving the highest service quality (Radević et al., 2023).

2.3 Knowledge and skills transfer in diagnostic radiography

In diagnostic radiography, knowledge and skills transfer occur constantly, with students receiving their clinical training from qualified diagnostic radiographers (Council on Higher Education, 2013). Clinical education is crucial in radiography as it allows students to develop the knowledge and skills necessary to become competent radiographers (Council on Higher Education, 2013; South African Qualification Authority, 2015). According to the radiographer scope of practice (Health Professions Council of South Africa, 2016), the responsibilities of a qualified diagnostic radiographer include supervising students, practitioners, and auxiliary personnel through the provision of appropriate and relevant education, training and mentoring.

This collaborative effort, particularly in the diagnostic radiography department, is crucial for ensuring high standards of patient care and professional competency (Flott & Linden, 2016). Radiographers frequently transition between roles as knowledge contributors and learners, fostering a dynamic learning environment (Health Professions Council of South Africa, 2016). This knowledge exchange extends beyond verbal communication to include the demonstration and teaching of practical skills. For example, when a senior radiographer explains a complex imaging procedure, they not only impart theoretical knowledge but also demonstrate the technical skills required, allowing junior radiographers to observe, learn, and eventually apply these skills in clinical practice (Wan, Haggerty & Wang, 2015).

This iterative cycle is vital in the clinical setting, as it involves cultivating practical proficiencies that are directly applicable to real-world scenarios, such as radiographic clinical examinations (Woo & Li, 2020). The continual cycle of learning and collaborative knowledge-sharing is essential for the ongoing advancement and refinement of radiography departments, leading to enhanced patient care and professional development in the South African radiography context.

Against the background of the current study, examining the transfer of skills is pivotal for understanding how expertise is developed in implementation facilitation. By drawing on the findings of Ritchie et al. (2021), the current study can benefit from the identified techniques and processes used by expert facilitators. Analysing how these strategies align with or differ from the researcher's specific context will contribute valuable insights to the field of diagnostic radiography.

2.4 Enablers of knowledge and skills transfer in healthcare professions

According to Chelagat et al. (2019), enablers are organisational mechanisms that continuously promote knowledge development, protect knowledge and encourage knowledge sharing within the workplace. These mechanisms create an environment that motivates employees to engage in continuous learning and collaboration, while ensuring that valuable knowledge is effectively captured and applied to drive organisational success.

A study conducted in Kenya by Chelagat et al. (2019) explored the key factors influencing knowledge transfer in project-based experiential learning in healthcare. The authors investigated strategies to enhance knowledge sharing in healthcare organisations. The participants included healthcare managers, with 23 from public health facilities, 10 from faith-based organisations and six from private healthcare facilities. The key factors influencing knowledge transfer reported by Chelagat et al. (2019) are summarised in Table 2.1.

Table 2.1. The key factors influencing knowledge transfer (Chelagat et al., 2019).

Factor	Application
Training design	Managers in all three contexts (public, private and faith-based institutions) viewed the training program's effectiveness as the factor having the greatest impact on knowledge transfer at work. The practicality of the curricula and the team-based coaching that followed classroom instruction allowed for the prompt completion of the projects. Baldwin and Ford (1988) listed the training curriculum or content, the learning approach, and the arrangement of the training activities as some of the most crucial training design components.
Trainee characteristics	Individual trainee qualities, such as personality traits, motivation levels, and the ability to apply newly learned knowledge and training expectations have been linked to a transfer of knowledge after training. The three trainee qualities that were highlighted by the data as being the most effective in knowledge transfer to practice, were the degree of motivation, the capacity to apply knowledge and the training goals.
Work environment	Most healthcare managers cited their workplace culture, which includes institutional buy-in and board support, as a crucial aid in the transfer of learning. As a stand-out subtheme, "power and position," trainees in senior leadership positions were able to expedite project implementation. Another significant contextual enhancer was political goodwill; in nations experiencing political support from the national government, projects were completed on time.

In a study at two tertiary referral hospitals in China, Ma et al. (2018) found that one of the key factors influencing the successful transfer of knowledge and skills was the relationship between the qualified nurse and the student. The qualified nurse needed to have a good rapport with the student to ensure that the knowledge and skills were successfully transferred. This was especially true in cases where the student was not familiar with the qualified nurses and their methods of communication.

Additionally, Ma et al. (2018) identified that the student's willingness to learn was another critical factor influencing knowledge and skills transfer. Qualified nurses should be able to identify the student's learning needs, as this would ensure transfer to be successful. Furthermore, qualified nurses should be able to motivate the student to learn, as this would promote effective transfer of knowledge and skills.

Moreover, Ma et al. (2018) argued that the level of knowledge and experience of the qualified nurse could also have a significant impact on the success of knowledge and skills transfer. The qualified nurse should be able to communicate the knowledge and skills to the student in a way that is easy to comprehend and apply. Overall, knowledge and skills transfer can be a challenging process (Factor et al., 2017). However, by understanding the key factors that can influence the success of the transfer, such as the relationship between the qualified nurse and

the student, the student's willingness to learn, and the qualified nurse's knowledge and level of experience, the process can be improved considerably. With the right approaches, knowledge and skills transfer can be a successful and rewarding experience for both the qualified nurse and the student (Ma et al., 2018).

Building on these insights, a study conducted by Rothwell et al. (2021) in the United Kingdom (UK) further explored factors influencing the effectiveness of clinical supervision in the workplace. Notably, enablers enhancing the positive impact of supervision were identified and included the importance of regular supervision sessions conducted during protected time and in a private space, offering flexibility in their delivery. Furthermore, the findings emphasised the value of providing supervisees with the autonomy to choose their supervisor, fostering a supervisory relationship built on mutual trust, respect, positivity and establishing cultural understanding between supervisors and supervisees. A shared understanding of the purpose of supervision, tailored to individual needs and geared towards improving knowledge and skills, emerged as a crucial enabler. Additionally, the provision of training and feedback from supervisors was highlighted as essential for the effectiveness of their supervisory roles in facilitating knowledge and skills transfer. The study also underscored the potential benefits of a mixed supervisor model involving several supervisors or individuals trained to manage overlapping and potentially conflicting needs. These comprehensive findings offer practical insights into optimising clinical supervision in the workplace, recognising the multifaceted nature of these enabling factors (Rothwell et al., 2021).

In a related study, Ritchie et al. (2021) identified various enablers (facilitators) in the process of transferring facilitation skills. These enablers are integral to the successful development of expertise in facilitating knowledge and skills transfer and play a crucial role in supporting trainees as they progress from novice to expert facilitators. The study categorised the techniques into two broad groups: primary methods and learning support. Figure 2.1 summarises these two broad groups.

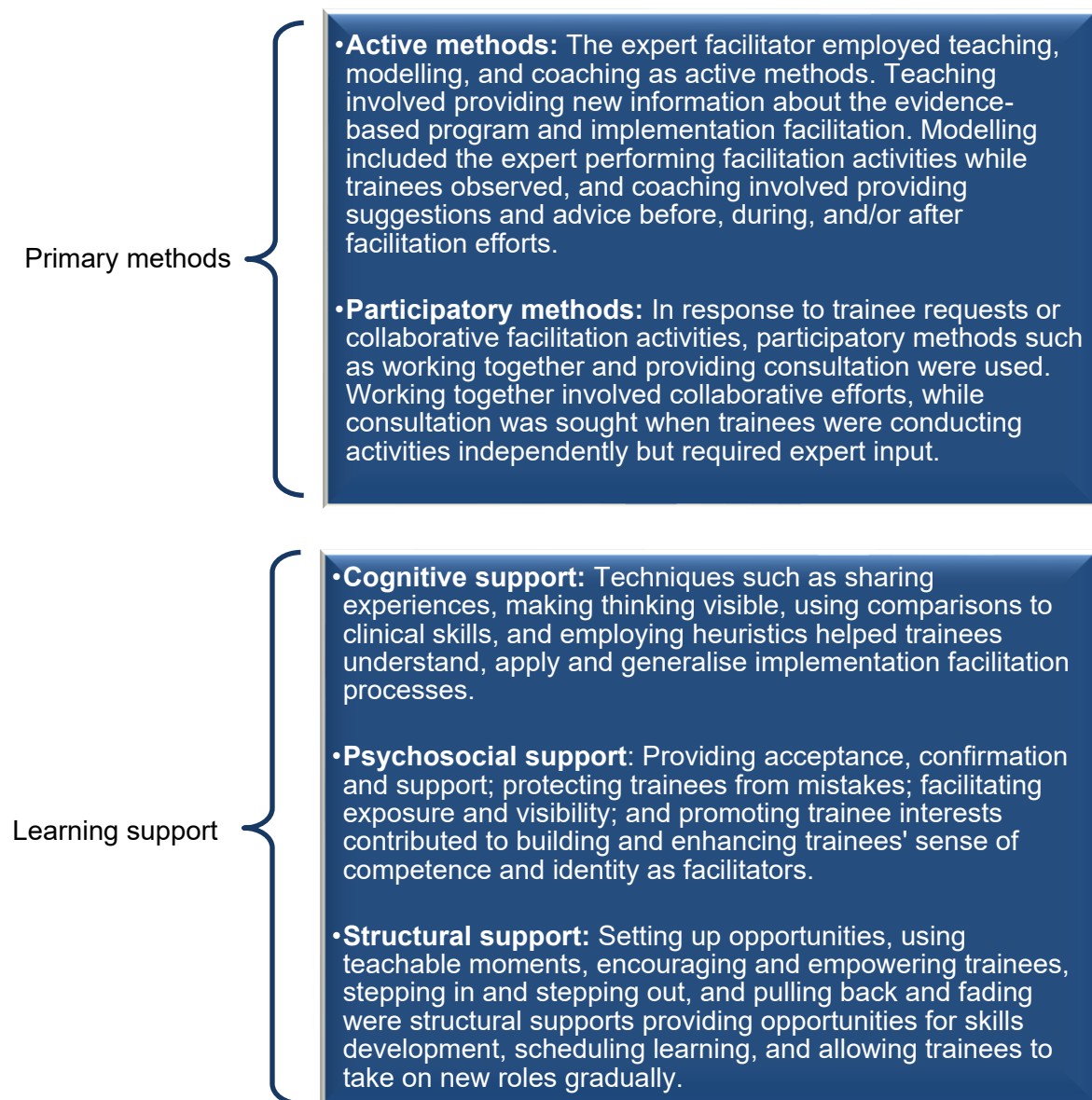


Figure 2.1. Categorisation of techniques into primary methods and learning support (Ritchie et al., 2021).

The insights drawn from the studies by Ma et al. (2018), Rothwell et al. (2021) and Ritchie et al. (2021) provide valuable perspectives on the factors influencing knowledge and skills transfer, particularly in healthcare and clinical settings. Understanding the importance of the relationship between diagnostic radiographers and students is crucial. The role of motivation and the willingness to learn are key factors. Effective strategies in clinical supervision and facilitation also play a substantial role. These elements can significantly inform and enhance the researcher's understanding of knowledge and skills transfer among diagnostic radiographers and students.

2.5 Barriers to knowledge and skills transfer in healthcare professions

Barriers are differences in values, behaviours and attitudes that can create substantial conflict in the workplace (Hashemiparast et al., 2019). Zamaniahari, Farhang, Hashemi and Kamran (2023) investigated the challenges of knowledge transfer from pre-clinic to dental clinics in the Endodontics Department at the Ardabil University of Medical Sciences in Iran. This research aimed to qualitatively assess challenges in transferring knowledge among dental students. The primary barriers to accomplishing clinical education included support issues (laboratory, lack of turbines, unit failures), insufficient patient numbers, student stress, and weak clinical skills.

Previous studies explored challenges in clinical education, with student stress (Naram & Anthony, 2021), weaknesses in clinical abilities (Downey, Bentley & Pandit, 2021), and financial and physical resource constraints (Khakrah, Malekian, Saeedipour & Kaviani, 2019) identified as contributing circumstances. According to Jamshidi, Molazem, Sharif, Torabizadeh and Najafi Kalyani (2016), the primary obstacles to achieving clinical education include ineffective communication, insufficient preparation and emotional reactions. Gharaei, Kargoza, Amirchakhmaghi and Gholami (2015) also emphasised the importance of sufficient training, an adequate number of students, and appropriate educational facilities in both the resources and the department.

Hashemiparast et al. (2019), in a study conducted in Iran, investigated the difficulties of using theory in clinical settings. The participants consisted of 15 nursing and paramedic students, faculty members and experienced nursing staff. Table 2.2 summarises the findings reported by Hashemiparast et al. (2019).

Table 2.2. Difficulties of using theory in clinical settings (Hashemiparast et al., 2019).

Finding	Description
Non-standard practices in the clinical setting	The student participants perceived that some clinical tasks were carried out in unconventional ways that were not part of their theoretical knowledge. Because of this discrepancy, students felt forced to follow what they saw as a non-standard practice in their clinical workplace and to ignore the theoretical knowledge that was taught in the classroom. The students had to adjust their behaviour to align with the workplace environment, which required them to apply knowledge and skills they had not previously encountered. This lack of exposure had a detrimental effect on the students' confidence and subsequent behaviour. In actuality, the students are forced to choose between adhering to their university's "demands" by using the normal methods and using the clinical settings' "unconventional" techniques.
System resistance against applying theoretical knowledge	According to the student participants' experiences, using accurate and current knowledge learned caused resistance in the hospital clinical personnel. Clinical personnel prohibited students from applying the theoretical knowledge learned in the classroom for a variety of reasons, including a lack of time and in some instances, resources.
Following non-standard clinical practices	Student participants claimed that the healthcare staff's lack of commitment to applying current theoretical knowledge had affected their behaviour negatively. Students articulated that the clinical personnel were considered negligent because, in their opinion, clinical personnel were not using accurate current knowledge in the clinical settings.

In a UK-based study, Rothwell et al. (2021) highlighted significant barriers to effective clinical supervision in the workplace. Among the identified obstacles, a shortage of time and space emerged as crucial impediments, limiting the optimal implementation of supervision practices. Additionally, a lack of trust was identified as a barrier, potentially impeding the development of a positive and effective supervisory relationship. The study also underscored the detrimental impact of a lack of shared understanding regarding the purpose of supervision, creating challenges in aligning goals and expectations. Furthermore, insufficient ongoing support and engagement from leadership and organisations were identified as key barriers, emphasising the importance of organisational commitment to fostering an environment conducive to effective clinical supervision. These findings illuminate the multifaceted challenges faced in the implementation of clinical supervision, providing valuable insights for organisations seeking to address barriers and enhance the efficacy of their supervision practices.

2.6 Conceptual framework

A conceptual framework provides researchers with a theoretical foundation to guide their work, outlining the relationships between fundamental concepts underpinning a specific phenomenon (Polit & Beck, 2018). As there was no radiography-specific conceptual framework deemed suitable in the existing literature, a framework from the field of social sciences was **adapted** for this study. The learning transfer conceptual framework by Yasin, Nur, Ridzwan, Bekri, Arif, Mahazir and Ashikin (2014) was selected for its relevance to the study. The original framework was designed to illuminate the complex interconnections between educational institutions, industry, the Indian National Occupational Skill Standards (NOSS) system and workplace learning (Yasin et al., 2014). The structure of the **adapted framework** is illustrated in Figure 2.2.

As illustrated in Figure 2.2, the learning transfer conceptual framework revolves around four primary factors: trainee characteristics, training design, work environment and learning spaces. Table 2.3 describes these four primary factors influencing the knowledge and skills transfer conceptual framework implemented for the current study.

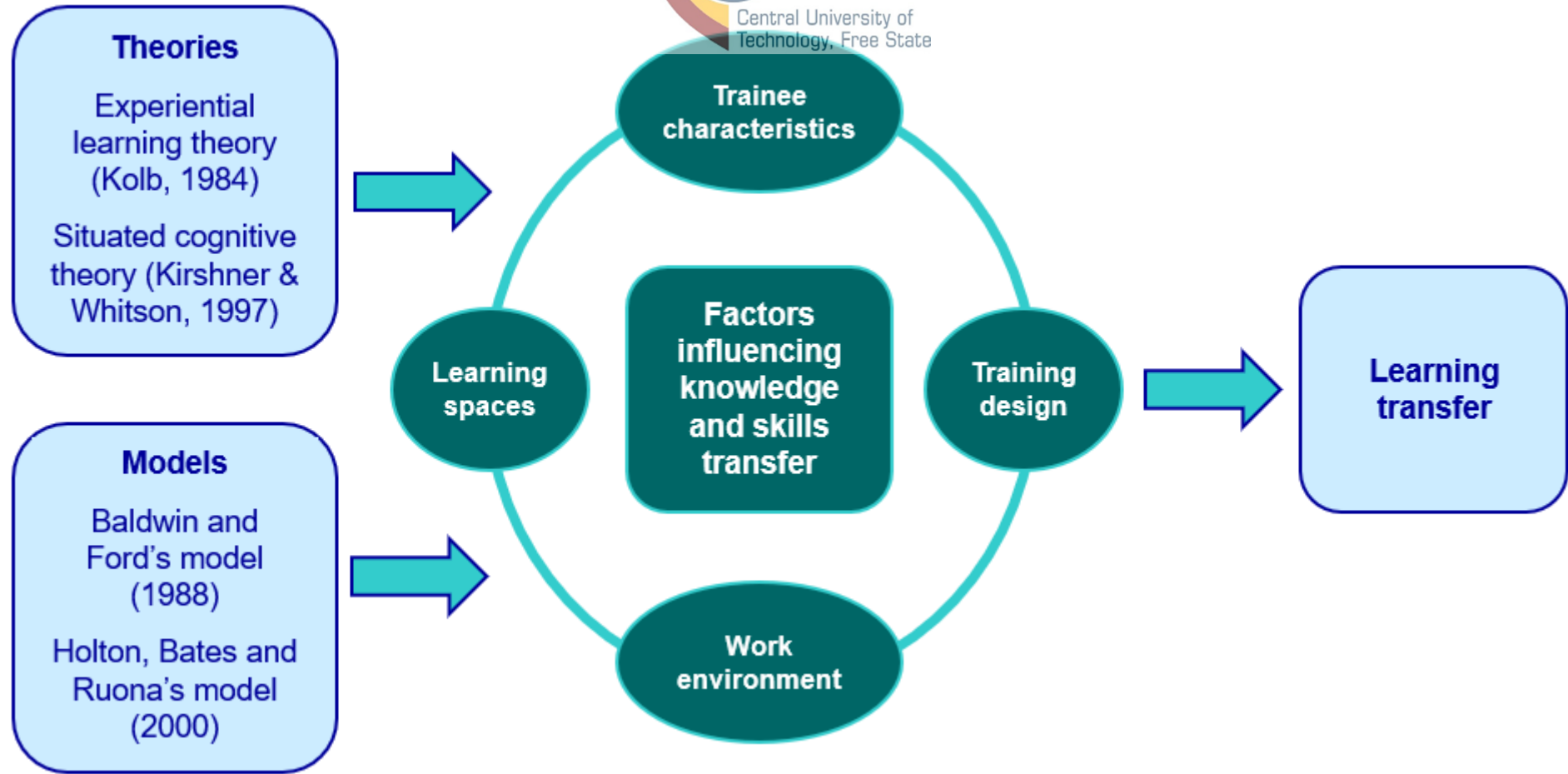


Figure 2.2. Learning transfer conceptual framework adapted from Yasin et al. (2014).



Table 2.3 Factors influencing knowledge and skills transfer (Yasin et al., 2014).

Factor	Concept	Application to the study
Trainee characteristics	The characteristics of trainees, including autonomy, self-efficacy, motivation and prior experience, are crucial for effective learning transfer, as these traits influence the trainees' ability to apply and integrate new knowledge and skills (Tai, 2006). These characteristics have a significant impact on learning transfer, with motivation playing a key role in inducing the desire to apply acquired knowledge and skills in the workplace (Burke & Hutchins, 2007).	In diagnostic radiography, the characteristics of trainees, such as autonomy, self-efficacy, motivation and prior experience, have a significant impact on the transfer of knowledge and skills. Motivated radiography students are more likely to apply the knowledge and skills acquired during their training in clinical practice.
Training design	Proper training design, incorporating relevant content and a realistic environment, contributes to effective learning transfer (Abdullah & Suring, 2011). The validity of training content and alignment with trainees' needs are crucial, as they affect the effectiveness of the training (Hutchins, 2009). The training environment should mirror real work conditions to foster improved learning transfer (Hutchins, 2009).	Effective training design in radiography should incorporate relevant content and realistic scenarios that closely simulate clinical conditions. While this training equips students with the necessary skills and knowledge, effective skill transfer occurs during workplace learning (WPL) when students apply their training in actual healthcare settings. Ensuring that the training aligns with real-world conditions helps to bridge the gap between theoretical knowledge and practical application during WPL (CHE, 2011).
Work environment	Supervisory and peer support opportunities for training participation and a positive transfer climate are vital elements of the work environment that influence learning transfer (Baldwin & Ford, 1988; Burke & Hutchins, 2007). A positive transfer climate includes signals for skill application, feedback and incentives, which facilitate the effective use of new skills (Grossman & Salas, 2011). Providing opportunities to apply new skills in the workplace further enhances learning transfer (Burke & Hutchins, 2007).	In diagnostic radiography, a supportive work environment is crucial for effective knowledge and skills transfer. Factors such as supervisory and peer support, opportunities for applying new skills and a positive transfer climate with feedback and incentives play a significant role in enhancing the practical application of learned skills in the clinical environment.
Learning spaces	The concept of learning spaces includes various types of learning environments: daily learning (informal and cultural), school learning (formal education), workplace learning (experience-based), interest-based learning (personal hobbies) and net-based learning (e-learning). Transitions between these spaces can affect learning transfer, especially in vocational and technical education contexts (Illeris, 2009).	Diagnostic radiography training spans two learning spaces that include academic settings (university) and clinical placements (hospital). Understanding the transitions between these spaces and their impact on learning transfer is crucial for improving radiography education and practice.

To enhance the conceptual framework, two established models of learning transfer are incorporated. Baldwin and Ford's (1988) model emphasises training inputs and outputs, as well as the conditions under which learning is successfully transferred to the workplace. This model focuses on trainee characteristics, training design and work environment. It has been chosen for its adaptability and ability to address critiques in existing learning transfer research, allowing for further recommendations (Baldwin & Ford, 1988). The integration of this model into the conceptual framework accentuates the significance of trainee characteristics and the work environment and its influence on learning transfer. The flexibility of the model is underscored by its utility in examining individual characteristics, work attitudes and the work environment's impact on learning transfer. Baldwin, Ford and Blume (2009) highlighted that the effectiveness of training programmes depends on the interplay between training designs and workplace environmental conditions, showcasing the adaptability of learning transfer in diverse contexts.

Complementing Baldwin and Ford's (1988) model, the model of learning transfer proposed by Holton, Base and Ruona (2000) is also integrated into the framework. This model is widely recognised in research on learning transfer. The model posits that transfer is affected by individual factors, training conditions and organisational context to enhance performance. The key influences on learning transfer include interpersonal support, reward systems, personal characteristics, motivation and training design elements. The Holton et al. (2000) model is regarded as more comprehensive compared to others because it encompasses a wide range of factors affecting learning transfer (Ahmad, Ahmad, Kasa, Gessler & Spootle, 2010). As a result, both Baldwin and Ford's (1988) model and the Holton et al. (2000) conceptual model are integrated into the study's conceptual framework, providing a basis for understanding and analysing learning transfer.

Table 2.4 presents the theories of situated cognition and experiential learning, describing their concepts and illustrating their adoption for the current study.

Table 2.4. Learning transfer theories and the application to the current study.

Theory	Concept	Application to the study
Experiential learning theory (Kolb, 1984)	Learning is a continuous process essential for navigating life, applicable across various settings and throughout one's life. The theory supports ongoing performance improvement, learning and development by emphasising active engagement in experiences and reflection on those experiences.	This theory was used to understand how diagnostic radiographers and students engage in and reflect upon clinical experiences. It assisted with analysing how these experiences contribute to knowledge and skills transfer, and how reflection on practice can improve the identification of enablers and barriers to knowledge and skills transfer in diagnostic radiography
Situated cognition theory (Kirshner & Whitson, 1997)	This theory focuses on human learning and emphasises the context in which learning occurs, such as the environment, interactions, and real-world applications that influence the learning process. The theory posits that learning is inherently linked to the activities, contexts and cultures in which it takes place. According to this theory, knowledge is not only acquired in isolation but is developed through engagement in real-world activities.	This theory was applied to examine how diagnostic radiographers and students interact with and learn from their clinical environments. It assisted with analysing how real-world clinical settings, including the social and organisational context, affect the transfer of knowledge and skills.

The conceptual framework developed for this study offers a foundation for exploring and understanding the factors influencing knowledge and skills transfer in diagnostic radiography (Chapter 1, section 1.5.2, objectives I and II). Furthermore, the framework integrates theories and models with the four primary factors: trainee characteristics, training design, work environment and learning spaces to guide the research. Along with the themes identified in the current study, this framework informed the development of the literature control figures specific to diagnostic radiography clinical practice. In Chapter 5, the connection between the study's findings and the conceptual framework is described, ultimately serving as the basis for the infographic (Chapter 1, Section 1.5.2, Objective III; Chapter 5, Figure 5.3).

2.7 Conclusion

In this chapter, the researcher presented insights from existing literature, models and theories on knowledge and skills transfer, and the gap in the literature that underscores the need for the current study. The study also adopted a conceptual framework to guide the findings presented in Chapter 4. Next, Chapter 3 will describe the methodology used to collect the data.

CHAPTER 3

METHODOLOGY

"Knowledge, like air, is vital to life. Like air, no one should be denied it."

Alan Moore

3.1 Introduction

This chapter elaborates on the methodology used in the study by providing insights into the approaches and procedures employed by the researcher while investigating the transfer of knowledge and skills among diagnostic radiographers and students in the clinical environment. The methodology was guided by the research paradigm, ensuring that the chosen methods were aligned with the study's philosophical suppositions. As the intricate details of the research design and execution are discussed, this chapter plays a crucial role by establishing a connection between the theoretical foundations presented in Chapter 2 (Literature Review) and the practical strategies implemented during the data collection phase of the study.

At the heart of any research endeavour lie the methods employed for data collection and analysis. Therefore, this chapter offers a comprehensive understanding of the research design, sampling strategies and data collection methods. Essentially, this chapter serves as a guide, navigating through the complexities of the selected research methods and illustrating how the researcher obtained data from participants, laying the groundwork for the subsequent findings in Chapter 4.

3.2 Research design

A qualitative research study was employed to gain understanding into the study participants' perspectives that offered the researcher a comprehensive perception of their social dynamics involved (Gray, 2018). The exploratory-descriptive research methodology complemented this by addressing social realities and providing insights into the experiences of diagnostic radiographers (Gray et al., 2017). Contextual research, as defined by Mason and Dale (2011), was conducted to explore the specific environment of public sector hospitals, examining participant perceptions of relationships and identifying factors influencing knowledge and skills transfer. These methodologies, according to the researcher and the study's paradigm, collectively contributed to a detailed exploration in the diagnostic radiography context. Table 3.1 outlines the research design and methods of the study.

Table 3.1. Research design and methods of the current study.

Research design and methods	Description	Application
Qualitative research	A qualitative investigation is conducted to obtain fresh insights into previously investigated phenomena, or phenomena for which little or no information is available (Gray, 2018). After exploring and gaining insight into the multiple constructed realities of the participants regarding the phenomenon being studied, a qualitative research design aims to provide an in-depth, systematically interpreted description of the participants' social world (Polit & Beck, 2018).	The current study entailed the investigation of knowledge and skills transfer in the diagnostic radiography department. The research problem was approached using a qualitative research design format to describe the social world (the radiography department). The use of semi-structured interviews was employed and provided an in-depth, systematically interpreted description of the participants' social world (Polit & Beck, 2018).
Exploratory-descriptive research	According to Gray et al. (2017), exploratory-descriptive techniques for qualitative inquiries address a social reality that necessitates a new strategy to solve a current issue or need by seeking the views of those most affected by the phenomenon of interest. An exploratory approach is employed when a researcher wants to investigate phenomena that are not well understood, where there is not much information regarding the nature of the phenomena, or to provide preliminary insights or hunches about phenomena of interest.	The researcher employed an exploratory-descriptive approach due to the study revolving around a social reality and focusing on the experiences of diagnostic radiographers (student, community service and qualified) regarding the transfer of knowledge and skills in the clinical environment.
Contextual research	According to Mason and Dale (2011), a contextual research study describes how participants conceptualise their relationships in their environment. The authors further stated that the immediate environment in which participants find themselves, as well as the tasks they are requested to accomplish, act as stimuli for their behaviours and responses in the circumstances, which is this overall situation that must be analysed (Mason & Dale, 2011).	Contextual research was deemed an appropriate method for this study, as it allowed for a detailed exploration of the knowledge and skills transfer among diagnostic radiographers and students in a specific environment of the public sector. It also facilitated the identification of enablers and potential barriers or challenges that might have hindered the transfer process.

3.3 Target population

The target population consisted of diagnostic radiographers, which included fourth-year students at University A, community service radiographers at Hospitals A and C and qualified radiographers at Hospitals A, B and C. These three groups were selected because they

represented the current composition of the workforce in the diagnostic radiography department. First-, second- and third-year students were excluded because they have limited clinical training experience. The study focused on students who had completed more than one year of clinical placements (300 days or more exposure to the clinical environment), ensuring participants had sufficient exposure to the clinical environment to provide meaningful insights into knowledge and skills transfer. Their diverse roles allowed for a comprehensive understanding of the knowledge and skills transfer process, as each group contributed a unique perspective. Table 3.2 presents an estimation of the population size (N=107). Numbers were obtained from the Assistant Director (Radiography) from each hospital when data collection commenced.

Table 3.2. Summary of the target population.

Population numbers	Hospital			Total per qualification level
	A	B	C	
Student diagnostic radiographers	15	15	15	45
Community service diagnostic radiographers	1	0	2	3
Qualified diagnostic radiographers	9	29	21	59
Total	25	44	38	107

3.4 Sample size and sampling protocol

The study sample represented a subset of the overall population that was selected for participation in a study (Kumar, 2019). For the current study, the study sample included five students (n=5), three community service participants (n=3), and seven qualified diagnostic radiographers (n=7). The decision to include the entire community service radiography population group (n=3) in the study was compelled by data saturation (cf. section 3.8.1), which required three rounds of coding. The inclusion of seven qualified radiographers was motivated by the need to have two radiographers with less experience, who served as substitutes for community service participants. One substitute radiographer had three years of experience, while the other had nine years of experience in the field of radiography. Table 3.3 presents the sample size of the study.

Table 3.3. Summary of the sample of participants.

Population numbers	Hospital			Total per qualification level
	A	B	C	
Student diagnostic radiographers	1	2	2	5
Community service diagnostic radiographers	1	0	2	3
Qualified diagnostic radiographers	2	4	1	7
Total	4	6	5	15

It was deemed necessary to ensure an equal representation of each group of participants to facilitate a comprehensive understanding of perspectives, identify emerging patterns, ensure a balanced comparison and minimise bias in the data analysis (Kumar, 2019). The appropriateness of the sample size can also be substantiated by the recommended minimum interview sizes defined by Creswell (2015), based on research in the field of qualitative research. For this study, the representative sample size was considered a minimum of three participants per group per qualification level, and interviews continued until data saturation was reached (cf. section 3.8.1).

3.4.1 Recruitment of participants

The researcher adopted a multifaceted approach for the recruitment of participants to ensure the effectiveness and confidentiality of the study. This approach included using recruitment methods, such as flyer invitations, verbal promotion and personal outreach to access a diverse pool of participants. Recruitment efforts were initiated by strategically placing informative flyers in the staff tea rooms across the three hospitals selected for data collection. This method aimed to capture the attention of potential participants in their common spaces, laying the groundwork for a diverse and representative sample. Simultaneously, the researcher actively engaged with the head radiographers at these hospitals, seeking their collaboration to verbally promote the study during weekly staff meetings. This direct engagement not only aimed to foster a supportive environment but also intended to broaden participation among diagnostic radiographers and students.

To maintain confidentiality and control over the recruitment process, the researcher included his contact information on the flyers. This measure ensured that only the researcher possessed knowledge of individuals expressing interest in participation, ensuring privacy and transparency in the recruitment strategy. Furthermore, the participant selection process adhered to a purposive sampling technique, depicting a deliberate and non-probability method by which units were chosen intentionally based on specific characteristics of study participants that were considered essential for the study. This method, as described by Kumar (2019), was

deemed necessary to guarantee equal representation of the three participant groups, which included qualified, community service and student radiographers. Participants were selected based on specific criteria, including availability on a first-come first-served basis, willingness to provide consent, belonging to one of the specified groups and meeting the inclusion criteria outlined for the study. This intentional and criteria-driven participant selection aimed to ensure a comprehensive exploration of knowledge and skills transfer in the clinical environment.

3.4.2 Inclusion and exclusion criteria

In research, inclusion criteria serve as specific guidelines to identify participants eligible to participate in the study. Alternatively, exclusion criteria outline factors or characteristics that render certain participants ineligible for inclusion in the sample (Gray et al., 2017). A clear summary of these criteria is presented in Table 3.4, providing a comprehensive overview of the requirements applied to determine which individuals were included in or excluded from the study.

Table 3.4. Summary of inclusion and exclusion criteria applied during the study.

Inclusion criteria	Exclusion criteria
• Fourth-year student, community service and qualified diagnostic radiographers who give written consent for participation. • Fourth-year student, community service and qualified diagnostic radiographer who works at the three-hospital research sites. • HPCSA registered as a fourth-year student, community service and qualified diagnostic radiographer. • Fourth-year student, community service and qualified diagnostic radiographer who can speak, read and write in English. English is the official language of communication at these hospitals. • Fourth-year student radiographers registered at University A. • Fourth-year students, community service and qualified radiographers who consent for the semi-structured interview to be voice-recorded.	• Student, community service and qualified radiographers who cannot speak, read, or write in English • Student, community service and qualified diagnostic radiographers working at other hospitals. • Student radiographers from other universities (some international students do rotate through these hospitals). • Nuclear medicine technologists, sonographers, and radiation therapists. • WIL coordinators, as they are not to be investigated in this study. • Student and qualified radiographers from private hospitals.

3.4.3 Context of research participants

A contextual approach in qualitative research necessitates a thorough exploration of the social context influencing a phenomenon of interest (Holloway & Wheeler, 2017). This approach was integrated into the research design to understand the underlying context of the findings and enhance the interpretation of the results.

The participants in this study were engaged in diagnostic radiography at public healthcare institutions such as Hospital A, Hospital B and Hospital C. These hospitals served as the primary settings where participants conducted their daily tasks using advanced radiographic technology for medical imaging purposes.

The study included a diverse range of roles within the diagnostic radiography department, including fourth-year students from University A, community service radiographers and qualified radiographers. Students brought a combination of theoretical knowledge and practical training, while community service radiographers were transitioning **from being trained as students to being employed as qualified radiographers working under supervision**. Qualified radiographers contributed to the radiographic workplace context through their extensive experience and expert understanding of the field. Table 3.5 below presents the characteristics of the 15 participants who took part in the study. Unique codes were allocated to the participants to ensure anonymity. **The codes were developed based on the participant's position (Student "S", Qualified Radiographer "Q" and Community Service Radiographer "COM") and affiliation either to the university ("CUT") or one of the hospitals ("PP", "PN" and "PU") included in the study.**

Table 3.5. Characteristics of the participants.

Participant code	Gender	Experience in diagnostic radiography	Student, community service, qualified
P1S1	Male	Fourth-year	Student
PCUT2	Male	Fourth-year	Student
PCUT7	Female	Fourth-year	Student
PCUT8	Female	Fourth-year	Student
PCUT5	Female	Fourth-year	Student
PPCOM1	Female	1 year post-qualification	Community service
PCOMN1	Female	1 year post-qualification	Community service
PPCOM2	Male	1 year post-qualification	Community service
PNQ2	Female	9 years post-qualification	Qualified
PNQ4	Female	32 years post-qualification	Qualified
PUQ6	Female	26 years post-qualification	Qualified
PUQ8	Female	35 years post-qualification	Qualified
PPQ4	Female	3 years post-qualification	Qualified
PUQ2	Female	25 years post-qualification	Qualified
PUQ5	Female	24 years post-qualification	Qualified

In this study, the researcher conducted the interviews with the intention to understand and interpret the unique context and experiences of the participants (Holloway & Wheeler, 2017).

The researcher acknowledges the significance of participants' roles in the healthcare sector, hence striving to be open and understanding of the diverse set of beliefs, values and judgments forming part of the field of diagnostic radiography.

3.5 Research tools

A research tool is a method or instrument employed to collect, analyse and interpret data (Brink, Van der Walt & Van Rensburg, 2018). According to Brink et al. (2018), research tools also facilitate a systematic investigation of specific research questions or hypotheses. Three research tools were applied in the study and included semi-structured interviews, fieldnotes and a reflective journal. These tools served as the researcher's guide that shaped the methodological framework for the investigation and furthermore allowed the researcher to gain a comprehensive understanding of the study's results.

3.5.1 Semi-structured interviews

Semi-structured interviews combine elements of structured and unstructured interview styles (George, 2022). While some questions are planned, others are formulated spontaneously as the interviews progress. Semi-structured interviews are characterised by their open-ended nature, allowing for flexibility. This flexibility is important because it enables the interviewer to explore topics in greater depth, adapt questions based on the interviewees' responses and uncover insights that may not emerge in more rigidly structured interviews (George, 2022). Semi-structured interviews were selected over observations or questionnaires because they allow participants to express their experiences and perspectives in detail, capturing the nuances of personal insights that may not be observable or easily conveyed through a fixed-response format. The semi-structured interview schedule for this study, presented in Appendix K, served as the means for collecting the necessary data for subsequent analysis.

The interviews were conducted by the researcher and were carried out in English, as it served as the primary medium of communication in both academic and clinical settings included in the study. Each interview had a duration of approximately 10 minutes. The researcher interviewed a minimum of 15 participants individually. However, one community service radiographer could not be present at the clinical site during the commencement of data collection. To ensure the inclusion of the entire population of community service radiographers (n=3), a virtual interview via Microsoft Teams (Microsoft Corporation; Redmond, WA, USA) meeting was conducted with the participant. The search for data saturation was conducted to determine the optimal number of participants, as specified in section 3.8.1. The qualitative

interview data allowed the researcher to identify the factors influencing knowledge and skills transfer among diagnostic radiographers and students within the clinical environment.

3.5.2 Fieldnotes

According to Phillippi and Lauderdale (2018), fieldnotes are notes researchers write or type during or directly after observations, interviews or fieldwork. This method helps to systematically capture qualitative data, including the researcher's observations and reflections. Fieldnotes play a crucial role in qualitative research by allowing researchers to document their experiences and interactions regarding the research topic.

The logistics for the interviews prioritised confidentiality, conducted in private hospital offices chosen for their quiet environment and enhanced privacy. Observations revealed an initial nervousness among participants. At first, the researcher felt rigid but became more at ease as participants shared their stories, while methodologically, the selected qualitative inquiry technique and strategic audio recorder placement contributed to a successful research experience, prompting reflective insights on knowledge and skills transfer experiences. The fieldnotes are included in Appendix B.

3.5.3 Reflective journal

Bashan and Holsblat (2017) described a reflective journal as a personal diary where researchers write down their thoughts, observations and reflections on different experiences, efforts or events during the research process. The journal promotes self-reflection, self-awareness and building critical thinking skills. Researchers carefully reflect on their experiences, not only to gain a better understanding of how they think, feel and learn, but to uncover the underlying processes and patterns that shape their cognitive and emotional responses. This reflective practice allows them to identify key insights and develop strategies to enhance their personal learning and professional development (Bashan & Holsblat, 2017).

In this study, the researcher kept a reflective journal throughout the research, during data collection, data analysis and writing up of chapters, strategies to enhance the researcher's learning and professional development. The detailed reflective journal can be found in Appendix C.

3.6 Pilot study

A pilot study is a smaller-sample study or initial exploratory analysis. It is undertaken to determine whether the data collection methods and participant recruitment process will effectively generate information-rich data relevant to addressing the research questions to

achieve the aim and objectives of a study (Gray et al., 2017). A pilot study can also assess the viability and adequacy of the research methods to be used in a more extensive, principal study and establish whether a researcher has the necessary skills to conduct the study (Botma et al., 2022). Botma et al. (2022) also described a pilot study as a way to evaluate the data collection instrument using a specific group of population participants targeted for the analysis.

The pilot study was conducted to allow the researcher to become familiar with conducting interviews and using the voice recorder tools, and also to verify the correct transcription of voice recordings by an artificial intelligence (AI) transcriber (Squirrel Audio-to-Text Transcriber, version 3.6.8; Chongqing Zhuzigao Technology Co. Ltd.; Chongqing, China; ©2023). **The researcher listened to the audio to verify that the AI transcription was correct.** Upon receiving approval from the ethics committee at Hospital A, the pilot study involved the participation of three qualified diagnostic radiographers on 6 September 2023. Beforehand, they were provided with the information and consent document for review and were requested to identify any areas requiring clarification or adjustments on both documents. All three participants had a clear understanding of the study requirements and signed the informed consent document. The information and consent documentation used in the study **are available in Appendices D and E.**

The semi-structured interviews conducted with the pilot study participants offered an opportunity for in-depth discussions and valuable insights regarding the transfer of knowledge and skills among diagnostic radiographers and students. According to feedback received from the three qualified radiographer participants, the interview questions effectively facilitated their point of view on knowledge and skills transfer. These interviews were conducted with prior permission in an office space, and no complaints or recommendations were made regarding the interview process.

The data obtained from the pilot study interviews were not incorporated into the main study data collection. These interviews were conducted with the specific objective of evaluating the quality of the recordings and the accuracy of the transcribing method. The transcriptions and recorded interviews were securely stored to maintain records. The duration of the interviews was as follows: Participant 1 – 9 minutes, Participant 2 – 9 minutes and 20 seconds, and Participant 3 – 8 minutes and 56 seconds, confirming that scheduling 10 minutes per interview would be sufficient.

3.7 Data collection methods

In executing the data collection, the researcher conducted in-depth semi-structured interviews, detailed in section 3.5.1. Each interview involved a thorough process of obtaining consent from participants. This included explaining the purpose and confidentiality aspects of the research and providing participants with an opportunity to ask questions and clarify any concerns before proceeding. A reminder that the session would be audio recorded was given, and the participant then signed the consent form, demonstrating their understanding and voluntary participation. The researcher provided the necessary tools, including a voice recorder and AI transcriber (Squirrel Audio-to-Text Transcriber), ensuring high-quality data capture. The researcher took notes during the interview as needed, as described in sections 3.5.2 and 3.5.3. These notes served as an additional layer of data, capturing contextual information and immediate reflections that enriched the subsequent analysis.

The scheduling of interviews was arranged in advance with the head radiographer at each hospital, who granted permission to use spaces provided in their respective areas. This coordination was essential to secure private and comfortable settings that encouraged open and honest dialogue between the researcher and participants. All the selected spaces ensured a quiet environment, promoting privacy and confidentiality during the interviews. The interviews were conducted chronologically at the following locations and times:

- At Hospital B, interviews were held in the head radiographer's office on 12 September 2023, from 08h00 to 15h50.
- At University A, interviews with the fourth-year students took place in a temporary office space provided for the researcher on 13 September 2023, from 09h00 to 12h00.
- At Hospital A, interviews were conducted in the seminar room on 13 September 2023, from 12h00 to 15h05.
- At Hospital C, interviews were held in an unused X-ray room on 14 September 2023, from 08h00 to 12h30.

The data collected were then subjected to analysis, following the guidelines described in section 3.8. This analysis involved a trustworthiness process of transcribing the recorded interviews, coding the data to identify recurring themes and patterns, and triangulating the findings with the notes taken during the interviews to ensure the accuracy and depth of the insights obtained.

3.8 Data analysis

The researcher applied a qualitative analysis approach to investigate knowledge and skills transfer among diagnostic radiographers and students in the clinical environment. The analysis included data saturation, literature control, information power, contextualisation, reflexive thematic analysis and triangulation. This comprehensive approach aimed to gain an understanding of the experiences of diagnostic radiographers and students in the public health sector. A thematic layout of the study's findings is presented in Chapter 4, section 4.5, Figure 4.1.

3.8.1 Data saturation

Data saturation occurs when all the possible codes in the data have been identified and no new codes emerge from the data (Saldaña, 2021). To determine if data saturation has been achieved, the researcher can review the data and compare it to the codes that have been identified. If there is no new information that can be coded, then the researcher has achieved data saturation (Saldaña, 2021).

According to Glaser and Strauss (1967), saturation is the criterion for determining when to cease sampling the various groups relevant to a category. Saturation occurs when no further data are discovered from which category attributes may be derived. Finding comparable occurrences repeatedly provides empirical confidence that a category is saturated. The researcher then goes out of his way to find groups that extend data variety as much as possible to ensure that saturation is based on the broadest possible range of data on the category. Saturation is an indication to cease data collection and/or analysis in qualitative research.

Table 3.6. Models of saturation and their principal foci in the research process (Saunders, Sim, Kingstone, Baker, Waterfield, Bartlam, Burroughs & Jinks, 2017).

Type of saturation	Definition	Focus
Theoretical saturation	Relates to the development of theoretical categories; related to grounded theory methodology	Sampling
Inductive thematic saturation	Relates to the emergence of new codes or theme analysis	Analysis
A priori thematic saturation	Relates to the degree to which identified codes or themes are exemplified in the data	Sampling
Data saturation	Relates to the degree to which new data repeat what was expressed in previous data	Data collection

A simple data saturation strategy described by Guest, Namey and Chen (2020) was used to determine the final number of participants sampled per group. Cresswell (2015) defined

proposed interview sizes that provide specific numerical suggestions based on experts' qualitative research experience: for narrative studies, one or two participants can be used for phenomenology, three to ten participants for ethnography, and a single cultural sharing group will be sufficient, hence the sample size would be relevant for this study.

The researcher conducted reflexive thematic analysis of the interviews with students, community service radiographers and qualified radiographers to identify baseline and new codes over three rounds of the coding process. The baseline number of unique codes was established as 25. In each subsequent round, the number of new codes was identified and used to calculate the saturation ratio, which helped to determine when additional data collection would no longer yield significant new information.

The data saturation ratio of the current study is summarised in Table 3.7. By the third round, the ratio had declined to 2.7%, which was below the commonly accepted threshold of 5%, indicating that data saturation had been reached (Guest et al., 2020).

Table 3.7. Data saturation ratio of the study.

Round	Interview number	New codes per interview	Total new codes	Baseline codes	Saturation ratio
Baseline	P1S1, PCUT2, PCOMN1, PPCOM1, PNQ4, PUQ6	10, 4, 3, 4, 4, 0	25	25	–
1	PCUT8, PPCOM2, PUQ8	0, 3, 3	6	25	24%
2	PCUT7, PPQ4, PUQ2	4, 2, 0	6 (Baseline 25 + round one 6)	25	19.4%
3	PCUT5, PNQ2, PUQ5	1, 0, 0	1 (Baseline 25 + round one 6 +round two 6)	25	2.7%

3.8.2 Information power and contextualisation

Information power and contextualisation refer to the adequacy of data available for answering research questions and the relevance of the information to the study's context (Malterud, Siersma & Guassora, 2016). By addressing these considerations within the sampling strategy, deliberate efforts were made to ensure a sufficient and diverse participant pool. The sampling process involved selecting participants with rich and relevant experiences in the field of diagnostic radiography including fourth-year students, community service and qualified diagnostic radiographers. By doing so, the aim was to ensure that the data collected would provide in-depth insights that could address the research question.

By purposefully seeking participants from various backgrounds and contexts in the public healthcare sector, the sampling strategy aimed to enhance the information power and contextual relevance of the study. Seeking participants from various backgrounds and contexts ultimately contributed to the strength and applicability of the research findings (Malterud et al., 2016).

3.8.3 Literature control

Understanding how other researchers conceptualised and theorised their empirical findings concerning the topic of interest was facilitated using literature control. A literature review was included to discuss the results of this investigation (cf. Chapter 2). Its primary objective was to serve as a starting point for comparing the findings, including themes and their respective codes of the study. Additionally, it provided a framework for assessing the significance and value of this study (Creswell, 2014).

When viewed in the context of the broader body of knowledge, the research findings corroborated existing literature and models, and adopted a conceptual framework (cf. Figure 2.2) that guided and contributed to the study's findings (Chapter 4), shedding light on the existing body of evidence. Moreover, conclusions in this study that could not be argued against or supported by previous research added to what we currently know about knowledge and skills transfer between diagnostic radiographers and students in the clinical environment.

3.8.4 Reflexive thematic analysis

The researcher used reflexive thematic analysis to analyse the data from the semi-structured interviews, adhering to Saldaña's (2021) framework. Figure 3.1 illustrates the steps taken in the process. A qualitative study design was critical for uncovering patterns and themes from participant experiences. The study employed this method to describe and explore factors influencing knowledge and skills transfer among diagnostic radiographers and students by systematically organising and interpreting participant interview transcripts, fieldnotes and the reflective journal kept by the researcher.

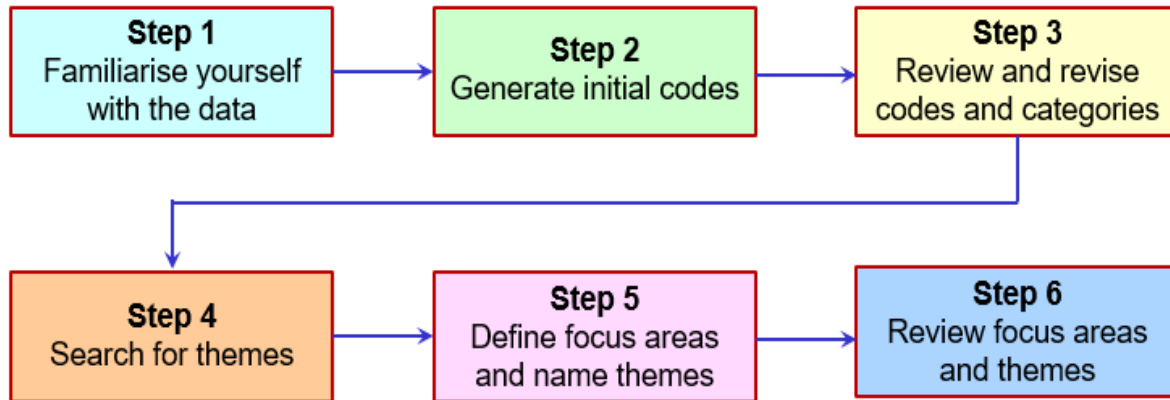


Figure 3.1. Steps involved in the reflexive thematic analysis.

3.8.4.1 Step 1: Familiarise yourself with the data

The researcher initiated the reflexive thematic analysis on 15 September 2023, dedicating one day to thoroughly familiarising himself with the data. This involved carefully reading through all 15 interview transcripts and fieldnotes to gain a comprehensive understanding of the content. Using Quirkos, a digital coding application for qualitative data analysis (Quirkos; Edinburgh, UK; ©2024), patterns and trends were noted during this period, which facilitated the organisation and easy retrieval of interview transcripts. The researcher immediately recorded initial observations in the fieldnotes (Appendix B) after each interview, which provided context for the data analysis. Throughout this phase, the researcher maintained a reflective journal (Appendix C) to document insights and thoughts that emerged while engaging with the data.

3.8.4.2 Step 2: Generate initial codes

Having acquired familiarity with the data, the researcher proceeded to generate initial codes through the process of open coding on 16 September 2023, which took approximately one week. This process involved analysing data from the 15 interviews, which resulted in the establishment of 25 baseline codes. Fieldnotes and reflections from the journal contributed to this coding process by highlighting key codes and contextual insights that emerged during the interviews. The researcher ensured that the codes represented meaningful units of information and accurately reflected the experiences shared by the participants.

3.8.4.3 Step 3: Review and revise codes and categories

From 21 September 2023 to 5 February 2024, a period of approximately 18 weeks, the researcher conducted a thorough review of the initial codes. The review process involved refining the initial 25 codes and identifying any missing or insufficiently developed codes that required revision. This iterative process also included additional rounds of coding: 6 codes in round 1, 6 codes in round 2, and 1 code in round 3 (cf. Table 3.7). Ultimately, this coding effort revealed a 2.7% saturation ratio in the data. At this stage, three categories were developed from the codes, which emerged as meaningful groupings based on shared characteristics and patterns identified in the data.

To enhance the reliability of the coding process, the researcher conducted member checking (cf. Appendix A) from 21 October 2023 to 2 February 2024, which involved reaching out to participants for clarification on specific codes. The researcher also implemented co-coding with a second coder, who provided feedback after independently coding all the interviews. This collaborative approach ensured the accuracy and consistency of the codes and categories identified.

The fieldnotes and reflections from the journal were instrumental during this review process. The journal provided the researcher with insights into how participants articulated their experiences and highlighted any nuances not captured in the initial coding. The journal also facilitated self-reflection on the coding process, allowing the researcher to assess their understanding and interpretation of the data.

3.8.4.4 Step 4: Search for themes

With the revised codes and categories in place, the researcher systematically searched for overarching themes within the dataset from 21 February to 7 March 2024, taking approximately two weeks. To uncover broader concepts that could apply to multiple pieces of data, this process involved identifying patterns and similarities across the codes. The researcher used a coding matrix to document the patterns and trends, which facilitated a visual representation of the relationships among the codes and categories.

Similar to Step 3, the fieldnotes and reflections from the journal again were instrumental at this stage, offering significant insights into the participants' articulation of their experiences and shedding light on nuances and emerging trends that the original coding might have missed. As these patterns began to surface, the researcher recognised the need for focus areas to organise the themes effectively. This realisation stemmed from the observation that

certain codes and categories consistently grouped together, indicating shared characteristics and reinforcing the necessity of thematic organisation.

The iterative process emphasised the connection between codes, categories and overarching themes, ensuring that the analysis was coherent and comprehensive. By referring to the established codes and categories, the researcher could ensure that the identified themes accurately reflected the data while allowing for deeper exploration of the underlying concepts.

3.8.4.5 Step 5: Define focus areas and name themes

Once identified, the researcher undertook the crucial step of defining and naming the themes, which took approximately one week from 8 to 15 March 2024. This process was essential for adding clarity and structure to the analysis and facilitating the organisation and interpretation of the data. The researcher referred to fieldnotes and journal reflections during this phase to ensure that the definitions resonated with the participants' experiences and accurately captured the essence of the data.

The focus areas emerged from the identified themes and served as overarching categories that encapsulated the specific themes linked to the participants' experiences in knowledge and skills transfer. Each focus area represented a critical aspect of the data analysis:

Enablers of knowledge and skills transfer

- Theme 1: Safe and conducive working environment
- Theme 2: Personal attributes
- Theme 3: Preferred learning methods

Barriers to knowledge and skills transfer

- Theme 4: Communication and supervision challenges
- Theme 5: Personal and interpersonal factors
- Theme 6: Workplace pressures and adaptation challenges

Solutions for knowledge and skills transfer

- Theme 7: Professional development and engagement
- Theme 8: Student placement strategies

3.8.4.6 Step 6: Review focus areas and themes

In the final step, the researcher undertook a thorough review of the focus areas and themes to ensure they accurately captured the essence of the data. From 26 February to 4 August 2024, the researcher conducted this 23-week, 6-day process, continuously revisiting the

codes and themes to ensure they were meaningful and coherent. The researcher verified that every theme represented patterns in the data and could connect to the study's research questions and objectives.

During this review, the fieldnotes and journal reflections played a significant role in validating the themes. The researcher cross-checked observations and insights noted during data collection, comparing them with the emerging themes. This confirmed the alignment of the themes with the participants' experiences and ensured no crucial elements went unnoticed.

The review also underscored the importance of refining the focus areas to ensure their clear definition and connection to specific themes. The researcher realised the need for focus areas early on, as they provided a structured way to organise the themes into broader categories for easier interpretation.

During this stage, the researcher continuously revisited the codes and themes to confirm each theme's foundation in the data. The researcher ensured that the final themes, as part of the focus areas, could effectively address the study's objectives and provide valuable insights into the factors influencing knowledge and skills transfer among diagnostic radiographers and students in the clinical environment.

3.8.5 Triangulation in qualitative research

Triangulation in qualitative research involves using multiple sources or methods to gain a more comprehensive understanding of a phenomenon (Natow, 2019). The interview findings were cross-referenced against the fieldnotes made during the interviews (Appendix B) and journal entries compiled by the researcher (Appendix C), offering diverse perspectives. Additionally, the literature covered in Chapter 2 was consulted to contextualise and enrich the findings with previous studies conducted. Furthermore, a second coder, who was an independent practising diagnostic radiographer, was involved in the analysis process, providing an additional layer of validation dealing with knowledge and skills transfer in the clinical environment.

Member checking involved obtaining feedback from participants on the verbatim transcripts and coding conducted by the researcher. Subsequently, participants were requested to approve the member checking (Appendix A). Their agreement with and confirmation of the researcher's transcripts and coding ensured the accuracy and credibility of the data collected (Polit & Beck, 2018). Through this approach, the study aimed to enhance the trustworthiness of the qualitative findings. Figure 3.2 illustrates the process of triangulation.

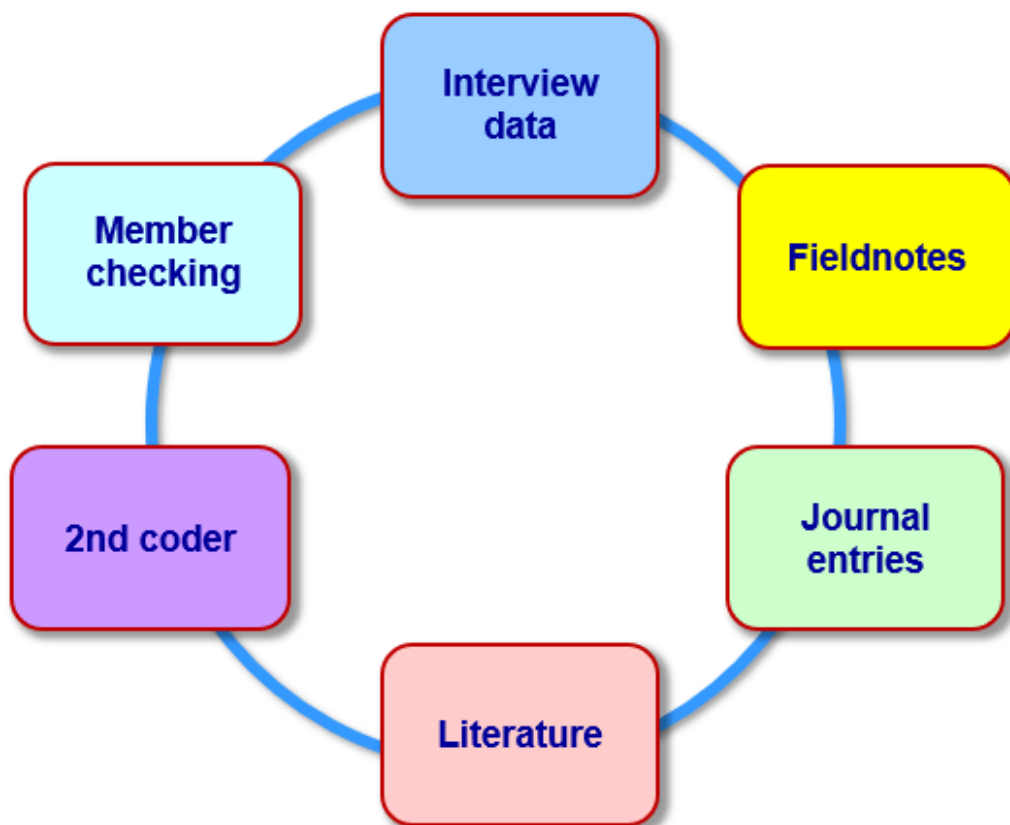


Figure 3.2. Triangulation of qualitative research in the current study.

3.9 Trustworthiness

Lincoln and Guba's (1985) trustworthiness model was applied in this study, which outlines qualitative research criteria. The study adhered to the requirements of dependability, credibility, transferability and confirmability, as specified by Anney (2014). Consistency in the conduct of semi-structured interviews was ensured by employing the same researcher and interview guide for each session. The researcher's proficiency in grouping information into focus areas, defining themes and establishing connections with the interview questions served as an indicator of the data's trustworthiness, as emphasised by Labuschagne et al. (2014). By member checking as a measure of trustworthiness, the participants were engaged in the researcher's reflective journal entries to obtain feedback on the study's findings. This interactive process allowed participants to share their perspectives, identify any language-related concerns and suggest improvements. For instance, during member checking, four participants highlighted instances where the language could be refined for clarity. The researcher took note of these comments, incorporating changes to enhance the overall readability of the study.

3.9.1 Credibility

Credibility refers to ensuring that the research findings accurately represent the experiences of the participants (Polit & Beck, 2018). The data collection method involved the use of audio recordings, transcribing interviews verbatim and keeping handwritten reflective journal entries to enhance the trustworthiness of the information. It is important to note that the data were preserved in its original form.

To enhance credibility, the study employed data saturation as a collection strategy, determining both the sample size and analysis to strengthen the overall reliability of the study (Polit & Beck, 2018). The strategies developed underwent peer review by supervisors, further ensuring the study's credibility (Polit & Beck, 2018). Direct quotes from participants were also included when presenting the findings.

The study integrated various elements, including reflective notes, triangulation, peer review, member checking and in-depth semi-structured interviews to establish credibility. The reflective journal, undertaken during data collection, along with data analysis and chapter writing, provided transparency regarding the researcher's experiences. Triangulation ensured the cross-verification of data from diverse sources. Peer review of the data conducted after analysis brought external perspectives to the study. Member checking carried out after interview coding involved sharing outcomes via email for participant validation. Ethically conducted in-depth semi-structured interviews fostered trust and openness. These comprehensive measures collectively contribute to the overall credibility of the research.

3.9.2 Dependability

Dependability refers to methods employed to ensure that if this study were replicated with similar subjects in comparable settings, it would result in consistency (Polit & Beck, 2018). To ensure dependability, the researcher kept detailed records of all methodological techniques and processes employed in the study. Fieldnotes on the context in which the participants were placed during data collection allowed the researcher to consistently record contextual details surrounding each participant, capturing their and the researcher's experiences (Appendix B). Furthermore, data triangulation provided a comprehensive assessment of the participants' experiences with knowledge and skills transfers among qualified and student radiographers, with the detailed explanation provided in section 3.8.5.

The pilot study also improved the trustworthiness of the overall study (Nieuwenhuis, 2016) by enabling the researcher to evaluate the feasibility of the data collection methods. This assessment facilitated necessary adjustments, thereby enhancing the efficiency and success

of the main study. In essence, the pilot study acted as a strategic tool for refining the research approach, ultimately enhancing the dependability of the study (cf. section 3.6).

3.9.3 Transferability

The extent to which research findings can be transferred from one context to another is referred to as transferability, also denoted the 'generalisability' of the findings. This study's transferability was supported by its theoretical sufficiency (Polit & Beck, 2018).

In this study, the research findings, outlined in Chapter 4, were translated into an infographic presented in Chapter 5. This infographic serves the purpose of enhancing awareness regarding knowledge and skills transfer in the diagnostic radiography departments of public sector healthcare facilities (cf. Appendix L).

3.9.4 Confirmability

Houser (2012) defined confirmability as an endeavour by a researcher to improve objectivity in implementation and method selection to avoid researcher- or methodology-caused biases. To improve confirmability, the study employed a second coder. Furthermore, peer review of the developed methodologies was identified as an effective measure (Polit & Beck, 2018). Maintaining accurate records of all methodological methods and processes was emphasised as a way for the researcher to ensure confirmability (Polit & Beck, 2018). The methodology included fieldnotes and a reflective journal (Appendix B and C, respectively).

3.10 Conclusion

In summary, Chapter 3 outlines the study's methodological approach, explaining the selection of methods to determine and understand how qualified diagnostic radiographers transfer their knowledge and skills to students. Using semi-structured interviews and ensuring the reliability of the data established the groundwork for a clear understanding of the research objectives. Chapter 4 presents the findings of the study, reporting an in-depth analysis and interpretation of the data collected.

CHAPTER 4

RESULTS AND DISCUSSION OF FINDINGS

"Education is the way to move mountains, to build bridges, to change the world."

Oprah Winfrey

4.1 Introduction

In this chapter, the findings of the semi-structured interviews conducted with the study participants are presented. A qualitative study with an exploratory-descriptive and contextual design was employed and data were collected through reflective journaling, fieldnotes and semi-structured interviews (cf. Chapter 3). The data were analysed by the researcher and a second coder, using reflexive thematic analysis (Saldaña, 2021). The objectives of the semi-structured interviews were to explore and describe factors influencing knowledge and skills transfer among diagnostic radiographers and students in the context of the clinical environment, and to distinguish between existing barriers and enablers that influence knowledge and skills transfer (cf. Chapter 1, section 1.5.2, objectives I and II). The themes identified through the data analysis were examined and linked to existing literature, learning transfer models, theories and the adopted conceptual framework (cf. Figure 2.2). Direct quotes from the participants have been included to support the identified themes.

4.2 Description of participants

The sample for this study consisted of a diverse group of individuals in the field of diagnostic radiography. Diagnostic radiography is a specialised medical discipline that applies various imaging techniques, such as X-rays, computed tomography (CT), magnetic resonance imaging (MRI) and mammography, to capture internal body images for diagnosing diseases, abnormalities or injuries (Hutchison, 2024). The researcher interviewed qualified radiographers, community service radiographers and student radiographers regarding knowledge and skills transfer in the clinical environment. A qualified radiographer is registered with the Health Professions Council of South Africa (HPCSA) as an independent practitioner who performs radiographic procedures without supervision. Community service radiographers have completed their studies, are HPCSA-registered and perform radiography procedures under the supervision of an independent practitioner. Student radiographers are HPCSA-registered and defined as radiographers in training who practice under the supervision of an independent radiographer (Health Professions Council of South Africa, 2016).

In the current study, the researcher included student radiographers, community service radiographers and qualified diagnostic radiographers. A detailed explanation of the sample

size and sampling protocol has been provided in Chapter 3, section 3.4. The decision to include the entire community service radiography population group (n=3) in the study was motivated by data saturation (cf. section 3.8.1), which required three rounds of coding. The inclusion of seven qualified radiographers was motivated by the need for two radiographers with less experience, who substituted as community service participants, with three and nine years' experience, respectively, in the field of radiography. The characteristics of each study participant have been presented in Chapter 3 (cf. Table 3.5)

4.3 Summary of data collection methods

The current study employed three research tools to systematically investigate the research subject and gain a comprehensive understanding of knowledge and skills transfer in diagnostic radiography in the clinical environment. These research tools included the following:

- **Semi-structured interviews** were conducted, combining structured and unstructured elements (Appendix K) to allow flexibility while maintaining comparability among responses (cf. Chapter 3, section 3.5.1). The semi-structured interviews were conducted in English. The interviews with the 15 participants each lasted approximately 10 minutes, including one conducted virtually to accommodate all the community service radiographers.
- **Fieldnotes** (Appendix B) were systematically recorded during interviews, which assisted with capturing qualitative data and the researcher's observations and reflections (cf. Chapter 3, section 3.5.2). These notes provided insights into logistical arrangements, participants' initial reactions, language challenges, and the researcher's evolving perceptions and level of comfort throughout the research process (Phillippi & Lauderdale, 2018).
- **A reflective journal** (Appendix C) was maintained by the researcher throughout the study, which enabled him to document thoughts, observations, and reflections on various experiences, efforts and events (cf. Chapter 3, section 3.5.3). This journal facilitated self-reflection, self-awareness and critical thinking, allowing the researcher to gain deeper insight into his personal thought processes, emotions and learning experiences (Bashan & Holsblat, 2017).

Together, the data collection tools formed the methodological framework for the investigation. Triangulation of the data acquired by these methods, allowed the researcher to gain insight into the exploration of knowledge and skills transfer between diagnostic radiographers and students in the clinical environment.

4.4 Summary of data analysis

A qualitative analysis approach (cf. Chapter 3, section 3.8) was employed to investigate knowledge and skills transfer in public sector diagnostic radiography facilities. The analysis consisted of several key components, including data saturation, literature control, information power, contextualisation, reflexive thematic analysis, and triangulation. This comprehensive approach was designed to achieve an understanding of the experiences related to knowledge and skills transfer among diagnostic radiographers and students in the practical setting. Through the systematic use of these analytical components, the findings provided valuable insights that contributed to enrich and broaden the body of knowledge in the field.

4.5 Thematic layout of findings

The semi-structured interviews set out to explore and describe factors influencing knowledge and skills transfer among diagnostic radiographers and students, and to distinguish between existing barriers and enablers that influence knowledge and skills transfer. From these objectives, three focus areas were identified. Themes developed via the reflexive analysis were sorted under a key focus area to which it aligned. Figure 4.1 illustrates the relationship of the focus areas, including (i) enablers for knowledge and skills transfer; (ii) barriers to knowledge and skills transfer; and (iii) possible solutions for challenges experienced with knowledge and skills transfer in the clinical environment. Additionally, analysis of each focus area yielded respective themes in relation to the research topic. Figure 4.2 builds on Figure 4.1 by illustrating the interconnectedness of the research question and objectives with the identified focus areas and themes. Verbatim quotes of statements made by the participants during the interviews are presented as supportive evidence.

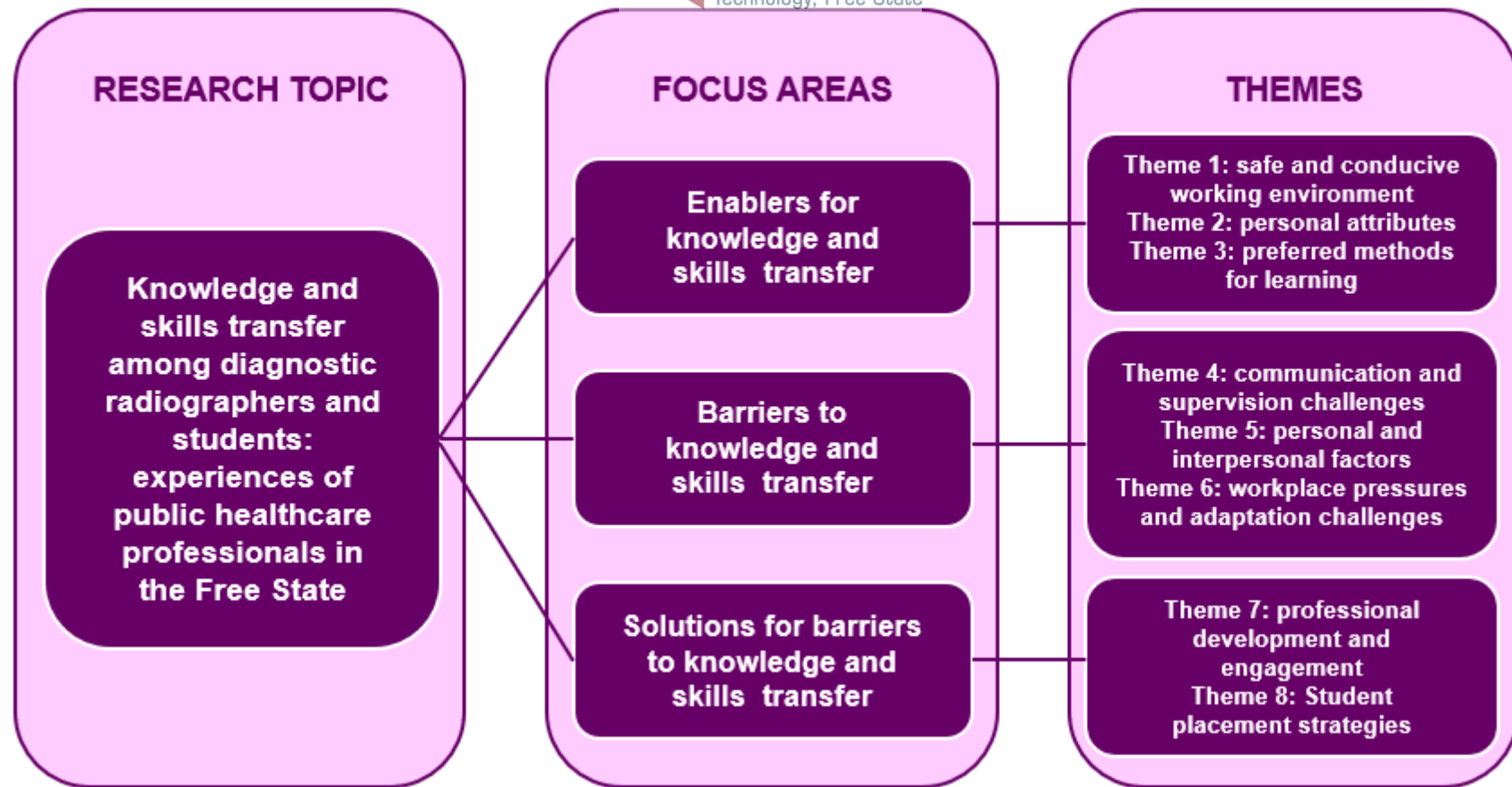


Figure 4.1. Interconnected focus areas and themes in relation to the research topic.

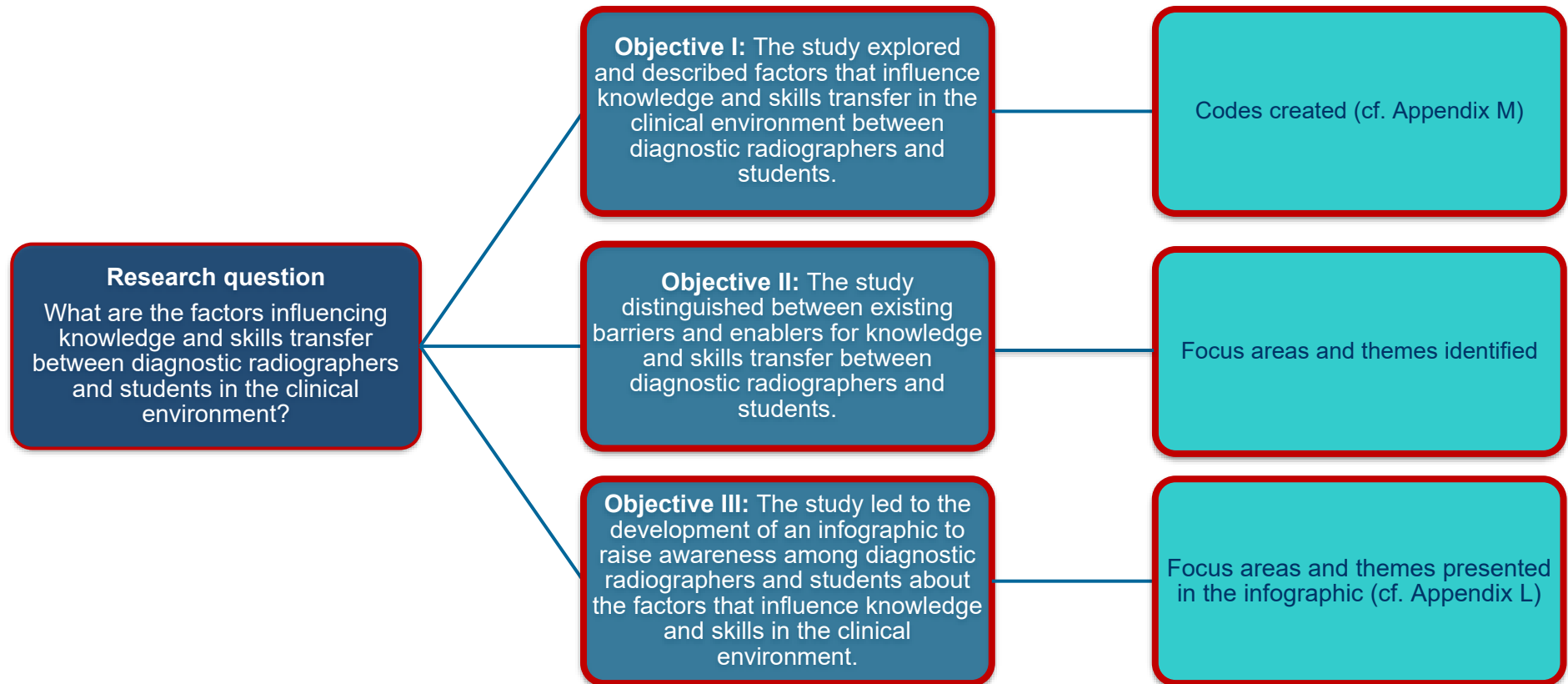


Figure 4.2. Interconnectedness of the research question and objectives in relation to the focus areas and themes.

4.6 Focus area: Enablers for knowledge and skills transfer

This focus area highlights the enablers that could enhance the transfer of knowledge and skills between qualified radiographers and students in the clinical environment. The focus area, as shown in Figure 4.3, comprises three themes: (i) a safe and conducive working environment; (ii) personal attributes; and (iii) preferred methods for learning.

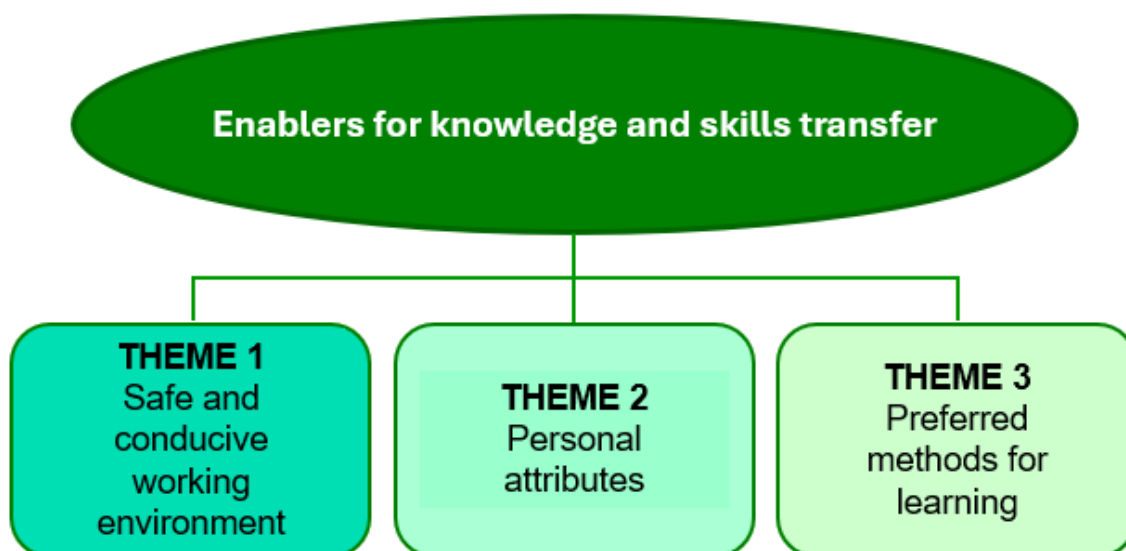


Figure 4.3. Enablers for knowledge and skills transfer between qualified and student radiographers.

4.6.1 Theme 1: Safe and conducive working environment

Theme 1 emerged from the data as a critical element for knowledge and skills transfer between diagnostic radiographers and students in the clinical environment. Within this theme, as shown in Figure 4.4, three codes were identified: (i) active support; (ii) a safe space for teaching and learning; and (iii) a respectful working environment.

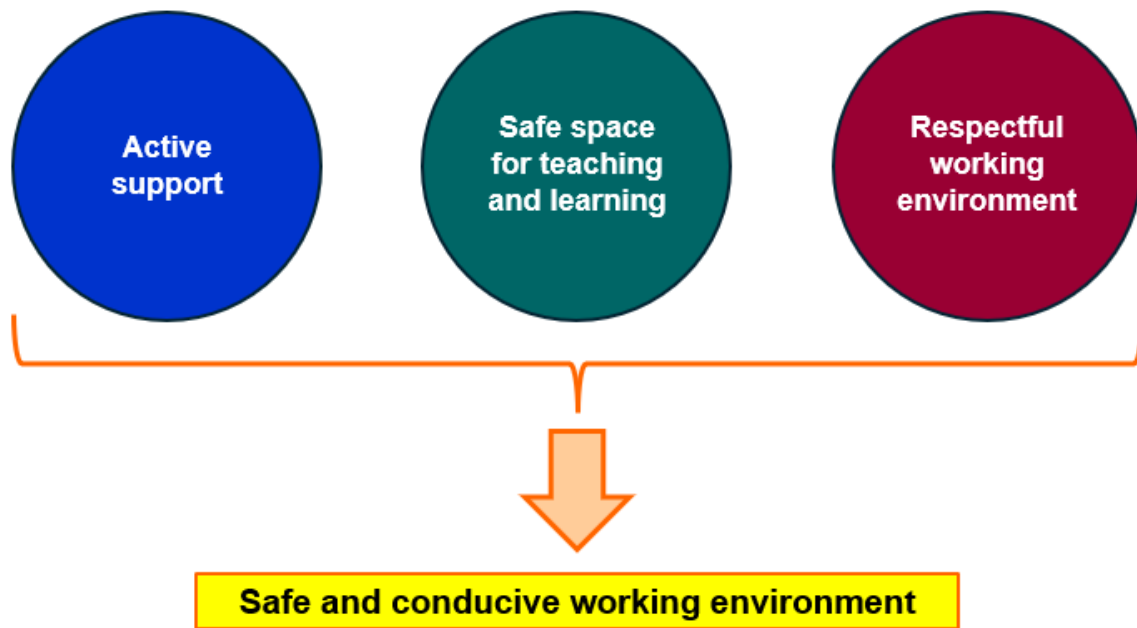


Figure 4.4. Factors contributing to a safe and conducive working environment.

Student radiographers who participated in the study expressed a desire for qualified radiographers to actively engage during radiographic procedures and provide real-time corrections rather than simply reviewing their work afterwards. A particular student participant also emphasised the need for constructive and supportive feedback from qualified radiographers that would facilitate understanding and improvement of their mistakes.

"Help us and then be there with us. Like don't just come and see that image, be there. I'm doing the patient. Correct me when I'm positioning let me do it, and then you correct me after I ... don't just come and check if it's wrong. You just tell me you should have done it this way."

Student: PCUT7

The findings presented under the current theme align with the insights from Ma et al. (2018), particularly regarding the importance of engagement and feedback from qualified professionals during clinical training. They emphasised that the relationship between qualified healthcare workers and students has a significant impact on the successful transfer of knowledge and skills, and underscored the necessity for qualified professionals to identify students' learning needs and provide motivation (Ma et al., 2018). This view is reflected by the current participants' desire for active engagement and constructive feedback when performing radiographic procedures.

Following on engagement and constructive feedback, a community service participant highlighted the importance of making students feel safe to ask questions without fear of rejection. This particular participant noted that such an approach would result in students feeling comfortable asking many questions.

"I want the students to feel safe to ask questions because I don't want someone to say no when I ask a question or someone to say go ask someone else."

Community service radiographer: PPCOM1

"So, I feel the students, the students feel safe with me to ask me questions. They do ask me a lot of questions."

Community service radiographer: PPCOM1

Adding to this view, another participant emphasised the need for developing mutual respect between students and qualified radiographers, which they deemed essential in their professional relationship.

"I can say I'll start with the qualified [radiographer]. I can say there's a lot of respect between the students and the qualified. We respect the qualified because we know we need them most of the time, and also, they also respect us back and then amongst the students, we also respect each other, but there are times whereby we cause each other's toes, here and there, but then because we are professional, we get, we approach the whole situation in a professional manner. So, this respect, respect is the big thing between students and the radiographers."

Community service radiographer: PCUT8

Notably, a qualified participant also expressed the importance of respect and attentiveness from students towards qualified radiographers. They stressed that students should respect both the experience and knowledge of qualified radiographers, maintain a respectful attitude and actively listen to their guidance to foster a positive learning environment.

"But even I always say you must respect age as well as knowledge."

Radiographer: PUQ6

"They should always be respectful, and they should learn from the qualifieds; most of the time they come with that attitude."

Radiographer: PUQ8

The findings from the current study highlighted the importance of creating a safe space for teaching and learning, as well as the necessity of mutual respect between students and qualified radiographers. The insights shared by Rothwell et al. (2021) emphasised that

fostering a supervisory relationship based on mutual trust, respect and positivity, enhances effective clinical supervision. Rothwell et al. (2021) also noted that establishing a supportive and respectful environment is crucial for effective knowledge and skills transfer.

This theme pertains to the learning transfer factor in the conceptual framework (cf. Figure 2.2), specifically the work environment. The work environment factor underlines supervisory and peer support, a positive transfer climate and opportunities to apply new skills that are crucial for successful learning transfer (Baldwin & Ford, 1988; Burke & Hutchins, 2007). The current study's findings align with this factor and confirm that a positive and supportive work environment, characterised by active support, a safe space for teaching and learning, and mutual respect, are essential for effective knowledge and skills transfer.

Furthermore, the theme under discussion aligns with both the experiential learning theory (Kolb, 1984) and the situated cognition theory (Kirshner & Whitson, 1997). The experiential learning theory (Kolb, 1984) points to the importance of active engagement and reflection, which resonates with the student participants' desire for real-time corrections and active involvement from qualified radiographers during procedures. The theory of situated cognition (Kirshner & Whitson, 1997) underscores the importance of the learning context, emphasising the construction of knowledge through participation in real-world activities. This is reflected in the participants' view on creating a safe space for learning, where students feel comfortable asking questions and mutual respect is maintained. Both theories emphasise the need for a supportive and respectful environment to facilitate effective learning and the transfer of knowledge and skills.

4.6.2 Theme 2: Personal attributes

Theme 2 delved into the personal attributes that influence the transfer of knowledge and skills between students and qualified radiographers. This theme is fundamental in understanding how individual characteristics affect knowledge and skills transfer in the clinical environment. The personal attributes, as shown in Figure 4.5, comprise (i) eagerness to learn; (ii) self-learning; (iii) seeking advice; (iv) being approachable; (v) having a gentle approach; and (vi) wanting to teach others.



Figure 4.5. Personal attributes contributing to knowledge and skills transfer.

Being "eager to learn," according to the participants' perspective, means showing genuine enthusiasm by actively observing procedures, asking questions and seeking clarification from qualified radiographers. The participants believed that enthusiasm would create a productive learning environment in which proactive engagement would help them to effectively gain knowledge and skills from qualified radiographers, as similarly reported by Diaz (2021).

"Um, and I also feel like enthusiasm plays a very huge part of it. Like if someone, if I am eager to learn, I'm obviously going to observe what they do, ask questions, and they're going to be like, okay that's how you do it. So, it's not going to be easy if students are not enthusiastic of showing your interest"

Student: PCUT2

"Well, it's me asking questions from them when I'm not sure about anything. And then yeah, if there are things that I'm also not certain about, I do call my qualified and ask them to demonstrate things for me to get a better understanding."

Student: PCUT8

Notably, a qualified participant was also of the opinion that the eagerness of individuals in the clinical environment to learn and improve their skills, would enhance the knowledge and skills transfer process. It indicates a strong commitment to professional development and a dedication to delivering high-quality care (Chelagat et al., 2019).

Um, you know, when I came here, I didn't know CT. So, because we are placed in groups, I had a member which would ... because I asked questions a lot. If I don't understand something, I ask questions a lot. So, they were freely educating me about things that I didn't know. I don't just say because I don't know I don't know this. I'm not going to do it. I ask people questions a lot. I'm very inquisitive when it comes to something that I'm very eager to learn. So that's how I hope I answered it."

Radiographer: PPQ4

Following eagerness to learn, a participant highlighted self-learning, which entails taking charge of their own learning process. This participant expressed a preference for exploring and practicing independently, believing that performing tasks by oneself could be the most effective way to build confidence and proficiency. **Independent practice and skills development were also found in the research by Jensen, Norbye, Dahlgren, Törnqvist & Iversen (2023).**

"I like doing it myself. Like if I'm learning from someone, I will try by all means to do everything that I'm learning by myself."

Community service radiographer: PPCOM2

"I mean, what works for me best? It's a like, like I said before, it's like doing it by myself, doing something by myself. If, for example, if I need to maybe learn a certain, um, special projection. Um, it's quite best to understand that you do first and do it by yourself."

Community service radiographer: PPCOM2

In addition, another participant stressed the importance of consulting qualified radiographers before undertaking tasks when uncertainty was experienced. Seeking their advice and validating procedures would ensure accuracy and uphold professional standards for both qualified radiographers and students. **Advice seeking is a well-known validation procedure (Hogan, Fox & Barratt-See, 2017).**

Um, I would definitely ask them before and before I do something if I am unsure and then I would ask them, like, let's say I am done with the procedure. I will ask them to just check again. Um, and ask them before, then when I'm done, I don't let them come into the room, and when I'm done, I'll ask them to double check for me. Is this what they would have also done? And pass the images. And just see if I can say it like that."

Community service radiographer: PCOMN1

Aligned with the attribute of seeking advice, a qualified participant emphasised their approach to learning by actively seeking clarification and guidance from colleagues when faced with unfamiliar concepts or procedures. This approach to learning demonstrates a strong commitment to personal growth and development and also fosters a collaborative and supportive work environment (Ritchie et al., 2021).

"Um, you know, when I came here, I didn't know CT ... I ask people questions a lot. I'm very inquisitive when it comes to something that I'm very eager to learn. So that's how I hope I answered it."

Radiographer: PPQ4

When seeking advice, the participants emphasised the importance of being approachable to cultivate effective teaching relationships with student radiographers. Power & Jewell's (2018) views aligned with these participants with the sense that it is important to create a supportive and non-intimidating environment, which would ensure that students feel comfortable seeking guidance and collaborating with the qualified radiographers.

"Um, I think they must ... you must be approachable to them. They must not be scared of you. We're not here to scare them. We are here to teach them our profession, and so if they go out after their fourth year, they would be able to take good X-rays. Yeah, it's very important."

Radiographer: PUQ2

"So, with the comm serves [community service radiographers]. I really treat them as qualified, because they are – they are almost qualified. You know, I don't ... just say, hey, you're comm serve. So no, I am superior. I'm above you. You should do this and that. No. So I see them as my colleagues."

Radiographer: PPQ4

In addition to being approachable to enhance knowledge and skills transfer, other qualified participants advocated for a gentle approach when supervising students and junior radiographers. They expressed the importance of being supportive and giving guidance rather than overly strict, as a gentler approach would foster a more conducive learning environment.

"So, we must have a softer approach also towards our students, and take them and lead them and guide them, to make sure that we are moulding them to become the best radiographer that they can be."

Radiographer: PNQ4

"Well, I think, um, to the approach from a, from a more friendly side or, um, not too strict. I think it's better than being very strict, um, that's now with students or junior radiographers um, because being strict make them so nervous and I don't think then they take in everything that you teach them."

Radiographer: PUQ6

Notably, a student participant also expressed the need for qualified radiographers to adopt a more lenient and understanding attitude. The participant stressed that students were still in the process of learning and developing, and required patience and support during their educational journey.

"They should become more lenient with the students because they are qualified, who are very harsh, and they don't understand that you guys are not on the same level. You are growing every day as a student, so others just don't understand. They expect you to know everything. So, if they could be like, lenient and understanding, patient with us."

Student: PCUT8

Lastly, the participants emphasised the importance of wanting to teach others in the radiography profession. They highlighted that qualified radiographers should be receptive and eager to share their knowledge with others while also remaining humble and open to learning from colleagues, including junior staff and students. Menges (2016) and Noypa, Trichandhara, and Potipiroon (2021) highlighted the value of continuous learning and collaboration in enhancing skills and advancing professional development.

"You know, the, the advice will go to qualified radiographers they should be more open and eager to teach. You know, they shouldn't have the superiority complex, if I should put it like that, because what I've observed is that because they chief radiographers or senior radiographers they ... think they can get away with a lot. They think they cannot. They can just speak. However, they want to speak with people, so, you know, they should just be sensitive and welcoming."

Radiographer: PPQ4

"Whether it works or not, if someone can teach me a technique that's, you know, working or easier or quicker, I would always be open to it. And as I said, I'm learning from the students, I'm learning from juniors."

Radiographer: PUQ2

"So, I think you must be open. You must never think that you, you know everything, because that's not true. If ... you're going to start thinking that, I think you're going to miss out."

Radiographer: PUQ2

The findings of this study corresponded with the trainee characteristic factor of the learning transfer conceptual framework (cf. Figure 2.2). Tai (2006) argued that characteristics such as autonomy, self-efficacy, motivation and prior experience are vital for effective learning transfer, as they determine how trainees apply and integrate new skills and knowledge. Motivation is particularly influential to drive the desire to use newly acquired skills in the workplace (Burke & Hutchins, 2007). This study highlighted several key characteristics: eagerness to learn, self-learning and seeking advice. Additionally, unique characteristics such as being approachable, having a gentle approach when teaching and wanting to teach others have been identified, emphasising the importance of personal attributes to promote knowledge and skills transfer between qualified and student radiographers in the clinical environment.

Baldwin and Ford's (1988) learning transfer model outlines the significance of trainee characteristics for effective knowledge and skills transfer. According to their model, these individual traits significantly influence how well trainees can apply and integrate new skills into their work. By incorporating Baldwin and Ford's learning transfer model into the current study, it will become evident that understanding these trainee characteristics could lead to more successful knowledge and skills transfer among qualified and student radiographers.

4.6.3 Theme 3: Preferred methods for learning

Theme 3 describes the preferred methods for learning among students and qualified radiographers. This theme focused on understanding the various approaches that enhance knowledge and skills transfer in the clinical environment. Figure 4.6 illustrates three approaches to learning: (i) learning through practice; (ii) learning through repetition; and (iii) observational learning.

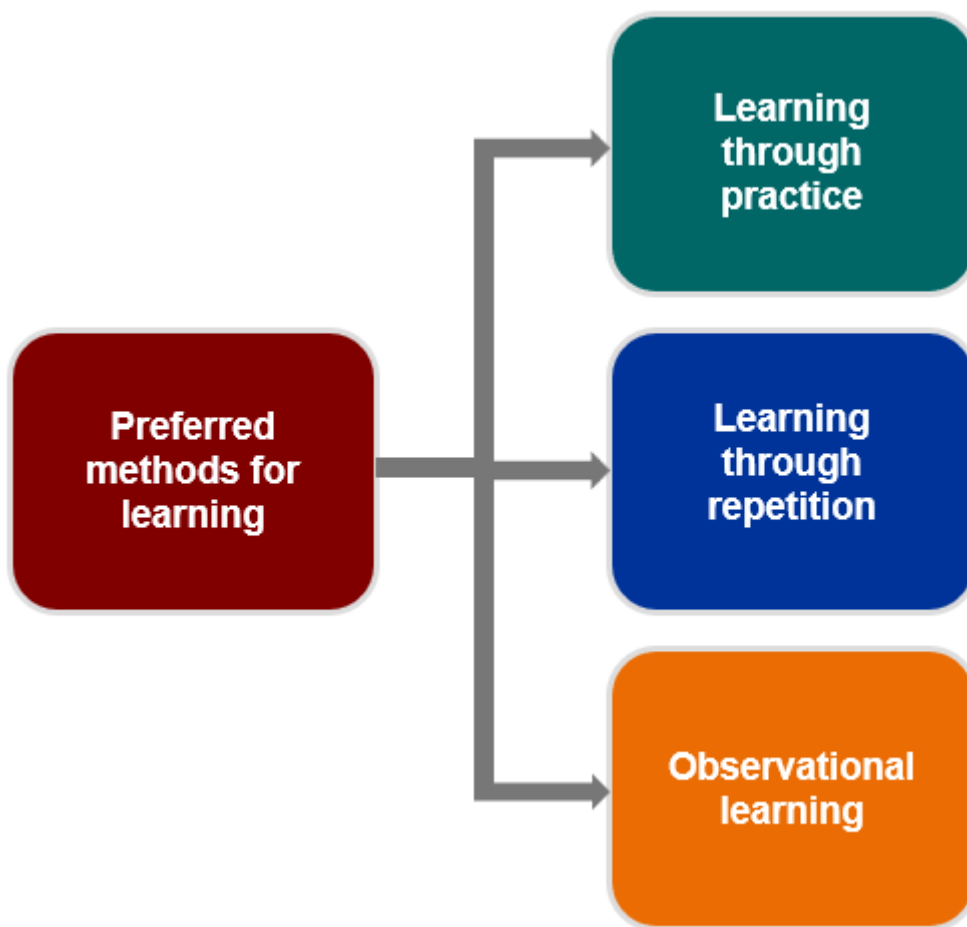


Figure 4.6. Preferred methods for learning to enhance knowledge and skills transfer.

Both students and qualified participants agreed that practical engagement is important for knowledge and skills transfer. They highlighted that engaging in tasks and receiving practical demonstrations are crucial for solidifying their knowledge and skills in radiographic practice. The participants noted the importance of hands-on practice, as reflected by the following statements:

"It comes with allowing me to practicalise it. Now, like whatever that you said, like let's do it, let's, let's begin talking about it, let's do it, and let's see if I really understand what you're saying."

Student: PCUT2

"I can't say theory is not important, but practical is, in my opinion, more important."

Radiographer: PUQ6

"To obtain the knowledge that you need by looking and by practicing book knowledge is important, but I think practical is even more important in radiography."

Radiographer: PUQ2

Qualified and community service participants emphasised the effectiveness of demonstrating radiographic procedures.

"They ask me a question and I show them how to do something. It works better than for me just to tell them how to do something"

Community service radiographer: PPCOM1

"Okay um, well, I think if you show me something rather than tell me something that ... then I will learn something. But not, I must, I must do it physically myself."

Radiographer: PUQ6

Additionally, the preference for observational learning was evident from the participants' feedback, according to the following statements:

"If someone gives me an example or if I say I'm struggling with this and this and this, and then they go and show me how to do it."

Community service radiographer: PPCOM1

"The best way I learn is to see how it is done."

Community service radiographer: PPCOM1

*"I think it's **hands-on** training. I show you what to do and how to do it."*

Radiographer: PNQ4

"Okay um, well, I think if you show me something rather than tell me something ... then I will learn something. But not, I must, I must do it physically myself."

Radiographer: PUQ6

With regard to hands-on practice and demonstrations, participants also voiced their opinion that frequent exposure to a high volume of patient interactions is crucial for skills development. Engaging with a diverse range of cases would enable participants to refine and enhance their skills through practical experience.

"So, we don't have like a lot of patients as compared to other hospitals. And even though the quality of work, you would see students that work at maybe it's a very busy hospital."

Student: PCUT2

"Um, my, you know what? Me practicing something that I ... something new, because we're always working with trauma patients, you know, we have to manipulate to get some views and all. So, me practicing it regularly and not being lazy to do patients like

they're challenging patients like that influence's my skills, actually. So, I don't just give up and say, no, I don't know this. I know I have to practice because I'm exposed to different patients with different body sizes, and also, I have to practice."

Radiographer: PPQ4

The findings of this study corresponded with the training design factor of the learning transfer conceptual framework (cf. Figure 2.2). The findings also aligned with the work of Abdullah and Suring (2011) and Hutchins (2009), who stressed the importance of effective training design in facilitating learning transfer. The participants' statements reflected the importance of learning through practice, learning through repetition and observational learning as best practice for knowledge and skills transfer in diagnostic radiography. By focusing on these training design aspects, qualified radiographers can provide better support to the students and convert theoretical knowledge to practical application in the clinical environment.

It is evident that findings substantiating this theme's discussion relate with the experiential learning theory (Kolb, 1984) and the situated cognition theory (Kirshner & Whitson, 1997). Kolb's (1984) theory posits that learning is an ongoing process that thrives on active engagement and reflection. The theme underscores the importance of practical experience in solidifying knowledge and skills. This was evident in the participants' views on the effectiveness of hands-on practice, which supported their understanding and ability to apply radiographic skills. Similarly, the situated cognition theory (Kirshner & Whitson, 1997) points out that learning is deeply embedded in the context in which it occurs, asserting that knowledge is developed through real-world activities rather than in isolation. Participants in this study underscored the importance of receiving and engaging with hands-on practical demonstrations for knowledge and skills transfer. They argued that observing tasks and physically performing them are vital for reinforcing their understanding and skills development in radiographic practice.

4.7 Focus area: Barriers to knowledge and skills transfer

This focus area highlights the barriers that obstruct the transfer of knowledge and skills between qualified radiographers and students in the clinical environment. As shown in Figure 4.7, the focus area comprises three themes: (i) communication and supervision challenges; (ii) personal and interpersonal factors; and (iii) workplace pressures and adaptation challenges.

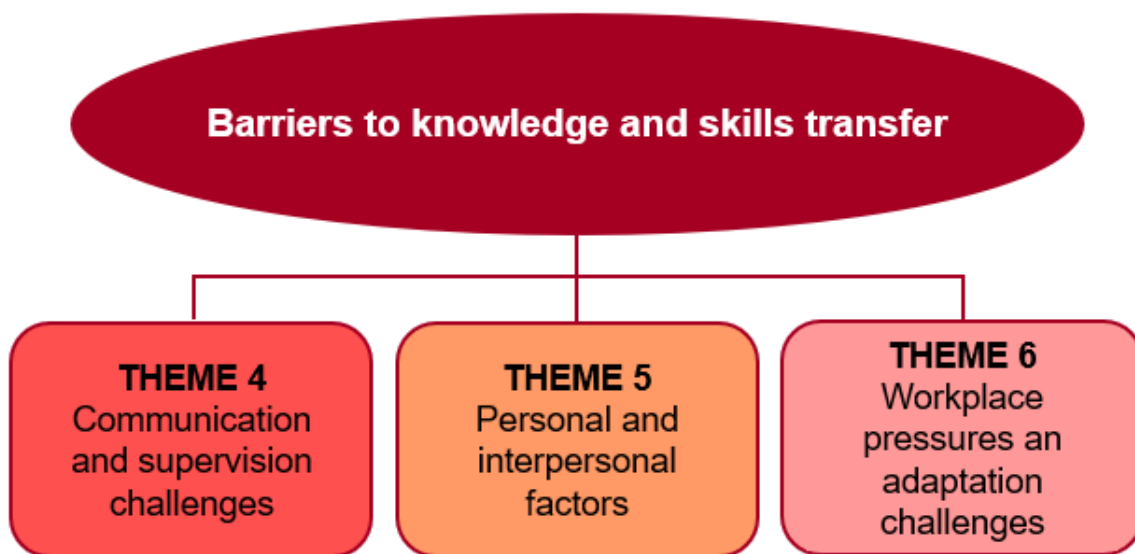


Figure 4.7. Barriers to knowledge and skills transfer between qualified and student radiographers.

4.7.1 Theme 4: Communication and supervision challenges

The theme pertaining to communication and supervision challenges emerged from the data as a critical element for knowledge and skills transfer between diagnostic radiographers and students in a clinical environment. Figure 4.8 illustrates this theme that includes five codes: (i) a lack of communication; (ii) the need for close supervision; (iii) a lack of mentoring by radiographers; (iv) separation between qualified and student radiographers; and (v) absent radiographer in imaging protocols.

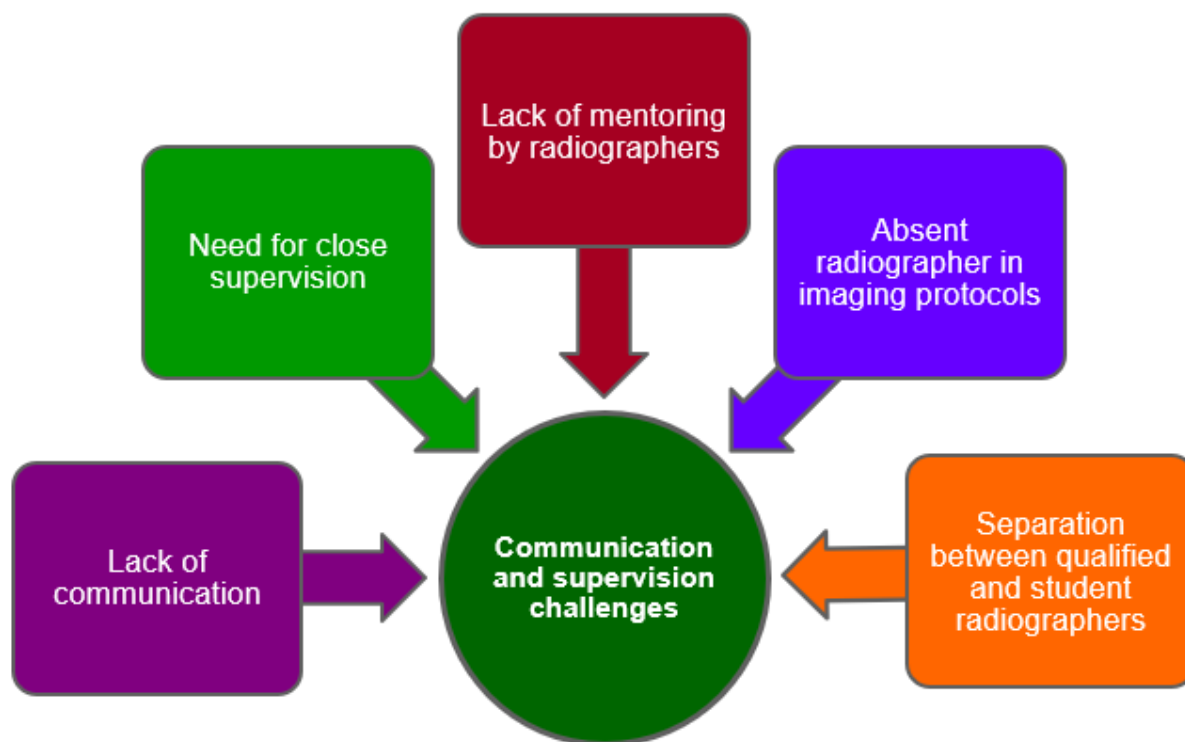


Figure 4.8. Codes identified as communication and supervision challenges.

The participants highlighted the issue of lack of communication between students and qualified radiographers in the clinical environment. As reflected by the following direct quote, a student expressed the limited interaction and communication with qualified radiographers, causing a barrier to knowledge and skills transfer.

"In Hospital B, we don't have that communication with the qualifieds, it feels like if they like you, they're going to explain something to you if you ask, but most of the time they just walk into your room and then you are in, then doing the patient and ask them to come and check the images after just stuff like that."

Student: PCUT7

This view was similar to findings reported by Jamshidi et al. (2016), who identified ineffective communication as a major obstacle in clinical education. The lack of meaningful dialogue and feedback impedes students' ability to integrate into the clinical setting and fully engage with their learning process. Additionally, a participant in the current study observed an obvious separation between qualified radiographers and students, creating a barrier to direct interaction.

Okay so I do see that there is kind of a separation between the qualifications [qualified radiographers] and the students, and especially because I'm a comm serve there's also even a separation between me and the qualified."

Community service radiographer: PPCOM1

In addition to the lack of communication and separation, a participant highlighted a need for close supervision and expressed a desire for more direct guidance and monitoring from qualified radiographers during their learning process.

"I think it's what I said working closely with one of the qualified ... and to see what they do and then to hear what they tell me and that's how I kind of like get more skills."

Student: P1SI

A qualified participant expressed a preference for one-on-one sessions over group learning environments. Such a preference pointed to the necessity of employing individualised and close supervision in students' learning process to enhance understanding and address specific learning needs. Individualised supervision allows for tailored feedback and support, fostering a more effective learning environment where students can engage deeply with the material and receive immediate clarification on concepts that may be challenging (Ritchie et al., 2021). This approach was noted by one of the qualified radiographers:

"I need like a one-on-one session. Don't come to me as ... a group bombarding me with information because I'm not going to grasp what I need to know. So, a one-on-one session actually, works best for me."

Radiographer: PPQ4

Apart from the need for close supervision, other participants highlighted insufficient mentoring by qualified radiographers, noting that students and community service radiographers lacked guidance from some qualified staff. This reluctance to mentor, perceived as "laziness" or an assumption that students should already know certain skills, might counteract learning and development, stressing the need for qualified radiographers to be more actively involved to accomplish knowledge and skills transfer.

"So, they don't work and they're also lazy to you can check for, for the images."

Student: P1SI

"I think the time, the time and the amount of people that actually want to help you, because most of the qualified doesn't really, they try to escape helping people."

Community service radiographer: PPCOM1

"So maybe, maybe the way we, we feel about educating people because most of us they don't want to help, or they feel like you should already know this. So why am I supposed to be helping you, you know, or something like that."

Community service radiographer: PPCOM1

This finding resonated with results reported by Jamshidi et al. (2016), who identified ineffective communication and insufficient preparation from clinical staff as major obstacles to achieving effective clinical education. The reluctance of some qualified radiographers to participate actively in teaching and mentoring creates a barrier to knowledge and skills transfer, highlighting the need for greater commitment and engagement from qualified radiographers to enhance the learning experience of students (Ma et al., 2018). In addition to the participants experiencing a lack of mentoring by qualified radiographers, they also observed that the diversity in techniques and teaching styles among qualified radiographers complicated the transfer of knowledge and skills. This emphasised that qualified radiographers were absent from imaging protocols and did not follow the standard practice in the clinical environment, aligning with findings by Hashemiparast et al. (2019). This inconsistency in instructional approaches might hinder students' understanding of core concepts in radiography.

"They all come with different kind of things, and I also come with what I know and, and then I can work on that based on what they're teaching me and what I take from what they teach."

Student: P1SI

"Every qualified has their own way of doing things and thinking outside of the box."

Student: PCUT2

The issue of diverse techniques and teaching styles among qualified radiographers was also reported by Rothwell et al. (2021), who identified a lack of shared understanding and inconsistent practices as barriers to effective clinical supervision. The diversity in teaching methods among radiographers can create challenges for students in assimilating knowledge and applying consistent techniques, underscoring the need for standardised approaches and clear communication to facilitate effective learning and skills development (Hashemiparast et al., 2019).

The findings corresponded with the work environment factor of the learning transfer conceptual framework (cf. Figure 2.2), as the lack of communication and separation in the workplace directly relates to the work environment's influence on learning transfer. Additionally, the need for close supervision, inactive radiographers with regard to teaching, and absent radiographers in imaging protocols touched on the training design factor of the learning transfer conceptual

framework (cf. Figure 2.2). Both factors emphasise the need for a supportive work environment and a standardised training design to facilitate effective knowledge and skills transfer in the clinical setting.

The experiential learning theory (Kolb, 1984) and the situated cognition theory (Kirshner & Whitson, 1997) provide valuable insights into the issues identified in the current study. The experiential learning theory (Kolb, 1984) emphasises that learning is an ongoing process involving active engagement in experiences and reflection. A lack of communication and limited interaction between students and qualified radiographers will handicap students' ability to engage deeply with their learning experiences, thereby affecting their reflective practice and performance improvement.

The situated cognition theory (Kirshner & Whitson, 1997) highlights that learning is contextually bound, stressing that effective knowledge transfer occurs through real-world activities and interactions. The observed separation and inconsistent communication between students and qualified radiographers reflect a mismatch between the theoretical and practical aspects of learning, which can impede the integration of academic knowledge into clinical practice. Also, the need for close supervision and individualised attention blends in with the experiential learning theory (Kolb, 1984), which emphasises active participation and customised learning experiences. The different teaching methods and styles among radiographers highlight the significance of consistent and relevant instruction, which is supported by the situated cognition theory (Kirshner & Whitson, 1997). Both theories collectively support the need for improved communication, consistent practices, and personalised guidance to improve the learning environment and facilitate effective knowledge and skills transfer.

4.7.2 Theme 5: Personal and interpersonal factors

Theme 5 explored the personal and interpersonal factors that influence the transfer of knowledge and skills between qualified and student radiographers. This theme is fundamental in understanding how personal and interpersonal factors negatively affect knowledge and skills transfer in the clinical environment. Figure 4.9 illustrates the various personal and interpersonal factors. Personal and interpersonal factors include (i) the differences between qualified radiographers' personalities; (ii) the student's mental health; and (iii) a lack of passion.

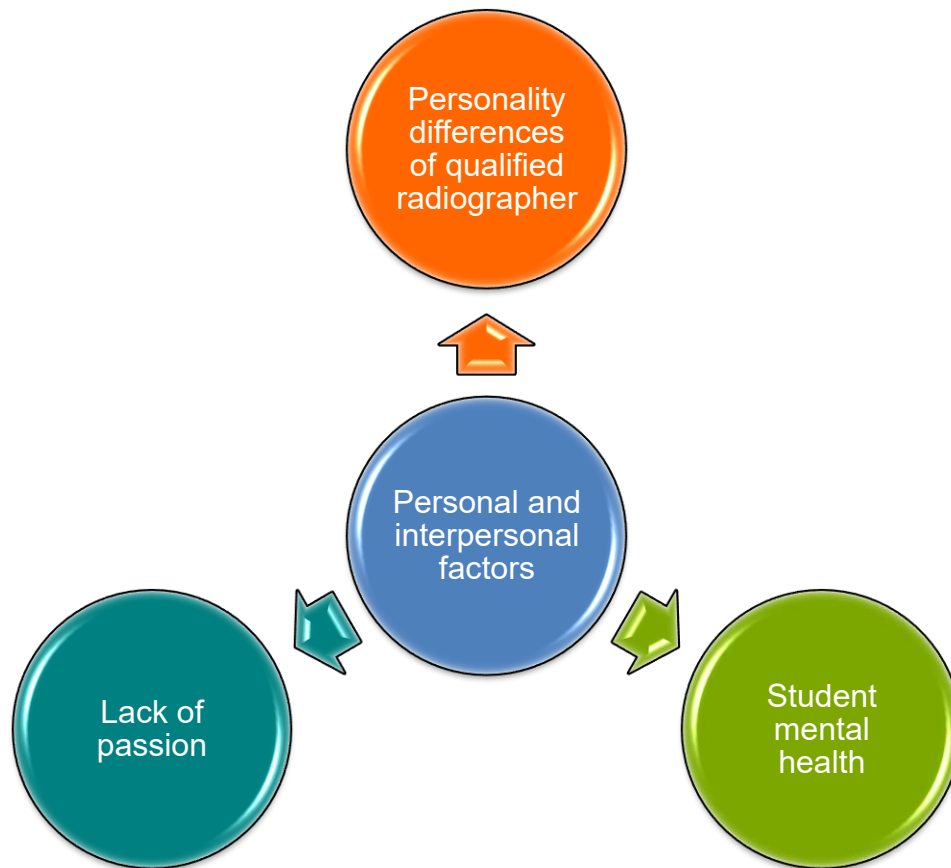


Figure 4.9. The personal and interpersonal factors acting as barriers to knowledge and skills transfer.

The influence of qualified radiographers' personality traits on students' learning experiences can be significant. A participant noted that working with qualified radiographers who displayed varying temperaments and behaviours could affect the learning environment. This, in turn, might impact their ability to effectively acquire knowledge and skills.

"Um, it would depend on someone who is working with me. Like, like I said before, the character and the way he's doing things. Um, I'm not sure if I'm explaining it well, but the character of the person."

Community service radiographer: PPCOM2

"But sometimes you work with an aggressive person, or you don't know what's going on."

Community service radiographer: PPCOM2

Following the influence of qualified radiographers' personality traits, the same participant highlighted that a lack of passion among some qualified radiographers created barriers to

engagement and collaboration. They suggest that genuine passion is essential for fostering meaningful connections and enhancing teamwork in the radiography team.

"I mean, like if we can actually stick to, so what can I say? Um, if we can actually stick to what we are here for, it will make everything easier. For example, why I'm saying that, um, some people will be just here because actually the passion, some people will be here, but they won't actually do anything. And it creates some parallel between, um, students and qualified and us comm serves.

Community service radiographer: PPCOM2

A participant highlighted the significant impact of mental health status and social challenges on student radiographers' learning, particularly in the wake of the COVID-19 pandemic.

"So, our students, they are also having so many psychological things that they have to deal with, as well as social issues that they have to deal with because there are so many social ills also nowadays that we didn't experience. Those, that we don't know what our students are going through, especially after the COVID pandemic as well."

Radiographer: PNQ4

The findings of this study corresponded with the trainee characteristic factor of the learning transfer conceptual framework (cf. Figure 2.2). Previous research provides support by highlighting the impact of trainee characteristics on the effectiveness of learning transfer (Baldwin et al., 2009). Moghimi et al. (2023) shed light on the mental health challenges faced by post-secondary students, emphasising the necessity of addressing these issues to enhance their academic experiences. The current research findings aligned with this view, where participants highlighted the significant impact of mental health and social challenges on student radiographers' learning, particularly in the aftermath of the COVID-19 pandemic. The connection between mental well-being and the ability to transfer knowledge and skills is critical; as students navigate psychological pressures and social issues, their motivation and self-efficacy can diminish, impeding effective learning transfer (Burke & Hutchins, 2007; Tai, 2006).

4.7.3 Theme 6: Workplace pressures and adaptation challenges

Theme 6 explored the workplace pressures and adaptation challenges that affect knowledge and skills transfer between qualified and student radiographers. Figure 4.10 illustrates the pressures and challenges experienced in the workplace, including (i) the practice being short-staffed; (ii) overworked community service and student radiographers; (iii) workload; (iv) disagreements between students and qualified radiographers regarding university teaching approaches versus clinical environment teaching approaches; and (v) changes in technology.

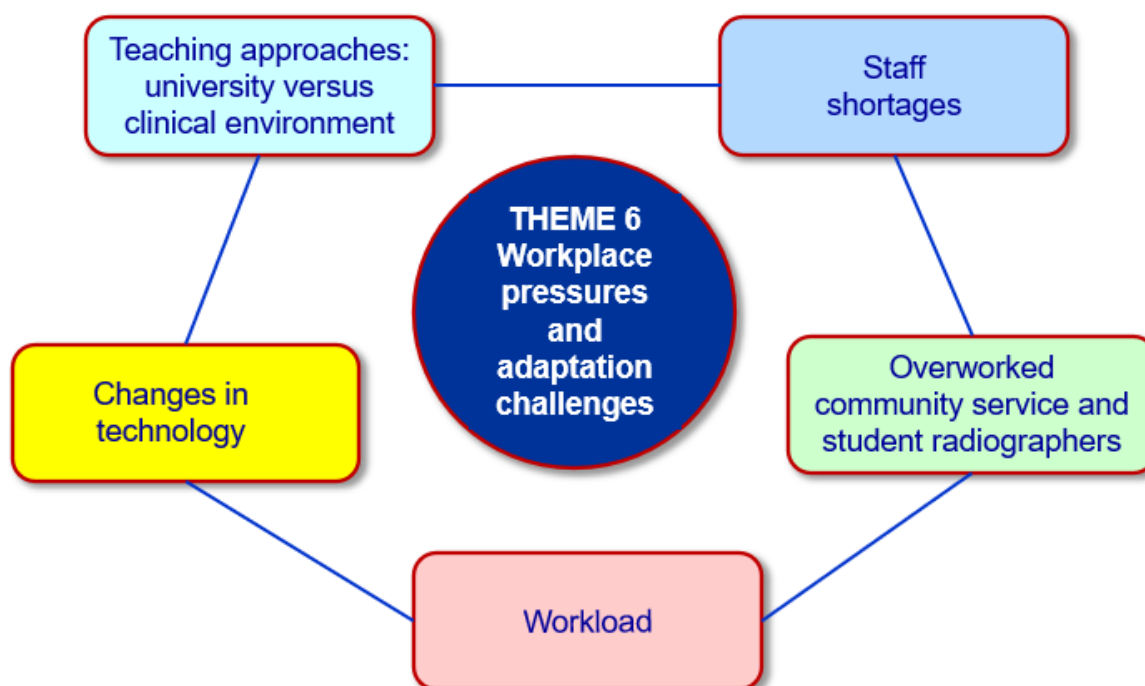


Figure 4.10. Workplace pressures and **adaptation** challenges.

The observation highlighted how staff shortages adversely affect the transfer of knowledge and skills between qualified radiographers and students. With fewer staff available, there may be **fewer** opportunity for students to receive adequate supervision and guidance. This could potentially impact their learning experience and the transfer of essential skills in the clinical environment.

"what I've noticed is when I'm working there's a shortage of staff, and then, um, that affects ... the relationship between radiographers and students."

Student: P1SI

The participants highlighted the issue of overworked students and community service radiographers, which was linked to staff shortages. According to the students and community service radiographers, this imbalance in workload was caused by qualified radiographers not fulfilling their duties. This situation highlighted the importance of addressing workload distribution issues to ensure a fair and manageable workload for all staff members.

*"The comm serves are also struggling from because of the other one [qualified radiographer]. We'll be doing a lot of work because ... the seniors **will not be** doing work."*

Student: P1SI

"So, um, I would be asked to do most of the stuff because the qualified I am still, and because I'm a comm serve."

Community service radiographer: PPCOM1

Additionally, a study participant highlighted how heavy workloads could impair the transfer of knowledge and skills in the clinical environment. When radiographers are overwhelmed with patients, they may not have sufficient time to mentor students effectively or explain procedures in detail. As a result, there is a risk of information being conveyed hurriedly to students that could negatively impact the quality of knowledge and skills transfer.

"There can also be an influence is quite sometimes. Sometimes you don't even have time to quickly show someone how to do something. There would be like twenty patients waiting for you. Then you must just be like, okay we're quickly going to do it like this, and you can't explain in detail why you are doing what you are doing. And I think, yes, that makes a difference as well, because as I am a community service, I do have the degree and I do know what to do, but whenever we are so busy, I would quickly do it. And then it's correct. So, I don't really want to explain to the students why I did what I did."

Community service radiographer: PPCOM1

Rothwell et al. (2021) found that a shortage of time and space, often a direct result of staffing shortages, is a significant barrier to effective clinical supervision. This limitation impairs the ability of supervisors to provide adequate support, which in turn affects the quality of learning and the transfer of knowledge and skills. Zamaniahari et al. (2023) identified insufficient resources and support as critical barriers to effective knowledge transfer. The current study's findings aligned with the literature on the impact of staff shortages, where excessive workloads lead to rushed radiographic procedures. As a result, there is little time for effective knowledge and skills transfer. Students and community service radiographers become overworked, which in turn influences their ability to concentrate, further impeding the transfer process.

Unique to this theme, a participant expressed that there was a disagreement between students and qualified radiographers on certain radiographic positioning techniques, stemming from differences in teaching approaches between the university and clinical environments. This view of the qualified participant portrays the importance of practical adaptability of students in the clinical environment. Furthermore, the participant underscored the significance of learning from experienced qualified radiographers in navigating real-world scenarios. The participant advocated for a collaborative approach to knowledge acquisition in the workplace.

"Like the other time the students came to me and said we're going to do the lateral skull, but he said no, at University A they told them that they should do the lateral skull like you do the lateral neck with the one fifty SID. Even if the patient can't, we can't do that if the patient can't do anything. But if the patient can turn the head and put the head next to the bucky, why not? Why should you do it like you do? As if it's a trauma patient there's some of the things that they — I don't think now, at the moment we, they turn to the way they teach, the way we teach. Sometimes it's different."

Radiographer: PUQ8

"Saying our lecturer said this, but not knowing that this other qualified has been qualified for so many years. They know the other tricks of doing some other things that the lecturers didn't teach them, so they should learn from us, even though they were taught maybe specific, specific positioning ... there are times when you can't do that position. They should listen to the qualifieds more at work."

Radiographer: PUQ8

The findings by Hashemiparast et al. (2019) resonate with the findings of the current study by highlighting the challenges students face when theoretical knowledge from their university education conflicts with non-standard practices observed in the clinical environment. This may be the case in particular when students experience a disconnection between the techniques taught in the classroom and the methods practised in the clinical environment (Factor et al., 2017). Furthermore, such discrepancies force students to adapt to unconventional practices, which could undermine their confidence and make it difficult for them to apply their academic knowledge effectively (Hashemiparast et al., 2019).

The same participant further expressed the necessity for radiographers to evolve with modern practices and technologies in the field. As radiography continues to advance, there is a shift towards new techniques and procedures, warranting continuous learning and adaptation (Bwanga, 2020). Due to the dynamic nature of the profession, the participants were of the opinion that qualified radiographers should stay updated with industry trends to ensure the effective transfer of knowledge and skills to students.

"The skills development at work. Seeing that radiography is evolving. Oh, since that is evolving there are new things that have been done. There are new things that have been done because you copy from the other, the other places, like you can see now, we don't do the barium clisma and other countries that don't do clisma this anymore so I think even as we should go that way, do the other things instead of doing that, to do the CT colonography instead of doing the clisma as an example."

Radiographer: PUQ8

"Um, the techniques I've been taught, um, changed. And radiography is a changing career and especially orthopaedics you know, to get a beautiful lateral shoulder angle fifteen degrees down."

Radiographer: PUQ2

The study's findings aligned with the work environment factor of the learning transfer conceptual framework (cf. Figure 2.2). The impacts of staff shortages, workload imbalances and overworked students and community service radiographers relate directly to the work environment's influence on learning transfer. Additionally, the disagreement between university teaching and the clinical environment, and the need to evolve with modern times, touches on the training design factor of the learning transfer conceptual framework (cf. Figure 2.2), highlighting the importance of aligning training with real work conditions to ensure that students can effectively apply theoretical knowledge in practice. Furthermore, the disagreement between university teaching and the clinical environment can also be viewed as the learning spaces factor of the learning transfer conceptual framework. The differences between these spaces can affect the way students connect theoretical knowledge to practical application, suggesting a need for better integration and alignment between academic curricula and clinical practice. These factors emphasise the need for a supportive work environment and realistic training design to facilitate effective knowledge and skills transfer in the clinical environment.

The theme's findings on workplace pressures and adaptation challenges highlighted how workload imbalances, being short-staffed and changes in radiographic technology directly impact the transfer of knowledge and skills between radiographers and students. It can be understood through the lens of the experiential learning theory (Kolb, 1984) and situated cognition theory (Kirshner & Whitson, 1997). The experiential learning theory (Kolb, 1984) emphasises that learning is compromised when students face insufficient supervision or are overworked, as these conditions limit their ability to fully engage in reflective practice. The situated cognition theory (Kirshner & Whitson, 1997), on the other hand, underscores the importance of context in learning, suggesting that the real-world environment of the clinical setting, shaped by factors such as staff shortages and workload pressures, deeply influences how knowledge is acquired and applied. The discrepancy between university and clinical environment teaching approaches further illustrates the significance of contextual learning, where students must adapt theoretical knowledge to the realities of their profession. As radiography continues to evolve with new techniques and technologies, both theories support the need for continuous learning and adaptation, highlighting the dynamic nature of knowledge and skills transfer in this field (Bwanga, 2020).

4.8 Focus area: Solutions for knowledge and skills transfer

The next focus area emerged from the data based on the perspectives of the participants on possible solutions for knowledge and skills transfer between diagnostic radiographers and students. This focus area suggests solutions to overcome the barriers identified in the current study. Figure 4.11 illustrates the two identified themes: (i) professional development and engagement; and (ii) student placement strategies.

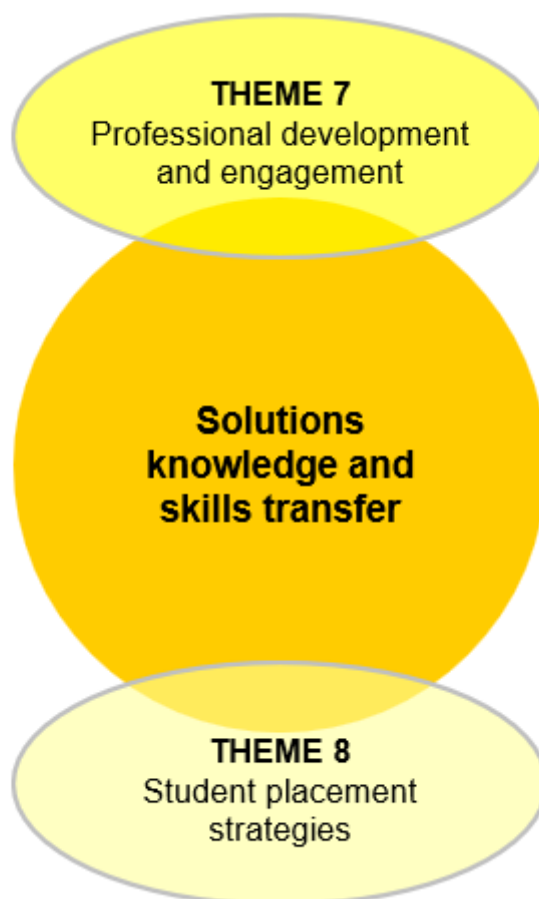


Figure 4.11. Solutions to address barriers to knowledge and skills transfer.

4.8.1 Theme 7: Professional development and engagement

The theme on professional development and engagement focuses on the essential strategies for enhancing professional growth and interaction between students and qualified radiographers in the clinical environment. Figure 4.12 illustrates these strategies. The theme emphasises (i) the importance of training in mentoring; (ii) using seminars to enhance skills; (iii) encouraging active participation from both qualified professionals and students; (iv) implementing initiatives to close the gap between qualified professionals and students; and (v) having introduction sessions for student radiographers in the clinical environment.

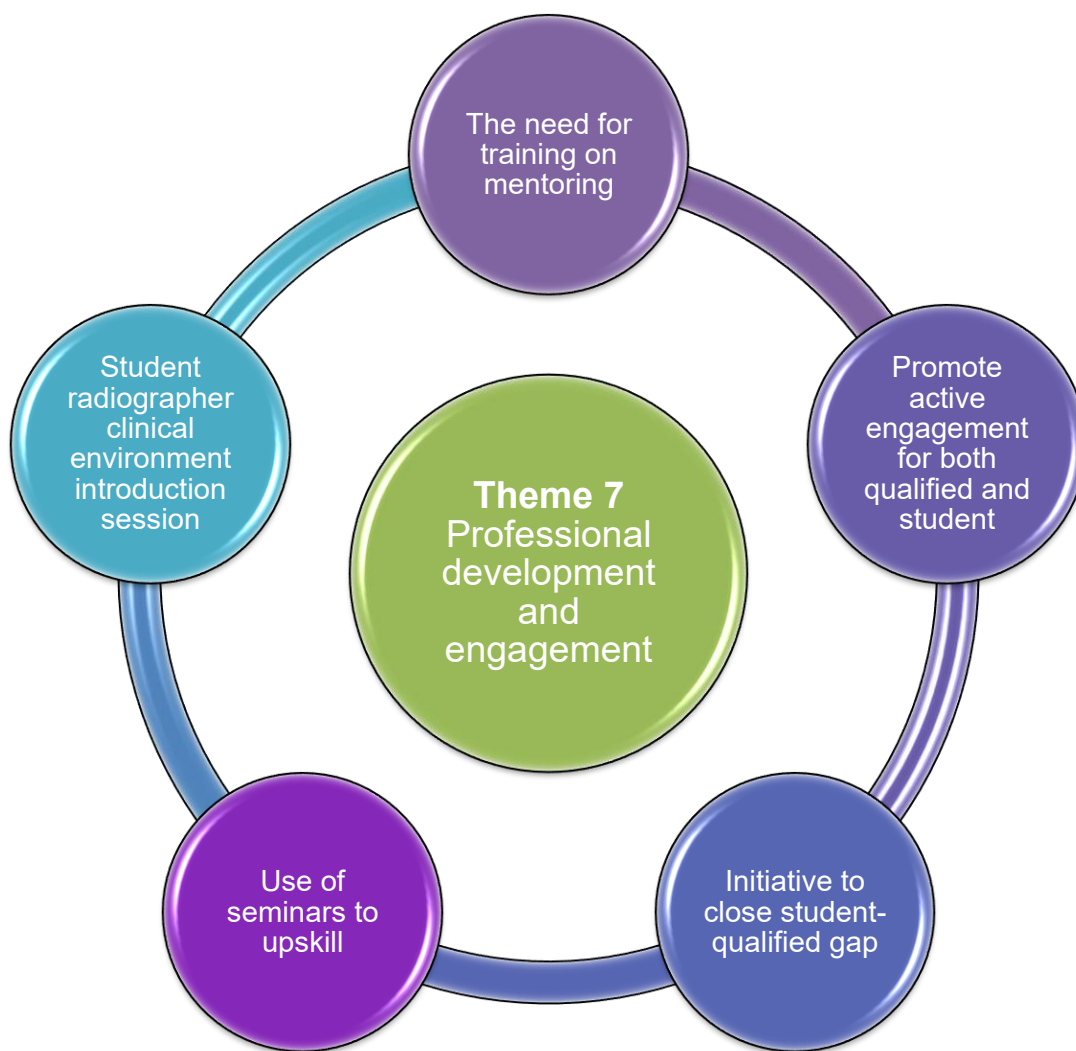


Figure 4.12. Professional development and engagement.

A student participant advocated for comprehensive training for radiographers on mentoring techniques, emphasising the necessity of equipping all radiographers with the skills necessary to effectively supervise students. The participant proposed that reputable organisations, such as the HPCSA, should provide training to ensure radiographers are adequately prepared to supervise and mentor students throughout their study period.

"And also, if we also can have a training for radiographers all of them, not just our coordinator focusing on students, radiographers should have a training run from HPCSA or something where they can train them now and then how to supervise students and how to be present for, for the period of study."

Student: P1SI

Building on the theme of professional development, another participant highlighted that seminars could be a valuable tool for advancing one's skills ("upskilling") in the radiography

profession. This perspective aligned with the emphasis on continuous professional development. The participant described a practice of reviewing images and discussing them in the morning before work, highlighting the importance of continuous learning and staying updated on new techniques, particularly through explanations provided by experts, such as orthopaedic surgeons, during seminars.

"At the moment, the knowledge that we need is to do those seminars, and what we used to do is, um, what do we call it? We'll have the seminar, but we'll do the images, and then we'll come and discuss them in the morning, usually before we start with our work. And if somebody comes with another way of doing things, like the orthopaedic surgeon, they will come every time they come with new things; I think it's better for them to come and explain, explaining what they want—that's how I need to learn."

Radiographer: PUQ8

One participant also stressed the importance of closing the social stance gap between students and qualified radiographers. This call for action suggests a need for qualified radiographers to foster understanding and discipline while providing students with opportunities to grow. Additionally, the participant highlighted the need for qualified radiographers to acknowledge the differences among students and respect their rights, which were safeguarded by previous generations.

"So, if we can just try and close that gap that is between students and qualified and try to understand more, and also if you reprimand the students, that it should be in a way where you instil discipline not to the person but to the way that they are doing things so that we cannot let them just get away with things due to your discipline and the concepts as well, to also give them during that year, give them a room to grow."

Radiographer: PNQ4

"I think what we should do is, as radiographers, we must look at the gap between us and the students and even the generational gap that they are, because our students, they are having so many rights, but when you look at it, it's because we also fought for the rights that the students are having."

Radiographer: PNQ4

Lastly, a community service participant suggested the need to introduce all groups within the clinical environment at the start of the year. This suggestion reflected an understanding of the importance of exposure to diverse teaching styles for students' learning experiences. By rotating between different qualified radiographers, students could become acquainted with

various teaching styles and foster relationships with each member of the team that might enhance their knowledge and skills transfer experience.

"A suggestion I would say is to, like in the beginning of the year, to just introduce ourselves nicely to all groups, because sometimes we get like a first-year group first and then a second and then a third, and then you are like in March. So, when it's your first time with a group of students, they must just tell us so that we can introduce. We and they can introduce themselves. And yeah, I would say working one-on-one more, because some students go to some qualified and vice versa. They like working. So, I feel like getting to know, rotating between qualified and getting to know everyone."

Community service radiographer: PCOMN1

Baldwin and Ford's (1988) learning transfer model emphasises the importance of a supportive work environment for facilitating learning transfer. The suggestions provided, such as mentoring training for radiographers and the use of seminars for continuous professional development, align with this model. By fostering a supportive environment where qualified radiographers are equipped with mentoring training, it is possible to transfer knowledge and skills more effectively. Additionally, regular seminars for professional development will keep radiographers updated on new techniques, possibly addressing the barrier to changes in technology. Promoting joint activities between students and qualified radiographers, such as collaborative image evaluations, will address the barriers created by communication and supervision challenges, thereby facilitating the transfer of knowledge and skills.

Furthermore, Holton et al.'s (2000) model reinforces the importance of feedback, peer and supervisor support, and the acceptance of change in enhancing learning transfer. The suggestion to rotate students among different qualified radiographers to expose them to diverse teaching styles highlights the importance of social and supervisory support in creating a positive learning environment. Finally, structured orientation sessions at the start of each academic year will ensure clear communication of expectations and foster familiarity.

4.8.2 Theme 8: Student placement strategies

This theme was identified and informed by the participants' perspectives that offered solutions to overcome the barriers identified in the study. Figure 4.13 illustrates (i) the need for more clinical training sites; and (ii) limiting the number of student placements in hospitals.

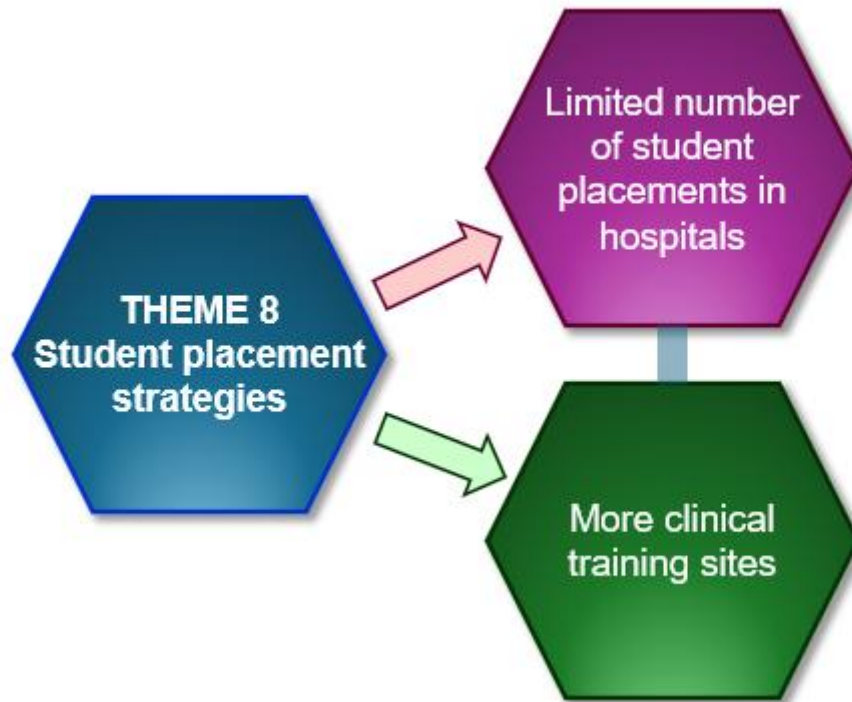


Figure 4.13. Student placement strategies.

A solution proposed by a participant was to limit the number of student placements in hospitals. The participant suggested that a smaller number of students per hospital could lead to improved engagement and supervision by qualified radiographers.

" I believe that most qualified don't know the students, what they are lacking so if we are a limited number where they can manage it, it's going to be way better."

Student: P1SI

In addition to limiting the number of students in the clinical environment, the participant also suggested the need for more clinical training sites to distribute students across different facilities to alleviate the strain on current academic hospitals.

"More hospitals, accredited hospital, so that students will be placed in different hospitals, then there will be less number of students for one hospital, so that qualified can be able to engage with students."

Student: P1SI

Baldwin and Ford's (1988) learning transfer model emphasises the importance of a supportive work environment in facilitating learning transfer. By reducing the number of students per hospital, the environment would become less crowded, and could lead to personalised attention, feedback and support from supervisors and peers (Ma et al., 2018). Moreover, the

Holton et al. (2000) model underscores the significance of feedback, peer and supervisor support and acceptance of change, all of which could improve as the student-to-qualified ratio decreases. Furthermore, it is possible that these suggestions expressed by the participants could also overcome the barrier posed by the need for close supervision that the participants expressed.

4.9 Conclusion

In this chapter, the researcher presented the findings, highlighting the identified codes that formulated the three focus areas and eight themes. These findings were analysed using the reflexive thematic analysis method outlined in Chapter 3, Section 3.8.4. Through this systematic analysis, an understanding of knowledge and skills transfer among diagnostic radiographers and students in the clinical environment has been attained. The next chapter presents the study's contribution in the format of an infographic developed to increase awareness among radiographers and students. The infographic visually communicates the barriers, enablers, and possible solutions related to knowledge and skills transfer, consequently translating the findings from this chapter.

CHAPTER 5

CONTRIBUTION OF THE STUDY

"To know that we know what we know, and to know that we do not know what we do not know, that is true knowledge."

Nicolaus Copernicus

5.1 Introduction

This chapter shares an infographic created to address Objective III of the study (Chapter 1, section 1.5.2) regarding the development of an infographic to raise awareness among diagnostic radiographers and students about the factors that influence knowledge and skills in the clinical environment. The chapter commences with an overview of the purpose of infographics. Compiled by the researcher, Figures 5.4, 5.5 and 5.6 are presented in this chapter to illustrate how the research findings **connect** to the conceptual framework (cf. Figure 2.2) adopted for the study. Figure 5.3 portrays the infographic developed by the researcher.

5.2 Purpose of infographics

Infographics are tools for visually communicating complex information in a dynamic and engaging manner. Infographics combine design, data visualisation and storytelling to present information in an eye-catching format. By simplifying complex concepts, they make information more accessible to a wider audience. This approach promotes transformation of data into graphics that are both compelling and easy to understand (Basco, 2020).

Infographics are particularly effective in capturing attention and enhancing comprehension. They facilitate the retention and recall of information by presenting key concepts in a clear, simplified and visually engaging format (Yarbrough, 2019). Previous studies have underscored the increasing use of infographics in research and health communication, with these tools reaching a broad spectrum of knowledge users, including health practitioners, students and decision-makers (Crick & Hartling, 2015; Occa & Suggs, 2016). Infographics are widely disseminated through scientific journals and on social media platforms such as X (previously Twitter), Facebook, LinkedIn and Instagram, thus demonstrating their accessibility and versatility in various contexts.

The outcome of this study was to employ an infographic to communicate the barriers, enablers and possible solutions to knowledge and skills transfer among diagnostic radiographers and students derived from the semi-structured interviews and shared in Chapter 4. The purpose of the infographic was to raise awareness in the radiography department about the transfer of

knowledge and skills between diagnostic radiographers and students. The infographic's visual representation aimed to create a deeper understanding of the factors influencing knowledge and skills transfer.

5.2.1 Design of the infographic

Effective infographic design is crucial for enhancing comprehension and engagement (Basco, 2020). Factors such as layout, colour scheme, typography and visual elements play a vital role in creating visually appealing and informative infographics. Based on the principles outlined by Bicen & Beheshti (2017), design elements are analysed to understand their impact on information communication.

The infographic was designed on an A2 size page (420 x 594 mm) to illustrate the enablers, barriers and possible solutions to knowledge and skills transfer identified by participants. It features vibrant colours and captivating typography, making each element visually appealing. The design highlights factors influencing knowledge and skills transfer among diagnostic radiographers and students in the clinical environment.

As illustrated in Figure 5.3, a green background has been used to highlight enablers and their role in enhancing knowledge and skills transfer. A red background symbolises barriers and their obstructive nature, while a yellow background represents solutions and emphasises potential improvements. Each focus area with its themes and corresponding codes are illustrated in Figures 5.4, 5.5 and 5.6. The infographic enhances understanding and promotes awareness of the factors influencing knowledge and skills transfer in diagnostic radiography by accompanying each factor with a visual picture.

For example, Figure 5.1 visually represents the current study's finding of a disagreement between teaching approaches in the clinical environment and university setting by using an air bubble with a thumbs up from one individual and a thumbs down from the other. This depiction aligns with the current study's findings, where participants highlighted differences, for example, in radiographic positioning techniques, and the resulting tension between theoretical teaching and practical application. In Figure 5.2, the image of individuals holding hands with a visible gap between them symbolises the social stance divide between qualified radiographers and students, as described by the participants. This image resonates with the expressed need to bridge the gap in social stance perspectives.



Figure 5.1. University teaching approaches versus clinical environment teaching approaches.



Figure 5.2. Initiatives to close the gap between qualified radiographers and students.



KNOWLEDGE & SKILLS TRANSFER AMONGST DIAGNOSTIC RADIOGRAPHERS & STUDENTS

ENABLERS

SAFE & CONDUCTIVE WORKING ENVIRONMENT



Active support



Safe space for
teaching & learning



Respectful working
environment

PERSONAL ATTRIBUTES



Eager to learn



Self learning



Seek advice



Approachable



Guidance



Wanting to
teach others

PREFERRED METHODS FOR LEARNING



Learning through
practice



Learning through
repetition



Observational learning

STUDENT PLACEMENT STRATEGIES



More clinical
training sites



Limited number of
student placement

PROFESSIONAL DEVELOPMENT & ENGAGEMENT



Promote active
engagement for
qualified & student



Use of seminars
to upskill



Need for training
on mentoring



Initiative to close
qualified-student gap



Radiographer student
clinical environment
introduction sessions

SOLUTIONS

BARRIERS

COMMUNICATION AND SUPERVISION CHALLENGES



Separation between
qualified & student
radiographers



Need for close
supervision



Lack of mentoring
by radiographer



Lack of
communication



Absent radiographer
imaging protocol

PERSONAL AND INTERPERSONAL FACTORS



Personality differences
of qualified radiographer



Student mental
health



Lack of passion

WORKPLACE PRESSURES AND ADAPTATION CHALLENGES



Changes in
technology



Workload



Short staffed



Overworked staff



Differences in teaching
approaches by university
& clinical environment

Figure 5.3. Infographic developed from the research findings.

5.3 Conceptual framework and the infographic

The conceptual framework (cf. Chapter 2, Figure 2.2) adopted in this study informed the creation of Figures 5.4, 5.5 and 5.6. These figures were benchmarked against the key learning transfer factors, with Figure 5.4 identifying the enablers of knowledge and skills transfer (trainee characteristics, work environment and training design), and Figure 5.5 focusing on the barriers to knowledge and skills transfer, incorporating the four factors identified by the participants as obstacles to learning transfer (learning spaces, trainee characteristics, training design and work environment).

The structure revolves around two primary focus areas: those that facilitate the transfer of knowledge and skills, and those impeding such transfer. Specific themes, derived from the current study's findings (cf. Chapter 4, section 4.5, Figure 4.1), formed each focus area. Furthermore, the study found possible solutions presented in Figure 5.6 to address barriers experienced by diagnostic radiographers and students in terms of knowledge and skills transfer. The three figures below were used to develop the infographic (Chapter 1, section 1.5.2, objective III) alongside Figure 4.1 (cf. Chapter 4, section 4.5 illustrating the interconnected focus areas and themes identified from the interview data).

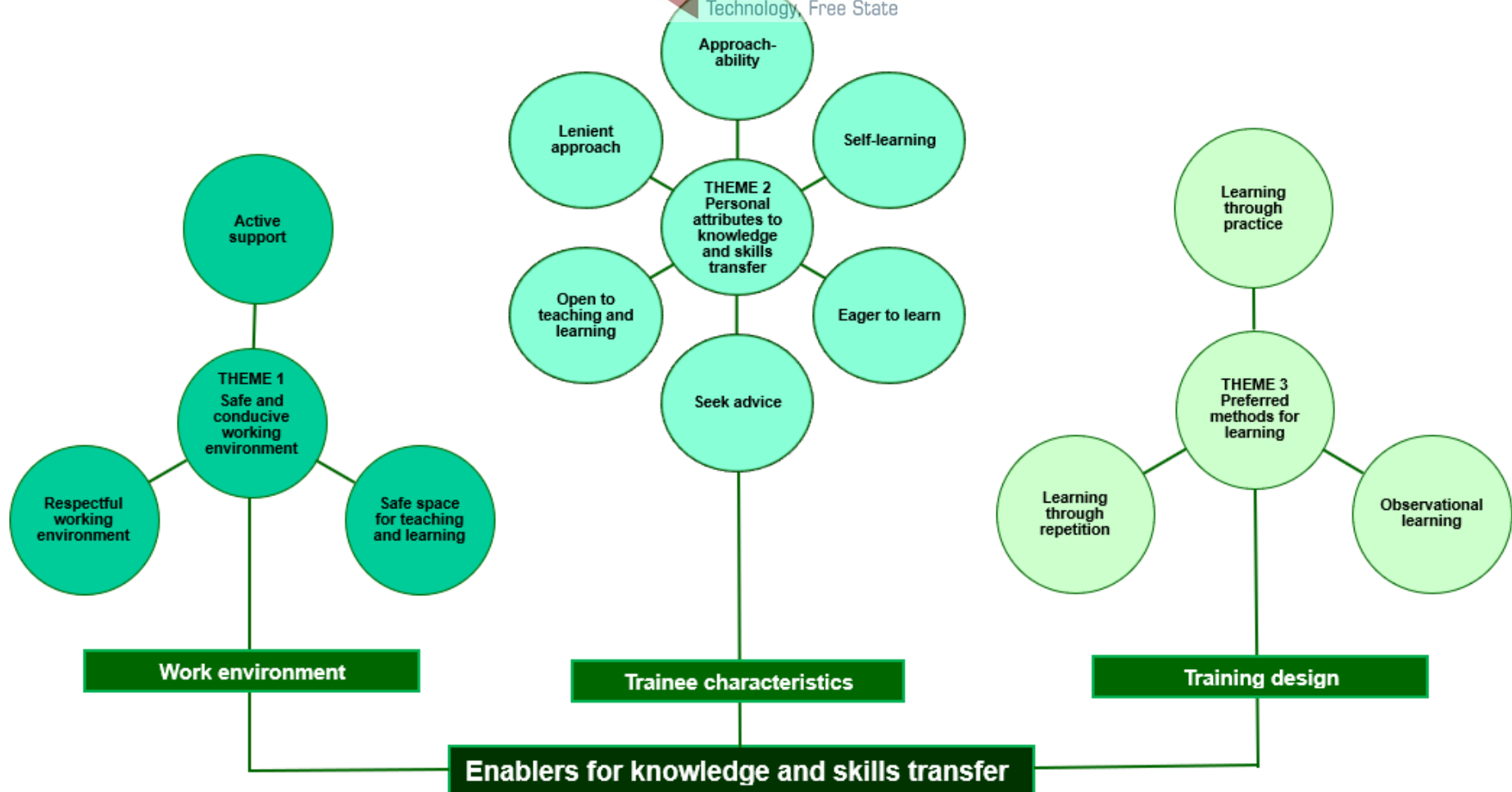


Figure 5.4. Enablers for knowledge and skills transfer.

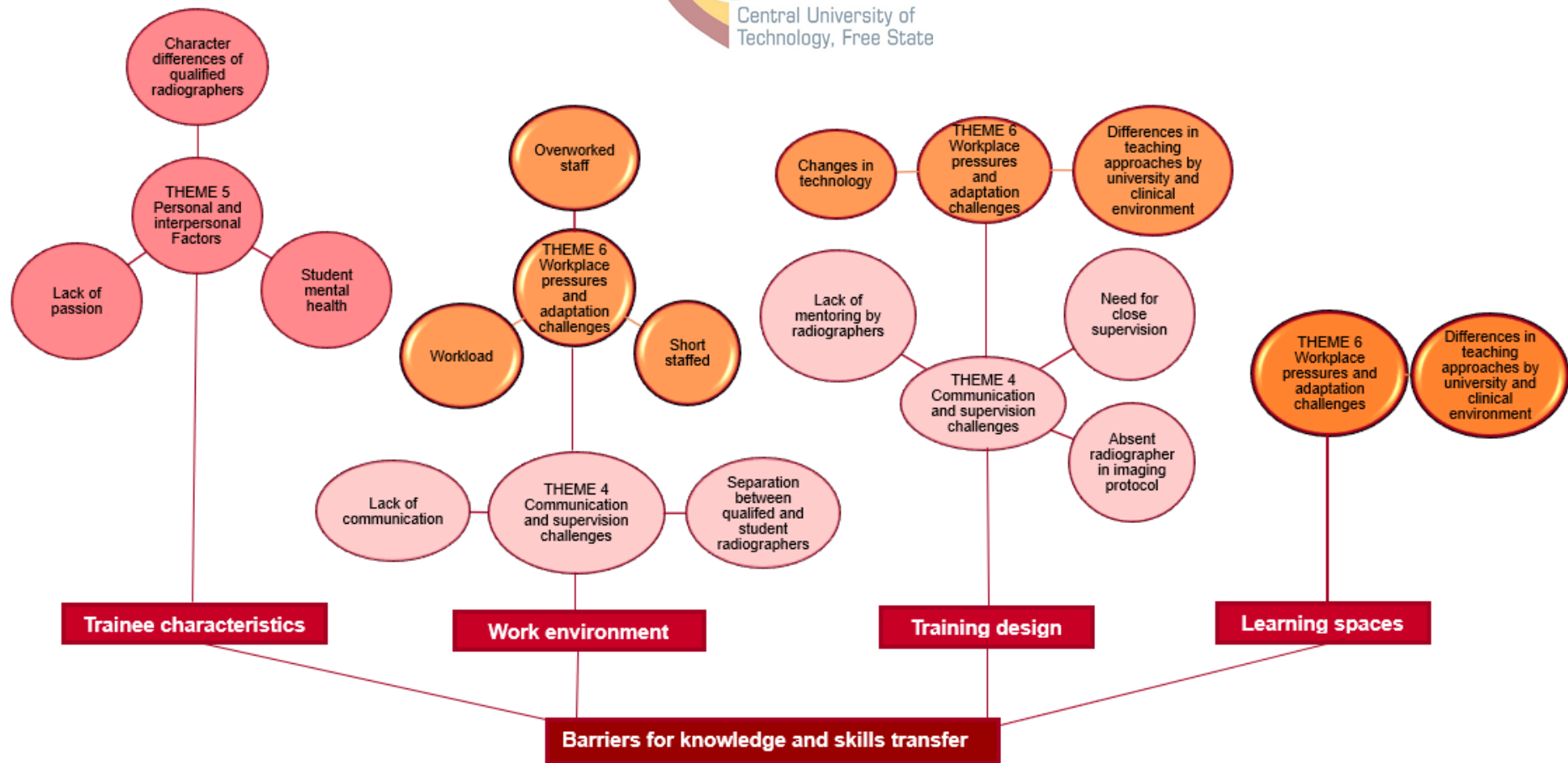


Figure 5.5. Barriers to knowledge and skills transfer.

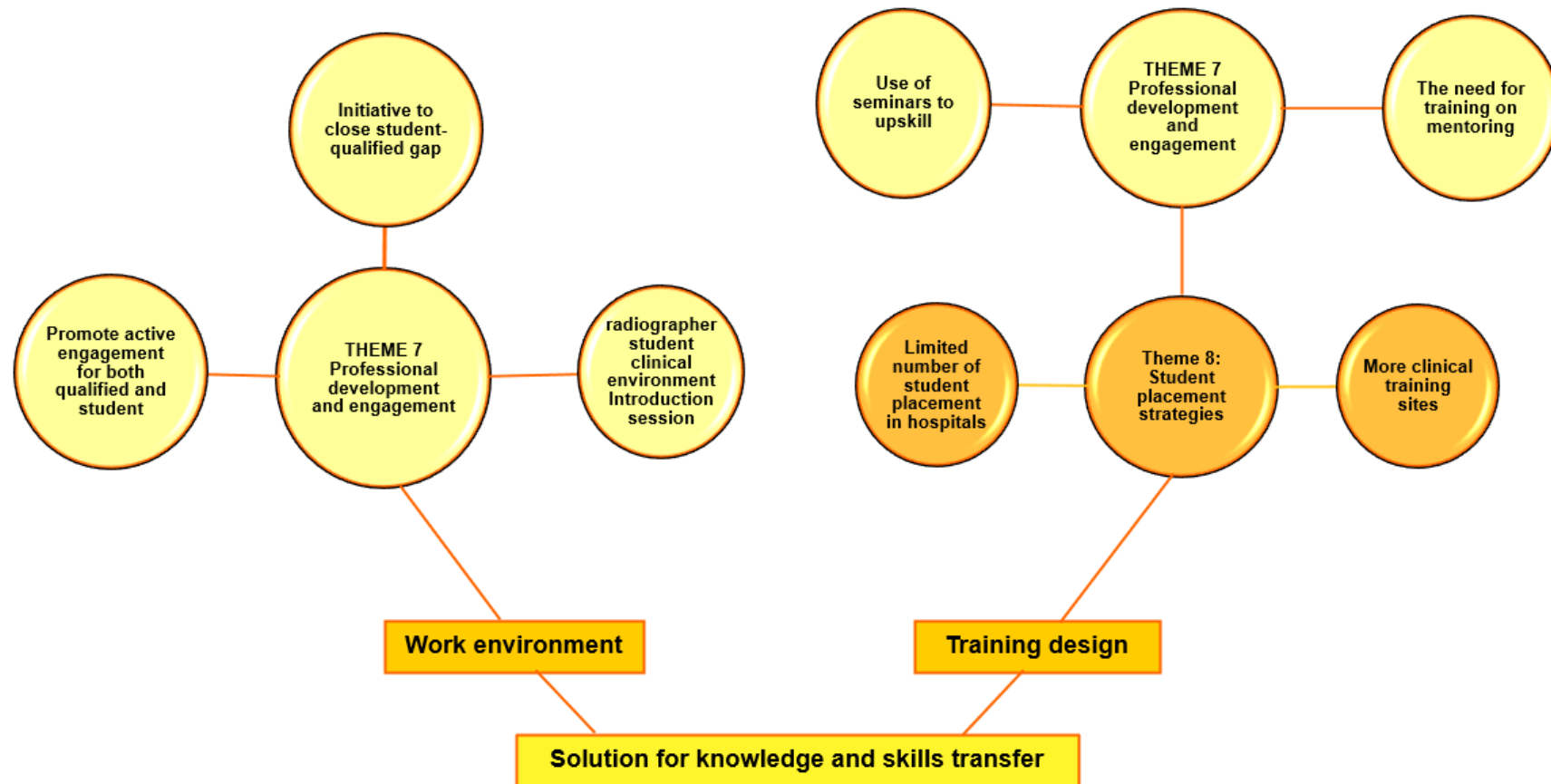


Figure 5.6. Solutions for knowledge and skills transfer.

5.4 Distribution of the infographic

The infographic was distributed on 5 November 2024 to the three hospitals that participated in the study. The assistant directors of radiography at these hospitals displayed the infographic in hallways and near the student tearoom, as shown in Figure 5.7. Additionally, the researcher shared the infographic with all participants via email to ensure wider access to the visual summary of findings. Although the infographic was intended to raise awareness, collecting and analysing feedback on its impact and effectiveness fell outside the scope of this study.



Figure 5.7. Distribution of the infographic (photographed by the research supervisor).

5.5 Conclusion

Chapter 5 highlighted the overview of the purpose of the infographic as a tool for data visualisation and communication. By combining effective design principles, compelling content, and strategic distribution strategies, infographics can effectively convey complex information to audiences, thereby enhancing understanding and engagement. The infographic in this study disseminated complex information by visually representing the factors influencing knowledge and skills transfer between qualified radiographers and students into easily comprehensible visual elements. In Chapter 6, the researcher presents the conclusion, limitations and recommendations for future research based on the study's findings.

CHAPTER 6

CONCLUSIONS, RECOMMENDATIONS AND LIMITATIONS

"Knowledge is the eye of desire and can become the pilot of the soul."

Will Durant

6.1 Introduction

In this chapter, a summary of the study's findings is provided, addressing the research question and objectives. Furthermore, the chapter presents the conclusion, recommendations and the limitations of the study.

6.2 Summary of findings

Discussions with colleagues identified a gap in existing research, which sparked the researcher's interest in further exploring the transfer of knowledge and skills among diagnostic radiographers and students in clinical environments. The researcher's personal passion for teaching in the clinical setting further fuelled this interest. To describe and explore the factors influencing knowledge and skills transfer, the researcher felt a strong motivation to delve deeper into this area. After conducting a literature review, it became apparent that there was a notable lack of evidence on this topic in the context of diagnostic radiography in South Africa. Consequently, the primary aim of this study was to investigate the experiences of diagnostic radiographers and students regarding the transfer of knowledge and skills between them.

The findings were grouped into three key focus areas: enablers for knowledge and skills transfer, barriers to knowledge and skills transfer, and possible solutions to overcome barriers experienced with knowledge and skills transfer. In Chapter 4, section 4.5, Figure 4.1 represents these focus areas and their respective themes, highlighting their relevance to the research topic.

Moreover, Figure 4.2 **is** built on this representation by connecting the research question and objectives of the study with the identified focus areas and themes. Further supporting the study, a detailed overview of the themes and their respective codes is provided in Appendix L.

6.2.1 Research objectives

This section summarises how each of the study's three objectives has been accomplished by applying the selected study design principles, research methods and data collection tools.

Objective I: The study explored and described factors affecting knowledge and skills transfer in the clinical environment between diagnostic radiographers and students. This objective was achieved by employing a qualitative method using semi-structured interviews (cf. Chapter 3, section 3.5.1). The study involved qualified, community service and student diagnostic radiographers. The researcher interviewed a total of 15 participants. Factors influencing knowledge and skills transfer have been described (cf. Chapter 4, Section 4.5, Figure 4.1), which identified themes such as safe and conducive working environments, personal attributes, preferred learning methods, communication and supervision challenges, personal and interpersonal factors, workplace pressures and adaptation challenges, professional development and engagement, and student placement strategies. Each theme and **its** respective codes are presented in Appendix L.

Objective II: The study distinguished between existing barriers and enablers for knowledge and skills transfer among diagnostic radiographers and students. This objective was achieved by organising the themes into three focus areas: enablers for knowledge and skills transfer, barriers for knowledge and skills transfer, and possible solutions to overcome barriers experienced to knowledge and skills transfer (cf. Chapter 4, section 4.5, Figure 4.1). Chapter 4 provided a detailed discussion of these focus areas to offer a structured understanding of the factors influencing knowledge and skills transfer.

Objective III: Finally, by applying the findings, the study led to the development of an infographic to raise awareness among diagnostic radiographers and students about the factors that influence knowledge and skills transfer in the clinical environment. This objective was achieved by the development of the infographic (cf. Appendix L). The infographic was shared with the participants at the three hospitals and university included in the study (Chapter 5, Figure 5.6).

6.2.2 Conclusive findings

The research question addressed through this study was: What are the factors influencing knowledge and skills transfer between diagnostic radiographers and students in the clinical environment? The factors were identified through 15 semi-structured interviews and analysed using reflexive thematic analysis. These factors were grouped into three key focus areas: barriers to knowledge and skills transfer, enablers of knowledge and skills transfer, and

possible solutions to overcome barriers experienced to knowledge and skills transfer in the clinical environment.

The first focus area examined the enablers for knowledge and skills transfer. The most influential enabler was pointed out as a safe and conducive working environment. Students and qualified radiographers highlighted the importance of a respectful working environment where both parties feel valued and supported. A safe space for teaching and learning, as well as active support from qualified radiographers, were considered as promoting knowledge and skills transfer in the clinical environment. Personal attributes such as an eagerness to learn, a gentle approach to teaching, and the ability to seek advice were also significant factors in enhancing knowledge transfer. Furthermore, participants expressed a preference for learning through practice, repetition and observation, recognising these methods as effective ways to improve the transfer of knowledge and skills in diagnostic radiography.

The second focus area **is** related to barriers experienced in the clinical environment. The barriers identified were communication and supervision challenges, personal and interpersonal factors, and workplace pressures and adaptation challenges. One of the key barriers was the lack of communication between qualified radiographers and students, which resulted in missed learning opportunities and diminished clarity during radiographic procedures. Aligning with the lack of communication was the barrier posed by the need for close supervision and the lack of mentoring by radiographers, which hindered the knowledge and skills transfer process tremendously from the student and community service participants' point of view. Workplace pressures, such as overworked staff and a high workload, were also a major concern. These factors limited the time available for knowledge and skills transfer, as the qualified radiographers had to rush to finish their responsibilities, leaving little to no time for knowledge and skills transfer. The barrier of workplace separation, where students often felt disconnected from qualified radiographers, was of utmost concern, as it could affect the overall learning experience and hold back the transfer of knowledge and skills.

The third focus area explored solutions to address the barriers to knowledge and skills transfer in the clinical environment. One key solution was the implementation of structured professional development initiatives, such as in-service mentoring training accredited by the HPCSA for qualified radiographers. This initiative would ensure that all qualified radiographers have the necessary training on how to effectively transfer knowledge and skills in the clinical environment. The use of expert-led seminars to update radiographers on techniques and radiographic practices was also suggested as a knowledge and skills transfer platform. Additional strategies included structured orientation sessions to enhance communication and rapport between students and radiographers, and increasing the number of clinical training

sites to ensure a balanced student-to-radiographer ratio. Limiting student placements per hospital was also identified as a means to improve knowledge and skills transfer and personalised learning experiences. Collectively, these possible solutions could create a supportive clinical environment conducive to effective knowledge and skills transfer.

The findings presented and discussed in Chapter 4 addressed the research question by identifying and describing the factors influencing knowledge and skills transfer. These factors were distinguished into focus areas of barriers, enablers, and potential solutions, providing a comprehensive understanding of the experiences of knowledge and skills transfer in the clinical environment between diagnostic radiographers and students. Chapter 5 described the development and distribution of an infographic that effectively communicated the key focus areas and themes, along with their respective codes, to the data collection sites. This visual representation was aimed at raising awareness about the factors influencing knowledge and skills transfer in the clinical environment.

6.3 Recommendations

Based on the findings, the researcher views the proposed solutions shared by participants as practical recommendations to enhance knowledge and skills transfer between diagnostic radiographers and students in the clinical environment. Table 6.1 summarises these recommendations.

Table 6.1. Recommendations for knowledge and skills transfer in the clinical environment.

Recommendation	Application
The need for training on mentoring	The HPCSA should establish in-service training sessions for radiographers, emphasising the transfer of knowledge and skills in the clinical environment. The HPCSA should accredit these sessions to award continuing professional development (CPD) points as motivation for radiographers to participate and stay updated with best practices.
Use of seminars to upskill	Regular professional development seminars should be conducted to provide updates on techniques, image reviews, and expert-led discussions. These sessions will promote knowledge and skills transfer and alignment with evolving radiographic practices.
Promote active engagement for both qualified and student radiographers	Promote joint activities such as performing radiographic procedures and evaluating images together. These collaborative efforts can build rapport, enhance learning experiences and reinforce effective knowledge and skills transfer.
Initiative to close the gap between qualified and student radiographers	Qualified radiographers should foster a supportive social environment by promoting mutual respect and understanding by addressing social dynamics that may hinder effective interaction and ensuring students feel valued and included in the clinical environment. Such efforts can contribute to building stronger working relationships and facilitate knowledge and skills transfer.
Arrange clinical environment introduction sessions to students	Introduce structured orientation sessions at the start of each academic year where students and qualified radiographers meet, ensuring clear communication of expectations and fostering familiarity.
More clinical training sites	Increase the number of accredited clinical facilities to ensure a balanced ratio of students to qualified radiographers. This distribution will enhance supervision quality and could foster effective knowledge and skills transfer.
Limit the number of student placements in hospitals	Maintain a balanced ratio of students to qualified radiographers in each clinical environment. This approach will promote personalised engagement, effective supervision and improved knowledge and skills transfer.

6.4 Limitations

A limiting factor in this study was that data collection occurred at a single university, rather than multiple universities offering radiography programmes in various South African clinical departments. This constrained scope might have limited the diversity of insights obtained. Additionally, the exclusion of lecturers presented a limitation, as they primarily operate in

lecture rooms and might not have continuous interaction with radiographers in clinical departments. The study excluded radiologists due to its specific focus on radiographers, potentially restricting the inclusion of interdisciplinary perspectives.

The researcher excluded private radiography practice settings because of their lack of familiarity and comfort in the public sector. Moreover, the private sector typically does not appoint community service diagnostic radiographers and has a limited number of student radiographers. The researcher's role in conducting all the interviews and analysing the data could possibly be regarded as a limitation, as it could have introduced bias. Conducting all the interviews within one week could further be considered a limitation, as it might have constrained the time available for in-depth participant engagement.

The study did not examine the university's curriculum to determine how it supports knowledge and skills transfer, nor did it assess the impact of the infographic developed as part of the research. These omissions could represent additional limitations, as they restrict the study's ability to evaluate the broader mechanisms and outcomes related to knowledge and skills transfer in the clinical environment.

6.5 Further research

Given the limitations inherent to this study's design and execution, as well as the insights gained from the findings, Table 6.2 describes proposed future research.

Table 6.2: Recommendations for future research

Future research	Description
Development of a model to facilitate knowledge and skills transfer	To enhance the transfer of knowledge and skills in diagnostic radiography, the development of a model that outlines key components and processes is worth investigation. This model should encompass various elements, including mentorship, structured communication channels, and reflective practices, aimed at bridging the gap between theoretical knowledge and practical application. By integrating these components, the model can provide a framework for facilitating effective knowledge transfer among students, community service radiographers and qualified radiographers. It can also serve as a guide for qualified radiographers and students to create supportive environments that promote continuous learning and professional development in the clinical environment.
Multicentre studies	Future research could involve studies at multiple universities across South Africa that offer diagnostic radiography programmes. Such endeavours would allow researchers to compare knowledge transfer practices and experiences among different academic institutions and clinical departments. By collecting data from a diverse range of settings, researchers can gain a more comprehensive understanding of the factors influencing knowledge and skills transfer in the clinical environment.
Study of private practice settings	Investigating knowledge transfer practices in private practice settings would provide insights into the unique challenges and opportunities in these environments. Unlike public sector healthcare facilities, private practices may have different organisational structures and patient populations. Examining how knowledge and skills are transferred and applied in private settings can inform strategies to enhance knowledge and skills transfer across diverse healthcare settings.
Preceptor training for qualified radiographers in the clinical environment	Preceptor training for qualified radiographers in the clinical environment should prioritise equipping radiographers with effective strategies for transferring knowledge and skills. Evaluating various training methods and content is essential for optimising the effectiveness of preceptorship programmes. Understanding the impact of such training on radiographers' ability to transfer knowledge and skills to students is crucial for enhancing education outcomes in diagnostic radiography.

6.6 Conclusion

The study offered insights into knowledge and skills transfer among diagnostic radiographers in the public healthcare environment in the Free State province, South Africa. The participants' perspectives on knowledge and skills transfer emerged as pivotal aspects of clinical training for professional development. Furthermore, the study emphasised the impact of the work environment, training design, learning spaces and trainee characteristics on the learning

transfer experience. From the participants' point of view, the study focused on identifying enablers of and barriers to knowledge and skills transfer, and suggesting potential solutions to overcome these barriers experienced in the clinical environment between diagnostic radiographers and students.

The study identified the creation of a safe and conducive working environment as a key enabler that would facilitate effective knowledge and skills transfer. Conversely, the lack of mentoring by qualified radiographers emerged as a significant barrier, negatively affecting the consistency and depth of knowledge and skills transfer. The study proposed structured mentoring programs, specifically those that are HPCSA-accredited and can award radiographers with CPD points for their participation, as a practical solution to address this issue. In response to these findings, the researcher produced an infographic to raise awareness about the transfer of knowledge and skills among diagnostic radiographers and students.

PERSONAL REFLECTION ON THE RESEARCH

Reflecting on my journey conducting this research on knowledge and skills transfer among diagnostic radiographers and students, particularly **focusing** on the experiences of public healthcare professionals in the Free State province, I acknowledge the significant challenges I faced while balancing work and part-time study. The unwavering support of my research supervisors was crucial. Their belief in my potential helped me overcome moments of self-doubt. I want to express my gratitude to Dr. Beatrix van der Linde and Dr. Róan Slabbert for their guidance. Their encouragement kept me motivated throughout this process. Engaging in qualitative research has deepened my understanding of the field and enhanced my scientific writing skills. Completing this dissertation is a rewarding achievement. I recognise that this accomplishment is the result of the support I received and the valuable lessons I learned along the way.

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APPENDIX A

MEMBER CHECKING LETTER

Dear Participant,

I hope this message finds you well. I greatly value your contribution to my research project, *Knowledge and skills transfer amongst diagnostic radiographers and students: experiences from the public healthcare professional in the Free State*. Your insights have been crucial to my study. To ensure the interpretation of your interview data is accomplished free of bias and as you meant for it to be interpreted, I have created a verbatim transcript from the recorded interview. I have also applied codes to highlight key data or information relevant to the following objectives of the study:

- I. To explore and describe factors that influence knowledge and skills transfer in the clinical environment between diagnostic radiographers and students.
- II. To distinguish between existing barriers and enablers for knowledge and skills transfer.
- III. To develop an infographic to raise awareness amongst diagnostic radiographers and students about the factors influencing knowledge and skills in the clinical environment between qualified and student radiographers.

I kindly request your assistance through a verification two steps process:

Step 1. Verbatim Transcript Review:

Please review the transcript that is attached to ensure it accurately represents what was said during our discussions. If you notice any errors or discrepancies, please inform me.

Step 2. Coding Confirmation:

Review the coded sections and let me know if they accurately reflect what you meant with your comments. To define the codes used, I am also sending along a table to define the codes. Please feel free to indicate additional codes that you think I missed or that you realise is relevant to this topic.

Your feedback will ensure that feedback obtained from the interview data is of quality and accurately reflect your experience and/or perceptions. Please complete your review and return the documents to me via email at Wassermanjason72@gmail.com.

If you have questions or need clarification, feel free to contact me at 0797575610.

Please tick the boxes below, should you agree with the following statements:

☒ I have reviewed the verbatim transcript and confirm its accuracy.

☒ I have reviewed the coded sections and I agree with the interpretation of each coded section.

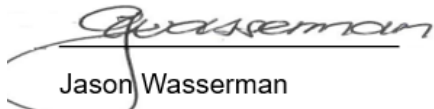
Signature:



Date: 30-11-2023

Thank you for your ongoing support. I look forward to receiving your feedback.

Best regards,



Jason Wasserman

Researcher

Central University of Technology

21-10-2023

Date

APPENDIX B

FIELDNOTES

LOGISTICS NOTES: The interviews were conducted in private office spaces at the hospital to maintain confidentiality. We chose this venue for its quiet environment, minimizing external disturbances. The closed door and a sign indicating ongoing interviews added an extra layer of privacy. The decision was made collaboratively by the head of radiography and me.

OBSERVATIONAL NOTES: Initially, participants exhibited some nervousness, but as the conversations progressed, the atmosphere became more relaxed and friendly. Participants willingly shared their stories, fostering a comfortable and engaging environment. Language challenges were noted for some participants, who mentioned English was not their first language. However, clarifications were provided, enabling effective communication.

PERSONAL NOTES: At the beginning, I felt a bit rigid and perhaps nervous about potential omissions of crucial information. However, as participants opened up, I became more at ease. A challenge for me was refraining from sharing personal experiences. In future interviews, my goal is to minimize paraphrasing, maintain a more neutral stance, and be attentive to passing the recorder around. I was impressed by the participants' understanding and their ideas for improving teaching. Their recognition of my passion for knowledge and skills transfer within the diagnostic radiography department was particularly gratifying.

METHODOLOGICAL NOTES: The qualitative inquiry technique effectively prompted participants to reflect on moments influencing their career choices and experiences with knowledge and skills transfer. Strategically placing the audio recorder ensured good sound quality for both participants and me. The use of large-font printed questions on four sheets allowed participants to anticipate and engage effectively with the interview. Overall, the chosen methodology, audio recording placement, and question presentation contributed to a successful research experience.

APPENDIX C

REFLECTIVE JOURNAL

Reflecting on data collection	Going to Bloemfontein for the interview was nerve-wrecking at first. Meeting many new people felt overwhelming, but they turned out to be incredibly friendly, making me feel comfortable and welcomed. Despite initial fears, the experience became a mix of meeting diverse individuals, each with their own stories. The interview turned into a chance to connect with these welcoming people, turning a nervous situation into an informative yet exciting experience of making unexpected friends in a new place. Bloemfontein, once unfamiliar, became a backdrop for personal growth and connection. I am appreciative of this journey.
Reflecting on data analysis	Upon delving into the data analysis phase, I initially felt a sense of apprehension. Sorting through the vast amount of information gathered during data collection seemed daunting at first. However, as I immersed myself in the process, I discovered a new-found clarity emerging from the data. Each piece of information began to reveal patterns and themes, shedding light on the complexities of knowledge and skills transfer within diagnostic radiography. Through careful analysis and interpretation, I gained deeper insights into the factors influencing this transfer process, laying the foundation for meaningful conclusions and recommendations.
Reflecting on writing up chapters	As I embarked on the task of writing up the chapters, I found myself grappling with the challenge of translating complex data into coherent narratives. Initially, the prospect of organising my thoughts and findings into structured chapters felt overwhelming. However, with each paragraph written, I gained confidence in my ability to articulate key concepts and insights. By drawing upon the rich data collected and the insights gained during analysis, I was able to craft chapters that captured the essence of the study and provided a comprehensive overview of knowledge and skills transfer in diagnostic radiography.

APPENDIX D

PARTICIPANT INFORMATION DOCUMENT

INFORMATION DOCUMENT

Knowledge and skills transfer amongst diagnostic radiographers and students: experiences from the public healthcare professionals in the Free State

Dear Participant

I, Jason Clint Wasserman from the Central University of Technology in the Free State, am doing research on Knowledge and skills transfer among diagnostic radiographers and students: experiences from the public sector in the Free State. Research is just the process to learn the answer to a question. In this study I want to raise awareness of the knowledge and skill transfer influencing factors in the diagnostic radiography department. It is important to note that no images will be taken for the purpose of this study. I will interview a minimum of 9 participants, including 3 qualified radiographers, 3 community service radiographers, and 3 student radiographers working in these three hospitals. Data saturation will be sought to determine the optimal number of participants.

I am asking you to participate in this research study.

1. To explore and describe factors that influence knowledge and skills transfer in the clinical environment between diagnostic radiographers and students.
2. To distinguish between existing barriers and enablers for knowledge and skills transfer.
3. To develop an infographic to raise awareness amongst diagnostic radiographers and students the factors influencing knowledge and skills in the clinical environment between qualified and student radiographers.

There are no direct risks to you by being involved in this study as the researcher will ask you questions during a semi-structured interview outside your work hours. The long-term benefits for this study will improve service delivery to hospitals by promoting differences and enhance the learning experiences in the public sector. The results from this study will be made available to you, through email or the postal service at your request. There is no financial gain for you or the researcher in the study.

Participation is voluntary, and refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled; you may discontinue participation at any time without penalty or loss of benefits to you. Efforts will be made to keep personal information confidential, absolute confidentiality cannot be guaranteed. Personal information will not be disclosed as it is not needed for the study.

The researcher will interview a minimum of 9 participants, including 3 qualified radiographers, 3 community service radiographers, and 3 student radiographers working in these three hospitals. Data saturation will be sought to determine the optimal number of participants. The interview will take approximately 60 minutes to complete. The infographic will be developed later and will be provided to assist you in obtaining access to methods to address problematic knowledge and skills transfer barriers that you identify.

Should you feel the need to debrief or seek professional assistance after the interview, please contact the researcher that is able to advise and assist in his capacity.

Kind Regards

Please feel free to contact me, for more information:



Jason Wasserman

Contact information Wassermanjason72@gmail.com

Cell: 0797575610

APPENDIX E

CONSENT TO PARTICIPATE IN THE RESEARCH

CONSENT TO PARTICIPATE IN RESEARCH

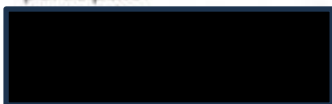
**Knowledge and skills transfer amongst diagnostic radiographers and students:
experiences from the public healthcare professionals in the Free State**

You have been asked to partake in a research study. You have been informed about the study by Mr Jason Clint Wasserman. You may contact Mr J Wasserman (0797575610) at any time if you have questions about the research.

You may contact the Secretariat of the Ethics Committee of the Faculty of Health Sciences, UFS (051 4052812) if you have questions about the rights as a research subject.

The participation in this research is voluntary, and you will not be penalised or lose benefits if you refuse participation or decide to terminate participation. If you agree to participate, you will be given a signed copy of this document as well as the participant information document, which is a written summary of the research.

The research study, including the above information has been verbally described to me. I understand what my involvement in the study means and I voluntarily agree to participate.



Signature of Participant

14-09-2023

Date



Signature of Researcher

14.9.2023

Date

APPENDIX F

HEALTH SCIENCES RESEARCH ETHICS COMMITTEE APPROVAL LETTER



Health Sciences Research Ethics Committee

24-Aug-2023

Dear Mr Jason Wasserman

Ethics Clearance: **Knowledge and skills transfer amongst diagnostic radiographers and students: experiences from the public healthcare professionals in the Free State**

Principal Investigator: **Mr Jason Wasserman**

Department: **Radiography - CUT**

[Submission Page](#)

APPLICATION APPROVED

Please ensure that you read the whole document

With reference to your application for ethical clearance with the Faculty of Health Sciences, I am pleased to inform you on behalf of the Health Sciences Research Ethics Committee that you have been granted ethical clearance for your project.

Your ethical clearance number, to be used in all correspondence is: **UFS-HSD2023/0488/2908**

The ethical clearance number is valid for research conducted for one year from issuance. Should you require more time to complete this research, please apply for an extension.

We request that any changes that may take place during the course of your research project be submitted to the HSREC for approval to ensure we are kept up to date with your progress and any ethical implications that may arise. This includes any serious adverse events and/or termination of the study.

A progress report should be submitted within one year of approval, and annually for long term studies. A final report should be submitted at the completion of the study.

Research conducted in any Department of Health facility: Researchers are required to sign and return the HSREC approval letters to the provincial Department of Health where they applied. It is also a requirement for researchers to submit electronic copies of their final research findings, and/or make a presentation of their findings and recommendations at departmental research days when and where indicated.

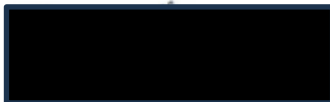
The HSREC functions in compliance with, but not limited to, the following documents and guidelines: The SA National Health Act, No. 61 of 2003; Ethics in Health Research: Principles, Structures and Processes (2015); SA GCP(2020); Declaration of Helsinki; The Belmont Report; The US Office of Human Research Protections 45 CFR 461 (for non-exempt research with human participants conducted or supported by the US Department of Health and Human Services- (HHS), 21 CFR 50, 21 CFR 56; CIOMS; ICH-GCP-E6 Sections 1-4; International Council for Harmonisation (ICH) Harmonised Guideline, Integrated Addendum to ICH E6(R1), Guideline for Good Clinical Practice (GCP) E6(R2), 2016, SAHPRA Guidelines as well as Laws and Regulations with regard to the Control of Medicines, Constitution of the HSREC of the Faculty of Health Sciences.

The Principal Investigator (PI) bears final responsibility for the RIMS application. In the event of any misconduct or improper activities perpetrated by a third party, the PI will be held vicariously liable. The HSREC will bear no responsibility or liability for any actions of a PI and/or third party or breach of confidentiality caused by the PI and/or third party.

For any questions or concerns, please feel free to contact HSREC Administration: 051-4017794/5 or email EthicsFHS@ufs.ac.za.

Thank you for submitting this proposal for ethical clearance and we wish you every success with your research.

Yours Sincerely



Chairperson: Health Sciences Research Ethics Committee

Health Sciences Research Ethics Committee

Office of the Dean: Health Sciences

T: +27 (0)51 401 2352/9860 | E: ethicsfhs@ufs.ac.za

IRB 00011992; REC 230408-011; IORG 0010096; FWA 00027947

Block D, Dean's Division, Room D104 | P.O. Box/Posbus 339 (Internal Post Box G40) | Bloemfontein 9300 | South Africa

www.ufs.ac.za



APPENDIX G

FREE STATE PROVINCE DEPARTMENT OF HEALTH APPROVAL LETTER



11 July 2023

Mr J Wasserman
Department of Radiography
Central University of Technology
Bloemfontein

Dear Mr J Wasserman

Subject: Knowledge and Skill Transfer Among Diagnostic Radiographers and Students: Experiences of the Public Healthcare Professionals in the Free State

- Please ensure that you read the whole document, permission is hereby granted for the above-mentioned research on the following conditions:
- Serious adverse events to be reported to the Free State Department of Health and/ or termination of the study.
- Ascertain that your data collection exercise neither interferes with the day-to-day running of the [redacted] nor the performance of duties by the respondents or health care workers.
- The Free State Department of Health expects that the researcher will be the responsible data manager according to the POPI Act. The responsibility thus lies with the researcher to ensure that the processing of all participants' personal information and research data is lawful according to the stipulations of the POPI Act (Protection of Personal Information Act 4 of 2013).
- Confidentiality of information will be ensured and please do not obtain information regarding the identity of the participants.
- Department of Health to be fully indemnified from any contravention of the POPI Act as you conduct this study.
- Research results and a complete report should be made available to the Free State Department of Health upon completion of the study (a hard copy plus a soft copy).
- Progress report must be presented not later than one year after approval of the project to the Ethics Committee of the University of Free State and the Free State Department of Health.
- Any amendments, extensions or other modifications to the protocol or investigators must be submitted to the Ethics Committee of the University of Free State and the Free State Department of Health.
- Conditions stated in your Ethical Approval letter should be adhered to and a final copy of the Ethics Clearance Certificate should be submitted to Sebeelats@fshealth.gov.za/Gwantshuws@fshealth.gov.za before you commence with the study.
- No financial liability will be placed on the Free State Department of Health.
- Please discuss your study with the Institution Manager on commencement for logistical arrangements.
- Department of Health is to be fully indemnified from any harm that participants and staff experience in the study.
- As part of the feedback, you will be required to present your study findings/results at the Free State Provincial Health Research Day.

Trust you find the above in order.

Kind Regards


HEAD: FREE STATE DEPARTMENT OF HEALTH

Date: 12/07/2023

Head: Free State Department of Health
PO Box 227, Bloemfontein, 9300
4th Floor, Executive Suite, Dophelo House, on Maitland and, Harvey Road, Bloemfontein
Tel: (051) 408 1646 Fax: (051) 408 1656 e-mail: chikobvup@fshealth.gov.za

www.fs.gov.za

APPENDIX H

HEAD OF DEPARTMENT OF CLINICAL IMAGING SCIENCES APPROVAL LETTER

16 Bedford street

Observatory

Cape Town

7925

26 August 2023

wassermanjason@gmail.com

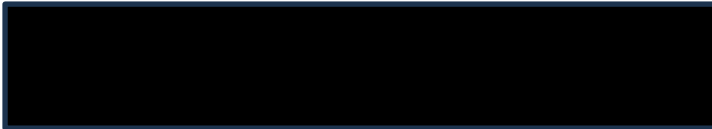
Contact number: 0797575610

Associate Professor

HOD: Diagnostic Radiology (Clinical Imaging Science)

Faculty Health Sciences: School of Clinical Medicine

University of the Free State



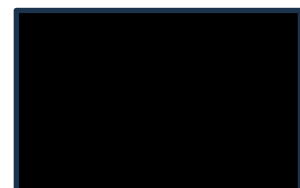
Request for permission to conduct a research study at Clinical Imaging Sciences

I am a master's degree candidate at Central University of Technology. As part of the course requirements, I am expected to conduct a research study. The study title is: *Knowledge and skills transfer amongst diagnostic radiographers and students: experiences from the public healthcare professionals in the Free State*

For this study to be carried out, I need student, community service and qualified diagnostic radiographers from the Clinical Imaging Science department to participate in semi-structured interviews. The hospitals in which I wish to do interviews are 

 Only 3 interviews per hospital will be conducted.

The interviews will be conducted outside of participant (before or after a shift). These interviews will be voice recorded with a moderator present. The identity of the interviewee will be confidential and will not be shared as part of the data analysis, dissertation, any presentation from the study or any publication in article format.



The purpose of this research is to demarcate the generational barriers found between mentors and mentees in diagnostic radiography.

The following objectives are set to be achieved,

- i. To explore and describe factors that influence knowledge and skills transfer in the clinical environment between diagnostic radiographers and students.
- II. To distinguish between existing barriers and enablers for knowledge and skills transfer.
- III. To develop an infographic to raise awareness amongst diagnostic radiographers and students about the factors influencing knowledge and skills in the clinical environment between qualified and student radiographers.

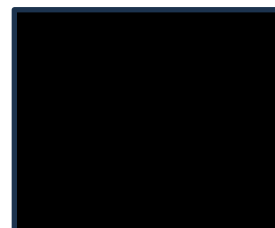
The confidentiality of the participants identity will be protected by storing the data in an online folder that only the researcher and the supervisor have access to. Participants will not be coerced into the research because participation is fully voluntary, and they will be given the chance to withdraw at any moment without penalty. To avoid coercion, no money or gifts of any kind will be offered during the participant recruitment process. No hospital equipment, consumables, or infrastructure will be used in this study.

This letter serves as a request for conditional permission to conduct the study in the Clinical Imaging Science department. Final permission from your office will be sought once the study has been approved by the:

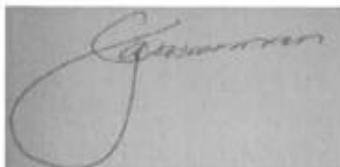
- i) Central University of Technology, Free State, Faculty of Health and Environmental Sciences, Faculty Research and Innovation Committee.
- ii) Department Clinical Sciences at Central University of Technology, Free State in which the radiography programme resides (to sample from student populace).
- iii) Health Science Research Ethics Committee (HSREC).
- iv) Department of Health, Free State province.
- v) I am registered for a masters degree in radiography at the Central University of Technology, Free State.

For final approval from your office, evidence of the above approval will be provided.

I am hopeful that my application will be taken into consideration.



Regards



Wasserman J

I,  (Title, initials and surname)

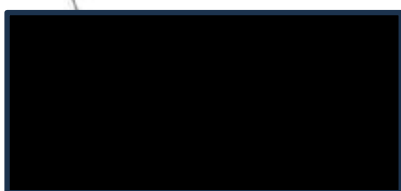
as  (Role profile)

at  (Institution) hereby grant

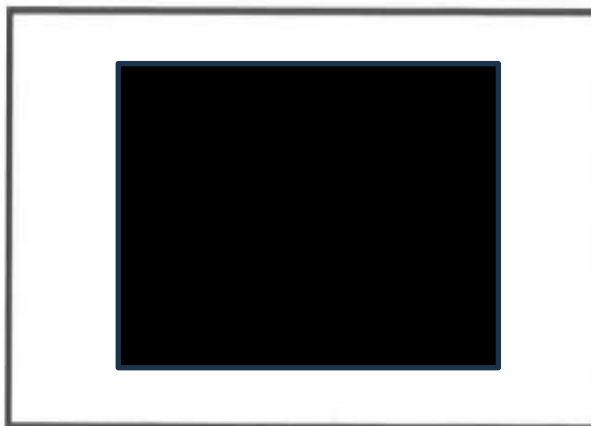
APPROVAL for the study with the thesis title *Knowledge and skills transfer amongst diagnostic radiographers and students: experiences from the public healthcare professionals in the Free State*

to be conducted at  hospitals
with the FINAL APPROVAL only to be granted if proof of the following are provided:

- i) Central University of Technology, Free State, Faculty of Health and Environmental Sciences, Faculty Research and Innovation Committee study approval (HES form).
- ii) Department Clinical Sciences at Central University of Technology, Free State permission letter to sample students.
- iii) Health Science Research Ethics Committee final approval letter.
- iv) Department of Health, Free State province ethics approval letter.
- v) Proof of registration as M.Rad candidate at the Central University of Technology, Free State.



Signature



APPENDIX I

INSTITUTIONAL PLANNING AND QUALITY ENHANCEMENT APPROVAL LETTER



INSTITUTIONAL PLANNING AND QUALITY ENHANCEMENT

J C WASSERMAN

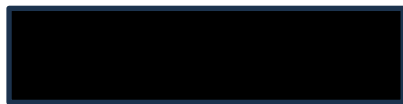
**PERMISSION FOR JASON CLINT WASSERMAN TO CONDUCT HIS RESEARCH AT CUT ENTITLED
"KNOWLEDGE AND SKILLS TRANSFER AMONGST DIAGNOSTIC RADIOGRAPHERS AND STUDENTS:
EXPERIENCES FROM THE PUBLIC HEALTHCARE PROFESSIONALS IN THE FREE STATE"**

Dear Mr Wasserman

This is to confirm that you have been granted permission to conduct research at the central university of technology for your master's degree study research project entitled "Knowledge and skills transfer amongst diagnostic radiographers and students: experiences from the public healthcare professionals in the free state."

The conditions of the conditional permission are:

- The research will not interrupt any of the official activities at The Central University of Technology.
- You will supply us with the copy of your report.
- The cost of all related activities will be covered by yourself.
- Recruitment of participants is the sole responsibility of yourself.
- Voluntary nature of the potential participants decision to consent to participate should be strictly observed.
- You should not disclose a potential participant's decision to participate or otherwise to any other party.
- Permission does not compel, in any sense, participation of staff members or students in your research.



Senior Director: Institutional Planning and Quality Enhancement



21/08/2023

APPENDIX J

HEAD OF DEPARTMENT OF CLINICAL SCIENCES APPROVAL LETTER



FACULTY OF HEALTH AND ENVIRONMENTAL SCIENCES
Department Clinical Science: Programme Radiography

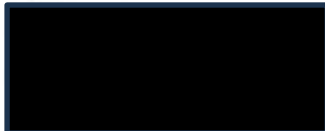


11 April 2023

Dear chair of the Health Sciences Research Ethics Committee (HSREC) at UFS,

Herewith I confirm that the student, Jason Clint Wasserman (Student number 223095711) is enrolled for the qualification a Master in Radiography (Diagnostic) at the Central University of Technology. I am thus aware of the intended research to be conducted on this topic: **“Knowledge and skills transfer amongst diagnostic radiographers and students: experiences from the public healthcare professionals in the Free State”**. I confirm that the project was reviewed in the Faculty.

Kind regards



Head of Department of Clinical Sciences

Mrs Bea van der Linde

Supervisor

Cell: 083 270 4663

E-mail: bekotze@cut.ac.za

Mr Róan Slabbert

Co-supervisor

Cell: 083 5616 478

E-mail: sslabber@cut.ac.za

APPENDIX K

SEMI-STRUCTURED INTERVIEW SCHEDULE

Recording of session starts

Demographic information:

1. Please indicate the estimated number of years you have been working in the field of diagnostic radiography: 4 (years)
2. Please indicate if you are a student/ community service or qualified radiographer (circle selection made by interviewee).
3. Date of interview: (yyyy/mm/dd): 13/09/2023
4. Location: [REDACTED]
5. Time: 10H30

Items to be discussed with participant:

- ✓ Let's talk about your workplace. Please tell me how you see your workplace relationships with students, community service and qualified radiographers.

Knowledge is defined as facts, competence, and skills gained by experience or education; theoretical or practical knowledge of a field (Hornblower, Spawforth and Eidinow, 2012).

- ✓ If you need to learn from someone else at work; what works best for you to obtain the knowledge that you need?
- ✓ What influences your receptiveness to tips or lessons shared with me?

Skills is defined as the specific knowledge and expertise required to complete complicated actions, tasks, and processes linked to computational and physical technology, as well as a wide range of other businesses, are referred to as skills (Hornblower, Spawforth and Eidinow, 2012).

- ✓ If you need to learn from someone else at work; what works best for you to obtain the required skills that you need to learn?
- ✓ What influences your skills development at work?

- ✓ Any suggestions from your side to improve relationships between students, community service or qualified radiographers?

Thank you for your participation, this is the end of the interview.

Recording of session ends

Researcher interview note page:

Participant nervous
at first. Became more
comfortable as
interview progressed

Rad
Skills — Practical
application

Rad
Knowledge - Theory
Hands training

↑ Practical component

APPENDIX L

THEMATICAL DEVELOPMENT

Student and qualified radiographers' experience to knowledge and skills Transfer	Focus area	Themes	Codes
	Enablers for knowledge and skills transfer	Theme 1: Safe and Conducive Working Environment	- Active Support (S) n= 1 - Safe Space for Teaching and Learning(S) n=2 - Respectful Working Environment (S and Q) n = 7
		Theme 2: Personal attributes	- Eager to Learn (S and Q) n= 4 - Self-Learning (S) n= 1 - Seek Advice (S and Q) = 2 - Approachable (Q) = 2 - Gentle approach (S and Q) = 3 - Wanting to teach others(Q) = 2
		Theme 3: Preferred methods for learning	- Learning through Practice (Sand Q) = 7 - Learning through Repetition (S and Q) n = 6 - Observational Learning (S and Q) n= 6
	Barriers for knowledge and skills transfer	Theme 4: Communication and supervision challenges	- Lack of communication (S) n = 1 - Need for close supervision (S and Q) n= 2 - Lack of mentoring by Radiographer(S) n= 3 - Separation in workplace n=1 - Absent radiographer in imaging protocol (S) n=1
		Theme 5: Personal and interpersonal Factors	- Personality differences of qualified radiographer n =1 - Student mental health (Q) n =1 - Lack of passion n=1
		Theme 6: Workplace pressures and adaptation challenges	- Overworked staff n=2 - University teaching approaches vs Clinical environment teaching approaches n=1 - Short staff n=1 - Changes of technology n=2 - Workload n=1
	Solutions for knowledge and skills transfer	Theme 7: Professional development and engagement	- The need for training on Mentoring n=1 - Use of seminars to upskill n=1 - Promote active engagement for both qualified and student n=1 - Initiative to close student-qualified gap n=1 - Student radiographer clinical environment Introduction sessions n=1
		Theme 8: Student placement strategies	- More clinical training sites n=1 - Limited number of student placement in hospitals n=1

APPENDIX Q

CURRICULUM VITAE OF SECOND CODER

PERSONAL DETAILS:

GRADE: 1 DIAGNOSTIC RADIOGRAPHER

Title : Ms

Initials :

Full First Names :

Surname :

HPCSA No :

Cell Phone number :

E-mail address :

CURRENT WORKPLACE:

2023

INSTITUTION

=

CAPE TOWN

+27 21

EXPERIENCES

= Community service(2022)

Diagnostic Radiographer

Radie Kotze Hospital

Western Cape

QUALIFICATIONS:

Academic Qualifications

NSC bachelor's pass at Secondary School (2013-2017)

BSc in Diagnostic Radiography at Cape Peninsula University of Technology (2018-2021)

APPENDIX R

SECOND CODER CONFIDENTIALITY LETTER

Dear, Mrs [REDACTED]

RE: CONFIDENTIALITY AGREEMENT

I trust this letter finds you well. I am writing to articulate the terms and conditions pertaining to our confidentiality agreement in the context of your role as the second coder for our research project, *Knowledge and skills transfer amongst diagnostic radiographers and student: experiences from the public healthcare professional in the Free State*. Upholding strict confidentiality is of paramount importance to ensure the integrity and credibility of our study.

By accepting the position of second coder, you commit to the following stipulations:

- 1. Confidentiality Pledge:** You shall treat all information, materials, and data associated with our research project as strictly confidential. This encompasses, but is not confined to, transcripts, research findings, research methodologies, and any other project-related information.
- 2. Non-Disclosure:** You undertake not to divulge, share, or disseminate any project-related information, data, or findings to any third party without obtaining explicit written consent from me, the principal researcher.
- 3. Data Security:** It is incumbent upon you to exercise due diligence in safeguarding any data or materials entrusted to you for the purpose of coding. This obligation extends to the secure storage and handling of physical copies and, where applicable, the utilization of secure electronic storage methods.
- 4. Utilization for Research Purposes Only:** Any information or data you access or receive shall be employed exclusively for the purpose of coding and contributing to the research project. It shall not be employed for personal gain or any unrelated purpose.
- 6. Return or Erasure of Materials:** Upon the completion of your role as the second coder or at my request, you pledge to either return or, where applicable, securely erase all materials, data, or information linked to the research project in your possession.
- 7. Breach of Confidentiality:** Any violation of this confidentiality agreement may incur legal repercussions, including but not limited to civil liability.

Kindly review and validate your consent to these stipulations by signing below:

I, [REDACTED] hereby acknowledge and affirm my commitment to the terms and conditions delineated in this confidentiality agreement. I recognize the critical importance of preserving the confidentiality of all project-

Signature: [REDACTED]

Date: 20/10/2023

Your steadfast adherence to upholding the confidentiality of our research is integral to the success of our project. Should you have any inquiries or require clarification pertaining to this agreement, please do not hesitate to reach out.

Thank you for your cooperation and dedication to our research.

Sincerely,

Jason Wasserman

Researcher



21-09-2023

APPENDIX S

SECOND CODER CONFIRMATION LETTER

Dear Mrs [REDACTED]

I trust this letter finds you well. Your participation in my research project, titled *"Knowledge and skills transfer amongst diagnostic radiographers and students: experiences from the public healthcare professional in the Free State,"* has been invaluable, and I appreciate your contributions immensely.

To ensure the accuracy and reliability of the research findings, I must take the following step:

Coding Confirmation: I have applied codes to specific sections of semi-structured interview transcript. The coding scheme should assist in research the following objective(s):

- I. To explore and describe factors that influence knowledge and skills transfer in the clinical environment between diagnostic radiographers and students.
- II. To distinguish between existing barriers and enablers for knowledge and skills transfer.

Kindly review the coded sections along with the coding scheme provided. Please reflect on transcript content that you would code differently. Also indicate any additional codes that the researcher should consider.

Your feedback is integral to upholding the quality and precision of the research. I kindly request that you complete your review and share your insights with me via email at Wassermanjason72@gmail.com.

Should you have any questions or require clarification during the review process, please do not hesitate to reach out to me.

For your convenience, please indicate your confirmation by ticking the box below:

☒ I have reviewed the coded sections in the transcript and agree with the applied coding.

☒ The coding scheme as developed by the researcher as a primary coding scheme which will develop as part of the data analysis process is acceptable.

Signature: [REDACTED]

Date: 14 February 2024

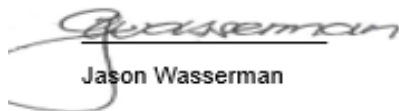
Please remark on specific transcripts where coding suggestions is reflected, by completing the table below:

Transcript nr.	Motivation for suggested different/alternative code to be applied
PCUT7	Active support speaks more to the participant then engagement

Please provide additional codes suggested based on your interpretation of the transcript contents, by completing the table below:

Code	Explanation or meaning of code
Active support	In need for active support when it come to training in the clinical sector.
Lenient approach	The approach should be lenient, when knowledge <u>are</u> being transferred.
Safe space for teaching and learning	The environment <u>need</u> to be safe, to ensure knowledge and skills transfer

Best regards,



Jason Wasserman

Researcher

Central University of Technology

21-10-2023

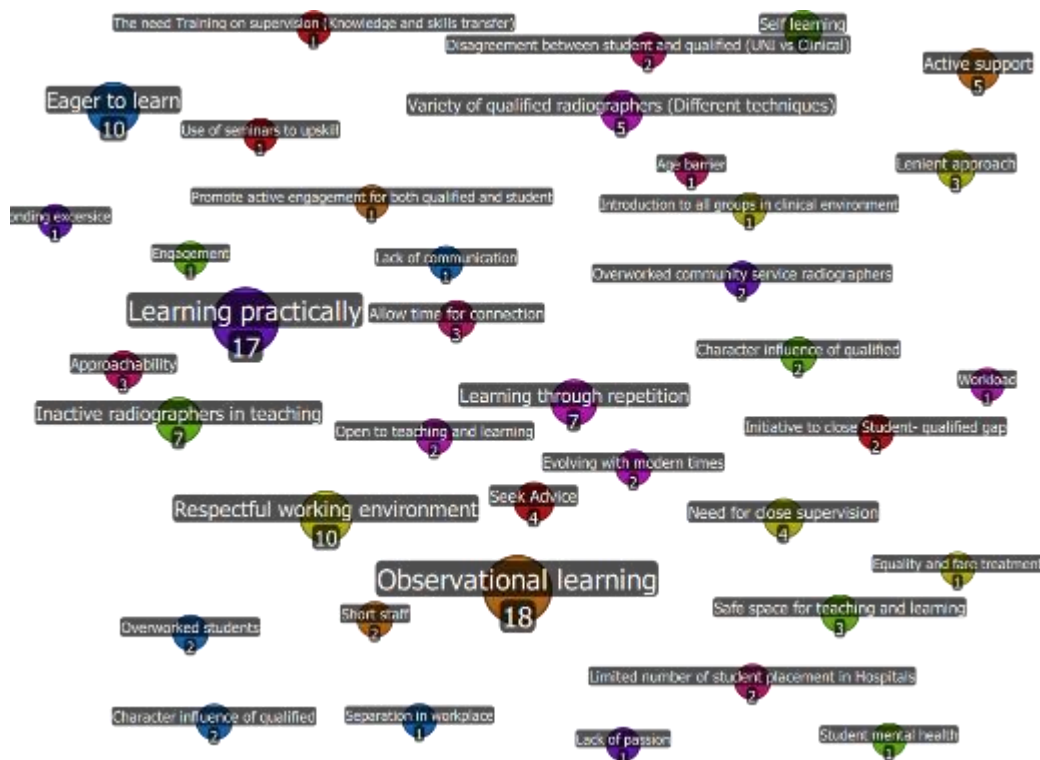
Date

APPENDIX T

CODING REPORT

Properties Summary

Quirkos Canvas – Primary



Text Sorted by Theme

Need for close supervision

What really works for me is when i work under close supervision. So when i work on the supervision , somebody teaching me that this is how we obtain an example , is how we obtain an OMV view like a yes , and , and that person will monitor you because of usually we're doing almost the same projection .

Source: 1_P1SI Transcription Coded

and i need to do that and i get close supervision so that , um , i can , i can learn instead of not having that

Source: 1_P1SI Transcription Coded

I think it's what i said working closely with one of the qualifieds can become comm serve working closely with them and to see what they do and and then to hear what they tell me and that's that's how i kind of like get more skill

Source: 1_P1SI Transcription Coded

I need like a one on one session . Don't come to me as like a group bombarding me with information because i'm not gonna grasp what i need to know . So a one on one session actually works best for me .

Source: 11_PPQ4 TRANSCRIPTION 1

Lack of radiographer in mentoring

So, they don't work and they're also lazy to you can check for, for the images.

Source: 1_P1SI Transcription Coded

And that also kind of shows that when you have to pass an image , then you'll be struggling to even get qualified to come and check for you

Source: 1_P1SI Transcription Coded

I think the time , the time and the amount of people that actually want to help you , because most of the qualified doesn't really , they try to escape helping people . So there's like one or two that you that i know i can go to and i can ask them and i know that they will help me , but most of the qualifiers i know that they're not gonna want to help me . So i think the , the wantonness you know , to want to learn someone . Yeah .

Source: 4_PPCOM1 TRANSCRIPTION

if some qualifies who doesn't want to help you ? So you must kind of pick out who you can ask

Source: 4_PPCOM1 TRANSCRIPTION

So maybe , maybe the way we , we feel about educating people because most of us they don't want to help or they feel like you should already know this

Source: 4_PPCOM1 TRANSCRIPTION

because most of the time the qualifiers tell you what to do , and then if you go in , you exposed and it's correct , then i want you to do it again and again , and that's not working because now the patient's getting overexposed you are getting frustrated with yourself because you're not getting it right

Source: 4_PPCOM1 TRANSCRIPTION

Okay i would prefer if the qualified goes with me to the room, i don't want to look for them because usually you don't get a patient . they just leave you there to do the patient and then you get them when you're done . So i prefer for them to come so they can show me even that technique

Source: PCUT5 TRANSCRIPTION 1

Overworked students

because of students will be overworked they will be overworked um

Source: 1_P1SI Transcription Coded

We'll be doing a lot of work because of the seniors will be not doing work . So most of the time when students are , they are the one who can they work too much

Source: 1_P1SI Transcription Coded

Overworked community service radiographers

and then when the students are not there , the comm serve are also struggling from because of the other one . We'll be doing a lot of work because of the seniors will be not doing work . So most of the time when students are , they are the one who can they work too much .

Source: 1_P1SI Transcription Coded

So , um , i would be asked to do most of the stuff because the qualifiers i am still , and because i'm a comm serv

Source: 4_PPCOM1 TRANSCRIPTION

Absent radiographer in imaging protocols

So if i work closely with not even one qualified , but different kind of qualified , but i know that they've been taught by her or him that way

Source: 1_P1SI Transcription Coded

because of they all come with different kind of things and i also come with what i know and and then i can work on that based on what they're teaching me and what i take from what they teach .

Source: 1_P1SI Transcription Coded

because every qualified has their own way of doing things and thinking outside of the box

Source: 2_PCUT2 TRANSCRIPTION

Obviously the qualifiers are different in terms of their personalit

Source: 2_PCUT2 TRANSCRIPTION

. So it comes with , um , like interacting with our qualifieds , getting to know how they do certain thing

Source: 2_PCUT2 TRANSCRIPTION

Limited number of student placement in Hospitals

, because i believe that most qualifiers don't know how the students , what they are leaking so if we are it's a limited number where they can manage it , it's gonna be way better

Source: 1_P1SI Transcription Coded

e if we can have more hospitals , accredited hospital , so that students will be placed in different hospitals , then there will be less number of students for one hospital , so that qualifieds can be able to engage with students

Source: 1_P1SI Transcription Coded

The need for Training on mentoring

And also, if we also can have a training for radiographers all of them, not just our coordinator focusing on students radiographers should have a training run from hpcsa or something where they can train them now and then how to supervise students and how to be present for, for the period of study

Source: 1_P1SI Transcription Coded

Short-staffed

s what i've noticed is when i'm working there's a shortage of staff , and then , um , that affects how the relationship between radiographers and students

Source: 1_P1SI Transcription Coded

Short of staff and lack of modalities and no opportunities for training or skills development.

Source: PNQ2 TRANSCRIPTION 1

Respectful working environment

space where this respect running around, um, and when we're working with more competent people and kind of like influences how i, how my abilities and how i excelled in my work. So working with more competent radiographers were able to respect each other and respect us students as well, and us respecting them . Kind of like influences and kind of like make a lot of difference for me when i have to go for my clinical.

Source: 1_P1SI Transcription Coded

although i do have respect for , um , the qualifiers that are older than m

Source: 3_PCOMN1 TRANSCRIPTION

I think these days we're living now in another time . Students sometimes can really have attitude . Um , so i think you must just show students that you are still qualified and , um , they must obey um , i think it can be difficult with qualified radiographers because they might feel , well , i'm also qualified and , um , i'm not a child anymore but even i always say you must respect age as well as knowledge . So yeah .

Source: 6_PUQ6 TRANSCRIPTION

I can say i'll start with the qualified. I can say there's a lot of respect between the students and the qualified . We respect the qualified because we know we need them most of the time , and also they also respect us back and then amongst the students , we also respect each other , but there are times whereby we cause each other's toes here and there , but then because we are professional , we get , we approach the whole situation in a professional manner . So this respect , respect is the big thing between students and the radiographers

Source: 10_PCUT8 TRANSCRIPTION1

Otherwise , everything is fine . Yeah , disrespect to this . Um , um , yeah , respect actually .

Source: 7_PPCOM2

they should always be respectful and they should learn from the qualifiers most of the time they come with that attitude

Source: 9_PUQ8 TRANSCRIPTION 1

They should listen to the qualifiers more at work . Okay okay i think so .

Source: 9_PUQ8 TRANSCRIPTION 1

You know , the , the advice will go to qualified radiographers they should be more open and eager to teach . You know , they shouldn't have the superiority complex , if i should put it like that , because what i've observed is that because they chief radiographers or senior radiographers they can , they can . They think they can get away with a lot . They think they cannot . They can just speak . However , they want to speak with people , so , you know , they should just be sensitive and welcoming.

Source: 11_PPQ4 TRANSCRIPTION 1

I think in the first place , respect for each other , communication , and they must have the , um , the willing , the willingness and the , and the need to learn from us and vice vers

Source: 13_PUQ2 Transcript

They must be open minded and then the students can show more respect to qualified , because we don't observe . The younger students have attitude when it comes to qualified, because of what they heard. What they had is what they heard. Some qualifieds are not nice, so when they go to work , they already have the attitude that ,

Source: PCUT5 TRANSCRIPTION 1

Personality difference of qualified

What influences i think an attitude, attitude from radiographers' kind of like influences me. And then , um , and the level of comfort that i will have and what else ? I think attitude and comfort is what can influence me.

Source: 1_P1SI Transcription Coded

Sometimes they, they not so very helpful, they have an attitude towards us. Yes, but in other days everything is goo

Source: PCUT5 TRANSCRIPTION 1

Eager to learn

, and i also feel like enthusiasm plays a very huge part of it . Like if someone , if i am eager to learn , i'm obviously gonna observe what they do , ask questions , and they're gonna be like , okay that's how you do it

Source: 2_PCUT2 TRANSCRIPTION

So it comes with that interacting with your qualified and asking questions , showing them that you are really going to learn and what are they wanting to know , what really is going on ?

Source: 2_PCUT2 TRANSCRIPTION

because if you're a student , you need to get that in your mind that i am a student . So it means i , i'm here to learn , and i must show that , that i , i really want to learn because i'd like to believe that i'm

Source: 2_PCUT2 TRANSCRIPTION

So it's not gonna be easy if students are not enthusiastic of showing your interest

Source: 2_PCUT2 TRANSCRIPTION

If you are a student , be a student , be like , show eagerness to learn , and the qualifiers will be the tool to help us

Source: 2_PCUT2 TRANSCRIPTION

And then while they are busy , i might ask , like , okay but why are you doing this ?

Source: 3_PCOMN1 TRANSCRIPTION

Well, it's me asking questions from them when i'm not sure about anything . And then yeah, if there are things that i'm also not certain about , i do call my qualifieds and ask them to demonstrate things for me to get a better understanding .

Source: 10_PCUT8 TRANSCRIPTION1

Um , you know , when i came here , i didn't know CT . So because we are placed in groups , i had a member which would - because i asked questions a lot . If i don't understand something , i ask questions a lot . So they were freely educating me about things that i didn't know . I don't just say because i don't know i don't know this . I'm not gonna do it . I ask people questions a lot . I'm very inquisitive when it comes to something that i'm very eager to learn . So that's how i hope i answered it .

Source: 11_PPQ4 TRANSCRIPTION 1

Um , maybe you can show someone a shortcut or a technique that's , um , that's working . So , and i still learn every day . So i was out of the , out of radiography for quite a few years . So i only recently came back to government . I started on the first of september , and now the students are teaching me . Okay

Source: 13_PUQ2 Transcript

Yeah, i always tell the students you're not gonna learn something by sitting in the teroom . Do take that don't and that also lessen your your scared because because you don't know and you don't have the experience

Source: PUQ5 TRANSCRIPTION 1

Learning through practice

show me and give me the opportunity to actually do it then .

Source: 2_PCUT2 TRANSCRIPTION

I would prefer the person to actually do it, like maybe once or twice. Show me this is how it's done with them. Explain. Obviously this is how it's done, and for them to allow me to give me the opportunity to actually do it . And if it comes with mistakes allow me to do the mistakes once or twice so that i get used to the routine of doing it .

Source: 2_PCUT2 TRANSCRIPTION

it comes with allowing me to practicalize it . Now , like whatever that you said , like let's do it , let's , let's begin talking about it , let's do it , and let's see if i really understand what you're saying

Source: 2_PCUT2 TRANSCRIPTION

they ask me a question and i show them how to do something . It works better than for me just to , just to tell them how to do something

Source: 4_PPCOM1 TRANSCRIPTION

I think it's hands on training . I show you what to do and how to do it

Source: 5_PNQ4 TRANSCRIPTION

the practical side is , is more helpful than the , um , theoretical side .

Source: 6_PUQ6 TRANSCRIPTION

So in radiography i feel that , um , practice makes perfect . So , um , yeah , obviously um , i can't say theory is not important , but practical is , in my opinion , more important .

Source: 6_PUQ6 TRANSCRIPTION

Okay um , well , i think if you show me something rather than tell me something that , that , then i will learn something . But not , i must , i must do it physically myself . Yeah

Source: 6_PUQ6 TRANSCRIPTION

A demonstration? No one . When a person demonstrates things for me , it becomes easy for me to understand and i'll never forget . So rather than someone explaining to me, for when you position that patient , you should do this and this , but if they come and they show me for it , okay this is how you turn your patient , this is what you do , then it becomes more easy for you . So more practical learning is

Source: 10_PCUT8 TRANSCRIPTION1

Hmm i think the best way for me to receive them , the tips from the other persons do it most of the time , practically to show me practically because i'm an old school . Some of the things we don't know , some of the things we don't know is there are new things that are coming . So i feel the person who needs to go for me to receive what he's coming with . I think do it more practical is better that way

Source: 9_PUQ8 TRANSCRIPTION 1

Um , my , you know what ? Me practicing something that i something new , because we're always working with trauma patients , you know , we have to manipulate to get some views and all . So me practicing it regularly and not being lazy to do patients like they're challenging patients like that influences my skills , actually . So i don't just give up and say , no , i don't know this . I know i have to practice because i'm exposed to different patients with different body sizes and also i have to practice . Yeah .

Source: 11_PPQ4 TRANSCRIPTION 1

To obtain the knowledge that you need by looking and by practicing book knowledge is important , but i think practical is even more important in radiography

Source: 13_PUQ2 Transcript

Practical examples .

Source: PNQ2 TRANSCRIPTION 1

Lessons can be applied practically in my work . Yes

Source: PNQ2 TRANSCRIPTION 1

If they explained to me before and what i need to do in a simple manner doesn't have to be textbook manner and then practically demonstrate for me and then also demonstrating in a way that i understand . You kno

Source: PNQ2 TRANSCRIPTION 1

practically wise, and i said it's always better to show and demonstrate them to go and just tell them what to do , and then that sticks so we work in a close bond together .

Source: PUQ5 TRANSCRIPTION 1

As i see skills and physical experience, you can read the thing and you don't know what you're reading , but if you can demonstrate it to a student , show him once , it will stick . So it's more to me , practically

Source: PUQ5 TRANSCRIPTION 1

Learning through repetition

So we don't have like a lot of patients as compared to other hospitals . And even though the quality of work , you would see students that work at , maybe it's a very busy hospital . So if you get to see more patients daily , you are more exposed to work as compared to someone who's working at a hospital that has four , ten hospital patients per day now

Source: 2_PCUT2 TRANSCRIPTION

Um , i think it's the , definitely the amount of patients you see for certain procedures , like , um , let's say we don't have a lot of skull . A skull is not something that i'm trained on it's to make an example . So i definitely say it's , the amount of things that we are exposed to , the amount of exposures that we are exposed to

Source: 3_PCOMN1 TRANSCRIPTION

So in radiography i feel that , um , practice makes perfect

Source: 6_PUQ6 TRANSCRIPTION

Practicing a lot , because if you keep on doing more patients the more patients you do , the more you become good . So practicing and not just sitting around and playing

Source: 10_PCUT8 TRANSCRIPTION1

Um , my , you know what ? Me practicing something that i something new , because we're always working with trauma patients , you know , we have to manipulate to get some views and all . So me practicing it regularly and not being lazy to do patients like they're challenging patients like that influences my skills , actually . So i don't just give up and say , no , i don't know this . I know i have to practice because i'm exposed to different patients with different body sizes and also i have to practice . Yeah .

Source: 11_PPQ4 TRANSCRIPTION 1

I said practice and practice and practice . The more you do , the more you will reach that goal in life to be the best radiographer okay

Source: PUQ5 TRANSCRIPTION 1

You don't want to do the patient . But the more you do , the more you learn and the better you get . So go on and just do and practice and practice and practice .

Source: PUQ5 TRANSCRIPTION 1

Allow time for connection

I think it comes with time, like getting to know or getting like a closer relationship with your qualifiers now , as a first year , my relationship was not as intact as it is now compared to and like i first arrived . So it comes with seeing them over and over again and interacting them over and over. So that like your guys relationship can be because when you get like , but when you're still doing first year you , you don't really have an idea of the type of people that they are , whether you are really free to talk to them

Source: 2_PCUT2 TRANSCRIPTION

whether they can actually help you in terms of whatever that you need to practice at that particular time . But i think it comes with time getting to know the kind of people that they are and getting to talk to the give them more

Source: 2_PCUT2 TRANSCRIPTION

So it differs with our years but even when you get to practice now , you will see that the fourth years are more closer to the qualifiers they had the first year because the first thing is always a thing of not being sure if they would . Yeah

Source: 2_PCUT2 TRANSCRIPTION

Seek Advice

i would definitely ask them before and before i do something if i am unsure and then i would ask them , like , let's say i am done with the procedure . I will ask them to just check again . Um , and ask them before , then when i'm done , i don't let them come into the room , and when i'm done , i'll ask them to double check for me . Is this what they would have also done ? and pass the images. And just see if i can say it like that

Source: 3_PCOMN1 TRANSCRIPTION

Um , i would say definitely the person that it's coming from . If i know that this is someone that i would not normally ask for advice or whatever , then i would not take it as seriously . Let's say it like that unless i know . Okay definitely they are . I definitely this is not what we should be doing

Source: 3_PCOMN1 TRANSCRIPTION

Um , i would go to the ones that i know , work fast and we're gonna , um , like a routine set in place

Source: 3_PCOMN1 TRANSCRIPTION

Um , you know , when i came here , i didn't know CT . So because we are placed in groups , i had a member which would - because i asked questions a lot . If i don't understand something , i ask questions a lot . So they were freely educating me about things that i didn't know . I don't just say because i don't know i don't know this . I'm not gonna do it . I ask people questions a lot. I'm very inquisitive when it comes to something that i'm very eager to learn . So that's how i hope i answered it .

Source: 11_PPQ4 TRANSCRIPTION 1

Observational learning

So i would watch them and ask, like , can i quickly come and observe this if i haven't done it yet , or if it's something that i don't usually do , and i would like to see that i can i quickly just come and watch .

Source: 3_PCOMN1 TRANSCRIPTION

Okay so the best that works for me is i would like to see so i would want them to show me how it is done . So that is the best way i learn . If someone gives me an example or if i say i'm struggling with this and this and this , and then they go and show me how to do it . The next time i will be more comfortable to do it on my own . So they're actually showing you yes , yes , it's not just an explanation , an explanation also works , but for me to understand it . But you must show me then

Source: 4_PPCOM1 TRANSCRIPTION

or even if you write it down for me , i'm not gonna remember it . So i think the best way is for them to show me . If they don't show me , i feel like that's not gonna help me in any way .

Source: 4_PPCOM1 TRANSCRIPTION

Even with the skills , if they show me how to do it , i feel most of the students also , even if i show them how to do something

Source: 4_PPCOM1 TRANSCRIPTION

So yeah , for me to show them how to do it to even , i will even tell the patient i'm just going to explain to them why i am doing this , and most of the time it works one hundred percent

Source: 4_PPCOM1 TRANSCRIPTION

for example , a patient is busy , they're busy with a patient and they're like , can you come and assist us ? Then i would go in , i would show them , and even afterwards i would ask questions for them to make sure that they still understand i

Source: 4_PPCOM1 TRANSCRIPTION

I think it's hands on training . I show you what to do and how to do it . And then , because sometimes people are very , um , how can i say it , nervous , especially for me being in a room with them . So i will teach you how to do something , and then i'll let you do it together with me , and then i'm just standing and watching from a distance . How is it that you , that you are doing it ? And like from other qualifieds as well

Source: 5_PNQ4 TRANSCRIPTION

Okay um , well , i think if you show me something rather than tell me something that , that , then i will learn something . But not , i must , i must do it physically myself . Yeah ,

Source: 6_PUQ6 TRANSCRIPTION

A demonstration? No one . When a person demonstrates things for me , it becomes easy for me to understand and i'll never forget . So rather than someone explaining to me, for when you position that patient , you should do this and this , but if they come and they show me for it , okay this is how you turn your patient , this is what you do , then it becomes more easy for you. So more practical learning is

Source: 10_PCUT8 TRANSCRIPTION1

Well, it's me asking questions from them when i'm not sure about anything . And then yeah, if there are things that i'm also not certain about , i do call my qualifieds and ask them to demonstrate things for me to get a better understanding .

Source: 10_PCUT8 TRANSCRIPTION1

Hmm i also think it's the same answer , the demonstration , especially in radiography because that's all that matters , rather than let someone explain to you . So if they demonstrate that's how you learn , that's how you acquire skills ,

Source: 10_PCUT8 TRANSCRIPTION1

I go and approach a specific person . I ask them nicely to come show me how to do . Let's say a hand , simple hand . If i don't know how to do the basic principles and that's how i observe and yeah , and then i let them see me doing it , observing me , and then i take corrections from them if i'm doing it wrong.

Source: 11_PPQ4 TRANSCRIPTION 1

Observing and practicing what influences your skills development at work ? I'm learning new techniques . I'm getting a request form that you don't know how to do and then go and ask someone . Please come and show me . Um , yes , and then practice it afterwards . It's been a very long time since i've done a longer set and the students taught me yesterday how to do it again . So yeah , which is great .

Source: 13_PUQ2 Transcript

To obtain the knowledge that you need by looking and by practicing book knowledge is important , but i think practical is even more important in radiography

Source: 13_PUQ2 Transcript

If they explained to me before and what i need to do in a simple manner doesn't have to be textbook manner and then practically demonstrate for me and then also demonstrating in a way that i understand . You know

Source: PNQ2 TRANSCRIPTION 1

practically wise, and i said it's always better to show and demonstrate them to go and just tell them what to do , and then that sticks so we work in a close bond together .

Source: PUQ5 TRANSCRIPTION 1

As i see skills and physical experience, you can read the thing and you don't know what you're reading , but if you can demonstrate it to a student , show him once , it will stick . So it's more to me , practically

Source: PUQ5 TRANSCRIPTION 1

You can remember that in theory , but just to give them a tip to get the position and that is mostly out of experience , you can give them a tip and show him do this bend the knee in this and center to this, in this . Yeah

Source: PUQ5 TRANSCRIPTION 1

Student radiographer clinical environment introduction sessions

a suggestion i would say is to like in the beginning of the year to just introduce ourselves nicely to like all groups , because sometimes we get like a first year group first and then a second and then a third , and then you are like in march . So when it's your first time with a group of students , they must just tell us so that we can introduce ourselves and they can introduce themselves . And yeah , i would say working one on one more , because some students go to some qualified and vice versa . They like working . So i feel like getting to know , rotating between qualified and getting to know everyone

Source: 3_PCOMN1 TRANSCRIPTION

Safe space for teaching and learning

I want the students to feel safe to ask questions because i don't want someone to say no when i ask a question or someone to say go ask someone els

Source: 4_PPCOM1 TRANSCRIPTION

. So i feel the students , the students feel safe with me to ask me questions

Source: 4_PPCOM1 TRANSCRIPTION

the only suggestion i have is between the students and the qualified would be that they mustn't be scared to ask questions that's the only lack of relationship we have . Wat Ek nou al gesien het. It is that they are scared to ask if they don't know something , because we are always willing to help or explain or teach , but they are scared to ask or they don't they are hesitant to ask .

Source: PNQ2 TRANSCRIPTION 1

Separation between qualified and students

Okay so i do see that there is kind of a separation between the qualifications and the students , and especially because i'm a comm serve there's also even a separation between me and the qualified

Source: 4_PPCOM1 TRANSCRIPTION

Bonding exercise

i think we should have i don't want to say like a , you know , a bonding exercise , but something that will

Source: 4_PPCOM1 TRANSCRIPTION

Workload

There can also be an influence is quite sometimes . Sometimes you don't even have time to quickly show someone how to do something . There would be like twenty patients waiting for you . Then you must just be like , okay we're quickly gonna do it like this , and you can't explain in detail why you are doing what you are doing . And i think , yes , that makes a difference as well , because as i am a community service , i do have the degree and i do know what to do , but whenever we are so busy , i would quickly do it . And then it's correct . So i don't really want explain to the students why i did what i did .

Source: 4_PPCOM1 TRANSCRIPTION

Initiative to close student-qualified gap

So if we can just try and close that gap that is between students and qualified and try to understand more and also if you reprimand the students that it should be in a way where you instil discipline not to the person but to the way that they are doing things so that we cannot let them just get away with things due to your discipline and the concepts as well , to also give them during that year , give them a room to grow , so that next year they will be at another practice , may be with you . Then they can say , at least because i think in your comm serve, that is the year when you are now actually now being a radiographer there is now really where we groom you and say , go out in this world and just take up your space . Do you be the best radiographer that you can be.

Source: 5_PNQ4 TRANSCRIPTION

i think what we should do is , as radiographers we must look at the gap between us and the students and even the generational gap that they are , because our students , they are having so many rights , but when you look at it , it's because we also , we fought for , for the rights that the students are having

Source: 5_PNQ4 TRANSCRIPTION

Promote active engagement for both qualified and student

Um , i think what works best for us is like here every morning , we are doing quality assurance on our x ray films , so that is where all of us are having a voice , and what makes it nice is the subjective and the objective of how we see our x ray films . It's like , i can say , but this is not the way it should be , but you are having a voice to tell me , but this is the reason , and you did it like this , and the condition of the patient , so that the interaction that we are having , so we are learning from them and also we are now imparting our skills to them as well , to see how we did it and how things are being done now .

Source: 5_PNQ4 TRANSCRIPTION

Gentle approach

So we must have a softer approach also towards our students , and take them and lead them and guide them , to make sure that we are molding them to become the best radiographer that that they can b

Source: 5_PNQ4 TRANSCRIPTION

Well , i think , um , to the approach from a , from a more friendly side or , um , not too strict . I think it's better than being very strict , um , that's now with students or junior biographers um , because being strict make them so nervous and i don't think then they take in everything that you teach them yah .

Source: 6_PUQ6 TRANSCRIPTION

They should treat students with , they should become more lenient with the students because they are qualified who are very harsh and they don't understand that you guys are not on the same level . You are going growing every day as a student , so others just don't understand . They expect you to know everything . So if they could be like, lenient and understanding , patient with us .

Source: 10_PCUT8 TRANSCRIPTION1

Student mental health

because there are so many social ills also nowadays that we didn't experience those , that we don't know what our students are going through , especially after the covid pandemic as well . So our students , they are also having so many psychological things that they have to deal with , as well as social issues that they have to deal with

Source: 5_PNQ4 TRANSCRIPTION

Self learning

I like doing it myself . Like if i'm learning from someone , i will try by all means to do everything that i'm learning by myself , and you'll just be there to guide me day and day

Source: 7_PPCOM2

I mean , what works for me best ? It's a like , like i said before , it's like doing it by myself , doing something by myself . If , for example , if i need to maybe learn a certain , um , special projection . Um , it's quite best to understand that you first and do it by yourself , by myself and the person i'm looking for . Um , it'll be just there to guide me day and day , but the best way for me is to do it by myself , okay um

Source: 7_PPCOM2

I would like for the qualified to explain to me . Let's say , the first patient , he can tell me what am i supposed to do , and then the second patient , i want her to allow me to do the patient on my own until i'm done , and then maybe if i made a mistake , she can correct me . But i want a chance to do it by myself,

Source: PCUT5 TRANSCRIPTION 1

Personality difference of qualified

Um , it would depend on someone who is working with me . Like , like i said before , the character and the way he's doing things . Um , i'm not sure if i'm explaining it well , but the character of the person , yeah , okay where i'm looking for ? Okay so you say that the person should be more approachable yes , yes , yes . But sometimes you work with an aggressive person or you don't know what's going on . You such an individual.

Source: 7_PPCOM2

like i said before , um , characters of my seniors and the way they behave that's the thing i can say ,

Source: 7_PPCOM2

Lack of passion

i mean , like if we can actually stick to , so what can i say ? Um , if we can actually stick to what we are here for , it will make everything easier . For example , why i'm saying that , um , some people will be just here because actually the passion , some people will be here , but they won't actually do anything . And it creates some parallels between , um , students and qualified and us COMM serves . , i'm not sure if you understand what i'm trying to say . So it's a barrier . Do you mean it's a barrier ? If there's no passion there's a barrier between engagement ? Yeah . Okay okay i understand .

Source: 7_PPCOM2

Change of technology

The skills development at work . Seeing that radiography is evolving Oh , since that is evolving there are new things that have been done . There are new things that have been done because you copy from the other , the other places , like you can see now , we don't do the barium clisma and other countries that don't do clisma this anymore so i think even as we should go that way , do the other things instead of doing that , to do the CT colonography instead of doing the clisma as an example . Yes .

Source: 9_PUQ8 TRANSCRIPTION 1

Um , the techniques i've been taught , um , changed . And radiography is a changing career and especially orthopedics you know , to get a beautiful lateral shoulder angle fifteen degrees down . So stuff like that . So i think you must be open . You must never think that you , you know everything , because that's not true . If you , if you , if you're gonna start thinking that , i think you're gonna miss out .

Source: 13_PUQ2 Transcript

Different teaching approaches of university and clinical environments

hmm the relationship in relation to the work ? Yes , it is good , but sometimes there are things that the University A will be asking us to ask this , we'll just find a student coming up with things we don't know we don't agree with , like for positioning of the marker . Like the other time the students came to me and said we're gonna do the lateral skull , but he said no , at University A they told them that they should do the lateral skull like you do the lateral neck with the one fifty SID . Even if the patient can't , we can't do that if the patient can't do anything . But if the patient can turn the head and put the head next to the bucky , why not ? Why should you do it like you do ? As if it's a trauma patient there's some some of the things that they - i don't think now , at the moment we , they turn to the way they teach , the way we teach . Sometimes it's different .

Source: 9_PUQ8 TRANSCRIPTION 1

saying our lecturer said this , but not knowing that this other qualified has been qualified for so many years . They know the other tricks of doing some other things that the lecturers didn't teach them , so they should learn from us , even though they were taught maybe specific , specific positioning there are times when you can't do that position . They should listen to the qualifiers more at work . Okay okay i think so .

Source: 9_PUQ8 TRANSCRIPTION 1

Use of seminars to upskill

at the moment . The knowledge that we need is to do those . The seminar , and what we used to do is , um , what do we call it ? We'll have the seminar , but we'll do the images , and then we'll come and discuss them in the morning , usually before we start with our work . And if somebody comes with another way of doing things , like the orthopedic surgeon , they will come every time they come with new things , i think it's better for them to come and explain , explaining what do they want that's how i need to learn .

Source: 9_PUQ8 TRANSCRIPTION 1

Active support

I feel like if i just , i do a patient and then they should let me get the patient alone and then , um , i do a mistake and then they correct me , they tell me how to do it properly without like , sounding like they are like harsh or something like that . They should be able to try to tell me in like a nice , informative way .

Source: 14_PCUT7 TRANSCRIPTION 1

I feel like if we'd like sit down and talk about it and you tell me , like , why did i like , how did i make a mistake and what did i do wrong and how to correct it ? And then , like , give me a time again to go do it again and then i come and check again . Yes

Source: 14_PCUT7 TRANSCRIPTION 1

help us and then be there with us . Like don't just come and see that image , be there . I'm doing the patient . Correct me when i'm positioning let me do it , and then you correct me after i don't just come and check if it's wrong . You just tell me you should have done it this way

Source: 14_PCUT7 TRANSCRIPTION 1

it's like , um , just let me be myself , help me and , um , but let me do my mistake and then let me learn from my mistake . And if i don't understand something , like , help me , like be there for me , he is like , tell me what did i do ? Correct me , like give me tips about like , how can i do better.

Source: 14_PCUT7 TRANSCRIPTION 1

Because sometimes when you do something from the book and then the patient is difficult, especially Hospital C because it's trauma patient , you can't do the way the book says it must improvise so i would like for them to teach me their techniques when they find difficult patients

Source: PCUT5 TRANSCRIPTION 1

Equality and fare treatment

i feel like they should be more open . I feel like they shouldn't have , like , favorite students , that they should treat all of us the same

Source: 14_PCUT7 TRANSCRIPTION 1

Engagement

Engaging with the qualifieds . And i feel like i work with Hospital A more , because , like , i engage with the qualifieds that they're asking pquestions , they , they like . If i'm done with the patient , they ask you , can you do something wrong here ? And then if i say , i cant tell , okay okay and then they show me , and then you gotta talk about patients and even in the morning we like , before we start everything , we go through like yesterday's work , and then we engage with them . Like , okay this is how i say , this is how i did it . This is why i repeated this image

Source: 14_PCUT7 TRANSCRIPTION 1

Lack of communication

We don't have that communication with the qualifieds , it feels like if they like you , they're gonna explain something to you if you ask , but most of the time they just walk into your room and then you are in the doing the patient and ask them to come and check the images after just stuff like that . You don't think you can .

Source: 14_PCUT7 TRANSCRIPTION 1

Wanting to teach others

You know , the , the advice will go to qualified radiographers they should be more open and eager to teach . You know , they shouldn't have the superiority complex , if i should put it like that , because what i've observed is that because they chief radiographers or senior radiographers they can , they can . They think they can get away with a lot . They think they cannot . They can just speak . However , they want to speak with people , so , you know , they should just be sensitive and welcoming

Source: 11_PPQ4 TRANSCRIPTION 1

whether it works or not , if someone can teach me a technique that's , you know , working or easier or quicker i would always be open to it . And as i said , i'm i'm , i'm i'm learning from the students , i'm learning from juniors

Source: 13_PUQ2 Transcript

Approachable

So that's that i'm with the comm serves . I really treat them as qualified , because they are - they are almost qualified . You know , i don't . I don't just say , hey , you're comm serve. So no , i am superior . I'm above you . You should do this and that . No . So i see them as my colleagues , as qualified with the other ones , the qualified ones . I - i always see them as colleague

Source: 11_PPQ4 TRANSCRIPTION 1

. Um , i think they must have the , um , what's - the word , the , um , um , they must have the what's the right approach . They approachable you must be approachable to them . They must not be scared of you . We're not here to scare them . We are here to teach them our profession , and so if they go out after their fourth year , they would be able to take good x rays . Yeah , it's very important

Source: 13_PUQ2 Transcript

Or i would like them to be nice. And when they tell you that , they must understand that i do not know , they mustn't assume that because maybe i was taught at school , i already know what's going on . I want them to have patience when they teach us

Source: PCUT5 TRANSCRIPTION 1

Age barrier

okay it's different. With the younger qualified, we are more close to them, we interact with them a lot and they help. We learn a lot from them . But with the older qualified , it depends

Source: PCUT5 TRANSCRIPTION 1

APPENDIX U

TURNITIN SIMILARITY REPORT

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APPENDIX V

DECLARATION OF TECHNICAL AND LANGUAGE EDITING

TO WHOM IT MAY CONCERN

I hereby declare that regarding the following document:

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experiences from the public healthcare professionals in the Free State

1. I have performed the language editing (grammar, vocabulary and syntax).
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