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Professional socialisation of diagnostic radiography students: influence on global engagement

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Abstract

This research aimed to explore the professional socialisation of diagnostic radiography students in a clinical learning environment and how this could influence global engagement. Professional socialisation is a process of acquiring and internalising the competencies and values of a chosen profession. Health professions education involves work integrated education (WIE) and work integrated learning (WIL), to intentionally integrate academic and clinical learning, and the professional socialisation of students takes place in both learning environments. However, the clinical learning environment dominates with regards to its significance for professional socialisation, and therefore, the focus of this study was on the diagnostic radiography clinical learning environment. A qualitative research design was employed. Data was collected from final year diagnostic radiography students and clinical diagnostic radiographers through focus groups and one-on-one interviews. Thematic analysis resulted in the generation of three themes. Effective professional socialisation is essential for the development of a diagnostic radiography community that is well prepared for engagements with patients and other healthcare professionals, locally and globally. This study provided insights into important aspects of professional socialisation, which will assist with the development of guidelines for the facilitation of effective professional socialisation of diagnostic radiography students with a focus on extracting the learning on WIL for enabling global engagement.

Keywords: Diagnostic radiography, Health professions education, Medical imaging, Professional engagement, Radiation technology, Work-integrated learning

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Introduction

Diagnostic radiography is a healthcare profession that involves the use of various medical imaging technologies such as general x-rays, computed tomography, and magnetic resonance imaging to produce images of organs, structures and tissues of the human body which play a crucial role in patient diagnosis and management (Carlton et al., 2018). Because of the role of medical imaging in health care, most patients who attend a hospital visit the diagnostic radiography department (Migliorini & Portelli, 2019). Many of these patients are critically ill or injured, thus radiographers may encounter patients who are experiencing high levels of pain, stress or anxiety related to their symptoms and potential diagnosis (Cunningham et al., 2015; Bwanga & Lidster, 2019; Lundvall et al., 2021). It is worth noting that diagnostic radiography procedures have a short duration, for instance, a chest x-ray examination can be completed in less than 10 minutes (Pollard et al., 2019). Therefore, diagnostic radiographers must be able to deliver effective patient care in the short period of time that they are performing the radiographic procedures to reduce the patient's anxiety and stress (Pollard et al., 2019; Migliorini & Portelli, 2019). Given the increasing globalisation of healthcare, the mobility of patients across nations, and international career opportunities, diagnostic radiographers must be equipped to deliver culturally competent care to diverse national and international patient populations (Lai et al., 2019).

Professional socialisation, comprising the anticipatory and formal stages, is a developmental process through which individuals learn and internalise competencies, values, and behaviours associated with their profession (Cornelissen & van Wyk, 2007). The anticipatory stage is characterised by the knowledge and expectations of the future profession which an individual possesses before entering the professional course. Formal professional socialisation, on the other hand, begins after the student registers for the professional course at a higher education institution. In the formal stage of professional socialisation, the student begins to view the profession from an insider perspective, with their expectations of future roles shaped by members of the profession (Cornelissen & van Wyk, 2007). In the health professions, professional socialisation takes place through academic and clinical learning (Higgs, 2013). Both academic and clinical educators have a role to play in socialising students into the diagnostic radiography profession. Notably, professional socialisation is not just about students blindly copying and adopting practices of experienced members. Instead, students use the knowledge gained in the classroom about the acceptable professional behaviour to reflect on their clinical experiences and determine correct behaviour to emulate (Challen et al., 2017).

According to published literature, the clinical environment is more significant in the professional socialisation of health professions students which highlights the need for clinical educators to be intentional in socialising students into the professions (Higgs, 2013; Melrose et al., 2015; Challen et al., 2017; Shahr et al., 2019). Similarly, a literature review conducted by Cunningham et al. (2015) revealed that radiography students value learning from clinical educators more than academic educators. Thus, clinical radiographers play a major role in professionally socialising students in the field of diagnostic radiography. This emphasises the importance of clinical learning in developing professional competence. Therefore, a supportive clinical environment with supportive clinical staff is fundamental to diagnostic radiography students achieving professional competence (Melrose et al., 2015; Shaw et al., 2018; Meyer et al., 2023).

Global engagement entails connecting with international individuals or communities with the aim of learning with and from each other through shared ideas, strategies and perspectives, and improving communities (Canas et al., 2022). In the context of diagnostic radiography, this encompasses the capacity to deliver efficient radiographic services to a global patient population, whether within the radiographer's home country—due to increased migration and international movement of individuals who might fall sick or get injured requiring health care services away from their country of origin—or through professional practice in international settings (Lai et al., 2019; Gunn et al., 2020). According to Omiyi et al. (2024) over 25% of radiographers working in the United Kingdom in 2024 were migrants who completed their studies in other countries. Therefore, radiographers need to be aware of global similarities and variations in health care. They must also be sensitive to cultural diversity and demonstrate intercultural competence to be able to provide effective patient care to diverse patient populations (Hyter et al., 2017; Lai et al, 2019).

The field of diagnostic radiography also involves sharing of professional knowledge between international colleagues and students through international student and staff exchanges, research collaborations, and sharing of research through international conferences and journals (Chau et al., 2025). As an example, the 2024 International Society of Radiographers and Radiologic Technologists (ISRRT) world congress had more than 700 radiographers attending from all over the world (ISRRT, 2024). Hence, diagnostic radiographers need to have the ability for effective global engagements

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and provide culturally competent radiographic services to national and international citizens (Lai et al., 2019). This signifies the importance of equipping diagnostic radiography students with the knowledge and skills to practice successfully in diverse contexts both locally and globally upon qualification (Lai et al., 2019). To this end, Gunn et al. (2020) advocate for the cultivation of global citizenship in radiography students and a broader international understanding of the profession, especially in relation to clinical practice. This would give students a sense of global responsibility and prepare them for caring for diverse patient populations and future international career opportunities (Chau et al., 2025).

Diagnostic radiography education varies across the globe (Susiku et al., 2024); in South Africa, it is offered as a four-year Professional Bachelor's degree based on the work integrated learning (WIL) pedagogical approach (Friedrich-Nel & Isaacs, 2018; du Plessis & Bezuidenhout, 2019). According to Zegwaard et al. (2023), WIL is a curriculum-based educational strategy that emphasises the integration of theoretical knowledge with practical experience, and fosters student learning through engagement in authentic, meaningful activities that are directly aligned with their academic programmes and future professional roles. WIL involves a collaborative partnership between a higher education institution, a student, and an external stakeholder/ industry partner (Ferns et al., 2025), which is a clinical setting in the health sector for the context of this research. Zegwaard et al. (2023) emphasise the importance of the external partner involvement in the co-design and ongoing revisions as their input can provide valuable insights to ensure the continued relevance and alignment of the WIL curriculum with current professional practices.

Work integrated learning (WIL) incorporates a variety of modalities which may take place either in the workplace (such as work placements) or on campus (non-placement activities) (Zegwaard et al., 2023). These modalities include work-directed theoretical, problem-based, project-based, simulation-based and workplace-based learning (WPBL) (Winberg et al., 2011; du Plessis & Bezuidenhout, 2019). Theoretical learning incorporates topics such as ethics and human rights which aim to promote professional conduct and ethical behaviour among diagnostic radiographers, and ultimately good patient care and safety (Kekana & Steenkamp, 2019). The broad knowledge that students gain on various topics allow them to be adaptable in different environments. Simulation-based learning has become common practice in diagnostic radiography education to introduce students to the clinical component and bridge the gap between theory and practice (Vestbøstad et al., 2020). This method provides a safe learning environment with no serious consequences arising from students' mistakes (Hyde, 2015; Hazell et al., 2020; Vestbøstad et al., 2020). However, England et al. (2017) argue that simulations cannot substitute entirely for the learning gained from direct clinical experience with patients, the public and other health professionals which occurs during WPBL.

Students are offered opportunities to transfer theoretical information gained during academic learning to workplace experiences, and learn by doing through WPBL (Martin et al., 2019; Meyer et al., 2023; Ferns et al., 2025). Involvement in the workplace also exposes students to the expectations and practices of their chosen profession, offering authentic, real-world learning experiences (Zegwaard et al., 2023). Through this process, students are socialised into the norms and values of the profession, thereby broadening their knowledge base and developing key competencies essential for future professional practice (Martin et al., 2019; Jackson & Cook, 2023; Meyer et al., 2023). The WIL pedagogy within the radiography curriculum at the research site encompasses clinical placements as a WPBL method. In the clinical environment, radiography students engage with qualified radiographers, other healthcare professionals, patients and the public, e.g., patient representatives (Migliorini & Portelli, 2019). These engagements are essential for effective patient care and facilitating students' professional development (Arkana et al., 2018; Girn et al., 2022). Accordingly, Shaw et al. (2018) recommend early introduction of students to the clinical environment and active participation in patient care to facilitate their professional development.

According to Billett (2024) WIL is an individual process where students integrate their experiences from educational and workplace environments. This integration does not happen automatically and, on its own, is insufficient. WIL requires a curriculum with strategies intentionally designed to encourage the integration of theory and practice. In this model of work-integrated education (WIE) there is the meaningful preparation of students for future professional practice. Billett (2024) describes WIE as efforts by higher education institutions to provide organised educational opportunities and guidance to achieve intended goals through academic and workplace learning. In contrast, WIL entails individual student's unique experiences of engaging with what needs to be learned and their interpreting of those experiences to achieve intended outcomes and professional requirements. In other words, WIE constitutes the intended curriculum while WIL entails the experienced curriculum. Therefore, integration between the two is essential to align the intended and achieved outcomes (Billett, 2024). This author further suggests strategies such as engaging students in workplace preparedness prior

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to their work placements, providing support during placements and including post placement debriefings to achieve the alignment of WIE and WIL (Billett, 2024).

In the clinical environment, diagnostic radiography students work under supervision of qualified radiographers to ensure patient safety (Naylor et al., 2016; England et al., 2017; Hazell et al., 2020). The goal is for students to develop professional competencies and values of a diagnostic radiographer, which are essential for effective engagements with patients, the public and other healthcare professionals both locally and globally (Thompson et al., 2016; Lai et al., 2019). The important skills for effective global engagements include adaptability, interpersonal flexibility, intercultural competence, empathy, critical reflection, and effective communication (Hyter et al., 2017; Lai et al., 2019; Di Michelle et al., 2024). These skills and other essential professional competencies, values and norms for diagnostic radiography can be acquired through professional socialisation in the clinical learning environment (Naylor et al., 2016; Shaw et al., 2018; Haynes, 2020).

Despite the crucial role of clinical radiographers in the professional socialisation of students into the diagnostic radiography profession, there are no obvious processes in place to guide or aid clinical radiographers in this function. Furthermore, there is sparsity of data on professional socialisation of diagnostic radiography students. Related research exists on aspects such as professional socialisation of qualified radiographers (Al-Maslahi, 2020), professionalism and professional competencies and values of diagnostic radiographers (Challen et al., 2017; Haynes, 2020; Hale & Wright, 2021; Tashiya et al., 2021), radiography students' transition from classroom to their first clinical placements (Hyde, 2015) and transitioning from radiography student to practitioner (Naylor et al., 2016; Kasita et al., 2023; Makanjee et al, 2023). As far as the authors could establish, there are no published studies that explored the process of professional socialisation of diagnostic radiography students and its influence on global engagement.

Research aim

This study aimed to explore and describe professional socialisation of diagnostic radiography students and its influence on global engagement, with a focus on the clinical learning environment.

Research methods

The methodology for this study was guided by the social constructivism research philosophy which assumes that there are multiple realities, and that individuals create meanings of their experiences through discussions with other people (Holloway & Galvin, 2017). In line with this research philosophy, a qualitative, exploratory approach was employed to explore professional socialisation of students into diagnostic radiography from the perspectives of qualified clinical radiographers and diagnostic radiography students.

Research site

This research was conducted in one of the departments within a faculty of Health Sciences at a South African higher education institution (HEI). South Africa is a highly diverse nation, characterised by a multiracial, multicultural, and multilingual population. There are also increased migration patterns which add to the heterogeneity of a patient population in any region. The healthcare system in South Africa is divided into public and private healthcare sectors. The department where the research was conducted offers a four-year Bachelor of Science programme in diagnostic radiography through academic and clinical learning on a rotational basis from first year and throughout the four-year study period. Clinical learning takes place at various public and private clinical sites approved and accredited by the Health Professions Council of South Africa (HPCSA).

Population and sampling

The current study population included students registered for 4th year in diagnostic radiography at the research site. Qualified clinical diagnostic radiographers (i.e. radiographers in clinical practice who hold diagnostic radiography qualifications) working at the clinical sites where students conduct WPBL were also included. Purposive sampling was

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employed (Brink et al., 2012) to allow for only students partaking in clinical learning and qualified radiographers involved in the clinical education of diagnostic radiography students from the research site to participate.

Data collection

A total of three focus groups were conducted to collect data from diagnostic radiography students, while data from qualified clinical radiographers was collected through seven one-on-one interviews. All focus groups and one-on-one interviews utilised the unstructured interview method with one central open-ended question. The unstructured interview method afforded participants opportunities to express themselves in their own words while also allowing the researcher to probe for more information when necessary, resulting in collection of information rich data (Holloway & Galvin, 2017).

Each focus group consisted of five to six participants, in line with the recommendations by Holloway and Galvin (2017). All focus group interviews were conducted online via Zoom, and the duration ranged between 47 and 57 minutes for each interview. The one-on-one interviews with qualified clinical radiographers were conducted outside participants' working hours to avoid interfering with their work. Participants were given an option between in-person and online interviews, and all preferred in-person interviews. As a result, all interviews with qualified clinical radiographers were conducted in-person, at various locations according to participants' preferences. Each interview lasted between 23 and 45 minutes.

Data collection continued until data saturation was considered to have been reached (Brink et al., 2012). The researcher captured field notes and audio recorded all interviews. The audio recordings were later verbatim transcribed by an independent transcriber.

Data analysis

Data was manually analysed using the framework approach of thematic analysis, also termed framework analysis (Gale et al., 2013; Braun & Clarke, 2022). This analysis method allowed for the identification, description, and interpretation of key themes and patterns of the phenomenon of interest within and across the two groups of data (Braun & Clarke, 2022). It also offered analytic transparency which added to the audit trail (Braun & Clarke, 2022). The seven steps of framework analysis described by Gale et al. (2013) were followed (Figure 1). All interview data was transcribed verbatim and familiarity with the data was achieved by repeatedly reading the transcripts and field notes and listening to the audio recordings. After familiarity was gained, the one-on-one interview data was coded, and themes were developed from the dataset. The developed codes and themes were then used to construct the analytical framework which was applied to the separately coded focus group data. The analytical framework was revised taking into consideration the new data (focus group data). The result was three themes being generated from the data.

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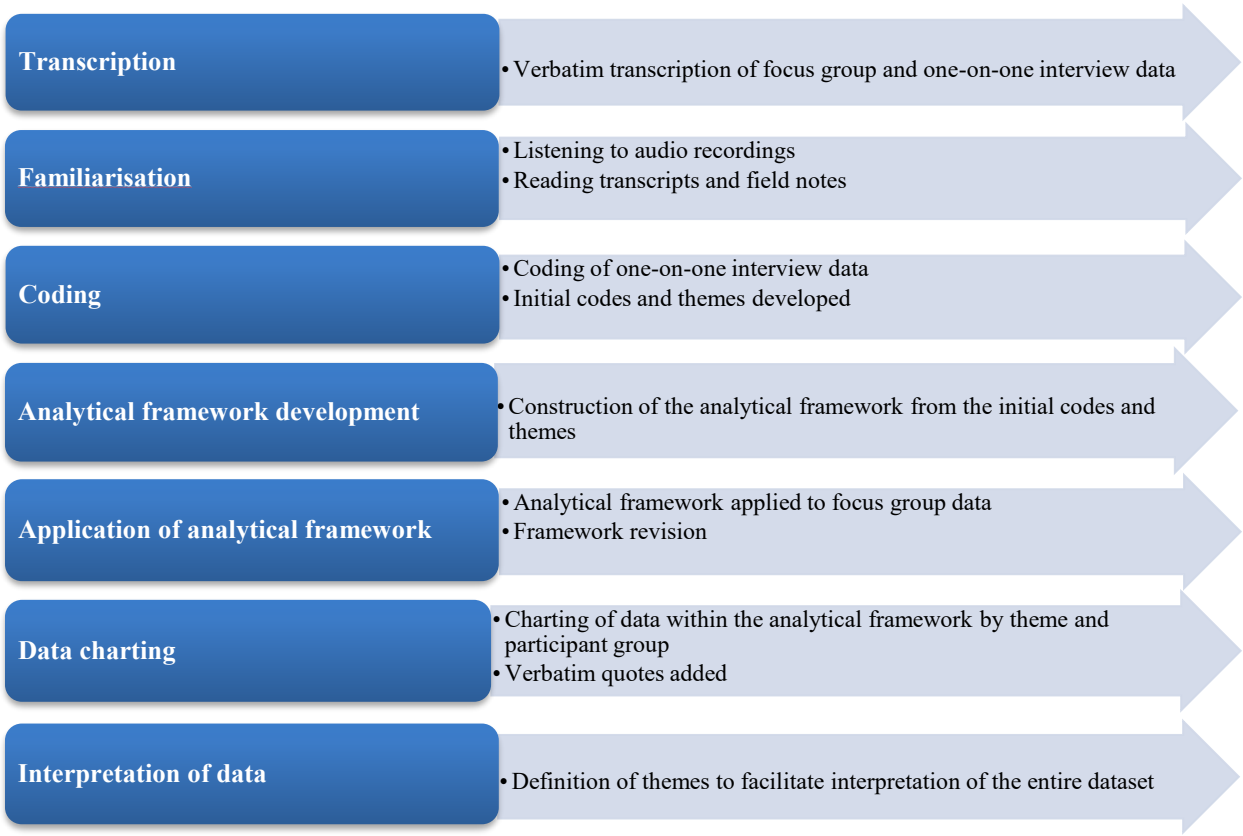

Figure 1: Seven steps of framework analysis (Gale et al., 2013).

Ethical considerations

The study obtained ethical approval from the research site (HW-REC 2021/H35). Ethical principles of respect for autonomy, beneficence, non-maleficence, and justice recommended by Beauchamp & Childress (2013) were upheld during this study.

Participation was completely voluntary, and informed consent was obtained from all research participants before commencement of interviews. Participants were also asked to sign an additional consent form for recording of interviews. Moreover, participants were informed of their right to withdraw from the study at any time, if they wished to, without any negative impact on them (Brink et al., 2012). To ensure confidentiality, research data was only accessible to the researcher and the two research supervisors. An independent transcriber was also allowed access to the data after she had signed a confidentiality agreement form. Furthermore, focus group participants were also requested to sign confidentiality agreement forms. Finally, all participant identifiable information was removed from the transcripts and each participant was assigned a code to protect their identity.

Risk-benefit ratio analysis was performed prior to the commencement of research to ensure that the risks and potential benefits are balanced as recommended by Brink et al. (2012). The exploratory nature of this research meant there was a potential for a small risk of psychological or emotional distress due to talking about past experiences (Brink et al., 2012). However, no participants showed any signs of emotional distress during data collection. There were no direct benefits for the participants of this study, but the outcome of this study is the development of a model for effective professional socialisation of diagnostic radiography students which has potential benefits for future students.

In terms of the justice principle, it is essential for the study participants to benefit from the knowledge generated from the study. To ensure that participants of this study benefit from the knowledge created, the results will be presented

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to all research participants, other students at the research site, and clinical sites where students from the research site conduct clinical learning.

Findings

Sixteen fourth-year diagnostic radiography students (five males and eleven females) and seven qualified clinical diagnostic radiographers (1 male and six females) participated in the study. The clinical experience of the qualified radiographers ranged from 2 to 25 years. Five of them worked at public hospitals while the remaining participants worked at private hospitals.

Three themes pertaining to professional socialisation and global engagement were identified from the collected data, namely, 1) building competence for global engagements through workplace learning; 2) ethical awareness and reflective practice in a clinical learning environment; and 3) fostering a sense of belonging to the radiography community. These themes are presented below. Verbatim quotes are provided; "IP" codes indicate quotes from one-on-one interview qualified radiographer participants while "FG" codes indicate quotes from focus group student participants.

Theme 1: Building competence for global engagements through workplace learning

Under this theme, participants described different aspects of learning in the clinical workplace, such as opportunities to progress from learning through observations to learning by doing, preparation for different clinical contexts, the time it takes to gain familiarity and learn, and the development of student's confidence. In addition, this theme highlighted the important interpersonal skills that can foster professional socialisation and effective global engagements. These skills which are developed through participation in workplace include communication, adaptability and teamwork.

> I'll show them how to do it. The next time that exam comes up I will have one of those who were with me in the group, I'll let them do it while I observe… because that's how you're going to learn - actually physically doing it. There's no use in just watching it the whole time. You need to actually try it for yourself (**IP3**)

> The practical part of it [learning] is also important because that's when you like gain more confidence and like also find your own way of doing things (**IP1**)

> The students that I have worked with are all introduced into the practice with all sorts of digital, having only been trained on digital systems, so I've had to prepare them for what would happen if you don't have a digital system in place for example […] because you don't know where you're going to go (**IP7**)

> I would say in private you learn faster, but the thing is that there are only limited examinations that you get exposed to. So the advantage would be you learn faster and you are taught by a smaller group of radiographers. I would say a mixture of two is good because in public you are going to see a lot of things that you would never see in private. I would say first year, maybe someone can go six months private and then they can go to public, they can have a better foundation and a solid knowledge of where to work from (**FG2P1**)

> We acquired communication skills. We acquired independence in the sense of working alone and not with staff like in first year. We also acquired patient care and how to deal with difficult patients or different patients and different circumstances (**FG1P3**)

> I've learned like how to work with people, like with other people, so teamwork skills and this is like in an academic sense as well as in clinicals. And I also like learned how to work with like people of different age groups (**FG1P5**)

To be a global professional, radiographers require the ability to operate in various healthcare environments. Adaptability is an essential characteristic of a global professional, and this trait is evident in the experiences shared by the participants when learning in the clinical environment. Data demonstrated the process of professional growth through active

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involvement in authentic activities, where students build confidence over time and develop their interpersonal abilities for effective global engagements. Participants also emphasised the importance of preparing students for future employment in different clinical contexts. Students suggested rotating between private and public hospitals, which indicates that they realise the importance of exposure to different environments to gain a broad understanding of the profession which might better prepare them for future professional practice in diverse environments. At present, each student engages in workplace learning at either a public or private clinical site. Educators at the research site should be cognisant of this important suggestion and consider strategies to implement it.

Theme 2: Ethical awareness and reflective practice in a clinical learning environment

Data under this theme revealed that role modelling and peer learning, i.e., students learning by observing and imitating qualified radiographers and other students, are influential methods of diagnostic radiography students' learning in the clinical environment. Student participants indicated that they engage in reflective practice to determine suitable and unsuitable behaviour. This reflection and ethical awareness enable students to identify appropriate professional behaviour and role models they can relate to and adjust their behaviour accordingly.

> What taught me a lot in the four years was just picking a staff member from the start who you could work according to them. So, there is a specific staff member that I follow religiously because I just understand their workflow, the way they treat the patients. Just everything about them just makes more sense to me (**FG3P3**)

> It works for me to teach the junior [students], it helps me a lot and I also learn best when I'm asking my fellow classmates. I always feel more freely - it's not like I'm not free to learn from lecturer and clinical instructors - but the best way for me to learn is to ask my fellow classmates and when I learn something I also teach others as well (**FG1P4**)

> So, foundation for me would be academics, teaching me how to behave and the laws and everything. And then when I get to clinical sector, I get to practise. I believe what I have been taught is right and then I can differentiate also amongst the staff members if they are doing what's right or what's wrong (**FG2P1**)

> What I ended up doing was watching staff members, what were they doing and copycatting that. But, if I look back at it now, there are some good traits and bad traits that I ended up adopting because of that copycat method. Now in fourth year, you have the confidence to realise what is right from wrong and then decide for yourself okay you are going to start doing it the proper way instead of just watching and doing what others are doing.[…] You can see this is wrong or patients being hurt because at the end of the day the patient is what matters and if you are a student and especially in first year you don't know if it is in your right to say something. […]. But like I said with that confidence building in your fourth year you actually realise that wait, you are also a staff member here. You can also say something about this because at the end of the day this is your patient **(FG3P1)**

Globalisation brings together diverse perspectives and values, which means it is possible for professionals to be exposed to unfamiliar behaviours. This necessitates reflection and ethical awareness to navigate complex moral situations and make ethically sound decisions appropriate for the profession. Through reflection, individuals critically evaluate their actions as well as those of others around them, fostering the development of appropriate professional behaviour. Students in this research indicated that they engage in reflective practice as they interact with peers and clinical radiographers to determine suitable behaviours to learn. This practice can guide their decision-making and professional conduct in future roles within a global healthcare environment.

Theme 3: Fostering a sense of belonging to the radiography community

The information shared by participants revealed that students are self-motivated, driven and eager to learn. They value being recognised for their work, getting compliments, and being treated like they belong. Factors such as professional pride and passion, radiographers' passion for student training, as well as students' motivation and willingness to learn promote

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a sense of belonging for students and positively influence their professional socialisation.

> I think it makes a very big difference if you love what you do. So, you don't get up in the morning and say, Ah I really need to go to work. The attitude is very important. And then also your work ethic when you go to work, whether you are a student or you are a qualified radiographer **(FG2P2)**

> I tell the patient, 'look, they're students, I'm teaching, just bear with me' and so it takes us longer to get through patients but at the end of the day I know that you left here with at least some knowledge of why you did something and what it's supposed to be like and I also tell them, if you can, if you come across a younger student or a student that's starting out, explain this to them because you know what, this is knowledge that I've acquired over the years and this is knowledge that I'm imparting to you so try to then carry that over **(IP4)**

> I make sure that they understand that I want to learn, that I am willing to really learn **(FG3P2)**

> But the second-year group now, they are so confident. They are so eager **(IP5)**

> I was really happy because those doctors were really impressed with me and I was thinking, you know, I haven't spent much time here and people are impressed with my work already. So that really made me feel good because I felt at least valuable. I felt like I'm part of the team. I could contribute **(FG1P2)**

This study also found that students are sometimes faced with difficult situations in the clinical environment including negative experiences such as unprofessional behaviour by clinical staff and unrealistic expectations towards students, which can have a negative influence on their sense of belonging and professional socialisation. The high patient volumes and staff shortages also make it difficult for clinical radiographers to provide students with adequate supervision and support, potentially leading to feelings of neglect and a diminished sense of belonging among students. Participants' expressions were as follows:

> In first year, I saw the most incredible things, I saw staff members shouting at patients **(FG3P1)**

> So, this staff member was asking me questions about the contrast media, all the procedures they do there and at that time I didn't know and we had not yet covered that section in theory and then when I didn't know, she wasn't happy, she was like I don't belong here. I'm not serious, how can I not know? So I really doubted myself. I kind of lost my confidence **(GF1P2)**

> And also, there are a lot more patients coming through departments nowadays. So, the radiographers might not have the same amount of time that they need to spend with the students, teaching them **(IP2)**

A sense of belonging plays a crucial role in shaping professional identities and developing the competencies and attributes necessary for appropriate behaviour in diverse professional settings. The participants' expressions of belonging reflect a meaningful connection within the local radiography community, with the potential to expand to other settings globally. However, the negative experiences they shared highlight areas that require attention in order to foster and sustain their sense of belonging.

Discussion

This study aimed to explore and describe professional socialisation of diagnostic radiography students and its influence on global engagement, with a focus on the workplace learning environment. The findings revealed that the clinical learning environment plays a crucial role in developing professional competence including skills such as teamwork and adaptability which promote students' readiness for effective global engagements. Through critical reflection and ethical awareness, students determine appropriate professional behaviour to adopt and take into future practice in diverse contexts. The study also found that students are motivated to learn and experience a sense of belonging to the local radiography community,

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which has the potential to extend to the global professional community. A detailed discussion of the study findings is presented in the following sections.

Building competence for global engagements through workplace learning

The findings of the current study revealed the role of the clinical learning environment in the professional socialisation of diagnostic radiography students and the development of essential competencies for effective global engagements. Participants recognised that it takes time to adjust to the clinical environment and build confidence. These findings emphasise the need to create a supportive clinical learning environment. These findings are supported by Jeyandrabalan et al. (2022) assertion that clinical learning is an important component of diagnostic radiography education. Students develop confidence and a professional identity through the practical experiences they gain in the clinical environment (Arkana et al., 2018; Jeyandrabalan et al., 2022). The interactions between students, patients, clinical radiographers, and other students in the clinical environment facilitate the acquisition of patient care, critical thinking, decision-making skills, and professional socialisation (Cunningham et al., 2015; Arkana et al., 2018). In line with the findings of this study, Thompson et al. (2016), posit that it takes time for students to become familiar with the clinical environment, but once familiarity is gained, learning develops quicker. Spending adequate time in the same clinical environment can facilitate professional socialisation of diagnostic radiography students (Naylor et al., 2016).

Diagnostic radiography students in the current study indicated that they first learn by observing clinical radiographers in practice, and over time progress to hands-on experience. Correspondingly, a study conducted by Lundvall et al. (2021) on the learning of students during clinical placements in Sweden revealed that learning in the clinical environment starts with students listening to and observing qualified radiographers in practice. This includes listening to how radiographers speak to patients and other health care professionals and how they perform radiographic examinations (Lundvall et al., 2021). Students then progress to hands-on experience where they perform the examinations on their own, under supervision (Lundvall et al., 2021). Students in this study by Lundvall et al. (2021) explained that they learned more when they performed examinations independently, and they internalised the knowledge through repeated actions. Similarly, in a study conducted by Portanier Misfud et al. (2015) radiography students reported learning more when they are given opportunities to be actively involved in the task. A literature review conducted by Bwanga and Lidster (2019) also highlighted the significance of a conducive clinical learning environment where students are given opportunities and time for hands-on experience.

The current study findings further highlighted the interpersonal skills essential for diagnostic radiographers as global professionals. These skills including adaptability, teamwork and communication skills are developed during professional socialisation in the clinical learning environment. In agreement with these findings, a scoping review conducted by Ofori-Manteaw et al. (2025) reported that communication, empathy, teamwork and adaptability are some of the important interpersonal skills in radiography. These authors argue that the aforementioned skills are essential for delivering high quality, personalised patient care, collaborative practice and professional development. Specifically, adaptability facilitates continuous professional development and excellence in practice (Ofori-Manteaw et al., 2025). Teamwork between radiographers and other categories of medical professionals, such as nurses and doctors, is essential for ensuring that appropriate medical imaging is performed, and patients' needs are met (Wallin et al., 2023). In a study conducted by Kasita et al. (2023) participants shared that teamwork among radiographers eased the work and increased work efficiency. This study further found that teamwork facilitates the development of professional identity in newly qualified radiographers because of the guidance they obtain from experienced radiographers (Kasita et al., 2023).

Studies by Hyde (2015), Lundvall et al. (2021) and Jeyandrabalan et al. (2022) found that good relationships and positive interactions between radiographers and students are crucial for students' learning in the clinical environment. Effective communication is an essential aspect of such relationships and for effective engagements with patients, other healthcare professionals and the public (Arkana et al., 2018; Migliorini & Portelli, 2019; Hyde & Hardy, 2021). Language is central to effective, respectful communication (Lee et al., 2025). Therefore, it is important for radiographers, like other healthcare professionals, to be able to speak in a language that is understood by patients (Sharkiya, 2023). While English is the most spoken language in South Africa, not all patients can speak the language (Soudien & McKinney, 2016). Also, in a multicultural nation or globalised healthcare, health professionals need to be mindful of the culture differences and be able to communicate in a culturally sensitive manner (Lee et al., 2025). This challenges radiographers to develop

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intercultural, multilingual and/ or non-verbal communication skills to ensure effective communication (Sharkiya, 2023). These skills, which are also essential for effective global engagements (Lai et al., 2019; Di Michelle et al., 2024) can be developed during undergraduate radiography education as part of professional socialisation (Gunn et al., 2020) or through continuous professional development (Lee et al., 2025).

Rotation of diagnostic radiography students between private and public hospitals was suggested by current study participants as a possible approach for effective professional socialisation and preparing students for diverse clinical contexts. Currently, each student from the research site undertakes clinical learning at either public or private hospital. Staffing levels, variety and types of available imaging equipment and imaging examinations performed at these clinical sites differ. Accordingly, this study revealed that students' learning experiences varied across facilities. The public hospitals were regarded as having an advantage of exposure to a broader range of imaging examinations. On the contrary, certain imaging examinations are rarely performed at private practices, limiting students' competency levels for such examinations. But private hospitals were perceived as offering a more supportive learning environment with more focused student supervision. This finding corresponds to those of a study by O'Connor and McNulty (2024) where private clinical learning environments were associated with more opportunities for hands-on learning, better quality of supervision and safe learning. These authors attributed this finding to the smaller number of students at private clinical sites (O'Connor & McNulty, 2024). In a study by Gunn et al. (2020) to investigate the experiences of international exchange students, initial challenges related to the unfamiliar clinical environment, imaging equipment and different imaging protocols were identified. However, participants reported gaining rich learning experiences in the end, characterised by a deeper understanding of their profession (Gunn et al., 2020). While the context of the finding in the current study is different to that of the study by Gunn et al., it is envisaged that exposing diagnostic radiography students to both private and public clinical learning environments would have similar results where students get to view and experience the profession from different contexts, enhancing their professional socialisation and readiness for global engagements.

Ethical awareness and reflective practice in a clinical learning environment

The current study found that diagnostic radiography students learn through role modelling and peer learning in the clinical environment. However, this exposes students to a range of behaviours necessitating their incorporation of ethical awareness and critical reflection to ensure that they adopt appropriate behaviours and actions. The crucial role of positive role modelling in the effective professional socialisation of diagnostic radiography students is emphasised in the literature (Cunningham et al., 2015; Bwanga & Lidster, 2019; Hyde & Hardy, 2021; Lundvall et al., 2021). Diagnostic radiography students engage in reflective practice to identify a particular clinical radiographer to be their role model; sometimes they create an ideal role model by choosing and combining certain characteristics from different radiographers (Cunningham et al., 2015). Anderson et al. (2022) reported the potential ethical dilemmas that students may encounter during clinical placements, particularly in interactions involving patients, peers, and qualified staff. These challenges are often compounded by the diverse backgrounds and perspectives of the different individuals. Dealing with these issues requires theoretical knowledge, ability to reflect on what is right or wrong and decide on what needs to be done in a specific situation (Anderson et al., 2022). According to these authors, professional knowledge, cultural competence and an understanding of diverse patient perspectives are essential for making ethically sound decisions. These are especially important in a globalised or diverse healthcare system.

Another approach to learning in the clinical environment is peer learning, where senior students teach junior students with the purpose of improving understanding, knowledge, and skills (Boyd et al., 2019). In this approach, senior students gain confidence and enhanced communication skills from teaching junior students (Cunningham et al., 2015; Meertens, 2016). Peer teachers in a study by Meertens (2016) further expressed that participating in peer learning prepared them for their future role as qualified radiographers in student training. For peer learners, the benefits include improved academic performance and clinical skills as their peer teachers often can explain concepts in an easy-to-understand manner based on their experiences with the content (Boyd et al., 2019). International mobility students in a study by Di Michele (2024) highlighted the role of peer support in their successful learning during the exchange programme. Likewise, international peer-assisted learning was reported as a useful tool to boost radiography students' learning experience on internationalisation (Lai et al., 2019). Therefore, role modelling and peer learning are instrumental in the professional socialisation and internalisation of diagnostic radiography students. Reflective practice and ethical awareness remain critical in ensuring that students learn and internalise only the appropriate behaviours and values.

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Fostering a sense of belonging to the radiography community

Student participants shared experiences that reflected their sense of belonging to the workplace team. This sense of belonging was associated with feeling valued and included as part of the collective. Participants' narratives also demonstrated a strong sense of professional pride, a commitment to learning, and high levels of motivation, factors that are linked to an enhanced sense of belonging within the clinical learning environment (Frangieh et al., 2024). Belonging is defined as the experience of feeling valued and connected to others within a group or community (Coleman et al., 2024) which is associated with authenticity, good interpersonal connections, and contribution to meaningful work (Boland et al., 2025). In healthcare contexts, a sense of belonging is essential for promoting compassionate care (Boland et al., 2025). Further to this, Murphy (2024) notes that for healthcare professionals working in international contexts, a sense of belonging enhances morale and motivation, thereby contributing to overall commitment to their profession and success at work.

Corresponding to the findings of the current study, radiography students in a study by Coleman et al. (2024) expressed feelings of belonging to their clinical placements. Similarly, Thompson et al. (2016) reported students' feelings of belongingness characterised by feeling safe and comfortable, which increased their self-efficacy and motivation to engage in learning activities. A literature review conducted by Salisu et al. (2019) also found that students' recognition by qualified staff motivated them, resulting in the development of a sense of belonging and professional identity. Furthermore, radiography students reported high levels of motivation to learn when they were surrounded by supportive professionals (Thompson et al., 2016). Involvement of students in clinical activities and interactions with patients has been reported to motivate student learning (Arkana et al., 2018; Portainer Mifsud et al., 2015; Hadwen et al., 2020). Radiographers' passion and commitment to student learning also plays a significant role in student motivation (Cunningham et al., 2015; Bwanga et al., 2022). In turn, student motivation and eagerness to learn promotes their professional socialisation (Thompson et al., 2016).

Participants of this current study also shared challenging experiences, such as unrealistic expectations and negative role modelling which have a potential to negatively impact the sense of belonging and professional socialisation of students within the clinical workplace. According to Frangieh et al. (2024) a stressful clinical environment diminishes students' sense of belonging. Examples of stressful or challenging clinical situations include work overload, staff shortages and limited resources (de Swart et al., 2017; Girn et al., 2022). These challenges can make it difficult for the clinical radiographers to balance the clinical workload with the supervision of students, often to the detriment of student supervision (Cunningham et al., 2015; Kasita et al., 2023). Negative consequences of workload pressures and time constraints on student learning were also reported by Hyde and Hardy (2021). Additionally, different radiographers have varying expectations and requirements from students, and different radiographic technique preferences which can be stressful for students (Cunningham et al., 2015; Girn et al., 2022). In a study by Girn et al. (2022) diagnostic radiography students reported experiencing challenges related to the expectations to be knowledgeable about certain radiographic examinations despite limited experience. All these challenges can hinder students' ability to develop professional competencies and negatively affect their sense of belonging and professional socialisation.

Strengths and weaknesses of the methodological approach

The qualitative exploratory approach utilised for this research provided a deeper understanding of professional socialisation of diagnostic radiography students in the clinical learning environment from the participants' perspectives. Data was collected through one-on-one and focus group interviews from qualified radiographers and diagnostic radiography students respectively. Focus groups were chosen as a data collection method for student participants because they are ideal for collecting data from research participants who have common experiences and characteristics (Brink et al. (2012). Also, since all student participants in this current study were fourth year diagnostic radiography students from the same higher education institution, the utilisation of focus groups made logistical sense. Furthermore, focus groups yield more data in the same amount of time when compared to one-on-one interviews (Holloway & Galvin, 2017). The downside of focus groups is the potential for some participants to dominate the discussions (Holloway & Galvin, 2017). Careful moderation was employed throughout the focus group discussions to avoid dominance by any individuals and afford everyone equal opportunities to share their opinions and experiences. One-on-one interviews were conducted to collect data from clinical radiographers because participants worked at different hospitals and possessed varying levels of clinical experience,

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therefore their perspectives could be diverse. This made the use of individual interviews more appropriate. One-on-one interviews also mitigated challenges associated with coordinating a convenient time and venue for different participants due to the shiftwork nature of diagnostic radiography.

Validity and reliability of data in qualitative research can be achieved by applying the principles of trustworthiness (Lincoln & Guba, 1985). These principles are credibility, dependability, transferability, and confirmability (Holloway & Galvin, 2017; McGregor, 2018). In this study, credibility was ensured by collecting data until saturation was reached and there was the opportunity for triangulation between the two participant groups as well as the field notes and interview transcriptions. Peer review or expert consultation (where the collected data, the data analysis method and the developed themes were discussed in the research team) also enhanced credibility (McGregor, 2018). Dependability was achieved by keeping an audit trail which involved a thick description of the research process, including direct quotations from the participants when reporting results (Holloway & Galvin, 2017). The transparent nature of the framework analysis method that was employed to analyse data added to the audit trail (Braun & Clarke, 2022). To allow for transferability to similar contexts, a detailed description of the research setting, and research participants are provided (McGregor, 2018). Lastly, audit trail, peer review and reflexivity were employed to ensure confirmability of results (Holloway & Galvin, 2017; McGregor, 2018).

Conclusion

The importance of effective professional socialisation of diagnostic radiography students cannot be over emphasised. Radiography is a highly practical, patient-centred profession, which requires students to develop clinical competence, appropriate professional behaviour and decision-making skills needed in the healthcare environment. The efforts by higher education institutions to design a curriculum along the principles of WIE, involves structured educational opportunities and guidance to achieve intended goals through academic and workplace learning. WIL is at the core of this curriculum for diagnostic radiography education, offering opportunities to bridge the gap between academic learning and real-world clinical practice. The clinical component of WIL plays a significant role in the professional socialisation of students as it allows them to acquire radiography competencies in preparation for future practice as qualified diagnostic radiographers while being introduced to the norms, attitudes and values related to the profession. The developed competencies are also important for effective global engagements. This study provides insights into different facets of diagnostic radiography students' professional socialisation in the clinical learning environment, and their influence on global engagement. The identification of factors that impact professional socialisation, such as professional pride, sense of belonging, students' eagerness to learn, workload pressures and time constraints, is valuable as it will assist in the development of strategies to facilitate effective professional socialisation of diagnostic radiography students to better prepare them for global engagements. A possible limitation is that this study was conducted within diagnostic radiography at a single institution. However, this enabled an in-depth study, and the findings have the potential to inform radiography education programmes widely, thereby contributing to the development of future globally competent radiographers better equipped for international practice and collaborations. Future studies, including the various categories of radiography in different contexts, are recommended to confirm these findings and research in other health science programmes would expand the understanding of professional socialisation for students.

Recommendations

An ability for effective global engagement is becoming increasingly important for diagnostic radiographers to be able to provide efficient patient care to diverse patient populations considering the open borders and increased movement of people around the world, and the growth of opportunities to work internationally. Effective global engagements are also necessary for participation in international conferences and international collaborations. Therefore, higher education institutions offering diagnostic radiography education should be intentional about the inclusion of globalisation in the radiography curriculum with a focus on skills such as effective communication (including ability to communicate across language barriers), intercultural competency, teamwork, adaptability, critical thinking and reflection. This can be facilitated through

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work integrated learning as a component of professional socialisation. Additionally, the standardisation of the diagnostic radiography curriculum across the globe can enhance radiographers' preparedness for effective global engagements and international job opportunities.

Declaration of interest

The authors declare no conflict of interest.

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