POSTGRADUATE EDUCATION: PERSONAL, ORGANISATIONAL AND HIGHER EDUCATIONAL BARRIERS EXPERIENCED BY RADIOGRAPHERS IN KWAZULU-NATAL

This work is submitted in fulfilment of the requirements for the
Master of Health Sciences in Radiography in the
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ABSTRACT

INTRODUCTION

Radiography is a profession of rapidly advancing technology, changing scope of profession and practice and intolerance for anything but quality service delivery. The profession demands competent and relevant radiographers who are engaged in Postgraduate Education (PGE) which will facilitate consistence, relevance, competence and excellence. Participation in PGE is critical therefore barriers need to be eliminated.

PURPOSE

This study sought to investigate the barriers to PGE that radiographers in KwaZulu Natal (KZN) experienced at personal, organisational and higher educational levels. In addressing these, participation in PGE should increase and an improvement in the quality of radiographic services will then result to the end users, in this case the people of South Africa.

METHOD

A quantitative, descriptive research approach using surveys, was used to collect primary data from a randomly selected sample of 283 radiographers across all categories of radiography in the public and private sectors within KwaZulu-Natal. A questionnaire comprising of closed questions with a five-point Likert scale, and open-ended questions was utilised. SPSS and inferential statistics were used to identify relationships and associations between the variables. A p-value <0.05 was considered to indicate a significant result. The return of 121 responses yielded a response rate was 42.8%.

RESULTS

Significant differences were identified between variables in the personal, organisational and higher educational barriers. Personal barriers such as non-recognition for PGE and non-remuneration that would elevate personal status and self-esteem were identified as the main barriers to PGE. Lack of time, lack of

motivation, and lack of funding were also noted. PGE was found to be a lower personal priority for males than for females (*p*<0.05). Personal health was not a hindering factor for females (*p*<0.05).

The lack of financial support by the employer (*p*<0.05) and heavy workloads created organisational barriers. No time off to study, staff shortages as well as lack of incentives or rewards for PGE were also identified at the organisational level. A significant difference was found for employee development and remuneration for additional training between the public and private sector (*p*<0.05).

Higher educational barriers included a lack of quality local courses, inequalities in the admission criteria and quota system and instability such as protest action and untimely disruptions.

CONCLUSION

To effectively address the barriers to PGE, recommendations were made to radiographers to take responsibility for their professional development by adopting a culture of life-long learning to remain competent. Return on investment is guaranteed for organisations that support employee development. HEIs need to ensure quality supervision and support for appropriate PGE in order to meet industry demands for high quality, standardised courses. Barriers to PGE have no place in radiography where participation in PGE is critical.

DECLARATION OF ORIGINALITY

I, Angela Moonsamy, do hereby declare that this dissertation is my own work and that as far as I know, no other similar dissertation exists and, has not been submitted in part or full for any other degree to any other University.

…….. ……

Angela Moonsamy Date

Approved for submission for examination

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DEDICATION

I dedicate this dissertation to my loving mother, my wonderful husband and my amazing son.

To my mum, Mrs Chinnamah Moonsamy, thank you for your love, encouragement and support all through my life.

To my husband, Annamalay Moonsamy, despite all your own challenges during this time, your constant love, unwavering support and motivation is applaudable and very much appreciated.

To my only son, Kaylin, your spiritual journeys, creativity and amazing personality has touched our lives and others in more ways than one can imagine. You have taught us that our children are not ours to own but sent through us to raise our consciousness as parents and teach us lessons as no one else can.

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ABBREVIATIONS

ASSA*f*:	Academy of Science of South Africa
B-Tech:	Bachelor's Degree in Technology
CEU:	Continuing Education Unit
CHE:	Council on Higher Education
CPD:	Continuing Professional Development
CT:	Computed Tomography
DoH:	Department of Health
DUT:	Durban University of Technology
HAI:	Historically Advantaged Institutions
HE:	Higher Education
HEI:	Higher Education Institution
HET:	Higher Education and Training
HEQSF:	Higher Education Qualifications Sub-Framework
HPA:	Health Professions Act, 1974
HPCSA:	Health Professions Council of South Africa
IREC:	Institutional Research and Ethics Committee
KZN:	KwaZulu-Natal
MHSc:	Master of Health Sciences
MRI:	Magnetic Resonance Imaging
NM:	Nuclear Medicine
NRF:	National Research Foundation
NQF:	National Qualifications Framework
PGE:	Postgraduate Education
RCT:	Radiography and Clinical Technology

RSSA: Radiological Society of South Africa

RT: Radiotherapy

SA: South Africa

SAQA: South African Qualifications Authority

SDL: Self- Directed Learning

SORSA: Society of Radiographers of South Africa

SPSS: Statistical Package for Social Sciences

UK: United Kingdom

UoT: University of Technology

US: Ultrasound

USA: United States of America

WHO: World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 INTRODUCTION

Chapter one includes the background, the motivation for and the significance of this research study. The research aim, objectives, assumptions and delimitations are stated, the researcher's interest is highlighted and finally a summary of the subsequent chapters is presented.

The purpose of this study was to investigate the possible barriers to postgraduate education (PGE) experienced by qualified radiographers in KwaZulu-Natal (KZN). Rapid advances in imaging technology have made it more difficult for radiographers to maintain service excellence without obtaining some form of additional training such as PGE, in-house training and workshops. According to the ethical and professional rules of the Health Professions Council of South Africa (HPCSA) all healthcare professionals registered with the council are required "to update and develop the knowledge, skills and ethical attitudes that underpin competent practice" (HPCSA 2016:20). One option to achieve compliance would be through engaging in PGE. The aim of this study was to identify the barriers to PGE experienced by radiographers at a personal, organisational and higher educational level, in order to address and maintain service excellence at these levels. For the purpose of this study, PGE is taken to mean any formal, credit bearing, further study undertaken after acquiring a first degree (Collins Dictionaries 2017: 1).

A quantitative, descriptive, survey design, utilising a self-administered questionnaire was conducted on HPCSA registered, qualified radiographers in KZN. A simple random sampling method was used to draw a representative sample of 283 from the target population of 1059 at the time of the study. Data was analysed using descriptive and inferential statistics to identify and describe possible relationships and associations between variables, from which conclusions and recommendations were drawn.

1.2 BACKGROUND

The profession of radiography has four categories viz. Diagnostic (D), Nuclear Medicine (NM), Ultrasound (US) and Radiotherapy (RT). Prior to the re-structuring of radiography qualifications in South Africa (SA), the undergraduate qualifications offered were the three-year diploma at Universities of Technology (UoT) and the three-year bachelor's degree in radiography at universities. In 2014 two universities were already offering the four–year bachelor's degree while others introduced this degree in the following years. Some institutions offer all four categories, while others only offer Diagnostic plus one or some of the other categories (Professional Board for Radiography and Clinical Technology 2016:4). The Bachelor of Technology (B-Tech) degree which was previously offered by UoTs is categorised as an undergraduate qualification even though it is offered after completion of a first qualification in radiography. The postgraduate qualifications currently available in radiography are the honours, masters and doctoral degrees. Certificate programmes offered at some higher education institutions (HEI) include, amongst others, the Certificate in Mammography, Certificate in Computerised Tomography (CT) and the Postgraduate Certificate in Magnetic Resonance Imaging (MRI) (HPCSA 2010: 2-3).

A qualification is defined as "a formal recognition and certification of learning achievement awarded by an accredited institution" (Department of Higher Education and Training (DHET) 2014: 13). Figure 1 below, illustrates the higher education qualification range on the Higher Education Qualifications Sub-Framework (HEQSF) that may be conferred when learning outcomes are achieved after assessment. The HEQSF defines the relationship between higher education qualification types at different levels.

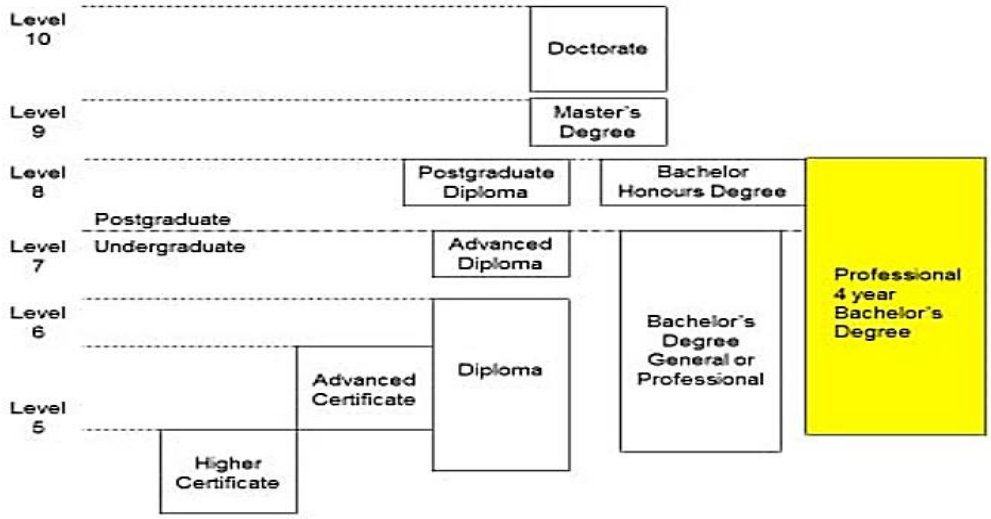

Figure 1: Higher education qualifications sub-framework (CHE 2013: 6)

The function of the Council on Higher Education (CHE) is to advise the Minister of Higher Education and Training (HET) on the development and management of the HEQSF and related matters. Professional bodies such as the HPCSA's Radiography and Clinical Technology (RCT) Professional Board are consulted to determine if a current or a proposed radiography qualification meets the requirements for professional registration, membership or licensure (CHE 2013: 13). All radiography qualifications must be approved by the HPCSA so that they are registrable with the board. The qualification types are depicted on the HEQSF flowchart (Figure 1).

Radiography qualifications are offered at various universities and UoTs across SA. Most of the training institutions have or are in the process of transforming their undergraduate qualifications from a three-year national diploma and degree into a four-year professional degree to align them with the HEQSF (RCT 2016: 4). The new professional degrees, illustrated in Figure 1 above, are offered on the National Qualifications Framework (NQF) at level eight which is a higher level than the previous three-year national diploma and degree that were pitched at NQF level six (South African Qualifications Authority (SAQA) 2019). The master's and doctoral qualifications are now pitched at NQF levels nine and ten respectively on the HEQSF.

Dr Blade Nzimande, the current HET minister, declared that "the last date for first time entering students enrolling in academic programmes that are not aligned with

the HEQSF to be the 31st of December 2019" (Department of HET 2016:4). The impact on radiography was that the last intake for the B-Tech was 2019. For many radiographers with the national diploma qualification, the time has run out for further upward progression in radiography education. With the introduction of the new qualifications there is a gap between the B-Tech (NQF level 7) and the masters (NQF level 9) which presents as a barrier for radiographers wishing to study further after 2019.

Radiographers with undergraduate qualifications at any of the NQF levels are required by law, to register these qualifications with the HPCSA as a pre-requisite to practice. The four categories of radiographers are registered on one common register for radiographers. There are no separate registers for areas of specialisation such as those for medical practitioners (HPCSA 2017: 1). The absence of specialist registers in radiography may be a demotivating factor for engaging in PGE. This could possibly have a negative impact on the radiographers' professional status as well as the associated remuneration. Furthermore, there seems to be no system in place that recognises further studies for suitable job placement and status. This could possibly be due to such factors as lack of funding, bursaries or time off available to radiographers for PGE. Those that do engage in PGE are often required to finance their own studies. Radiographers, therefore, may not see any benefit of engaging in PGE and may therefore not be inspired to study further in their profession. This study sought to investigate the possible factors that may serve as barriers to PGE.

1.3 MOTIVATION AND SIGNIFICANCE OF THE STUDY

Besides monitoring the registration for professional practice, the HPCSA also regulates "…aspects pertaining to education and training, professional conduct and ethical behavior, ensuring continuing professional development, and fostering compliance with healthcare standards" (HPCSA 2019:1). Radiography is a rapidly evolving profession where advancements in imaging technology require continuing education and training to ensure that radiographers remain updated and competent (Ohagwu *et al*. 2010: 1). In SA however, it appears that PGE is hindered by numerous barriers experienced by radiographers. A South African study by Du

Plessis, Friedrich-Nel and van Tonder (2012: 116), found that at that time, only 7.9% of radiographers had obtained a B-Tech, which can only be obtained after an undergraduate qualification, indicating that there is a need for a greater participation in PGE. The authors did not however, identify the barriers to PGE, which this current study has aimed to do.

A study by Mbuuke and Pope (2015: 223-229) in the United Kingdom (UK) identified intrinsic (personal) and extrinsic (organisational and educational institutions) variables that influenced postgraduate students' decisions to pursue PGE. The small sample used however, was confined to one centre, thus highlighting the need for further research using a larger sample population. In addition, the study did not identify which decision-making factor was more influential towards pursuing PGE. The paucity of literature on PGE for radiographers in the South African context was the rationale for the current study. This study therefore aimed to identify the barriers to PGE experienced on the personal, organisational and higher educational institution levels.

The theoretical framework underpinning this study is embedded in Maslow's Hierarchy of Needs (Maslow 1954: 35-46) as it referred to the five levels of needs that motivate people – in this case radiographers. Engaging in PGE would satisfy the higher order needs of esteem and self-actualisation. In addition, Adult Learning Theories such as those by Knowles (1973: 47-48) recognised the inherent need to learn and grow and therefore complemented Maslow's hierarchy of needs theory by identifying the level of needs at a given time. The perceived barriers presented at the individual, organisational and higher education levels however, appeared to hinder the realisation of such needs. Therefore, this study sought to investigate these possible barriers experienced by radiographers.

Continuous Professional Development (CPD) activities do not all constitute PGE, except when the healthcare practitioner is engaged in formal studies where CPD points can be claimed. Interesting to note, is that the current scope of profession as regulated by HPCSA, is in the process of being reviewed and amended to accommodate role extension (HPCSA 2018:1). The implementation of this reviewed scope will require PGE, as extended roles will necessitate additional training such as medicine control and administration of contrast media, basic image interpretation and therapeutic use of high intensity ultrasound (Department of Health 2020: 2-5)

This gives further credence to the significance of the current study which sought to identify the barriers to PGE in order to sustain service excellence.

1.4 RESEARCH AIM AND OBJECTIVES

1.4.1 Aim

The aim of this study was to investigate the barriers to PGE experienced by qualified radiographers in KZN.

1.4.2 Objectives

- To identify personal barriers to PGE experienced by qualified radiographers.
- To identify organisational (workplace) barriers to PGE experienced by qualified radiographers.
- To identify the barriers to PGE in higher educational structures experienced by qualified radiographers.
- To make recommendations to address identified barriers to PGE experienced by qualified radiographers.

1.5 ASSUMPTIONS AND DELIMITATIONS

The researcher has assumed that the information provided by all the participants is their personal and honest opinions and perceptions, based on their experiences within the field of this study.

Delimitations are restrictions placed deliberately by the researcher (USC Libraries 2014: 1) to set the boundaries of a study. The study focused on obtaining input from qualified radiographers in the province of KZN and only the barriers experienced at a personal, organisational and higher educational level were investigated. The sample was selected from the HPCSA's iRegister to ensure that it was restricted to currently registered radiographers in KZN.

1.6 LIMITATIONS OF THE STUDY

The limitations identified for this study:

- Non-responsiveness from respondents was addressed by sending an automated reminder every second day for the online surveys. Hand-delivered questionnaires were left at a specific location in a labelled collection box with a specified collection date.
- Radiographers who have relocated to another address and not changed their contact details with HPCSA resulted in a reduced sample. Additional participants were again randomly selected from the HPCSA database for KZN radiographers to compensate for this limitation.
- Self-reporting may have provided inaccurate or biased information.

1.7 RESEARCHER'S INTEREST IN THE STUDY

The researcher's professional career has spanned across the public and private sector as well as the higher educational sector as a clinical radiographer, manager and a lecturer. In these various clinical settings, it was observed that although radiographers discussed engaging in further studies, they were not actively pursuing them. Radiographers were also registering for PGE but deciding to deregister in the early stages of the study program. For South African radiographers to remain clinically competent, ongoing education and training such as PGE is critical, yet based on observations by the researcher there appeared to be very little interest amongst radiographers in KZN to study further. The researcher's intention was, therefore, to identify the barriers experienced by radiographers to PGE. It is further hoped that the results of this study will minimise personal barriers by reforming organisational behavior towards PGE in the form of funding, time off to study, recognition and remuneration for PGE obtained. It is also envisaged that higher educational institutions will review the factors that are perceived as barriers to PGE. This should result in an increase in radiographers engaging in PGE and thus increase the research output in KZN.

1.8 SUMMARY OF CHAPTERS

Each chapter of the dissertation contains the following:

- Chapter one introduces the study with a background to the problem; the problem statement; the aim of the study; the objectives of the study and the research questions; and finally, the significance of the study;
- Chapter two reviews relevant literature related to the current study. Previous studies related to the current study are critically analysed;
- Chapter three describes each step in the research methodology adopted;
- Chapter four focuses on presenting the results of the research study;
- Chapter five presents a discussion and interpretation of the research findings;
- Chapter six brings to light the conclusions and recommendations and further assesses whether the research objectives have been met; and
- A list of references concludes the dissertation citing all works referred to in the study.

1.9 CONCLUSION

A background to the study and a statement of the research problem has been presented. The purpose of the study was discussed followed by the aim and objectives of the study. The significance of the study was motivated, and a layout of the study was presented.

Literature relevant to this study will be reviewed in the next chapter.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

Radiography is a health science profession that involves the use of ionising radiation to help locate, identify, diagnose and treat diseases. It encompasses four categories; Diagnostic (production of images of anatomical structures using x-rays), Ultrasound (imaging of internal body structures using sound waves), Nuclear Medicine (introduction of radionuclides into body organs and systems and recording their activity) and Radiotherapy (treatment of cancer using high energy gamma rays) (Lundgren, Linden and Anderson 2015: 4; Mochifefe 2005: 15 and Health Professions Act of 1974:1). Lundgren, Linden and Anderson (2015: 4) further describe radiography as a science that combines the five attributes related to patient care and the environment, image production with the mastering of techniques and technological equipment and the safe use of radiation.

Rapid advances in imaging technology have made it necessary for radiographers to obtain additional training or PGE in order to maintain service excellence (HPCSA 2017: 15; HPCSA 2016: 20). Obtaining this PGE can, itself, be a possible challenge as potential barriers may be encountered. The purpose of this study was to therefore identify the possible barriers to PGE experienced by radiographers in order to address them and maintain service excellence.

Paans *et al.* (2013: 348) have defined the excellent professional as one who possesses competencies that are related to superior reasoning, personal attributes, skills, values and beliefs. The authors have further claimed that service excellence and efficiency are maintained through ongoing education and training by engaging in undergraduate, extended curriculum and postgraduate courses. Compliance with CPD, as mandated by the HPCSA for all healthcare practitioners, would ensure service excellence and efficiency (HPCSA 2017:15-16). Evripiotis *et al.* (2013: 20) are also proponents for ongoing education and training as the key to radiographers maintaining competence, usefulness and accountability in a constantly evolving radiography profession. The rapid advances in imaging technology have made it more difficult for radiographers to maintain service excellence without additional

training and education. Role extension for South African radiographers may only be possible through engaging in the relevant PGE (Koch, Swindon and Pillay (2017: 128), Ohagwu *et al.* (2010 cited in Esop, Paulinus and Egber 2017: 47), Evripiotis *et al.* (2013: 20) and Paans *et al.* (2013: 348) all concur that radiographers need to be adequately and continually trained and educated in order to provide an efficient service to the demanding healthcare sector. These authors have strongly emphasised the need to engage in PGE, so it is important to identify barriers that are preventing professionals from engaging in PGE which this current study aimed to do in KZN.

Justification to engage in PGE from an organisational perspective was presented by Comley-White and Potterton (2019:3), Jerome (2013: 44) and Smith *et al.* (2010: 33) who asserted that employers seeking a greater return on investment need to encourage ongoing education and training. They also identified that recruiting high-quality postgraduates in research-intensive technology, science and engineering industries was critical to business success. This practice was in agreement with the World Health Report compiled by the World Health Organisation (WHO) (2000: 76-77) in which human resources were identified as the most important resource in any healthcare environment. The efficient performance of healthcare systems is therefore dependent on the knowledge, skills and motivation of the people responsible for delivering the service (WHO 2000: 76-77).

According to the *Ethical and Professional Rules of the Health Professions Council of South Africa* (2016: 20), all healthcare professionals registered with the HPCSA are required to update and develop the knowledge, skills and ethical attitudes that underpin competent practice. Ongoing development is a legal requirement that can also be achieved through PGE, which the HPCSA recognizes as one of the accepted CPD activities for which continuing education units (CEU) can be awarded (HPCSA 2017: 15-16). Radiographers are registered with the HPCSA and are therefore required to be compliant with the Health Professions Act, 1974 (Act 56 0f 1974) which mandates CPD in the form of formal or informal activities (HPCSA 2017: 2). Engagement in CPD however can include a variety of activities, such as PGE, publishing articles and being an external examiner, which are classified as level 3 activities by the Council (HPCSA 2017: 15-16).

An analysis of the state of postgraduate studies in South Africa identified a shortage of skilled professionals especially at postgraduate level in almost all professions (CHE 2006: 12). This report by the CHE emphasised the urgency of prioritising support and funding for postgraduate students.

It can be seen from above that, service excellence; return on investment and professional compliance requirements all serve to support the need for radiographers to engage in PGE. This current study, therefore sought to identify any possible barriers that would hinder radiographers from engaging in PGE.

The review of literature that follows will cover: a definition of key concepts; ongoing education and training in radiography; followed by an examination of the different barriers to postgraduate education; a graphic display of Maslow's Hierarchy of needs theory; discussion of Knowles adult learning theories; deliberations on the personal barriers to PGE; a review of organisational barriers to PGE and finally, discussion of reflections on higher educational barriers to PGE were discussed.

2.2 DEFINITION OF KEY CONCEPTS

Postgraduate education (PGE) is defined, for the purposes of this study, as further studies undertaken after acquiring a first degree (Collins Dictionaries 2017: 1). In radiography this includes masters, doctoral as well as all HPCSA accredited courses and diploma studies as illustrated in Figure 1 (CHE 2013: 6). It does, however, exclude the B-Tech degree which is classified as an undergraduate qualification at NQF level 7 as per the HEQSF flowchart (Figure 1). Respondents in the current study however, had considered the B-Tech to be PGE since it could only be obtained after first acquiring an undergraduate qualification.

An accredited qualification is an existing academic programme that is registered on the National Qualifications Framework (NQF) and has been accredited by: Universities and Technikons Advisory Council (UTAC); South African Qualifications Authority (SAQA); or the Higher Education Quality Council (HEQC) (CHE 2019: 1). The UTAC was abolished when the CHE was established in December 2010 through the Higher Education Act 101 of 1997 (CHE 2019:1). In the case of professional qualifications such as radiography, the professional body (RCT Board

of the HPCSA) is also required to approve and accredit the qualification for the purposes of registration.

CPD as mandated by the HPCSA is defined as ongoing development of knowledge, skills and ethical attitudes that underpin competency as healthcare professionals (HPCSA 2017: 2) and Self-Directed Learning (SDL) is a process in which learners take the initiative in diagnosing their own learning needs, implementing appropriate strategies to meet their objectives, and evaluating their achievements (Couper 2016: 2).

A barrier is defined as anything that prevents movement, access or progress, making it difficult or impossible for something to happen or to be achieved (Collins English Dictionary 2019: 1). The barriers experienced by radiographers in KZN to PGE were categorised into Personal (Pager, Holden and Golenko 2012: 56), Organisational (Du Plessis, Friedrich-Nel and van Tonder 2012: 114) and Higher Educational barriers (WHO 2013: 5). None of these authors have used all three categories in a single study therefore this study set out to investigate all three categories of barriers.

2.3 THEORIES UNDERPINNING POSTGRADUATE EDUCATION

A variety of motivational and adult learning theories exist that impact an individual's choice to engage in PGE. This study is underpinned by two such theories that explain the attitudes, status and motivation of radiographers to PGE.

2.3.1 Maslow's Hierarchy of Needs Theory

One of the most influential theories of motivation is Abraham Maslow's hierarchy of needs which depicts a model that suggests employees are motivated by five levels of needs as seen in Figure 1 below (McLeod 2017: 1). This theory explains that an individual cannot satisfy any higher-level needs unless the needs below have been satisfied. This was supported in a study using Maslow's Hierarchy of Needs scale to interpret findings on the obstacles to self-actualization in the personal, social and educational levels of college students in Turkey (Bulut 2018: 1).

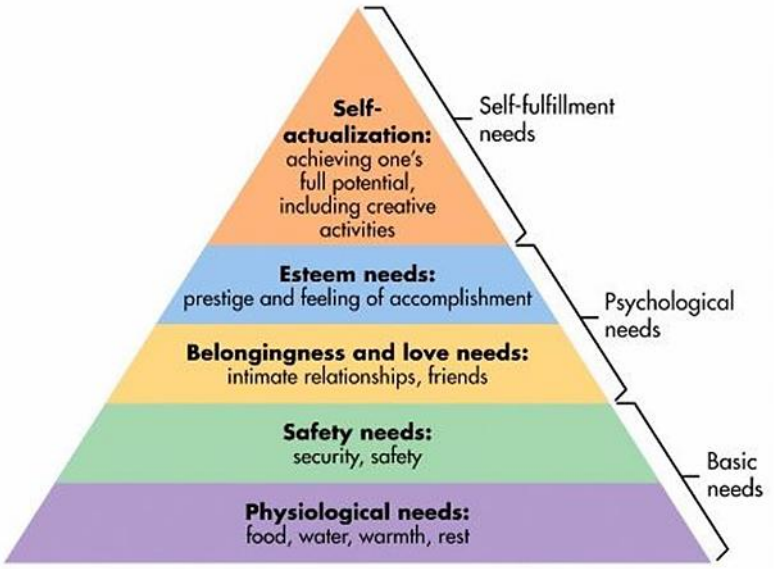

Figure 2: Hierarchy of human needs theory (McLeod 2017: 1)

Maslow's statement that "people are motivated to achieve certain needs, where some needs take precedence over others", was cited in McLeod (2017: 1-3). He declared however, that the most basic need that motivated behaviour was for physical survival. Once the primary level of need was fulfilled, then the next level of need was sought. The order of needs was found to be flexible according to circumstances or individual differences (McLeod 2107: 1-3). Radiographers seeking good interpersonal relationships with radiologists emphasised their self-esteem and recognition needs in the workplace (Britton, Pieterse and Lawrence 2017: 30). A study by Henwood *et al*. (2015: 220-228) also highlights the flexibility of Maslow's Hierarchy of needs theory.

A study of mental health recovery based on Maslow's notion of self-actualisation, strengthened the argument that material deprivation such as homelessness or a lack of a basic need such as the safety and security of the comforts of home may affect recovery (Henwood *et al.* 2015: 220-228). The authors have argued that self-actualisation in terms of recovery seems to occur when the more basic needs are not met, which supports Maslow's later hypothesis that physiological needs may emerge from the frustration of non-fulfilment of basic needs. The findings from this study by Henwood *et al.* (2015: 220-228) dismissed the argument that Maslow studied only intelligent and able-bodied persons and re-asserted that the Hierarchy of needs theory was applicable to any person irrespective of their mental or physical state of health.

Kaur (2013: 1063) identified various other theorists who have also criticised Maslow's hierarchy of needs as being unrealistic in assuming that all people were alike, and all situations are alike. Kaur believes that Maslow's theory has made a significant impact in the field of organisational behaviour and management especially in respect of employee motivation. Britton, Pieterse and Lawrence (2017: 30) concur with Kaur as they found that radiographers seek good working relationships with radiologists in order to feel respected and valued. Self-esteem and confidence are boosted when they gain recognition and are valued for their opinion. Creed (2011: 98) argues that higher level needs may be dominant at any time despite the fulfilment of lower level needs and that motivation and management intervention allows for achievement of those higher-level needs. Furthermore, an individual can have more than one need at a time therefore the assumption by Maslow that an individual has one need at a particular time is impractical and unrealistic as argued by Creed (2011: 98) and Britton, Pieterse and Lawrence (2017: 30). However, it is vital to note that Maslow's hierarchy of needs has been widely accepted as fundamental and new theorists have adapted their models around similar kinds of needs (Creed 2011: 98).

Maslow also emphasised that the need for self-actualisation was any healthy person's prime motivation (Maslow 1943: 394). To achieve this, people seek growth, achievement and advancement such as PGE. Findings from a study by Pager, Holden and Golenko (2012: 57) indicated that their respondents' interest in research had motivated them to conduct research thereby satisfying the higher order needs for self-actualisation as described by Maslow. Maslow's hierarchy of needs has been used to identify the current priority needs of radiographers. If radiographers were found to be fixated on any of the lower order needs, it could be argued that they were not ready and or able to engage in PGE that would satisfy the higher order needs for esteem and self-actualisation. Professional stagnation from lack of adequate compensation or recognition of PGE left respondents feeling stuck with no room to improve as seen in the study by Britton, Pieterse and Lawrence (2017: 30).

2.3.2 Malcolm Knowles Adult Learning Theory

A complementary theory to Maslow's is Malcolm Knowles' Adult Learning Theory (1980: 27-28), which states that the mission of adult education is to satisfy three

distinct needs and goals namely those of individuals, institutions and that of society. Merriam, Caffarella and Baumgartner (2007: 22) reiterated this theory by affirming that the effect of global economy and technological advances required that adults should continue to learn in order to function optimally at home, work and in their communities. Merriam, Caffarella and Baumgartner (2007: 18) predicted that knowledge acquired by professionals through formal training at that time would be outdated in less than five years, making the need for continuing education more critical. It was also expected that professionals should be lifelong learners in order to maintain their licence to practice (Merriam, Caffarella and Baumgartner 2007: 125).

Malcolm Knowles, (1980: 27-28, cited in Litster 2016: 2) developed the following five assumptions about the characteristics of adult learners:

- **"Self-concept** – states that a person progresses from being a dependent personality to a self-directed human being as they mature;
- **Role of experience** - As a person matures, they accumulate a growing reservoir of experience that becomes an increasing resource for learning;
- **Readiness to learn** - As a person matures, his/her readiness to learn becomes oriented increasingly to the developmental tasks of his/her social roles;
- **Orientation to learning** - As a person matures, his/her time perspective changes from one of postponed application of knowledge to immediacy of application, and accordingly his/her orientation toward learning, shifts from one of subject-centeredness to one of problem-centeredness; and
- **Motivation to learn** - As a person matures, the motivation to learn is internal" (Excerpt from Litster 2016: 2).

The assumptions listed above complement Maslow's Hierarchy of Needs theory to ultimately achieve self-fulfillment. The current study tested the relevance of Knowles theory which states that the mission of adult education is to satisfy three distinct needs and goals of the individual, institution and that of society (Litster 2016: 2).

Another key component of Knowles theory is SDL which emphasizes the need for adult education or PGE that would enable one to develop the attitude that learning is a lifelong process and that one should strive to acquire the skills of self-directed

learning (Knowles 1975, cited in Couper 2016: 2). He defined SDL as a process in which learners take the initiative in diagnosing their own learning needs, implementing appropriate strategies to meet their objectives, and evaluating their achievements. Radiographers who have adopted the concept of SDL would be engaging in PGE that would enable quick clinical decision making in their professions as explained by Avdal in 2013 (cited in Couper 2016: 2) who defined SDL as an ability to search, evaluate and adopt the information retrieved in the clinical decision-making process.

A study conducted by Houle and Tough in 1950 (cited in Knowles 1973: 35), was designed to discover why adults engage in continuing education. The results identified three types of learners namely the goal, activity and learning-oriented learner which identifies learners' reasons for wanting to engage in further education. The goal and activity-oriented learner engaged in learning to fulfil specific needs whereas, the learning-oriented learner engaged in lifelong learning. The first two types of learners placed self-imposed barriers to further education once their needs were satisfied. A sudden spike in the numbers registering for the radiography B-Tech degree due to it being phased out is indicative of radiographers being activity-oriented learners (DHET 2016: 4; Knowles 1973: 35). The current study ascertained the type of learner the radiographer identified with and whether this imposed barriers to further education.

Sawatsky *et al.* (2017: 1) developed a theoretical model of SDL in medical education for physicians in the United States (US). The study emphasised that SDL is part of lifelong learning and is an important competency for physicians to develop and maintain as required by the Accreditation Council for Graduate Medical Education. In the South African context, ongoing education was legislated by the HPCSA and radiographers are required to engage in CPD which includes PGE to remain compliant and competent (HPCSA 2017: 16-17). The current study sought to investigate the possible barriers to PGE which is one of the activities that contributes to compliance with HPCSA requirements.

Whilst motivational and adult learning theories emphasised an inherent need for learning, the different types of adult learners, as well as a need for self-actualization, there were limited studies found that utilised these theories to explore the barriers to PGE experienced by radiographers in the South African context. This current

study therefore utilised both the motivational and adult learning theories to underpin the investigation of the personal, organisational and higher educational barriers experienced by radiographers to PGE.

2.4 PERSONAL BARRIERS

Attitudinal and perception barriers were found to be the personal barriers which individuals themselves place on further education and training (Pager, Holden and Golenko 2012: 56). These same authors found that a lack of time for research, other priority work roles and the lack of funds were frequently reported as barriers towards engaging in post graduate studies in Queensland Australia. Gqweta and Naidoo (2014: 14) reported that practitioner stagnation and resultant general decreased morale do exist within the radiography profession. A study in South Eastern Nigeria by Ugwu, Erondu and Onwuazombe (2012: 120) reiterated the fact that personal commitment was critical to achieving PGE. In a South African study, it was found that physiotherapists chose not to pursue PGE due to the perception that these degrees were solely academic and less relevant than the practical skills required in the clinical setting (Cobbing and Maddocks 2017: 2). These authors also identified PGE barriers such as high costs, lack of time and family commitments. Interesting to note is that they also identified the following factors that participants in their study had cited as facilitators to engaging in PGE: development of expertise, achievement of a personal goal and improvement of patient care. These factors aligned with Maslow's Hierarchy of need of self-actualisation (Cobbing and Maddocks 2017: 2-3; Britton, Pieterse and Lawrence 2017: 30). Ohagwu *et al.* 2010 (cited in Esop, Paulinus and Egber 2017: 47) also found in a study conducted in Nigeria, that the low output at postgraduate level stemmed from radiographers' inherent poor knowledge and attitudes towards research, time constraints, lack of support from peers, managers and other health professionals, lack of resources and a resistance to change. The study also indicated that 51% of their sample had a Bachelor of Science degree, 36.6% had a diploma, and 12.4% possessed postgraduate qualifications. Only 9.4% of these postgraduate respondents possessed a Master of Health Sciences (MSc) qualification, of which 75% were in academia and 3.8% were in clinical practice. The imbalances indicated by the vast differences between PGE of academic radiographers against those in clinical

practice suggest that academia has an advantage over others such as promotion based on research output. In contrast, those in clinical practice cited barriers such as poor knowledge of research, lack of finance and a lack of interest for non-participation in research. Ogenyi, Geoffrey and Maikudi (2015: 6) agree that academic radiographers in Nigeria had more job satisfaction due to opportunities for postgraduate education as well as promotions associated with the acquisition of PGE.

There is a paucity of literature relating to PGE for radiographers in the South African context. Du Plessis, Friedrich-Nel and van Tonder (2012: 116) found in their study that only 7.9% of South African radiographers held a B-Tech degree as opposed to 62.5% who held a National Diploma in Radiography. While these statistics suggested a need for greater involvement by radiographers in PGE, the authors did not identify or focus on the barriers to PGE experienced by the sampled population.

Lack of research skills and knowledge in Allied Health professionals in Queensland, Australia were identified by Pager, Holden and Golenko (2012: 56) as a personal barrier to PGE, while a study at Cardiff University by Mubuuke and Pope (2015: 1) identified a lack of funding such as scholarships and loans as key barriers to radiographers pursuing PGE. This current study sought to identify the personal barriers to PGE experienced by KZN radiographers as these have not yet been investigated.

2.5 ORGANISATIONAL BARRIERS

Organisational barriers such as organisational culture, lack of management commitment to training and education, inadequate promotion opportunities as well as a lack of transparency and fairness in selection of employees for further development are seen as common barriers in an organisation (Chipere and Nkosi 2019: 5; Anlesinya 2018: 1; Mubuuke and Pope 2015: 229; Eze *et. al*. 2012: 25). Whilst employers seeking a greater return on investment should encourage ongoing education and training, there may exist organisational barriers which may limit or inhibit access to PGE (Du Plessis, Friedrich-Nel and van Tonder 2012: 114). The barrier of staff shortages was used to justify most employers' unwillingness to allow studies during working hours. Du Plessis, Friedrich-Nel and van Tonder (2012: 114),

Mubuuke and Pope (2015: 229) and Eze *et al.* (2012: 25) further identified the lack of rewards or incentives within the work environment as a barrier to pursuing PGE. A study conducted in Nigeria by Jerome (2013: 44) proposed the use of Maslow's hierarchy of needs theory in every organisation to mitigate such organisational barriers to PGE, and to furthermore gain success and excellence in the areas of organisational culture, human resource management and employee performance.

A report compiled by Smith *et al.* (2010: 33-34) on the United Kingdom's postgraduate sector emphasised that an organisations ability to recruit high quality postgraduate researchers in research intensive technology, science and engineering industries is critical to business success. Therefore, employers should not focus on the cost of PGE to their employees but rather on a significant return on investment. Comley-White and Potterton (2018: 4) and Smith *et al.* (2010: 34) also highlighted the benefits of postgraduate researchers to public sector employers including government which relies on research to inform the development of more effective public policies. Postgraduate researchers undertaking professional doctorates in fields such as healthcare and education were responsible for significant contributions to the advancement of knowledge and practice in their specific professions. The critical shortage of trained health care professionals in many countries including South Africa has impacted almost one billion people with no access to essential healthcare services (Academy of Science of South Africa (ASSAf) 2018: 93). These authors further highlighted the fact that in SA, 46% of the population live in rural areas whilst only 12% of doctors and 19% of nurses are employed here to serve their healthcare needs. Kabongo, Nel and Pitcher (2015: 3) further highlighted the vast differences in medical imaging resources between the Private and Public health sectors which further disadvantages the greater population in the rural areas. Therefore, time and money invested in PGE should not be a burden to any organisation.

Maslow's Hierarchy of Needs theory was used in this current study to identify organisational barriers to PGE.

2.6 HIGHER EDUCATIONAL BARRIERS

Educational barriers refer to factors such as high cost of education, lack of knowledge regarding HEI and inequality in access to higher education amongst others, which may impede a student's access to and success in higher education (Sosu 2016: 4-6)

A report on the transformation and scaling up of health professionals' education and training compiled by WHO (2013: 5) and the Academy of Science of South Africa (ASSA) (2018: 93) identified shortages and imbalances in the skill mix of teams and an uneven geographical distribution of health professionals globally resulting in millions of people without access to health services. The report further highlighted the need for more professional health workers. They emphasised the importance of quality rather just the quantity of health professionals' education in order to address the health needs of the population. Furthermore, WHO (2013:5) states that there needs to be: an increase in the capacity of educational institutions to teach; improved competencies of existing academic staff; increased numbers of staff; reformation of the admissions criteria; regular revision and updating of curricula; and a linking of new disease profiles to training needs.

A South African study conducted by the National Research Foundation (NRF), 2011 (cited in Dominguez-Whitehead 2015: 914), confirmed the findings in the WHO report when they found that the development and growth of PGE was identified as a national priority in SA. The NRF stated however, that the shortage of postgraduate students posed a major challenge to meeting these goals.

The lack of teaching facilities and resources identified by the WHO report was confirmed in the South African studies by Comley-White and Potterton (2018: 3) and Du Plessis, Friedrich-Nel and van Tonder (2012:116). They identified educational barriers which include lack of availability of additional postgraduate qualifications as required by the evolving professions; accessibility in terms of location, finance and standardisation of PGE. Morris *et al.* (2014: 250), in an Australian study, stated that no standardised PGE was available nationally and that whilst in-house training addressed the immediate needs of radiographers in practice, the acquired skills were not transferable to other workplaces. Comley-White and Potterton (2018: 3) and Du Plessis, Friedrich-Nel and van Tonder (2012:

112) also emphasised the need for PGE to be made more accessible to South African radiographers as well as to other Southern African countries. Mubuuke and Pope (2015: 227) and Eze *et al*. (2012: 25) concurred with Comley-White and Potterton, (2018: 3) and Du Plessis, Friedrich-Nel and van Tonder (2012: 112) on making PGE available at local institutions within specific countries for easy access.

A South African study by Dominquez-Whitehead (2015: 914-915) stated that for the postgraduate system to experience growth and development and an increase in doctoral graduates, the number and calibre of students at the entry level of postgraduate studies needed to grow. At the time of the study the author found that very little was being done by HEIs to prepare undergraduate students in general to pursue postgraduate studies due to a lack of postgraduate preparation programmes. This current study sought to verify the status of PGE amongst radiographers in KZN. In addition to the above barriers another key barrier that seemed to limit entry into PGE is the historical status of universities.

2.6.1 Historically advantaged and disadvantaged universities

South African studies conducted by Habib (2015: 10) and Kraak (2000: 91-93) identified inequalities between HEI's in respect of academic staff establishments, with postgraduate qualifications being one of the factors hindering new knowledge production in terms of research. Fewer appropriately qualified staff at HEI's was found to have impacted on student enrolment in postgraduate studies. Singh (2015: 1-5) also found that the best equipped HEIs made bigger strides in research and development as they had higher qualified staff and more financial and human resources. Additional supporting evidence was reported by Habib (2015: 10) that at that time (2015), historically advantaged institutions had largely white academic staff at the most senior academic levels. This has widened the gap between historically advantaged and historically disadvantaged HEIs. The current study sought to determine if any of the factors such as a lack of highly qualified academic staff and financial resources did in fact impact on PGE for radiographers in KZN.

A study by Cilliers and Aucoin (2016: 15) highlighted student fees, university staffing issues, and an untransformed higher education system, amongst others, as reasons for the "Fees Must Fall" and the "Rhodes must Fall" campaigns which led to student protests. To date it appears that the historical status of some universities has not

changed much since those studies conducted in 2000 and 2016 respectively (Kraak 2000: 91-93; Cilliers and Aucoin 2016: 15).

The Deputy Minister of Higher Education and Training, Manamela (2018: 1) confirmed the unchanged status of universities in his report, stating that only 43.8% of permanent academic staff in South African universities held doctoral degrees. The report reflected that male employees were more likely to hold doctoral degrees than females and that white academics were more advantaged than black academics. Yet another inequality identified by Manamela (2018: 1) was that universities had more academics with doctoral degrees than UoTs. Radiography is taught in many of the latter institutions therefore, inequalities such as these might negatively impact on PGE due to reduced academic staff needed for research supervision. The degree to which such deficiencies in the HEIs had hindered radiographers from engaging in PGE was investigated in this current study. Engaging and succeeding in PGE is dependent on competent, updated academic staff.

2.6.2 Infrastructure barriers in HEI

Having *et al.* (2010: 1-6) cited a lack of administrative and financial support to be barriers to commencing or maintaining PGE. The authors also found that the global sharing of educational curricula might pose a further challenge in respect of variation in education and training from one country to another, therefore Du Plessis, Friedrich-Nel and van Tonder (2012: 116) recommended that all learning material, online learning and assessment for PGE be made accessible. Respondents from studies by Comley-White and Potterton (2018: 3) and Having *et al.* (2010: 1-6) expressed a strong need for academic staff training and development in order to cope with the increased workload that accompanied international collaboration.

A study by Eze *et al.* (2012: 25) identified the unstable university system in Nigeria in respect of frequently interrupted academic programmes due to labour disputes between government and academic staff union of universities over stretched work schedules, as a barrier to PGE. These scenarios impacted negatively on the duration of most university courses due to fewer available staff. According to Singh

(2015: 1-5), SA has struggled to train adequate numbers of lecturers to meet its high demand for supervisors for PGE. Therefore, a need for increased postgraduate throughput has forced HEIs to focus on research capacity building, areas of supervision, publications and staff qualifications (ASSA 2018: 29).

As mentioned previously, instability issues have pervaded many major higher educational institutions in SA (Cilliers and Aucoin 2016: 15), resulting in a highly volatile environment that had disrupted the current academic programmes. This current study evaluated the role of instability as a barrier to PGE for radiographers.

2.7 CONCLUSION

The efficient performance of healthcare systems is dependent on continuing postgraduate education by health professionals, to ensure relevance in a field where there are rapidly advancing technologies. However, PGE for radiographers appears to be hindered by several barriers. The literature reviewed, emphasises the dearth of postgraduate qualifications amongst radiographers and previous studies conducted have suggested a need for greater involvement in PGE by radiographers. There is however a paucity of literature that identifies the possible barriers to PGE for South African radiographers. This was identified as a gap that motivated the need for this current study to be conducted. The aim of this current study was therefore to investigate the personal organisational and higher educational barriers to PGE experienced by radiographers in KZN. The recommendations from this research would further provide opportunities for future research to then address the identified barriers for radiographers within the South African context with the relevant stakeholders at a personal, organisational and higher educational level.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This section discusses the type and design, research strategies, study location, target population and sampling process, inclusion and exclusion criteria, type of data collected, data collection process, data analysis, limitations of the study and ethical considerations for this study.

3.2 TYPE AND DESIGN

3.2.1 Research paradigm

A paradigm is defined as a model or frame of reference through which to observe, understand and explain social phenomena (Saunders, Lewis and Thornhill 2009: 11; Babbie 2013: 59). Saunders, Lewis and Thornhill (2009: 133) identified two research paradigms in the social sciences; the positivist approach and the interpretivist approach, which are used for developing research methodology that is most valid and appropriate. The positivism paradigm was the most appropriate paradigm in which to conduct this study as positivists, in general, are aligned with quantitative data collection and analysis, which was used in this research study.

3.2.2. Research type and design

Quantitative research with a descriptive approach was conducted. Quantitative research examines social phenomena by using statistical techniques to analyse relationships between variables (Horsewood 2011: 390), i.e. to determine the quantity or extent of some phenomenon in the form of numbers (Bryman and Bell 2007: 177). The quantitative approach was preferred over the qualitative approach as it yielded both reliable and objective data. The researcher was external to the research process. In terms of reliability, the methodology chosen to investigate the phenomenon was highly structured to ensure replication (Saunders, Lewis and Thornhill 2016: 120). Achieving the objectives of this research required a controlled environment restricted to radiographers in KZN. Quantitative research catered for

such a controlled environment as it set specific parameters within which the research was conducted (Lichtman 2006: 78).

The object of descriptive research is to portray an accurate profile of persons, events or situations. Furthermore, Saunders, Lewis and Thornhill (2009: 140) stress that it is necessary to have a clear picture of the phenomena on which you wish to collect data prior to the collection of the data. The survey method is a quantitative, descriptive research design, used to answer the "who, what, where, how much and how many" questions (Saunders, Lewis and Thornhill 2009: 144). The survey design allows for the collection of a large amount of data from a population in an economical manner. The use of a standardised questionnaire to collect this data further allows for easy comparison. In a survey, the sample to be studied is selected from the population in order to make inferences about that population using descriptive and inferential statistics. This study sought to answer the "what" question by investigating the barriers that hinder radiographers from engaging in PGE.

Respondents were asked what they thought the barriers were for not engaging in PGE. The structured questionnaire allowed for easier access to respondents via email and post. It further allowed the respondents to complete the questionnaire in their own time. Standardising the questionnaire allowed for easy comparison of data gathered as the respondents belonged to four different categories of radiographers.

3.3 STUDY SETTING

This study was carried out on radiographers practising in the private and public sector in KZN. The South African healthcare system is comprised of the public sector which is owned by the government and the private sector which belongs to independent individuals or groups. Public sector is categorised into primary healthcare centres, community healthcare centres, district, regional and tertiary hospitals. Radiology services vary at the different levels of institutions ranging from basic x-ray and ultrasound to highly specialised services such as CT and MRI (Mahlathi and Dlamini 2015: 5). Private sector radiology practices are usually based in private hospitals and generally provide CT and MRI services. One radiology practice is situated in a hospital and provides a 24hour service to the hospital

(Radiological Society of South Africa (RSSA) 2016: 8). Participants were approached in their private capacity therefore permission from the employers was not required as the participants were not contacted in their places of work.

3.4 TARGET POPULATION AND SAMPLE SELECTION

Hayes (2011:1) defines a target population as a group of individuals which the researcher is interested in and to whom he/she would like to generalise the outcome of the research study. The process of sampling as defined by Trochim (2006: 41) is the selection of units from a population of interest to be studied so that results may be generalised back to the population. The target population for this study was all qualified radiographers working in KwaZulu-Natal, from which a representative sample was selected. According to the HPCSA iRegister at that time (HPCSA 2017: 1), the total number of radiographers in KZN was 1059 and included all four categories of radiographers practicing in the public and private sectors. A simple random or probability sampling technique was used to select a representative sample from the total population on the iRegister as all elements of the population were known (De Vos *et al.* 2006: 198). An acceptable sample size of 283 was calculated, using the Raosoft software at a 95% confidence level (Raosoft 2004:1) with a population size of 1059 for KZN.

A written request (Appendix A) was sent to the HPCSA's Information Technology Department requesting a list of currently registered radiographers in KZN which was 1059. Every fourth radiographer was selected from the HPCSA register in alphabetical order to yield a total of 283 radiographers which made up the study sample. The names and postal addresses of this randomly selected sample were then requested from HPCSA. This information was used to trace email addresses using social media such as Facebook, Linked-In and personal contact as many of the participants were known to the researcher.

- The four main reasons for selecting a sample over the entire population to be studied are; it is not practical to survey the entire population as not all elements may be available or that it is too large to manage; budget constraints; time constraints; and speed of analysis of results of data

collected (Trochim 2006: 41). The sample was further refined using the inclusion and exclusion criteria.

3.4.1 Inclusion criteria

The following were included in the study:

- Qualified radiographers in all four categories
- Community service radiographers
- Radiographers currently registered with HPCSA
- Radiographers practicing in public or private in KZN.
- Radiographers working in the higher education institutions

3.4.2 Exclusion criteria

The following were excluded from the study:

- Student radiographers
- Supplementary radiographers
- Those who participated in the pilot study.

3.5 TYPE OF DATA COLLECTED

Primary data is the data collected by the researcher himself/herself for a specific reason or purpose whereas secondary data is the collection of data from existing literature, files or records, but for the same reason or purpose (Gibson 2008: 1). The data collected for this research study over a period of two months was primary data comprising of numerical and text data obtained from the responses to the questionnaires.

3.6 DATA COLLECTION TOOL

In determining the most appropriate data collection instrument, consideration was given to what the demands of the research objectives were. The criteria that were used to search for appropriateness were:

- **Access:** Was there access to the radiographers? How would the geographic dispersion of respondents be appropriate in terms of time and cost?
- **Time:** How much time would each respondent be available for the study?
- **Sensitivity:** How would honest responses to sensitive issues be elicited?
- **Cost:** What resources would be available to carry out the study (National Statistical Services 2013: 5) and;
- **Response Rate:** Would an acceptable response rate of 38% be obtained (Hiebl and Richter 2018: 70)?

The questionnaire was deemed to be the most appropriate method of data collection that would respond holistically to all criteria listed above and align with the research design. The problem of access was resolved through the e-mailing system and the use of an online survey which reached across geographic boundaries. Thus, minimal costs were incurred with the dissemination and collection of the questionnaire. As the target population had full and varied schedules and limited time, the questionnaire was designed to ensure that it would take no more than fifteen minutes of the respondents' time to complete. Anonymity ensured a greater probability of honest responses to the sensitive questions posed. A higher response rate was ensured as anonymity and confidentiality were afforded to respondents because they were not required to identify themselves on the questionnaire. They were also made aware that they were not compelled to answer any or all the questions. The aforementioned were justification for the use of the questionnaire as the most appropriate data collection instrument to address the objectives of this study.

The research tool used was an online survey administered through SurveyMonkey (SurveyMonkey 2018: 1). This paid, online service was utilised to distribute the questionnaires via email or weblink, allowing the participant easy access. The initial intention was to post questionnaires to respondents without email addresses however, due to the delays with the local postal services (Pillay 2018: 1) alternate methods such as Facebook and Linked-In were used to trace these participants. A letter of Information and consent (Appendix B) was attached to the questionnaire (Appendix C). Participants in close geographic proximity to the researcher were handed the questionnaire personally and arrangements were made to collect them

once completed. Completed questionnaires were placed by the respondents into a sealed box to maintain anonymity.

The self-administered questionnaire comprised of four sections viz:

- **Section A**: collection of respondents' biographical details.

  This enabled a comparative analysis to be made of variables such as gender, age group, qualifications and radiographer registration categories amongst others Paans *et al.* (2013: 348)

- **Section B**: investigation of the personal barriers to PGE.

  A range of personal barriers were presented with a Likert scale for respondents to rate the effect of these on PGE. Multiple-choice questions were also used to elicit the respondents' motivation to engage in PGE (Pager, Holden and Golenko 2012: 56).

- **Section C**: interrogation of the organisational barriers to PGE.

  Multiple choice and Likert scale questions were presented to the respondents (Comley-White and Potterton (2018:3)

- **Section D**: probing the HEI barriers to PGE.

  This section included closed, open ended and multiple-choice questions as well Likert rating scales to address the objective (Sosu 2016: 4-6)

The questions in the questionnaire were derived from the literature reviewed and the findings of previous studies relevant to the current study for the South African context.

3.7 FOCUS GROUP

Lues (2011: 62) defined a focus group as a group of individuals who are experienced in a specific area in order to provide opinions and recommendations for a particular research study or project. A focus group meeting was convened to review the questionnaire for this study. Members of the focus group signed a letter of confidentiality (Appendix D) to ensure that the contents of the research tool and research study remained confidential. The main purpose of the focus group was, therefore, to cross-examine the content of the research tool. The principal researcher together with the supervisor, a Diagnostic, a Radiotherapy, a Nuclear

Medicine and an Ultrasound radiographer critiqued and discussed the questionnaire to ensure the validity of the instrument. Validity is the degree to which a question measures what it was intended to measure. Content (or face) validity refers to whether a panel of judges or experts on the topic, agree that the statements do relate to what they are supposed to measure (Maree 2011: 147). All relevant recommendations such as simplifying specific questions and removing irrelevant questions made by the focus group regarding the content and structure of the questionnaire were addressed after which it was piloted.

3.8 PILOT STUDY

Also known as Vanguard Trials or pre studies, the main purpose of the pilot study was to assess the feasibility of carrying out the full-scale study. The emphasis of the pilot study was on enhancing the efficiency and internal validity of the study (Kistin and Silverstein 2015:1). Bell and Waters (2018: 308) suggested that a pilot study should focus on: time taken to complete the questionnaire; clarity of instructions; unclear or ambiguous questions; sensitive questions; omission of relevant information; clear layout; and any other comments by respondents.

A pilot study was conducted (using similar participants as for the sample group) once provisional approval from the Institutional Research Ethics Committee (IREC) was granted (Appendix E). A sample of ten radiographers was chosen from outside the original sample that represented public and private, urban and rural and all the radiography categories. Questionnaires were issued to these participants in a private setting. They were instructed to comment on the issues of reliability and validity in terms of the relevance of content, register, language, structure of the questions as well as the format of the tool. Participants made recommendations regarding the format of the tool; adding additional options in order to ensure response choices were comprehensive and rephrasing certain questions for better understanding. The responses were checked by the researcher for reliability and validity and the questionnaire was then amended accordingly. Reliability refers to the consistency of a measure where the same results would be obtained if the measure was to be repeated using the same subjects under the same conditions.

The pilot study respondents' feedback gave credence to the scientific value of the study in terms of the validity and reliability of the data collection tool, the questionnaire. These respondents also contributed to the questionnaire becoming re-aligned to ensure that it tested what it was intended to test (validity) and further that the results yielded were the same in different settings (reliability) (Saunders, Lewis and Thornhill 2016: 101). Once full approval for ethics clearance (Appendix F) was obtained, the data collection process commenced

3.9 DATA COLLECTION PROCESS

SurveyMonkey was used to design and administer the questionnaire. Confidentiality of responses was ensured as only the researcher had access to the password-protected responses. Links were sent to those participants whose email addresses were traced through social media. Respondents were required to click on the link to access and complete the questionnaire. Responses were automatically saved in the researcher's account on SurveyMonkey when the respondent clicked on the submit button. The researcher had to login to the account to access and download the completed questionnaires which were then saved in a password-protected folder (SurveyMonkey 2018: 1).

The questionnaires were originally intended to be posted to participants with no internet access, and hand-delivered to participants near the researcher. However, due to the ongoing delays with the local postal services at that time, the researcher chose not to post the questionnaires as this would have impacted on the response rate. Majority of the participants were sent links to the online survey and automated reminders were set for every alternate day for questionnaires that were still outstanding. Automated "Thank you" messages were set for every completed questionnaire. The hand-delivered questionnaires, once completed, were placed by the respondent into a sealed box (to ensure anonymity), and this was personally collected by the researcher. A timeframe of one month was set for the completion and collection of questionnaires. Due to the initial poor response rate, the online survey was continued for an additional month. Completed questionnaires were downloaded from SurveyMonkey. Every hard copy and the online questionnaires were numbered. Each question was captured as headings and sub-headings on an

excel spreadsheet. Coded responses were then captured under these headings where common themes emerged. These themes were categorised and coded to convert qualitative data to quantitative data. The excel spreadsheet with all the coded data was submitted to the statistician for analysis.

3.10 DATA ANALYSIS

Descriptive and inferential statistics were used to present the quantitative data (numerical) and qualitative data (text) in the form of graphs and tables (Botti and Endacott 2005: 191). All findings were analysed to identify possible relationships and associations between variables from which conclusions and recommendations were drawn (Saunders, Lewis and Thornhill 2016: 328). The Chi-squared test for association was used to determine whether there were significant associations amongst variables of interest. A *p*-value less than 0.05 indicated a significant result. Data analysis software package SPSS soft version 25 was used for this study.

3.11 ETHICAL CONSIDERATIONS

Careful consideration of ethics principles was given to ensure ethical behaviour towards the respondents in the study. Resnik (2011: 2) urged that researchers need to comprehensively assess the potential for harm to respondents and to develop plans to mitigate such possibilities. This study ensured that ethical practices were adhered to as follows:

- **Ethics approval** – this was granted by the DUT IREC prior to the study being undertaken. The ethics clearance number is 039/18 (Appendix E)
- **Voluntary participation (Autonomy)** – respondents were not forced or coerced to participate and were permitted to withdraw from the study at any stage.
- **Informed consent** – A letter of information and consent (Appendix B) accompanied the questionnaire. This contained information regarding the purpose of the study and the use of the questionnaire (Appendix C)
- **Confidentiality and anonymity** – No names were required, and all data collected was protected using password-secured files which will be

destroyed after five years. Only the researcher, statistician and supervisor had access to the data.

- **Non-maleficence** – No harm was inflicted on any respondent in the process of carrying out this study; and
- **Coercion** - Some of the participants from the sample were friends and colleagues of the researcher but the integrity of the research process was maintained in order to ensure validity of the study. No respondents were forced or coerced to take part in the study.

3.12 CONCLUSION

A quantitative, descriptive study, involving the random sampling of HPCSA registered qualified radiographers residing and practicing within the KZN province, was conducted. Ethics approval to perform this study was obtained from the DUT's IREC. Participants were contacted in their personal capacity. The research tool used for this study was an online survey that included various questions and statements related to the Personal, Organisational and Higher Educational barriers to PGE experienced by radiographers in order to meet the study objectives. The content of the research tool was evaluated, discussed and amended by a focus group and a pilot study prior to distribution to ensure reliability and validity. All the data obtained from this research study was kept confidential and password protected applications.

CHAPTER FOUR

RESULTS

4.1 INTRODUCTION

The primary research tool used to obtain the responses of the respondents for this study was a questionnaire (Appendix B). An Excel spreadsheet was used to enter and code the questionnaire data and IBM SPSS version 25.0 was used to analyse the questionnaire data using descriptive statistics (frequencies and percentages). Narratives, tables and graphs have been used to present the data collected relating to the demographics and the research objectives. Associations between categorical variables were determined by performing a Chi-square test for independence (Saunders *et al*. 2009: 585). A *p*-value <0.05 was considered to indicate a significant result.

4.2 RESPONSE RATE

The questionnaire was administered to 283 radiographers in KZN of which, 121 respondents returned a completed questionnaire. The response rate was 42.76%.

4.3 DEMOGRAPHICS

The respondents' demographics are presented below in Tables 1 and 2

Of the total respondents in Table 1 below, 17% were male whilst 80% were female. The ratio of males to females is approximately 1:5. The average age of the respondents and standard deviation was 35.56 years and 9.83 respectively. The majority of the respondents (80.99%) were Diagnostic radiographers whilst the rest belonged to the disciplines of Ultrasound, Nuclear Medicine and Radiotherapy. The average number of years of experience in the respondents' current disciplines was 12.38 years with a standard deviation of 8.38 years.

Table 1: Demographics of participants in frequencies (*f*) and Percentage (%)

CATEGORY	Frequency *f*	Percent %
GENDER	**N = 121**	
Male	21	17
Female	97	80
Missing system	3	2.47
AGE	**N=121**	
21-30	44	36.36
31-40	45	37.19
41-50	19	15.70
51-62	11	9.09
Missing system	2	1.65
Mean and SD = 35.56 and 9.8		
DISCIPLINE	**N=121**	
Diagnostic	98	80.99
Ultrasound	14	11.57
Nuclear Medicine	8	6.61
Radiotherapy	1	0.82
YEARS OF EXPERIENCE IN CURRENT DISCIPLINE	**N=121**	
0 – 10	61	50.41
11 – 20	38	31.40
21 – 30	15	12.39
31 – 40	4	3.30
Missing System	3	2.47
QUALIFICATION	**N=121**	
National Diploma in Radiography	53	43.80
Bachelor's Degree in Technology (B-Tech)	55	45.45
Master's Degree in Radiography	3	2.47
Doctoral or PhD in Radiography	1	0.82
Three-year Bachelor's Degree	2	1.65
Bachelor's Degree (Hons)	0	0
Higher Education Degree/Diploma	1	0.82
Other (HPCSA accredited courses)	4	3.30
Missing System	2	1.7

For the radiography undergraduate qualifications, as seen in Table 1 above, 43.80% of the respondents were in possession of a National Diploma in Radiography, whilst

45.45% held a B-Tech. For the radiography postgraduate responses, 2.5% held masters degrees whilst only one respondent held a doctoral degree. Of the 121 respondents, 62.8% were not engaged in PGE whilst only 37.2% indicated that they were currently engaged in PGE. The responses recorded in Table 1 above relating to current engagement in PGE indicate that respondents considered any qualification beyond the entry level diploma into radiography, to be PGE. This included the B-Tech.

Table 2: Demographics of participants in frequencies (*f*) and Percentage (%) Continued

CATEGORY	Frequency *f*	Percent %
GEOGRAPHIC AREA	**N = 121**	
Urban	97	80.2
Rural	22	18.2
Missing System	2	1.7
INSTITUTION EMPLOYED	**N = 121**	
Tertiary/Academic Hospital	17	14.0
Regional Hospital	22	18.2
District Hospital	22	18.2
Community Healthcare Center	4	3.3
Private radiography practice owned by yourself	4	3.3
Private practice owned by a radiographer - you are employee	2	1.7
Private practice owned by a radiologist - you are employee	45	37.19
Higher Educational Institution	3	2.5
Missing System	2	1.7
DO YOU WORK AFTER – HOURS?	**N = 121**	
Yes	70	57.9
No	27	22.3
Missing System	24	19.8
ARE YOU CURRENTLY ENGAGED IN PGE?	**N = 121**	
Yes	45	37.2
No	76	62.8

In Table 2 above, responses to the geographic area indicated that 80.2% of the respondents were from the urban areas and 18.2% were situated in the rural areas.

The employment sector was almost equal with 53.7% in public, and 42.2% in private, whilst the higher educational institution only comprised of 2.5%. Of the total respondents, 57.9% indicated that they were shift workers.

4.4 RESPONDENTS AS ADULT LEARNERS

Table 3: Hierarchy of Needs

Maslow's Hierarchy of Needs	Unimportant		Least important		Neutral		Important		Very Important	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%
Physiological Needs	1	0.8	3	2.5	7	5.8	13	10.7	71	58.7
Safety	1	0.8	1	0.8	5	4.1	11	9.1	77	63.6
Social			1	0.8	7	5.8	26	21.5	61	50.4
Self Esteem	2	1.7			5	4.1	37	30.6	51	42.1
Self-Actualization	3	2.5			4	3.3	39	32.2	50	41.3

Table 3 above refers to the importance or lack thereof, placed on the hierarchy of needs of the respondents. 'Important' and 'Very Important' responses have been combined. While all five levels on Maslows' Hierarchy of Needs scale were considered important/very important, respondents reported the needs in decreasing order of importance as; self-actualisation (73.5%), self esteem (72.7%, social (71.9%), safety (69.6%) and least important, physiological (69.4%).

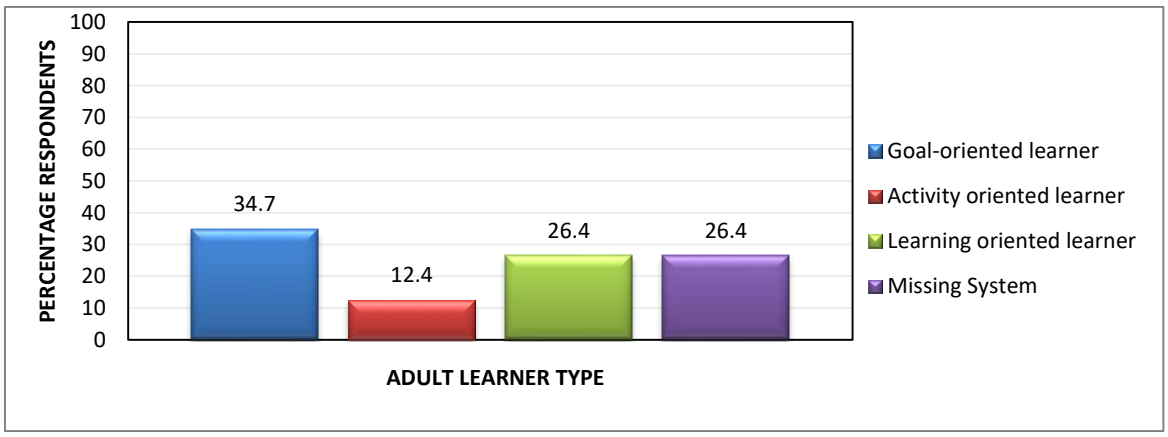

Figure 3: Type of adult learner

Figure 3 above reports the type of adult learner the respondent identifies with. Majority of respondents (34.7%) indicated that they were goal-oriented learners, while 12.4% felt they were activity-oriented learners.

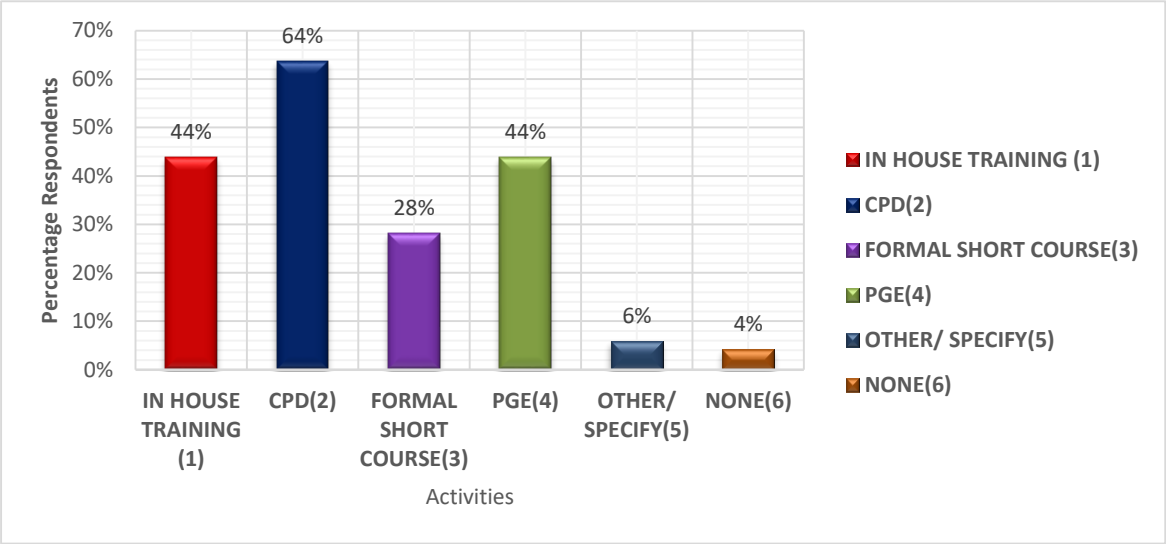

Figure 4: Activities to stay current with Technology

Of the various activities, respondents engaged in to stay current with technology (Figure 4), CPD activities account for 63.64% followed by similar responses for PGE and In-house training with 43.8% for each. Formal short courses accounted for the least responses of 28.1%.

Table 4: Engagement with PGE

RESPONSES	Frequency *f*	Percent %
Previous engagement in PGE?	**N = 121**	
YES	68	56.2
NO	52	43.0
Missing System	1	.8
Were you successful in PGE?	**N= 121**	
YES	58	47.9
NO	6	5.0
N/A	31	25.6
Missing System	26	21.5
Are you motivated to study further?	**N =121**	
YES	50	41.3
NO	10	8.3
N/A	27	22.3
Missing System	34	28.1
Have you experienced any barriers to PGE?	**N=121**	
YES	48	39.7
NO	43	35.5
Missing System	30	24.8

In Table 4 above, 56.2% of respondents have previously engaged in PGE while 43% have not. Success with previous PGE was reported by almost half (47.9%) of

the 95 respondents. Motivation to study further based on their previous success was indicated by 41.3% of respondents, while 8.3% were not motivated to study further even after having previously achieved success.

Table 4 indicates similar results for respondents that experienced barriers to PGE (39.7%) and those that did not (35.5%). It is noted that 25% of the respondents did not answer the question.

Table 5: Reasons for PGE success

Reasons for achieving goal	Frequency *f*	Percentage %
Self- motivation	46	34.7
Support from work	4	3.3
Support from HEI	1	.8
Employer funded study	2	1.7
Contribution to scarce skills	1	.8
Support from family	4	3.3
Recognition of PGE	3	2.5
Missing System	68	56.2

It is seen from Table 5 above that 34.7% of the respondents identified self-motivation to be the main reason for achieving success in PGE.

4.5 BARRIERS TO POSTGRADUATE EDUCATION: PERSONAL

This section reports the results for personal barriers to postgraduate education.

Table 6 below presents the factors that may hinder PGE and the percentage of agreement and disagreement reported by respondents per factor. In Table 6, 'to a large extent' and 'greatly', responses have been combined as well as the 'not at all' and 'very little' responses. The factors reported to be the biggest hindrances were; 'No incentives or promotion' (53.7%) and 'lack of time' (52.0%), followed by 'no appropriate courses available' (33.9%). Factors such as a 'Lack of confidence' (54.5%) and 'personal health' (52.9%), were not considered to hinder PGE. 'Low personal priority' (36.3%) was the least hindrance to PGE.

Table 6: Personal factors hindering PGE engagement.

HINDERING FACTORS	NOT AT ALL		VERY LITTLE		NEUTRAL		TO A LARGE EXTENT		GREATLY	
	f	%	*f*	%	*f*	%	*f*	%	F	%
Finances	11	9.1	18	14.9	23	19.0	28	23.1	14	11.6
Time	3	2.5	7	5.8	15	12.4	43	35.5	20	16.5
Age	33	27.3	12	9.9	33	27.3	10	8.3	5	4.1
No Incentives/ promotion	7	5.8	5	4.1	15	12.4	26	21.5	39	32.2
Not aware of available PGE	38	31.4	15	12.4	19	15.7	10	8.3	9	7.4
Lack of Motivation	24	19.8	15	12.4	25	20.7	16	13.2	13	10.7
Not interested	34	28.1	16	13.2	27	22.3	11	9.1	3	2.5
Family commitments	12	9.9	14	11.6	25	20.7	24	19.8	17	14.0
Lack of confidence	42	34.7	24	19.8	17	14.0	8	6.6	1	.8
Personal Health	48	39.7	16	13.2	16	13.2	7	5.8	5	4.1
Lack of Appropriate courses	16	13.2	16	13.2	20	16.5	26	21.5	15	12.4
Low personal priority	28	23.1	16	13.2	37	30.6	7	5.8	4	3.3

Table 7 below presents the 'other factors' identified by respondents as hindrances to PGE. Most of these are included in the list considered to be hindering factors in Table 6. The factors not included are study leave approval process; short-staffed;

no work-integrated learning; long lectures; institutional quota system and inadequate HEI resources.

Table 7: Other Personal factors that may hinder PGE

Other Factors Hindering PGE	Frequency f
Family Commitments	2
No Motivation	1
No recognition of PGE	7
No time off for lectures	9
Study leave approval process	1
Short staffed	2
No Work-Integrated Learning	4
Long lectures	1
High Fees	2
Limited local scope for PGE	8
Institutional quota system	3
Inadequate HEI resources	1

4.6 BARRIERS TO POSTGRADUATE EDUCATION: ORGANISATIONAL

This section relates to barriers that the organisation presents to PGE. Table 8 below refers to the organisation's technologies, employee engagement in the available disciplines and their impact on PGE for service excellence.

In Table 8 below, 53.7% of the respondents indicated that they do have updated technologies at the workplace while 22.3% indicated that these did not exist where they work. Fifty two percent indicated that they were rostered in specialised areas of their disciplines and 38% felt motivated to engage in PGE. The majority of the respondents (52.9%) indicated that they needed further education and training in their disciplines.

Table 8: Organisational environment factors

Organisational environment factors	Frequency *f*	Percentage %
Does your workplace have updated technologies?	**N= 121**	**%**
YES	65	53.7
NO	27	22.3
Missing System	29	24.0
Are you rostered in specialised areas?	**N= 121**	**%**
YES	64	52.9
NO	33	27.3
Missing System	24	19.8
Does working in specialised areas motivate you to study further?	**N=121**	**%**
YES	46	38.0
NO	15	12.4
N/A	31	25.6
Missing System	29	24.0
Is further education and training required?	**N=121**	**%**
YES	64	52.9
NO	33	27.3
Missing System	24	19.8
Are you adequately equipped for service excellence?	**N=121**	**%**
YES	41	33.9
NO	56	46.3
Missing System	24	19.8
Do you provide in-house training to others?	**N=121**	**%**
YES	82	67.8
NO	14	11.6
Missing System	25	20.7
Are you adequately trained to teach others?	**N=121**	**%**
YES	54	44.6
NO	29	24.0
N/A	10	8.3
Missing System	28	23.1
Are you willing to engage in PGE if sent by your workplace?	**N = 121**	**%**
YES	93	76.9
NO	4	3.3
Missing System	24	19.8
Do you feel disadvantaged among staff with PGE?	**N= 121**	**%**
YES	38	31.4
NO	58	47.9
Missing System	25	20.7

Of the 67.8% of respondents in Table 8 above who provided in house training to other employees in their respective disciplines, 44.6% felt adequately equipped to train and 46.3% indicated that they were not adequately equipped to provide service excellence. Almost half of the respondents (47.9%) indicated that they did not feel disadvantaged amongst staff who possessed PGE, and 76.9% indicated a willingness to engage in PGE if they were sent by their organisations.

Table 9: Reasons for non allocation to specialised work area

REASON FOR NO SPECIALISED WORK AREA	*f*	%
Only Diagnostic	17	14.0
Staff Shortage	2	1.7
No Speciality	4	3.3
No Speciality Rotation	1	0.8
Theatre Work Only	1	0.8
Managerial Position	3	2.5
Only Administration	1	0.8
Sales And Apps Specialist	1	0.8
Missing System	91	75.2
TOTAL	**121**	**100.0**

Table 9 above outlines the reasons for not being allocated to specialised areas at the workplace. Of the 33 respondents in Table 8 above that indicated they were not rostered in the specialised area, 18.9% (in Table 9) indicated that the only discipline available in their workplace was diagnostic.

Other reasons cited for non-allocation to specialised areas of work were that the respondents were in managerial positions (2.5%) or were sales and application specialists (0.8%).

Table 10: Impact of advancing technology

ADVANCING TECHNOLOGY IMPACT	GREATLY		TO A LARGE EXTENT		NEUTRAL		VERY LITTLE		NOT AT ALL		MISSING SYSTEM	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
Little or no impact	27	22.3	22	18.2	19	15.7	16	13.2	11	9.1	26	21.5
Feelings of inadequacy	3	2.5	10	8.3	25	20.7	27	22.3	31	25.6	25	20.7
Want to give up(resign)	3	2.5	3	2.5	13	10.7	11	9.1	66	54.5	25	20.7
Want to change workplace	11	9.1	9	7.4	17	14.0	9	7.4	50	41.3	25	20.7
Eager to learn and be updated	65	53.7	22	18.2	5	4.1	2	1.7	3	2.5	24	19.8
Self-motivated to be updated	62	51.2	18	14.9	13	10.7	2	1.7	1	0.8	25	20.7

Table 10 above illustrates the impact of advancing technology on respondents. Responses for ‘greatly’ and ‘to a large extent’ were combined as well as the responses for ‘very little’ and ‘not at all’. A total of 71.9% were eager to learn and be updated, followed by 66% who felt self-motivated to be updated. Advancing technologies had no impact on 40.5% of the respondents and 47.9% did not feel inadequate in the face of advancing technology. Of all the respondents surveyed, 63.6% did not feel threatened to resign and 48.7% felt that there was no need to change their workplaces due to the advancing technology.

Table 11 below presents the responses related to workplace culture and PGE. Responses for ‘strongly disagree’ and ‘disagree’ have been combined as well as responses for ‘agree’ and ‘strongly agree’. Of the respondents surveyed, 56.2% indicated that there was no remuneration for obtaining additional qualifications, while 59.5% indicated that no appropriate rewards and incentives were offered. Inadequate staffing at the workplace accounted for 43% of responses and 42.2% indicated that there was no support for study during working hours, and no financial support for PGE was indicated by 34.7%. Inapropriate placement of staff with PGE (38%) was identified as a further organisational barrier to PGE. However, 36.4% of respondents reported that allocation of study leave was available at their workplaces. It is noted that 35.5% indicated that no barriers to PGE existed in their workplaces.

Table 11: Workplace barriers with respect to PGE

Organisational Factors	STRONGLY DISAGREE		DISAGREE		NEUTRAL		AGREE		STRONGLY AGREE		MISSING SYSTEM	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
There is adequate staff	25	20.7	27	22.3	14	11.6	16	13.2	12	9.9	27	22.3
There are appropriate rewards & incentives for service excellence	38	31.4	34	28.1	11	9.1	11	9.1	3	2.5	24	19.8
Employee development (in-house or external service providers) is provided.	12	9.9	23	19.0	28	23.1	20	16.5	14	11.6	24	19.8
There is remuneration for obtaining additional training/qualification	39	32.2	29	24.0	14	11.6	10	8.3	5	4.1	24	19.8
There is support for self–study during working hours	21	17.4	30	24.8	22	18.2	14	11.6	9	7.4	25	20.7
There is financial support/ bursary for PGE	27	22.3	15	12.4	14	11.6	24	19.8	16	13.2	25	20.7
Radiographers with PGE are appropriately placed in the workplace	34	28.1	12	9.9	32	26.4	12	9.9	7	5.8	24	19.8
There is allocation of study leave for formal studies	13	10.7	13	10.7	27	22.3	33	27.3	11	9.1	24	19.8
None of the above exists in my workplace	24	19.8	19	15.7	30	24.8	6	5.0	7	5.8	35	28.9

4.7 BARRIERS TO POSTGRADUATE EDUCATION: HIGHER EDUCATION

The results for factors emanating from higher education institutions that relate to possible barriers are presented below. Respondents were asked if they considered any of the factors listed in Table 12 to be barriers to PGE.

In Table 12 below, 47.9% of respondents indicated that cost was a barrier to PGE, followed by 45.9% who agreed that instability at universities hindered PGE. Lack of standardised courses was identified by 42% to be a barrier and 40.5% agreed that the quota system hindered PGE. Insufficient academic staff was identified by 39.7% while access to institutions was found to be a barrier by 32.3%. The lack of PGE offerings was indicated by 40.5%.

Table 12 below also highlighted factors that were not considered to be barriers to PGE viz. access to internet (53.8%) and PGE courses offered online (47.9%). Current job placement was also not considered a barrier to PGE (38.8%).

Table 12: Higher educational barriers

HEI BARRIERS TO PGE	GREATLY		TO A LARGE EXTENT		NEUTRAL		VERY LITTLE		NOT AT ALL		MISSING SYSTEM		TOTAL	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
Is there a lack of awareness of available PGE?	8	6.6	19	15.7	36	29.8	10	8.3	23	19.0	25	20.7	121	100.0
Is there access to institutions that provide PGE?	18	14.9	21	17.4	28	23.1	19	15.7	10	8.3	25	20.7	121	100.0
Is the high cost of PGE an additional financial burden?	23	19.0	35	28.9	21	17.4	9	7.4	8	6.6	25	20.7	121	100.0
Is instability of tertiary institutions (protest action) a barrier?	33	27.3	22	18.2	27	22.3	9	7.4	5	4.1	25	20.7	121	100.0
Is there a lack of PGE offerings at institutions?	26	21.5	23	19.0	26	21.5	17	14.0	4	3.3	25	20.7	121	100.0
Do Equity (quota system) policies present as barriers?	35	28.9	14	11.6	25	20.7	13	10.7	9	7.4	25	20.7	121	100.0
Is your current job placement a barrier to entry to PGE?	14	11.6	12	9.9	23	19.0	24	19.8	23	19.0	25	20.7	121	100.0
Is there insufficient academic staff to facilitate PGE?	29	24.0	19	15.7	30	24.8	12	9.9	6	5.0	25	20.7	121	100.0
Is PGE not being offered as an online course, a barrier?	6	5.0	14	11.6	33	27.3	10	8.3	32	26.4	26	21.5	121	100.0
Is access to internet a barrier?	8	6.6	12	9.9	21	17.4	15	12.4	40	33.1	25	20.7	121	100.0
Is there a lack of standardised courses offered by different institutions?	29	23.9	22	18.1	30	24.8	4	3.3	11	9	25	20.7	121	100.0

4.8 THE RELATIONSHIPS AND ASSOCIATIONS WITHIN VARIABLES

The section below relates to the relationships and associations between demographic variables and factors hindering PGE within the personal, organisational and higher educational levels.

4.8.1 Personal level

Table 13: Chi-square tests for "Gender" and "Low Personal Priority"

Chi-square tests	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	10.859[a]	4	0.028
Likelihood Ratio	12.975	4	0.011
Linear-by-Linear Association	5.256	1	0.022
N of Valid Cases	91		

In Table 13 above, the cross tabulation for 'Gender' versus 'Low Personal Priority', the Pearson Chi-square value is 10.86 with 4 degrees of freedom and a *p*-value of 0.028. Since the *p*-value is less than 0.05 we reject the null hypothesis that 'Gender' and 'Low Personal Priority' are independent and conclude that the response distribution for males and females differs across the categories of 'Low personal priority'.

Of the 44 responses for 'Low Personal priority' as a factor that may hinder PGE, 93% of females responded, 'not at all' or 'very little' and males were 6.8%. 'To a large extent' and 'Greatly' elicited a total response from 11 respondents, of which 72.7% were females and 27% were males.

Table 14: Chi-square tests for 'Gender' and 'Personal Health'

Chi-square tests	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	10.644[a]	4	0.031
Likelihood Ratio	9.386	4	0.052
Linear-by-Linear Association	5.303	1	0.021
N of Valid Cases	91		

Table 14 above refers to the cross tabulation for 'Gender' versus 'Personal Health'. The Pearson Chi-square value is 10.64 with 4 degrees of freedom and *p*-value=0.031. This implies that 'Gender' and 'Personal Health' are dependent and the response distribution differs for males and females. Of the 21 responses for 'Personal Health' as a factor that may hinder PGE, 71.4% of females indicated 'not at all' or 'very little' and for males it was 28.6%. A total of 4 responded to 'To a large extent' and 'Greatly' of which, three were females and one was male.

Further Chi-squared test results for relationships and associations were as follows: 'Age' versus 'Incentives or Promotions for PGE' (p=0.45); 'Age' versus 'Family Commitments' (p=0.08); 'Age' versus 'Personal Health' (p=0.92); 'Age' versus 'Finances' (p=0.76) and 'Age' versus 'Time' (p= 0.18). All these variables had p>0.05 which implied there were no significant relationships between these variables.

4.8.2 Organisational level

Table 15: Chi-square tests for public versus private and employee development

Chi-Square Tests	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	27.370[a]	4	0.000	0.000
Likelihood Ratio	30.908	4	0.000	0.000
Fisher's Exact Test	28.730			0.000
Linear-by-Linear Association	19.832[b]	1	0.000	0.000
N of Valid Cases	94			

In Table 15 above the Chi-squared value using Fisher's exact test is 28.73 with p-value = 0.000 which is less than 0.05. This indicates that there is an association between the work sector (public and private) and employee development as a factor that hinders PGE. In the public sector 59.25% of respondents indicated that employee development does not exist while only 7.5% from the private sector reported a lack thereof. In the private sector 52.5% strongly agreed that employee development existed in their organisation.

Table 16: Chi-square test for public versus private and remuneration for additional training and PGE

Chi-square tests	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	10.123[a]	4	0.038	0.033
Likelihood Ratio	13.464	4	0.009	0.013
Fisher's Exact Test	10.725			0.023
Linear-by-Linear Association	7.065[b]	1	0.008	0.008
N of Valid Cases	94			

In Table 16 above the Chi-squared value using Fisher's exact test is 10.72 with a *p*-value = 0.023, which is less than 0.05. This indicates that there is an association between the work sector (public and private) and remuneration for additional training and PGE. Of the public sector respondents surveyed, 61% strongly disagreed that there was remuneration for additional training and PGE at their organisation, while 87.5% of the private sector respondents indicated that they were not remunerated for additional training and PGE.

Table 17: Chi-square test for public versus private and financial support or bursary

Chi-square tests	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	16.205[a]	4	0.003	0.002
Likelihood Ratio	16.699	4	0.002	0.003
Fisher's Exact Test	15.869			0.003
Linear-by-Linear Association	13.839[b]	1	0.000	0.000
N of Valid Cases	93			

In Table 17 above the Chi-squared value using Fisher's exact test is 15.87 with *p*-value = 0.003 which is less than 0.05. This indicates that there is an association between the work sector (public and private) and financial support/bursary for PGE. Of the public sector respondents surveyed, 60.37% strongly disagreed that there was financial support and a bursary available for PGE, while in the private sector, 65% of the respondents indicated that there was financial support and bursaries available.

Table 18: Chi-square test for public versus private and 'None exists'

Chi-square tests	Value	Df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)
Pearson Chi-Square	9.681[a]	4	0.046	0.044
Likelihood Ratio	10.164	4	0.038	0.057
Fisher's Exact Test	9.438			0.047
Linear-by-Linear Association	3.573[b]	1	0.059	0.071
N of Valid Cases	83			

In Table 18 above the Chi-squared value using Fisher's exact test is 9.44 with *p*-value = 0.047 which is less than 0.05. This indicates that there is an association between the work sector (public and private) and 'none exists for PGE'. Sixty-six

percent of respondents from the private sector agreed with 'none exists for PGE' factors at their workplaces. Only 40% of the public sector respondents reported a lack of support for PGE

Further relationships and associations were tested and the results were as follows: for 'geographic area' versus 'adequate staff', (p=0.82); 'geographic area' versus 'rewards or incentives for service excellence' (p=0.22); 'geographic area' versus 'employee development' (p=0.09); 'geographic area' versus 'remuneration for additional training or PGE' (p= 0.19); 'geographic area' versus 'financial support and bursary' (p=0.44) and 'geographic area' versus 'study leave' (p=0.48). All the variables above indicate that p>0.05 therefore this implies that there is no relationship between these variables.

4.8.3 Higher educational level

Table 19: Chi-square test for public versus private and Online PGE as a barrier

Chi-square tests	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	10.204[a]	4	0.037
Likelihood Ratio	10.553	4	0.032
Linear-by-Linear Association	2.123	1	0.145
N of Valid Cases	92		

In Table 19 above, the Chi-squared value using Pearson Chi-squared test is 10.20 with 4 degrees of freedom and a p-value = 0.037 which is less than 0.05. This indicates that there is an association between the work sector (public and private) and 'Online PGE' as a barrier. Of the respondents surveyed, 57.5% from the private sector indicated that 'Online PGE' as a barrier only hindered them to a very little extent or not at all, while 30.76% of the public sector respondents indicated that 'Online PGE' as a barrier, did not hinder them.

Further Chi-squared tests were conducted for relationships and associations and the results were recorded as follows: 'Gender' versus 'Institutional Access' (p= 0.18); 'Gender' versus 'High cost' (p= 0.36); 'Gender' versus 'Equity' barriers (p=0.78); 'Gender' versus 'Online PGE' as a barrier (p=0.12); 'Gender' versus 'Internet access' (p=0.43). All the above variables had p>0.05 which implied that there were no significant relationships between these variables.

Chi-squared test results for the following relationships and associations were recorded as follows: 'Age' versus 'High Cost' (p= 0.58); 'Age' versus 'Instability' (p=0.36); 'Age' versus 'Online PGE' as a barrier (p= 0.66) and 'Age' versus 'Internet access' as a barrier (p=0.65). No significant relationships existed between the above variables since p>0.05.

4.9 STRATEGIES TO IMPROVE POSTGRADUATE ENGAGEMENT

This section relates to the strategies to improve participation in PGE.

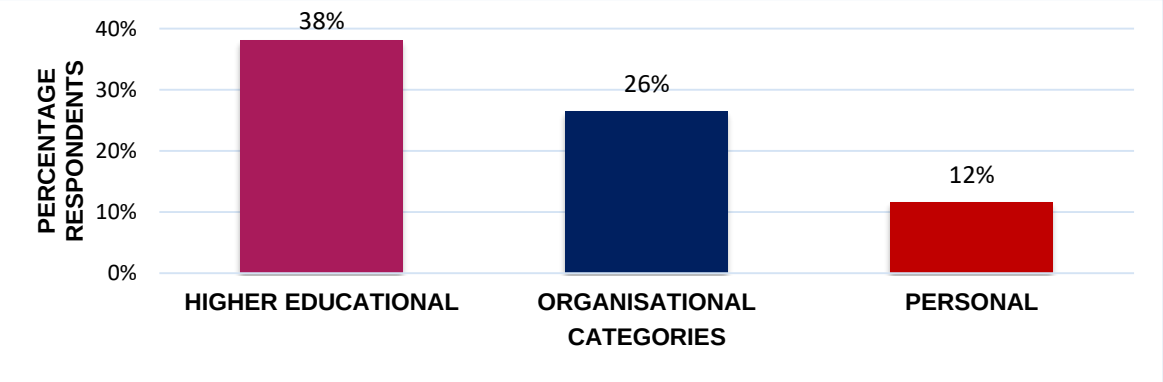

Figure 5: Personal, organisational and higher educational factors for improving PGE

In Figure 5 above, 78% of respondents presented options relating either to personal (12%), organisational (26%) or higher educational (38%) factors that would assist in improving their engagement in PGE. Twelve percent of the respondents chose the Personal category for improving participation in PGE whilst majority of respondents (38%) chose the Higher Educational category.

Table 20 below outlines the various factors indicated in the three categories above for improving PGE engagement. Respondents identified an equal number of factors (7) for the Organisational and Higher Educational categories and only two factors in the Personal category. Two key factors, 'Incentives to engage in PGE' and 'Availability of quality courses' were indicated most frequently (17%) by respondents. 'HEI Support' (6%) and 'Offer online courses' (6%) were the second highest factors to be selected. Factors such as 'self-motivation' and 'CPD participation', accounted for the lowest responses of 7% and 5% respectively.

Table 20: Classification of factors for improving PGE

Personal	*f*	%	Organisational	*f*	%	Higher Educational	*f*	%
CPD participation	6	5%	Incentives to engage in PGE	20	17%	Availability of quality courses	20	17%
Self-motivation	8	7%	Adequate staffing	2	2%	Part time courses	3	2%
			Recognition for PGE	1	1%	HEI support	7	6%
			Availability of specialities	1	1%	Allow conditional acceptance for PGE	1	1%
			Study leave availability	3	2%	Fee remission	6	5%
			Availability of funds	4	3%	Offer online courses	7	6%
			Equal study opportunity from employer	1	1%	Equal access to HEI	2	2%
TOTAL PERCENTAGE		**12%**	**TOTAL PERCENTAGE**		**27%**	**TOTAL PERCENTAGE**		**39%**

Table 21: Factors to reduce Personal barriers

BY SELF	*f*	%	BY OTHERS	*f*	%
Self-motivation	17	14.0	Offer online courses	2	1.7
Manage time	19	15.7	Improve HEI communication	2	1.7
Unable to change	4	3.3	Availability of funds	5	4.1
Active participation in PGE	1	0.8	Incentives for PGE	6	5.0
Seek better employment	1	0.8	HPCSA mandated Courses	1	0.8
Active PGE research	1	0.8	Free online training	1	0.8
Prioritise PGE	1	0.8	SORSA to liaise with HEI	1	0.8
			Access to resources	1	0.8
			Availability of quality	2	1.7
TOTAL PERCENTAGE		**36.20**	**TOTAL PERCENTAGE**		**17.40**

In Table 21 above, 5.8% of respondents indicated that availability of quality courses at HEI would improve PGE engagement and 5.0% recommended that organisations should provide incentives for PGE to improve participation. No new information was presented when respondents were asked for further comments and recommendations regarding PGE. Factors such as time management (15.7%) and self-motivation (14%) ranked high in respondents' choices for changes to Personal

barriers to PGE. Incentives for PGE (5%) and availability of funds (4.1%) implemented by others will also improve Personal barriers to PGE.

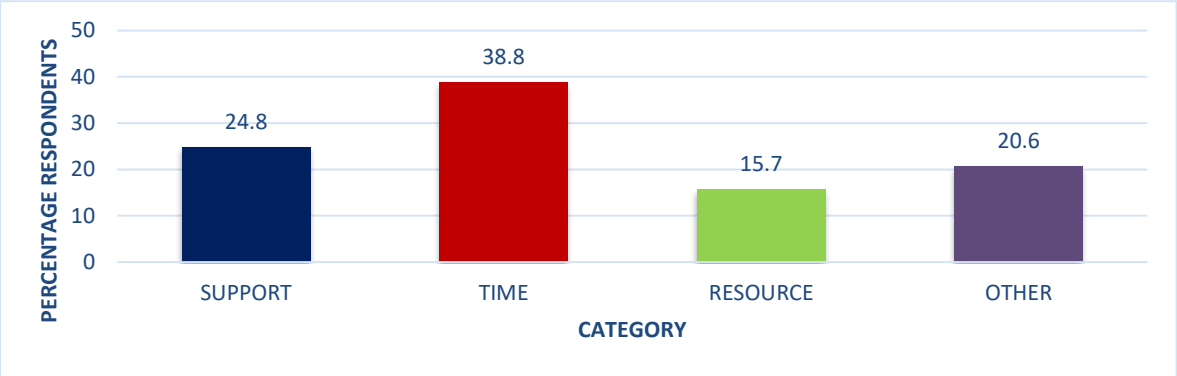

Figure 6: Changing workplace barriers

With regards to changes to workplace barriers to PGE (Figure 6 above), 'Time' ranked the highest (38.8%), followed by "Support" (24.8%), "Other" factors (20.6%) and "Resources" (15.7%).

Table 22: Factors to reduce or eliminate workplace barriers

SUPPORT	*f*	%	TIME	*f*	%	RESOURCE	*f*	%	OTHER	*f*	%
Employer support	18	14.9	Improve staffing	14	11.6	Availability of funding	10	8.3	Incentives for PGE	22	18.2
Employees to transfer skills	2	1.7	Time off to study	27	22.3	Access to resources	5	4.1	Research available	1	0.8
Supportive colleagues	1	0.8	Control patient bookings	1	0.8	More equipment	1	0.8	Unable to change	1	0.8
Equal opportunity	6	0.8	Increase study leave	3	2.5	Updated equipment	3	2.5	Quality courses	1	0.8
Opportunity to specialise	2	1.7	Decrease shift work	1	0.8						
Grant study permission	1	0.8	Reduce working hrs	1	0.8						
TOTALS	**30**	**24.8**		**47**	**38.8**		**19**	**15.7**		**25**	**20.6**

Table 22 above further categorises the various factors that could reduce or eliminate workplace barriers. The following were largely regarded as factors that would

improve PGE participation: 'Time Off to Study' (22.3%); 'Incentives for PGE' (18.2%) and 'Employer Support' for PGE (14.9%).

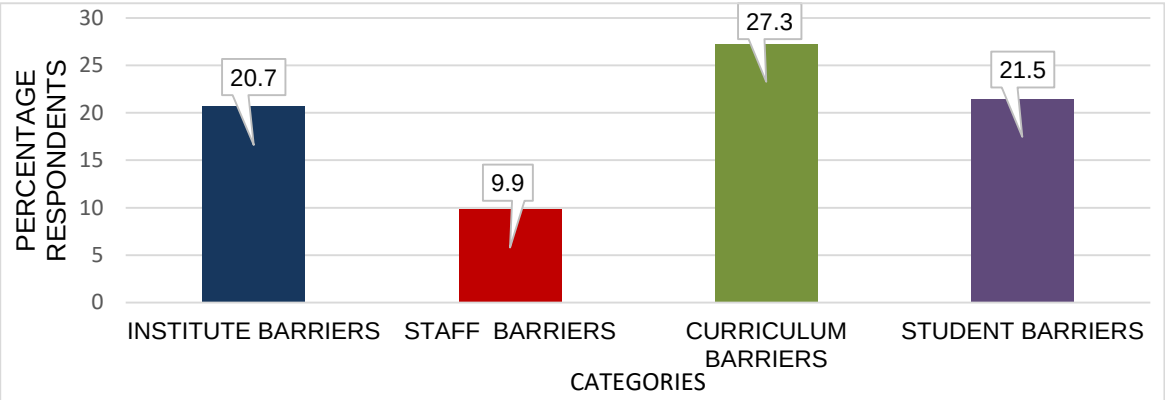

Figure 7: Change to HEI barriers to PGE

Figure 7 above, refers to changes to HEI barriers to PGE. The common responses were categorised into the above four barriers as illustrated in Figure 7. The 'Curriculum' was selected by 27.3% as a barrier to PGE, followed by 'Student Barriers' (21.5%), 'Institute barriers' (20.7%) and 'HEI staff barriers' (9.9%).

Table 23 below refers to the HEI factors related to PGE. Respondents identified 45 different factors as being HEI barriers to PGE. The researcher assigned these responses into four appropriate categories. viz. Institute, Staff, Curriculum and Student barriers. Curriculum barriers accounted for 27.3% of the HEI barriers. Student barriers comprised of 21.5% and Institute barriers was 20.7%. Availability of quality, standardised courses was highlighted as a change factor to improve participation in PGE.

Table 23: HEI factors to PGE

INSTITUTE BARRIERS	*f*	%	STAFF BARRIERS	*f*	%	CURRICULUM BARRIERS	*f*	%	STUDENT BARRIERS	*f*	%
Standard entry requirements	3	2.5	Competent lecturers	6	5.0	Frequent courses	1	0 .8	Funds available	4	3.3
HEI to communicate	1	0.8	Increase staff	2	1.7	Improve program structure	1	0.8	Student safety	1	0.8
Engage DOH	1	0.8	Lecturer support	1	0.8	After-hours classes	1	0.8	PGE Incentive	5	4.1
Updated HEI technology	1	0.8	Motivated staff	2	1.7	Quality courses	8	6.6	Better places	1	0.8
Promote PGE	10	8.3	Unbiased supervisor	1	0.8	More courses	2	1.7	Increase student intake	4	3.3
Improve application process	1	0.8				Offer CT and MRI courses	1	0.8	Childcare facilities	1	0.8
Timeous responses to queries	1	0.8				Offer HPCSA accredited courses	1	0.8	Improve PGE support - rural areas	1	0.8
Improve first line communication	1	0.8				Offer online courses	5	4.1	Reduce fees	4	3.3
Improve efficiency	1	0.8				Offer part time PGE	1	0.8	Equal access to HEI	4	3.3
Standardise PGE availability	3	2.5				Phase out Diploma	1	0.8	Punish unethical practices	1	0.8
Make PGE compulsory like CPD	1	0.8				Reduce assignments/ increase tests	1	0.8			
Timeous registration	1	0.8				Satisfy industry	2	1.7			
						Shortened courses	1	0.8			
						Simplify PGE	1	0.8			
						Standardise PGE	7	5.7			
						Increase assign. time	1	0.8			
TOTALS	**25**	**20.7**		**12**	**9.9**		**33**	**27.3**		**26**	**21.5**

Table 24: Factors contributing to PGE Barriers

BARRIER FACTORS	LEAST		BIG		BIGGER		BIGGEST	
	Ƒ	%	ƒ	%	Ƒ	%	ƒ	%
Personal Barrier	28	23.1	22	18.2	11	9.1	19	15.7
Organisational Barrier	9	7.4	23	19.0	25	20.7	23	19.0
Higher Educational Barrier	12	9.9	32	26.4	19	15.7	16	13.2
All of the Above	15	12.4	7	5.8	13	10.7	15	12.4

With regards to barriers to PGE (Table 24 above), the greatest hindrances were identified by some respondents as organisational (19%) followed by personal (15.7%) then higher education institutional (13.2%), whilst some recorded the barriers with least hindrance as personal (23.1%), higher education institutional (9.9%) and organisational (7.4%).

4.10 CONCLUSION

The study investigated the barriers experienced by 121 radiographers to PGE engagement in the categories of personal, organisational and higher educational institutions. The questionnaire data was analysed using IBM SPSS version 25.0 and was presented for each research objective in the form of tables and graphs using frequencies and percentages. The demographic profile of the respondents indicated a male to female ratio of approximately 1:5 with majority of the respondents being employed in the public sector.

The results indicated that most of the respondents did not possess a postgraduate qualification. Time and lack of incentives and promotions were the key factors that presented as personal barriers to PGE. Organisational barriers such as time off to study and no recognition for PGE posed the greatest hindrance to respondents engaging in PGE. Curriculum factors such as lack of availability of quality local courses, standardised courses and online courses accounted for Higher Educational barriers to PGE. Respondents recommended various strategies to address Personal, Organisational and Higher Educational barriers in order to improve participation in PGE.

CHAPTER FIVE

DISCUSSION

5.1 INTRODUCTION

This chapter will interpret and discuss the results presented in Chapter Four. It will include the response rate, profile of the respondents and findings for each of the objectives of the study followed by a brief summary.

5.2 RESPONSE RATE

The response rate for this study was 42.8%. Although this may appear low, it is above the average of 38% which Hiebl and Richter (2018: 70) recommend, and therefore can be considered acceptable. Demanding workloads of the respondents (in this study, radiographers), may have possibly contributed to the lower response rate. Studies in the United Kingdom (Hulls *et al*. 2018: 357), United Arab Emirates (Alyousef *et al*. 2019) and SA (Nkosi and Chipere 2019; Gam 2015: 66) have identified high workload and staff shortages as major stressors in radiographers. Further possible reasons for poor response could have resulted from a lack of incentive, lack of active follow-up by the researcher, and respondents working night shift not receiving the questionnaire directly from the Assistant Director (Nyathi, Chirwa and Van Der Merwe 2010: 4). The importance of following up with multiple reminders to respondents is supported by Weaver, Beebe and Rockwood (2019: 1). Contrary to the findings of the current study, Weaver, Beebe and Rockwood (2019: 4) found no statistically significant differences across modes of surveys in their study on response rates amongst physicians in the United States. They also suggested that individuals were more likely to respond to topics that were important or of interest to them. The lack of interest in PGE could justify the low response rate in the current study.

5.3 DEMOGRAPHIC PROFILE OF RESPONDENTS

The gender profile in the current study of KZN radiographers demonstrated that females dominate the profession in this province. A study conducted by Erasmus (2017: 46) in the eThekwini district of KZN, showed a female domination with a ratio

of 9:1 for females to males. A female response rate of 80% in the current study serves to re-affirm the trend of female domination in radiography with a recorded ratio of 5: The current study was conducted in the province of KZN, while the study by Erasmus was in one district of KZN. These results only indicate a trend for female dominance in the profession.

The age of the respondents in this study ranged from 22 to 62 years with a mean age of 35.56 years, indicating that radiographers do seem to remain in their professions for most of their working lives. However, radiographers have been known to emigrate as well as leave the profession at the most productive age of between 25 and 30 years (Thambura 2016: 95). Therefore, ongoing education and training is critical for radiographers to remain relevant in the face of a rapidly evolving profession (Naidoo 2016: 60; Austin 2013: 138). The current study found a wide dispersion of varied barriers to PGE amongst the different age categories of respondents who were at different stages of their careers.

In terms of experience in their current disciplines, the largest percentage of respondents in this study had 0 to10 years of experience. While it could be expected that respondents with at least ten years of experience would have engaged in PGE, the majority (91.7%) were in possession of undergraduate qualifications which was inclusive of the National Diploma and the B-Tech degree. Similarly, Du Plessis, Friedrich-Nel and Van Tonder (2012) at the time of their study, also reported a high percentage of respondents with undergraduate qualifications only. This high percentage could be attributed to the misconception about the B-Tech degree being a postgraduate qualification.

The number of respondents in possession of radiography undergraduate qualifications such as the National Diploma in Radiography and the B-Tech were similar. This similarity could again be attributed to the assumption by respondents that the B-Tech is a postgraduate qualification. In the responses for postgraduate qualifications, 2.5% held masters degrees whilst only one (0.8%) held a doctoral degree. These statistics indicate a significant difference between the undergraduate and postgraduate qualifications. Previous studies conducted in Nigeria (Ohagwu *et al.* 2010: 2-3), reported higher statistics for radiographers with postgraduate qualifications where 12.4% of their respondents had PGE. A South African study conducted in the Free State by Du Plessis, Friedrich-Nel and van Tonder (2012:

116) reported that 62.5% of their respondents held only an undergraduate qualification at the time of their study. The current study conducted in KZN recorded 89.25% of respondents with undergraduate qualifications indicating that more respondents in KZN only possess undergraduate qualifications. Self-directed learning or ongoing education (in the South African context) is part of lifelong learning. The HPCSA has legislated, that radiographers must engage in CPD through formal or informal accredited courses in order to remain compliant and competent (HPCSA 2017: 2). Therefore, engaging in PGE as one of the numerous CPD activities would enable radiographers to be updated, educated and compliant.

Majority of the respondents in this study were diagnostic radiographers. The HPCSA iRegister has more radiographers registered in the diagnostic category as compared to ultrasound, nuclear medicine and radiotherapy (HPCSA 2019: 1). The healthcare sector in Western Australia also has the largest demand for diagnostic radiography, which has been increasingly viewed as more of an essential component of healthcare than any of the other categories (Mackay *et al.* 2012: 35). All South African public health facilities, except for primary health care centers, provide a basic radiography service, with specialised modalities only being available at the regional and tertiary healthcare facilities (DOH 2019: 1).

Respondents in this study included; radiographers from the private and public healthcare sectors, those who own their practice and professionals employed in an academic institution. With respect to sector distribution of the respondents, the public sector (53.7%) was the majority followed by the private sector (42.2%) and the HEI (2.5%). The low response rate for HEIs was expected as there is only one training institution in KZN that has radiography academics on their establishment.

Just over half of the total respondents (57.9%) indicated that they were shift workers. This could be one of the factors that has contributed to radiographers not being engaged in PGE as the time factor, was cited as one of the barriers. A South African study on radiographers in KZN, found that shift work with its heavy workloads and long hours on duty was time consuming, tiring and a major stressor (Gam 2016: 68).

The largest percentage of respondents was situated in the urban areas possibly due to the increased job opportunities as well as access to updated technologies. These

assumptions are confirmed by a report on the drastic shortage and maldistribution of health professionals in the rural areas (Academy of Science of South Africa 2018: 26). This drastic shortage in the rural areas could be attributed to the unwillingness of respondents to relocate as indicated in a study conducted on final year radiography students in Nigeria (Okeji, Ugwuanyi and Adejoh 2014: 6).

The current study found that only 37.2% of the respondents were currently engaged in PGE. The responses indicated that respondents considered any qualification beyond the entry level diploma or degree into radiography, as being a PGE. Interesting to note, is that majority of radiographers who were enrolled in, or have acquired the B-Tech degree, assumed it to be a postgraduate qualification since the National Diploma was a pre-requisite for enrollment into the B-Tech degree (DUT 2019: 1; Du Plessis, Friedrich-Nel and van Tonder 2012: 113). The B-Tech degree is however, classified as an undergraduate qualification in radiography (DUT 2019:1; Du Plessis, Friedrich-Nel and van Tonder 2012:113). This therefore means, that majority of respondents (91.7%) in this study would have the National Diploma and the B-Tech, as undergraduate qualifications, whilst only 3.3% possessed postgraduate qualifications.

The respondents who engaged in CPD activities to remain current with technology accounted for 63.64%. Previous studies conducted in SA on engagement in CPD activities identified barriers such as a lack of time, and pressure to acquire CPD points due to it being a mandatory requirement by HPCSA (Naidoo and Naidoo 2018: 210). Engagement in PGE would also comply with CPD requirements since activities such as postgraduate studies, publishing articles and external examiner tasks are some of the different activities accepted for CPD (HPCSA 2017: 15-16).

Majority of respondents from this study, who indicated that they engaged in PGE, were enrolled for the B-Tech degree (an undergraduate qualification) at the time of data collection. It could be expected that radiographers would engage in a variety of PGE programs to be CPD compliant and updated. However, they seem to only be focussed on the B-Tech degree, which the current study found has been incorrectly interpreted to be a postgraduate qualification.

This study aimed to investigate the barriers that prevented or hindered radiographers from engaging in PGE on a personal, organisational and higher

educational level. The next section categorised the respondents into type of adult learners, and their level of needs at the time of the study, in order to determine the barriers encountered by the specific types of adult learners.

5.4 RESPONDENTS AS ADULT LEARNERS

This study identified the barriers that respondents experience to PGE engagement by utilising Maslow's Hierarchy of Needs theory to ascertain their needs level at the time of this study (McLeod 2017: 1-3). Self-actualisation (73.5%) and Self-esteem (72.7%) were the levels most indicated by the respondents as being important. While respondents considered all five levels on Maslow's Hierarchy of Needs scale as being important, the lower order physiological and safety needs were considered less important than the higher order needs of self-actualisation. This is supported in a study using Maslow's Hierarchy of Needs scale to interpret findings on obstacles to self-actualisation in the personal, social and educational levels of college students in Turkey (Bulut 2018: 1). The impact of advancing technology on respondents in this current study elicited responses such as being "eager to learn and be updated" (71.9%) and "self-motivated to learn" (66%), indicating that respondents had identified with the higher order needs related to self- actualisation. Interesting to note, is that the findings from this study did not reflect that engagement in PGE was needed to realise those higher order needs of self-esteem and self-actualisation in their professions. A South African study by Thambura and Amusa (2016: 105) found that respondents with PGE in specialisations (e.g. CT and MRI) had cited non-recognition and non-remuneration of PGE as one of the factors impacting on the emigration of radiographers. Specialisation did not appear to improve their status or self-esteem.

The respondents in this study were categorised into the types of adult learners using the Malcolm Knowles Adult Learning Theory (Knowles 1980: 27-28). Majority of respondents (34.7%) described themselves as goal-oriented learners. These are the individuals who do not make any real start to their continuing education until they are older (Knowles 1980: 27-28). The activity-oriented learner (26.4% of respondents) only engaged in PGE when their problems or needs became urgent. This would account for the recent spike in numbers registering for the B-Tech

degree as the last intake for this qualification was January 2019 (Department of Higher Education and Training 2016: 4) due to it being phased out.

For many radiographers with only the National Diploma qualification, the time has run out for further vertical progression in radiography education as this qualification will be phased out as of 31 December 2019 (Department of Higher Education and Training 2016: 4). With the introduction of the new 4-year Bachelor of Health Sciences degrees in radiography, there is an educational gap between the B-Tech at NQF level 7 and the masters at NQF level 9 on the HEQSF (CHE 2013: 13). This is a barrier for any radiographer wishing to study further in PGE after 2019. Whilst 26.4% of respondents identified as being a learning-oriented learner, who should be engaging in ongoing education such as PGE (Knowles 1980: 27-28), a considerably high percent indicated that they are not engaged in any type of PGE.

The most frequent reason for success in respondents who had engaged in PGE previously, was self-motivation. At least 41.3% of those who achieved success with previous PGE were motivated to study further. This would imply that being adult learners, respondents have been able to identify the need for self-directed learning which inspires them to engage in this type of learning. This is supported by Comley-White and Potterton (2018: 4) and Cobbing and Maddocks (2017: 2-3) who emphasise the impact of self-motivation in the achievement of personal goals, development of expertise and ultimately improving patient care. However, in the current study previous success in PGE was still not adequate to motivate some respondents to study further as this was overshadowed by lack of financial remuneration or recognition (Britton, Pieterse and Lawrence 2017: 31).

The following section explores the personal barriers to PGE experienced by radiographers in KZN.

5.5 PERSONAL BARRIERS TO POSTGRADUATE EDUCATION

Lack of time was cited by 52% of respondents as being a factor that hindered their engagement in PGE because they were in full time employment. The respondents (53.7%) also included lack of incentives or promotion as reasons for not engaging in PGE. Studies conducted in Australia (Pager, Holden and Golenko 2012: 56) and in SA (Cobbing and Maddocks 2017: 2-3; Aboo and Van Rooyen 2016: 7) support

these findings as they also found that lack of time, lack of distance learning, and being parents as well as sole providers were barriers to PGE. Studies by Alousef *et al*. (2019: 40-43), Gam (2015: 66) and Verrier and Harvey (2010: 119) concur with the current study, where barriers such as poor financial rewards and non-recognition of PGE were reported. In contradiction to this, healthcare workers in Nigeria are remunerated based on their academic qualifications therefore radiographers in that country are empowered to compete with or measure up to other allied health professions (Ugwu *et al*. 2012: 118).

5.6 ORGANISATIONAL BARRIERS TO POSTGRADUATE EDUCATION

In addition to personal barriers experienced by radiographers to PGE, organisational barriers were also presented in this study. As in other studies (Anlesinya 2018: 1; Mubuuke and Pope (2015: 229; Eze *et al*. 2012: 25), respondents in KZN also found that the workplace culture regarding PGE had a negative effect on them engaging in PGE. Remuneration for additional qualifications (56.2%), lack of rewards and incentives (43%) and lack of promotion opportunities (38%) where those with PGE were not placed appropriately (i.e. in their areas of specialisation), were identified by the respondents as factors that hindered radiographers from engaging in PGE. The respondents were not allocated to work in their areas of specialisation. Staff shortages in an organisation negatively impacts on radiographers engaging in PGE as they are unable to obtain time off to study. Du Plessis, Friedrich-Nel and Van Tonder (2012: 114) argued that staff shortages justified most employers' unwillingness to allow staff time off to study during work hours. Jerome (2013: 44) however supported the concept of further education and training such as PGE, to attain excellence in organisational culture and employee performance thereby resulting in a return on investment.

Lack of financial support and the allocation of study leave ranked high amongst the barriers experienced at the workplace by respondents. Smith *et al.* (2010: 33-34) highlighted the benefits of PGE to industry in both the private and public sectors and indicated that employers should not focus on the cost of PGE, but rather on a significant return on their investment.

Organisations (53.7%) that possessed updated technologies assisted their employees throughout their PGE with additional training and hands-on experience. The importance of the need for this type of support is stressed upon by Comley-White and Potterton (2018: 4). One of the barriers to PGE was a lack of updated technologies at the workplace (22.3%) which prevented radiographers from obtaining training on these modalities such as Mammography, CT and MRI. Approximately 30% of South Africa's population is served by the private sector and at the time of the study approximately 17% of the population belonged to a medical aid scheme (Kabongo, Nel and Pitcher 2015: 3). It is presumed that the private sector would have more updated technologies than the public sector as they are able to finance new technologies more easily than the public sector due to income generated from their clients. The difference between the public and private sector in South Africa with respect to advanced technologies such as MRI units, is demonstrated where the 2.9 MRI units per million populations largely reflect private sector capacity, with a 46-fold overall discrepancy in MRI resources between the public and private sectors (Kabongo, Nel and Pitcher 2015: 3). Some PGE such as mammography and CT requires students to be placed clinically where there are advanced technologies and forms one of the criteria for acceptance at some HEIs (DUT 2019: 1). More than half of the respondents in this current study were allocated to work in specialised areas of their disciplines, indicating that employers were obtaining a return on investment in employee development by allowing their staff to engage in PGE thereby ensuring that the updated technologies installed at the workplace delivered maximum benefits to all stakeholders. Since specialised radiography such as mammography, CT and MRI is constantly evolving at a rapid rate, additional training and education is critical to maintain service excellence. Respondents (43.8%) indicated that in-house training was received to stay current with technology. However, while in-house training was deemed adequate to keep abreast with technology, it was generally provided by experienced employees or application specialists from service provider companies. It should be noted that in-house training is not accredited by HPCSA, therefore it does not qualify as accredited, registerable training.

Respondents (44%) in this study further indicated that CPD engagement is needed for them to stay current with technology. However, a study done by Naidoo and

Naidoo (2018: 212) on KZN radiographers indicated that factors such as cost, inability to attend due to shift work and lack of employer support in terms of funding and motivation were the main factors preventing them from attending CPD activities. These findings concur with those of the current study. Naidoo and Naidoo (2018: 212) also highlight the challenges to CPD compliance which is legislated by HPCSA. The impact of these challenges on radiographers being able to remain current and competent in the face of rapidly advancing technologies is of concern and is echoed by Gqweta and Naidoo (2014:15). The PGE referred to in this study was mainly the B-Tech degree which this current study has already established is an undergraduate qualification.

Respondents indicated that a lack of updated technologies at their workplaces left them stagnant and without much motivation to engage in PGE. Gqweta and Naidoo 2014: 14) portray a bleak perspective of practitioner stagnation and resultant general decreased morale. Majority of the respondents in the current study were working in institutions that did not possess updated technologies as most only provided general diagnostic radiography. In those workplaces with updated technologies, respondents (52.9%) indicated that their current duties needed further education and training. This could suggest that perhaps these respondents feel they are not providing a service of excellence to their clients. Employers should empower their employees with ongoing education and training in order to see a significant, if not greater return on investment. Smith *et al.* (2010: 33-34) highlighted in their study, that recruitment of postgraduate researchers or employees is critical to the business success of an organisation. Success is highly dependent on the people who provide the service as well as the updated technologies available. Respondents (71.9%) in this study indicated that they were eager to learn and be updated when motivated by someone else, while 66% felt they were self-motivated to learn.

A substantial percentage of respondents displayed an indifferent attitude to colleagues who had acquired PGE, whilst 31.4% felt disadvantaged amongst those who possessed postgraduate qualifications. The indifference could be attributed to respondents being aware of the organisational barriers and having no faith that these will change (Nkosi and Chipere 2019: 5). Most of the respondents were willing to engage in PGE if their organisations were to send them. Staff morale must be positively maintained to ensure efficient teamwork and service excellence. However

organisational barriers in a study of newly graduated radiographers reported that being undervalued and unfairly rostered resulted in decreased morale (Nkosi and Chipere 2019: 4).

The respondents (57.9%) who performed after-hour duties reported that this may impact negatively on their engagement in PGE, as most courses are conducted in the evenings or over weekends. Similarly, the KZN study by Naidoo and Naidoo (2018: 212) on CPD for radiographers identified shift work as a barrier to CPD attendance.

5.7 HIGHER EDUCATION BARRIERS TO POSTGRADUATE EDUCATION

This section discusses HEI barriers that radiographers have experienced in addition to their own personal barriers and those presented by the organisation to engagement with PGE. Respondents in the current study indicated that higher educational barriers presented the greatest barriers to them engaging in PGE. Similarly, in a study on radiographers in Nigeria, university generated barriers were found to be the strongest barrier to PGE (Ugwu, Erondu and Onwuazombe 2012: 115). Factors such as shortage of academic staff, high cost of study and lack of appropriate training programs that would address the industry demands contributed to the barriers that Nigerian radiographers experienced to PGE.

In the current study, respondents identified numerous barriers to PGE; the high cost of available courses being the major barrier (47.9%), followed closely by the instability at universities (45.9%). Lack of funding by employers or HEIs meant that respondents must carry the burden of the cost themselves. Similarly, high costs and lack of funding was also found to be major barriers to PGE in a study conducted by Desmennu and Owoaje (2018: 341) in Nigeria. In SA, full-time research postgraduate students are granted remission of fees for two years for a master's degree and three years for a doctoral degree (DUT 2019: 23). Instability at HEIs has arisen from disparities in terms of student fees, university staffing issues and an untransformed higher education system, between historically advantaged and historically disadvantaged HEIs (Cilliers and Aucoin 2016: 15). This instability at HEIs (in the form of student and staff protests) has hindered access to those wanting

to learn, led to programmes being prolonged, and an extensive disruption to the examination timetable (Cilliers and Aucoin 2016: 15).

The lack of standardised courses at HEIs accounted for 42% of responses in the current study, a barrier which Du Plessis, Friedrich-Nel and van Tonder (2012: 116) also identified at the time of their study. Therefore, these two studies confirm that appropriate PGE in training institutions in South Africa have not yet been addressed. Respondents reported further that similar courses held elsewhere in SA varied in structure from the locally held courses. A recommendation by Du Plessis, Friedrich-Nel and van Tonder (2012: 116) at that time was that all learning material for PGE should be accessible online and online learning and assessments be actively utilised.

Respondents (40.5%) felt that the intake quota system at the HEI made it difficult to enrol for PGE, and thus presented further restrictions on access to PGE. A study by (Habib 2015: 10) reported a significant diversity in the demographical profile of students enrolled across the board. A quota system was established to afford opportunities to historically disadvantaged individuals thereby restricting enrolment to HEI by other race categories in SA.

Inadequate academic staff qualification was found to be a factor for 39.7% of respondents. The Deputy Minister of Education, Manamela (2018: 1) provided supporting evidence that traditional universities had more academic staff with doctoral degrees than UoTs. Additional supporting evidence was reported by Habib (2015: 10) that HEIs had largely white academic staff at the most senior academic levels at that time. As Radiography undergraduate and postgraduate education is taught mainly at UoTs, these qualification disparities could have a negative impact on PGE engagement. A successful PGE outcome is dependent on competent, updated and appropriately qualified academic staff and a committed student according to the Deputy Minister of Education, Manamela (2018: 1). Respondents also identified curriculum barriers such as unavailability of quality local courses, and not meeting the demands of industry in terms of accredited specialised courses (e.g. CT and MRI). This deficiency was also identified by Du Plessis, Friederich-Nel and van Tonder (2012: 112), who emphasised the need for PGE to be made more accessible to South African radiographers as well as the surrounding Southern African countries. Similar studies conducted in Wales, Africa and SA by Mubuuke

and Pope (2015: 227) and Eze *et al.* (2012: 25) concur with Du Plessis, Friedrich-Nel and van Tonder (2012: 112) and support the findings from the current study.

5.8 THE RELATIONSHIPS AND ASSOCIATIONS WITHIN VARIABLES

This section relates to the relationships and associations between demographic variables and PGE hindering factors within the personal, organisational and higher educational barriers.

5.8.1 Personal level

There was a significant difference between males and females across the categories with regards to PGE being a low 'Personal Priority'. A similar study in Australia identified other priority work roles such as daily workloads as a barrier to engaging in PGE (Pager, Holden and Golenko 2012: 56). The relationship between gender and 'Personal Health' also identified significant differences, i.e. a large proportion of females indicated that 'Personal Health' was not a hindering factor, whilst only 28.6% of males felt the same way. In contrast to the findings from the current study, Hulls *et al.* (2018: 358) reported that majority of radiographers with work-related illness during the period of 1989 and 2015 were women.

There were no significant relationships or associations between age and variables such as 'Incentives' or 'Promotions for PGE', 'Family commitments', 'Personal health', 'Finances' and 'Time' in this current study. It would be expected that due to the varying age categories of the respondents in this study, 'Personal Health' may have possibly been a hindering factor for the older professionals. However, a study by Imlach *et al.* (2017: 1) reported that ageing did not impede academic achievement.

The findings from another South African study on postgraduate accounting students indicated that working full-time and studying part-time proved to be difficult barriers to overcome for those students who had family and financial commitments (Aboo and van Rooyen 2016: 7).

5.8.2 Organisational level

This current study found a significant difference in employee development between the public and private healthcare sectors. More than half of the respondents from

the public sector indicated that employee development did not exist in their organisations whilst in the private sector this was a very small percentage. The findings of this study reported that the private sector was more invested in employee development which was in keeping with the concept of reaping return on investments as supported by Jerome (2013: 44). The findings of the current study are consistent with those of Du Plessis, Friedrich-Nel and Van Tonder (2012: 114), who identified organisational barriers such as staff shortages that may have limited or inhibited access to PGE, even though employers should be seeking a return on investment by encouraging ongoing education and training. Chipere and Nkosi (2019: 3) reported that respondents in their study were overwhelmed by the increased workload and institutional differences between the private and public sectors. In contrast Britton, Pieterse and Lawrence (2017: 30) found that respondents in their study wished to leave the private sector for public sector, in search of good interpersonal relationships that would improve their self-esteem and recognition by supervisors such as radiologists.

There was a significant difference (p<0.05) in the remuneration for additional training and PGE between the public and private sector. This difference indicated that private sector respondents were not more advantaged than those in the public sector with regards to remuneration for additional training and PGE. Contrary to the findings from this study, a South African study by Thambura and Amusa (2016: 105) found that respondents with PGE in specialisations (e.g. CT and MRI) had cited non-recognition and non-remuneration of PGE as reasons for emigrating. Mbuuke and Pope (2015: 229) and Eze *et al.* (2012: 25) concurred with the findings by Du Plessis, Friedrich-Nel and van Tonder (2012: 114) where a lack of rewards or incentives in the workplace was found to be a barrier to pursuing PGE.

The current study also found a significant relationship between the public and private sector regarding financial support and bursaries for PGE where p <0.05. Of the public sector respondents surveyed, 60.37% strongly disagreed that there was financial support and bursary available for PGE, while 65% of the private sector respondents indicated that there was financial support and bursaries available. The availability of financial support did not motivate respondents to engage in PGE since PGE did not positively influence their earnings (Britton, Pieterse and Lawrence 2017: 31).

A significant difference of $p<0.05$ was found between private and public sector regarding organisational factors that affect engagement in PGE. Further evidence in support of the discrepancies between private and public sector in SA found that diagnostic imaging capacity within the private sector was far superior to that in the United Kingdom for all modalities whilst resources in the South African public sector were substantially lower than those in the United Kingdom (Kabongo, Nel and Pitcher, 2015: 3). Organisational factors that may encourage PGE were found to be more dominant in the private sector. However, the low percentage of responses from the public sector may imply that the organisational factors that encourage PGE did exist, yet respondents were still not engaging in PGE. Stagnation and no room for professional growth were identified as barriers by Britton, Pieterse and Lawrence (2017: 31) in their study on radiographers which included both the private and public sectors.

Further relationships and associations tested between geographical area and the following variables such as: 'adequate staff'; 'rewards or incentives for service excellence'; 'employee development' 'remuneration for additional training or PGE' 'financial support and bursary' 'study leave' found no significant relationships between these variables where $p>0.05$. However, other studies found respondents seeking employment outside of their organisations, role extension and remuneration as well as adequate staff and flexible working hours to be important factors for job satisfaction (Chipere and Nkosi 2019: 5; Hulls *et al*. 2018: 354; Britton, Pieterse and Lawrence 2017: 31).

5.8.3 Higher education level

In this study majority of respondents indicated that the HEI barriers would improve their participation in PGE if they were addressed. Factors such as 'Availability of quality, standardised courses such as Mammography, CT and MRI across all HEIs, 'HEI support' and 'Offer of online courses' were the most frequently selected as factors that would improve participation in PGE if they were addressed.

A significant relationship/association ($p<0.05$) was found between the public and private sector with respect to 'Online PGE as a barrier'. The private sector and public respondents indicated that Online PGE was not a hindering factor, and this was supported by Du Plessis, Friedrich-Nel and van Tonder (2012: 116) in their

recommendations to have all coursework available online, including online assessments.

Relationships and associations tested for between gender versus 'Institutional Access'; 'High cost'; 'Equity' barriers; 'Online PGE'; and 'Internet access', found no significant relationships where $p>0.05$. Comley-White and Potterton (2018: 3) emphasised the importance of supervisor expertise and professionalism especially when supporting long distant PGE students in the allied health professions. Chi-squared tests conducted for relationships and associations between age versus 'High Cost'; 'Instability'; 'Online PGE'; and 'internet access' as a barrier found no significant relationships existed between the above variables since $p>0.05$.

5.9 CONCLUSION

The findings from the data collected in this study utilising the questionnaire were discussed. The study investigated the Personal, Organisational and Higher Educational barriers to PGE experienced by radiographers in KZN. Discussions and interpretations were focussed on the research objectives in order to determine if the results were consistent with theories and other studies identified in the literature review. The results indicate some consistency with other studies and theories from the literature review regarding common barriers experienced by the respondents in the personal, organisational and higher educational levels

Relationships and associations found in the personal level indicated a significant difference between males and females across the categories with regards to PGE being a low 'Personal Priority'. A large percentage of female respondents did not consider 'Personal Health' to be a hindering factor. Organisational relationships identified significant differences in employee development between the public and private healthcare sectors. In addition, remuneration for additional training and PGE between the public and private sector PGE did not influence earnings in both sectors. The most frequently selected factors for Higher Education were 'Availability of quality courses', 'HEI support' and 'Offer of online courses' and it was found that these factors, if addressed, would improve participation in PGE. The private and public sector respondents indicated that Online PGE was not a hindering factor.

Recommendations and Conclusions will be presented in the next chapter.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 INTRODUCTION

Radiography as a profession has rapidly evolved in imaging technology. However, the end user being the radiographer, has experienced numerous barriers in terms of additional education and training such as PGE which would enable one to be updated and relevant. The aim of the study was to investigate the barriers that radiographers in KZN have experienced to PGE at a Personal, Organisational and Higher Educational levels. Conclusions and recommendations derived from the findings of the study are expanded on in this chapter. The conclusions drawn have stemmed from the findings of the primary research and have sought to answer the research objectives as outlined in Chapter one. Recommendations are made to radiographers, the employers and the HEIs for behavior and process change where barriers have been identified.

6.2 LIMITATIONS AND FUTURE STUDIES

This study was conducted in one province (KZN) in South Africa and therefore only provides a KZN perspective of the problem. Based on the missing responses, some questions should be the revised for use in the other provinces. Trends that emerged would be useful in those specific settings. It is possible that if results were to be obtained in other provinces, they may differ considerably from those in KZN. It is recommended that future studies be conducted to include all nine provinces in order to determine if the barriers experienced in KZN are generalised or confined to specific provinces.

It is also recommended that future studies be conducted to include other Allied Health professionals to identify the barriers they experience to PGE, similarities and differences in order to determine if these barriers are generalised or confined to any one professional group.

The HPCSA's iRegister database was not current as some radiographers' postal addresses indicated KZN, yet they were living and employed elsewhere in SA whilst

others were working abroad. Some currently registered radiographers did not reflect on the database as being active even though their fees were paid. It is the radiographer's responsibility to notify HPCSA when personal details change. If this is not done, the information available on the iRegister remains outdated. This makes it difficult for researchers to access an updated database of SA healthcare practitioners when needed. It is recommended that HPCSA include practitioners' workplace details as it could be helpful to researchers for statistical purposes.

6.3 RECOMMENDATIONS FOR RADIOGRAPHERS: PERSONAL

This study has demonstrated that radiographers are eager to learn and be updated which signifies that the need for lifelong learning and self-actualisation is embedded in them. However, majority of the participants in this study were in possession of an undergraduate qualification only. Since the B-Tech degree which the respondents assumed to be a PGE is not classified as such, this indicates that radiographers need to be more engaged in PGE to remain current and competent.

Personal commitment to improvement, time management, professional pride and striving for service excellence needs to be given priority as a key area for development. The regulations defining the scope of the profession of radiography in SA are currently under review to include role extension. Keeping abreast of rapidly evolving technologies as well as the future role extension requires further education and training in the form of PGE, such as basic image interpretation, medicine control and administration of contrast media, and therapeutic use of high intensity ultrasound. For the radiography profession to gain recognition and improved status in SA, there should be benchmarking against international colleagues regarding standards of practice. However, personal responsibility for self-development must take precedence.

Radiographers need to familiarise themselves with the requirements of their statutory body, the HPCSA, and take responsibility for ensuring that their details are always correct. It is stated on the HPCSA website that all practitioners are responsible for keeping the HPCSA updated with their details therefore it is strongly recommended that radiographers use the 'Change of Details' form when paying their annual HPCSA subscription.

6.4 RECOMMENDATIONS FOR EMPLOYERS: ORGANISATIONAL

This research study identified non-recognition of PGE and the lack of incentives as the biggest barriers in the workplace.

6.4.1 Recognition of PGE

Since human resources are the most important asset in an organisation, employers should be investing time, money and support on their employees. The resulting benefits will be an efficient healthcare system providing service excellence which can be seen as a return on investment. In 2007 the Occupation Specific Dispensation (OSD) was rolled out to South African public sector employees. The nursing profession benefitted greatly from this roll out, in that all relevant postgraduate qualifications were recognised and remunerated and enabled promotions. However, the roll-out which was incorrectly implemented for the radiography profession has to date neither been addressed nor corrected. It is therefore recommended that an OSD roll-out system that is similar to that being utilised for the nursing profession, be implemented by the public and private sector employers of radiographers.

6.4.2 Organisational support and motivation

Employers of potential postgraduate students need to be cognisant of the structure of their workplace and how this may potentially impact on students' journeys through their studies. For employers, the findings of this study suggest that even partial employer financial support for students is an excellent motivator and maintainer. Work schedules and staffing should be reviewed to enable those radiographers engaged in PGE to be given time off to study and attend lectures. Supervisors of younger professionals should motivate them to strive for self-development, and the latter should be assured of continued employment, and benchmarked pay increases after PGE. Career advancement paths, pay increases, promotion, and new career opportunities could be offered as incentives by employers to motivate their older, loyal and dedicated staff. Organisations with a good workplace culture of ongoing professional development will ensure that their most valuable assets are appreciated and they in turn will benefit from a greater return on investment.

6.5. RECOMMENDATIONS FOR ACADEMIC INSTITUTIONS: HIGHER EDUCATION

Responses from respondents in this study indicated that the major barriers to PGE were presented by HEIs.

6.5.1 Postgraduate supervision

Based on the experiences expressed by the respondents in this study, the researcher recommends that a postgraduate supervisor be mindful of the importance of a good working relationship and open communication with the student. In addition, the supervisor should provide an adequate level of support by guiding students early in their studies so that the goals and objectives are realistic and attainable. It is believed that a good working relationship and adequate supervisor support would assist postgraduate students (current and future) to understand the commitment required of them for the duration of their studies and to plan their studies accordingly. Previous researchers have identified that the possibility of 'life happens' almost always happens once the student engages in PGE. Postgraduate supervisors should therefore also be adequately empowered and updated to provide appropriate mentoring and supervision to their students.

6.5.2 Postgraduate funding

HEIs in South Africa allocate funding to postgraduate research and studies in the form of scholarships or grants. Academic program administrators need to make information on all PGE funding more accessible to potential postgraduate students. This can be done through advertising in all media and at university open days, so that potential students are fully informed about funding options before embarking on PGE. This could result in a larger number of students being attracted to PGE. In addition, awareness on remission of fees for full time masters and doctoral students should be filtered down the relevant channels in order to attract more researchers. Financial support to postgraduate students to attend conferences, present papers, undertake study visits as well as assistance with publication of articles in journals should be widely advertised. It is critical to make the funding opportunities and available support structures known to potential students, as this knowledge can attract new students and motivate them to engage in postgraduate studies.

6.5.3 Research outputs

HEIs are awarded subsidies for research output generated through the institution. These subsidies are allocated to the HEI and the research accounts of the authors for use to attend conferences, purchase electronic devices, and other research related activities and projects provided they are affiliated to the institution. Not all postgraduate alumni can be affiliated to HEIs therefore subsidy acquired through alumni research output should be made available for use by the alumni whenever needed. HEI administrators should review their policies regarding the distribution of the research output subsidies. This would encourage more PGE engagement and would increase HEI research output.

6.5.4 Availability of quality courses and distance learning

This study has highlighted the need for more local, quality courses to meet industry demands and develop advanced skills. HEIs should offer PGE for the role extension courses at NQF level 8 in order to bridge the gap between the B-Tech (NQF level 7) and the Masters (NQF level 9). It is recommended that the PGE courses offered by different HEIs be standardised in terms of having nationally agreed on minimum standards for curriculum content and design. It is further recommended that HEIs provide some online PGE courses to avoid disruptions to studies in the event of student uprisings and staff protest action. Distance learning can be efficient and effective if well administered and managed by HEIs.

6.6 CONCLUSION

While there is a global trend for increased interest in pursuing PGE by healthcare practitioners, radiographers in KZN seem to lack interest in PGE engagement. This study, therefore, set out to investigate the personal, organisational and higher educational barriers to PGE as experienced by radiographers in KZN. The main personal barriers cited were a lack of time, a lack of incentives or promotions, lack of recognition and remuneration for PGE. Organisational barriers were found to be staff shortages resulting in higher workloads, lack of financial support and allocation of study leave. Respondents indicated that HEI barriers were the major barriers to PGE. High costs, lack of funding and instability at HEIs were cited as the main

barriers that hindered engagement in PGE for those who engaged in and abandoned their studies.

Despite barriers experienced at personal, organisational and HEI levels, results have indicated that the respondents are eager to learn and be updated in order to achieve self-development and be recognised as professionals in a multi-disciplinary team. Engagement in PGE is therefore critical for professionals to be updated through continuing education and training to remain competent and relevant in an evolving technological environment. It is intended that the results of this study will add to the body of knowledge regarding PGE in radiography and will contribute to the development of a culture of life-long learning in young professionals. This will ensure professional development, achievement of self-actualisation and ultimately an excellent healthcare professional that is able to deliver quality radiographic services to the healthcare users of the country.

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Gmail

ANGELA MOONSAMY <moonsamyangela@gmail.com>

Request for Radiographer members details for Research purposes

ANGELA MOONSAMY <moonsamyangela@gmail.com> Mon, Mar 13, 2017 at 8:04 PM
To: yvetted@hpcsa.co.za

Dear Mrs Yvette Daffle

My name is Angela Moonsamy (HPCSA No: 0048356) and I am a diagnostic radiographer employed in the Public sector. I am currently registered as a second year Master of Health Sciences student at the Durban University of Technology. My research study is on Barriers and Challenges to Post Graduate Education for Radiographers in KwaZulu Natal.

I have searched the HPCSA online iRegister for all radiographers in KZN and the search yielded a total of one thousand and fifty nine (1059) as at 11 March 2017. I would require about 25% of that total which should be about 264. However I would require only the currently registered, active, practicing members in KZN. I will need a sample from the whole of KZN. This would entail selecting every fourth radiographer starting from the surname with alphabet A until the surname ending with Z. This would ensure each and every element (radiographer) of the population has an equal chance of being selected in the sample.

This list together with the postal addresses will be highly valuable to my study.

Any assistance will be appreciated.

Yours sincerely

Angela

APPENDIX B:

LETTER OF INFORMATION

Dear Participant,
Thank you for considering taking part in this study. Your input would be of great value in identifying the barriers experienced by radiographers in KwaZulu-Natal (KZN) regarding PGE. Your time and contribution is appreciated.

Title of the Research Study: Postgraduate Education: Personal, Organisational and Higher Educational barriers experienced by radiographers in KwaZulu-Natal.

Principal Investigator/s/researcher:

Full names and surname **:** Angela Moonsamy (moonsamyangela@gmail.com)
Qualifications : B.Tech Radiography (D) (DUT)
: N.D Radiography (D) (DUT)

Co-Investigator/s/supervisor/s:

1. Full names and surname : Lynda Dawn Swindon (lyndas@dut.ac.za)
Qualifications : M.Ed (HE) (UKZN)
: B.Tech Radiography (D) (Natal Technikon)

2. Full names and surname : Fazila Ally (fazilaa@dut.ac.za)
Qualifications : M.Ed (HE) (UKZN)
: PhD (Anatomy) (UKZN)

Brief Introduction and Purpose of the Study:
Rapid advances in imaging technology have made it more difficult for radiographers to maintain service excellence without additional training. International studies have identified that ongoing education and training is the key to radiographers maintaining competence, relevance and accountability in a constantly evolving radiography profession. The Health Professions Council of South Africa stipulates that all healthcare professionals registered with this council are required, by law, to update and develop the knowledge, skills and ethical attitudes that underpin competent practice. Therefore, South African radiographers can be updated through informal education or through Postgraduate Education (PGE) to achieve compliance. However, there appear to be barriers to PGE therefore, the purpose of this study is to investigate barriers experienced by radiographers in KZN. Your participation in this proposed study will assist in identifying any possible challenges and barriers at personal, organizational and higher educational levels.

Outline of the Procedures:
All HPCSA registered, qualified radiographers currently working in KZN will be eligible to participate in this study. Student and supplementary radiographers are excluded. You will be requested to complete a questionnaire comprising of thirty-eight questions in your own time and at your convenience. This should take approximately 15 minutes to complete. The questionnaire consists of statements and questions related to the possible barriers to PGE for radiographers in KZN. Your

responses will identify the factors that hinder PGE and will yield recommendations to overcome these factors. An envelope with prepaid postage and return address can be used to submit your completed questionnaire. Email respondents may scan and email completed questionnaires. It would be appreciated if completed questionnaires could be returned to me by 30 March 2018.

Risks or Discomforts to the Participant:
There will be no risks or discomfits to the participants.

Benefits:
It is hoped that the findings from this study will yield recommendations to address any barriers identified on a personal, organizational and at higher educational levels so as to ensure that service excellence can be delivered by competent and knowledgeable radiographers. The results may be used to suggest policy change in staff development, remuneration and funding for further studies. The results may also be used to recommend a review of higher education statuses as well as organisational culture with respect to PGE. This in turn may motivate radiographers to engage in self- learning, thereby adding value to self as well as to the organisation.
Benefits for the researcher may include publication in a reputable, accredited, academic journal

Reason/s why the Participant May Be Withdrawn from the Study:
You are free, at any stage, to withdraw your consent and participation from the study without prejudice.

Remuneration:
There is no monetary or other compensation for participating in this study.

Costs of the Study:
The researcher will bear all financial costs for this research through institutional funding.

Confidentiality:
Your name will not be required for this study and will not be recorded anywhere. All information provided by you will be kept anonymous and confidential and will only be used for the purposes of this research.

Research-related Injury:
The proposed study will be conducted using a questionnaire therefore no research related injury is anticipated.

Persons to Contact in the Event of Any Problems or Queries:
You may contact the researcher, Mrs Angela Moonsamy (032-5419251), or my supervisors, Mrs Lynda Swindon (072 2684 355) and Dr Fazila Ally (031 3732389) or the Institutional Research Ethics administrator on 031 373 2375. Complaints can be reported to the DVC: TIP, Prof Moyo on 031 373 2382 or dvctip@dut.ac.za.

CONSENT

Statement of Agreement to Participate in the Research Study:

- I hereby confirm that I have been informed by the researcher, _____ (name of researcher), about the nature, conduct, benefits and risks of this study - Research Ethics Clearance Number: _____,
- I have also received, read and understood the above written information (Participant Letter of Information) regarding the study.
- I am aware that the results of the study, including personal details regarding my sex, age, date of birth, initials and diagnosis will be anonymously processed into a study report.
- In view of the requirements of research, I agree that the data collected during this study can be processed in a computerised system by the researcher.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I have had sufficient opportunity to ask questions and (of my own free will) declare myself prepared to participate in the study.
- I understand that significant new findings developed during the course of this research which may relate to my participation will be made available to me.

_____	_____	_____	_____
Full Name of Participant	**Date**	**Time**	**Signature / Right Thumbprint**

I, _____ (name of researcher) herewith confirm that the above participant has been fully informed about the nature, conduct and risks of the above study.

_____	_____	_____
Full Name of Researcher	**Date**	**Signature**
_____	_____	_____
Full Name of Witness (If applicable)	**Date**	**Signature**
_____	_____	_____
Full Name of Legal Guardian (If applicable)	**Date**	**Signature**

QUESTIONNAIRE TO BE COMPLETED BY RADIOGRAPHERS

Dear Participant, Thank you for your participation in this study. Your contribution and opinion is extremely valuable and appreciated.

The questionnaire consists of statements and questions related to the barriers experienced by radiographers to Postgraduate Education (PGE) in KwaZulu-Natal. For the purposes of this study PGE refers to any Health Professions Council of South Africa (HPCSA) accredited qualification acquired after the first qualification. Please answer all questions honestly as your responses will identify the factors that hinder PGE as well as contribute towards recommendations for change in the personal, organizational and higher education environments. All information provided will be kept strictly confidential and anonymous. Participation is voluntary. Completion of this questionnaire will indicate consent to participate.

QUESTIONNAIRE	**BARRIERS TO POSTGRADUATE EDUCATION (PGE) FOR RADIOGRAPHERS**

SECTION A	**DEMOGRAPHICS**
	This section relates to the radiographer's biographical information. No names are required.

Please select the appropriate response by placing an (X) in the appropriate box.

1. GENDER: Male | Female

2. RACE: Black | Coloured | Indian | White | Other

3. AGE (Actual age in years): _____

4. QUALIFICATION: (choose as many as are applicable)

National Diploma in Radiography	
Bachelor's Degree in Technology (B-Tech)	
Master's Degree in Radiography	
Doctoral or PhD in Radiography	
Three-year Bachelor's Degree	
Bachelor's Degree (Hons)	
Higher Education Degree/Diploma	
Other (HPCSA accredited courses)	

List Other_____

5. CURRENT ENGAGEMENT IN POST-GRADUATE STUDIES:

Are you currently studying anything related to radiography?

YES ☐ Specify: _____
NO ☐

6. CURRENTLY REGISTERED DISCIPLINE/S: (Indicate all applicable categories)

In which radiography category are you currently registered with the HPCSA?

Diagnostic	☐
Ultrasound	☐
Nuclear Medicine	☐
Radiotherapy	☐
Private Practice(own)	☐
Community Service	☐
Dual Registration	☐
Specify for dual registration	_____

7. GEOGRAPHICAL AREA OF EMPLOYMENT:

Where is your geographic area of employment?

Urban	☐
Rural	☐

8. CATEGORY OF INSTITUTION:

In the context of this study, Public Sector refers to those health institutions that operate under the KZN Department of Health. Private Sector refers to those practices owned by the radiographer or radiologist as specified below. Academic Sector refers to the higher education training institution in KZN. Indicate where you are employed by placing an (X) in the appropriate box.

PUBLIC SECTOR		PRIVATE SECTOR		ACADEMIC SECTOR	
Tertiary/Academic Hospital	☐	Private practice owned by a radiographer where you are the owner	☐	Higher Educational Institution	☐
Regional Hospital	☐	Private practice owned by a radiographer where you are an employee	☐		
District Hospital	☐	Private practice owned by a radiologist where you are an employee	☐		
Community Healthcare Center	☐		☐		

9. NUMBER OF YEARS CLINICAL EXPERIENCE IN CURRENT PRACTISING DISCIPLINE? ☐

SECTION B	PERSONAL BARRIERS TO POSTGRADUATE EDUCATION
	This section relates to possible personal barriers you may experience regarding Postgraduate Education (PGE)

10. Have you engaged in PGE before? YES NO

11. Have you experienced any barriers to PGE? YES NO

12. To what degree do you think that any of the following factors may hinder you from engaging in PGE? (Indicate all relevant factors)

	1 Not at all	2 Very little	3 Neutral	4 To a large extent	5 Greatly
Finances					
Time					
Age					
No Incentives or promotion					
Not aware of available PGE					
Lack of Motivation					
Not interested					
Family commitments					
Lack of confidence					
Personal Health					
Lack of appropriate courses					
Low personal priority					

13. Are there any other factors that may have hindered you from engaging in PGE? Please specify

_____

14. Please rate your needs using the following scale:

1= Unimportant 2= Least Important 3= Neutral 4=Important 5=Very Important

Physiological Needs (Food, shelter, security)	
Safety (Security, Safety)	
Social (Love, Belonging, Friendship, Family)	
Self Esteem (Confidence, Achievement, Respect)	
Self- Actualisation (Desire for Personal/professional development)	

15. Select the type of adult learner below that you think best describes you.

1.**Goal-oriented learner** One who uses education for accomplishing fairly clear-cut objective such as the realization of a need or interest. A course is taken to satisfy a need. These individuals did not make any real start to their continuing education until their mid-twenties and after.	
2. Activity-oriented learner These individuals begin their sustained participation in adult education when their problems or needs become sufficiently urgent.	
3. Learning oriented learner Are those who seek knowledge for its own sake. Have been engrossed in learning for as long as they can remember. Choose jobs and make other decisions in life in terms of potential for growth which they offer.	

16. Which of the following options have you engaged in, to stay current with advancing technologies in radiography? You may choose as many as are applicable.

In-house training	
CPD Activities	
Formal Short Courses (e.g. Mammography, CT, MRI)	
PGE (e.g. B.Tech., Higher Degrees in Education, Masters, Doctorate)	
Other	
(Specify)	
None	

17. If you have engaged in PGE, were you successful?

YES	NO	N/A

18. If YES, what (in your opinion) are the reasons for you being able to achieve your goal?

---

19. Does this (answer to no 18) motivate you to study further?

YES	NO	N/A

20. Imaging Technology is advancing rapidly in Radiography. How has this impacted on you professionally?

	1 **Greatly**	**2** **To a large extent**	**3** **Neutral**	**4** **Very little**	**5** **Not at all**
Little or no impact					
Feelings of inadequacy					
Want to give up(resign)					
Want to change workplace					
Eager to learn and be updated					
Self –motivated to be updated					

SECTION C	ORGANISATIONAL BARRIERS TO POSTGRADUATE EDUCATION
	This section relates to barriers that the organization presents to Postgraduate Education (PGE)

21. The following statements refer to the workplace culture with respect to PGE. In your workplace, do the following exist?

	1 Strongly Disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly Agree
Adequate staffing					
Appropriate rewards and incentives for service excellence					
Provision of employee development (in-house or external service providers)					
Remuneration for having obtained additional training/qualification					
Support for self–study during working hours					
Financial support/bursary for PGE					
Appropriate work placement for radiographers with PGE					
Allocation of study leave for formal studies					
None of the above exists in my workplace					

22. Does your workplace have updated technologies? YES | NO

23. In your workplace, are you rostered to work in any specialised areas (e.g. Vascular/MSK in ultrasound, CT) of your discipline? YES | NO

24. If NO state why. _____

25. IF YES, does this rotation motivate you to study further in that modality or specialised area? YES | NO | N/A

26. Do your current duties require further education and training? YES | NO

27. Are you working in an area (workstation) where you feel that you are inadequately equipped to provide service excellence? YES | NO

28. Do you provide in-house training to new or junior employees? YES | NO

29. If YES do you feel adequately trained to teach others? YES | NO | N/A

30. Would you be willing to engage in PGE if your workplace sent you? YES | NO

31. Do you feel disadvantaged amongst employees who have acquired PGE? YES | NO

32. Do your hours of duty include an after-hours service? YES | NO

SECTION D	HIGHER EDUCATIONAL BARRIERS TO POSTGRADUATE EDUCATION (PGE)
	This section relates to barriers experienced in Higher Education institutions to PGE

33. The following statements refer to barriers pertaining to the higher education institutions with respect to PGE. Do you think that these factors have hindered you to some degree, from engaging in PGE?

	1 Greatly	2 To a large extent	3 Neutral	4 Very little	5 Not at all
Lack of awareness of available PGE					
Access to institutions that provide PGE					
High cost of PGE as an additional financial burden					
Instability of tertiary institutions (protest action)					
Lack of PGE offerings at institutions					
Equity (quota system) policies that present as barriers					
Current job placement is a barrier to entry to PGE					
Insufficient academic staff to facilitate PGE					
PGE offered as an online course is a barrier					
Access to internet is a barrier					
Lack of standardized courses offered by different institutions					

SECTION E	STRATEGIES TO IMPROVE ENGAGEMENT IN POSTGRADUATE EDUCATION
	This section relates to how engagement in PGE can be improved

34. How can your participation in PGE be improved?

35. What changes can you make to your personal barriers experienced in PGE?

36. In your opinion, what are the changes that can be made at the workplace to eradicate or minimize the barriers experienced in PGE?

37. What changes would you recommend be made at higher education institutions regarding PGE?

38. In your opinion, which factors contribute the most towards your barriers and challenges to PGE? Rate your answers on a scale of 1 to 4 where 4 is the biggest barrier and 1 is the least.

Personal	
Organisational	
Higher Educational	
All of the above	

If you have any further comments or recommendations regarding PGE, please use the space provided below.

***Thank you for participating in this research study. Your input is greatly appreciated*.**

Any enquiries can be addressed directly to the researcher and/or supervisor using the following contact details:

Contact Details	Researcher (Mrs A.Moonsamy)	Supervisor (Mrs L.D. Swindon)
Work number	032 5419251	031- 3732450
Cell number	084 812 1997	072 268 4355
Email address	moonsamyangela@gmail.com	lyndas@dut.ac.za

Yours sincerely,

Angela Moonsamy (*Principal Researcher*)

APPENDIX D: Letter of Confidentiality

Dear Participant,

Thank you for participating in this focus group meeting. The purpose of which is to review and evaluate the research study questionnaire. The contents of the questionaire are not to be discussed outside this focus group. Your signing of this letter will ensure confidentiality of this discussion.

Title of the Research Study:

Post Graduate Education: Personal, Organisational and Higher Educational Barriers experienced by radiographers in KwaZulu-Natal.

Principal Researcher:
Full Names and Surname : Mrs Angela Moonsamy

Supervisor/Co-Supervisor:

1. Full Names and Surname : Mrs Lynda Dawn Swindon(Supervisor)
2. Full Names and Surname : Dr Fazila Ally(Co-supervisor)

Participation is voluntary and you are free to withdraw at any stage from this study without prejudice. Although there is no monetary or other compensation for participating in this study, your input is valuable and all information provided will be kept anonymous at all times.

Yours faithfully

_____
Angela Moonsamy
Principal Researcher

By signing below, you are agreeing to the following:

- I shall not discuss the contents of this research study questionaire with anyone other than the researcher, supervisor and co-supervisor.

_____	_____	_____
Name and Surname(Focus Group Member)	Date	Signature
_____	_____	_____
Name and Surname(Witness)	Date	Signature

Institutional Research Ethics Committee
Research and Postgraduate Support Directorate
2nd Floor, Berwyn Court
Gate 1, Steve Biko Campus
Durban University of Technology

P O Box 1334, Durban, South Africa, 4001

Tel: 031 373 2375
Email: lavishak@dut.ac.za
http://www.dut.ac.za/research/institutional_research_ethics

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APPENDIX E

27 July 2018

Ms A Moonsamy
5 16th Way
Campbellstown
Phoenix
4068

Dear Ms Moonsamy

Postgraduate Education: Personal, Organisational and Higher Educational barriers experienced by radiographers in KwaZulu-Natal.

I am pleased to inform you that **PROVISIONAL APPROVAL** has been granted to your proposal subject to:

- Piloting of the data collection tool. *Please note that should there be any changes to the data collection tool, in a letter signed by the researcher and supervisor, list the changes to the documents and submit to IREC with the final data collection tools. Even when there are no changes to the data collection tool, IREC has to be notified.*

PLEASE NOTE THAT THIS IS NOT A FINAL APPROVAL LETTER. KINDLY SUBMIT THE ABOVE MENTIONED DOCUMENTS WITHIN THREE MONTHS TO THE IREC OFFICE. DATA COLLECTION CAN ONLY COMMENCE WHEN IREC ISSUES FULL APPROVAL

The Proposal has been allocated the following Ethical Clearance number **IREC 039/18**. Please use this number in all communication with this office.

Approval has been granted for a period of two years, before the expiry of which you are required to apply for safety monitoring and annual recertification. Please use the Safety Monitoring and Annual Recertification Report form which can be found in the Standard Operating Procedures [SOP's] of the IREC. This form must be submitted to the IREC at least 3 months before the ethics approval for the study expires.

Yours Sincerely

Professor J K Adam
Chairperson: IREC

DUT DURBAN UNIVERSITY OF TECHNOLOGY
2013 -07- 27
INSTITUTIONAL RESEARCH ETHICS COMMITTEE
P O BOX 1334 DURBAN 4000 SOUTH AFRICA

Institutional Research Ethics Committee
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APPENDIX F

16 August 2018

Ms A Moonsamy
5 16th Way
Campbellstown
Phoenix
4068

Dear Ms Moonsamy

Postgraduate Education: Personal, Organisational and Higher Educational barriers experienced by radiographers in KwaZulu-Natal.

The Institutional Research Ethics Committee acknowledges receipt of your final data collection tool for review.

We are pleased to inform you that the data collection tool has been approved. Kindly ensure that participants used for the pilot study are not part of the main study.

Please note that FULL APPROVAL is granted to your research proposal. You may proceed with data collection.

Any adverse events [serious or minor] which occur in connection with this study and/or which may alter its ethical consideration must be reported to the IREC according to the IREC Standard Operating Procedures (SOP's).

Please note that any deviations from the approved proposal require the approval of the IREC as outlined in the IREC SOP's.

Yours Sincerely,

Professor J K Adam
Chairperson: IREC

DUT DURBAN UNIVERSITY OF TECHNOLOGY
2013 -09- 16
INSTITUTIONAL RESEARCH ETHICS COMMITTEE
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