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DIAGNOSTIC RADIOGRAPHY EDUCATION IN SOUTH AFRICA: WHERE WE WERE, WHERE WE ARE AND POSSIBLE FUTURES

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ABSTRACT

South African radiography education has its roots in a western knowledge system. The education programme's structure has undergone significant transformations since its inception to what is currently available. Reflections for future directions are provided in line with the purpose of higher education, needs of the healthcare system to provide quality care, and advancements in the medical imaging profession.

Keywords: professional education, transformation, history, future directions, medical imaging

LAY ABSTRACT

This paper provides a comprehensive overview of the development of diagnostic radiography education in South Africa. The authors also provide reflections that could inform the future direction of education for this imaging profession.

INTRODUCTION

The purpose of higher education is to promote societal transformation, and to be sites of knowledge creation, critique and dissemination while contributing to the development of individuals' learning for employment and enabling them to perform and grow in their chosen career. To achieve this higher education programmes should be aligned to the needs of society and the workplace.^[1] To this end one can appreciate the fluidity and dynamic nature of higher education as a field of inquiry and practice, since it must be responsive to the unrelenting changes presented by the advances and transformation in society.^[2]

Contextualising these goals of higher education to diagnostic radiography education we argue that it is important to document the historical pathway of the profession and field of study in order to assist users of such records to gain insights from the past that can inform future education provisions based on the lessons from historical events.^[3-4]

This paper aims to provide an overview of diagnostic radiography education in South Africa from its inception up to its contemporary state. Frequently when mapping a history through historic documents there are gaps that challenge the goal of gaining a holistic understanding.^[3] The situation with records about diagnostic radiography education in South Africa is that they are sparse and difficult to locate. In an attempt to overcome this, the authors sourced published as well as oral accounts from radiographers who

have first-hand experiences with diagnostic radiography education prior to 1994. In this way it was possible to provide a descriptive account in this paper.

INTERNATIONAL INFLUENCE

X-radiation (a.k.a. x-rays) was discovered by Wilhelm Conrad Röntgen in Germany on 8 November 1895. The discovery was publicly announced on 5 January 1896.^[5] Not much attention was given to the safe use of the equipment and the potential damaging effects of x-rays during this novel and experiential time when images were taken of people as a form of entertainment.^[5]

It was only in the early 1920s that the need for the training of persons specifically for operating x-ray machinery was recognised: until then little or no training had been provided. This was the birth of diagnostic radiography. The two first radiographers in the world were from the United States of America (USA) and United Kingdom (UK): both successfully completed their respective examinations in 1922. Sister Beatrice Merrigan sat for the examinations of the American Registry of Radiologic Technologists (ARRT) and Kathleen (Kitty) Clark completed the Society of Radiographers' (SoR) examination in the UK.^[6-9]

In the 1930s, the British Society of Radiographers established a branch in South Africa, which was responsible for formal education and training of radiographers in South Africa. In 1933 May Winfred Tompkins successfully completed

the first British examination in London; she then returned to Johannesburg. She completed her training under the tutelage of Kathleen Clark from the UK.^[10]

THE PRE-1994 ERA IN SOUTH AFRICA

Upon May Tompkins' return she was put in charge of education and training of radiographers in South Africa.^[8] She played a pivotal role in the development of the South African radiography profession and was solely responsible for the initial education and training of radiographers and establishing the Society of Radiographers of South Africa (SORSA).^[11]

By 1939, 46 white radiographers had qualified in Johannesburg and Cape Town. This need was driven by the 2nd World War, especially in North Africa.^[8] During the 1940s emphasis of training and education was approximately 90% workplace-oriented and 10% theory.^[12] Schools of radiography for English-speaking white students were established in the 1950s in Durban, Port Elizabeth, Cape Town and Johannesburg. The training was for a two-year diagnostic radiography diploma. Schools of radiography were later established in East London, Pretoria and Bloemfontein.^[10] White Afrikaans-speaking students could complete a two-year course at the University of the Orange Free State (UOFS) or the University of Pretoria (UP). Students at UOFS, UP and in the Western Cape had opportunities of becoming dual qualified in diagnostic radiography and radiotherapy. Radiography education and training for white Afrikaans-speaking students was offered at the Karl Bremer Hospital (KBH) in the Western Cape in the 1960s. The School of Radiography at KBH moved to Tygerberg Hospital in the mid-1970s (L Munro, personal communication in May 2020).

During apartheid hospitals were segregated. In what was then the Province of Natal, King Edward VIII Hospital (KEHVIII) in Durban provided healthcare services to those classified by the apartheid system as 'non-white' (i.e., Indian, Coloured, and Black) patients. Addington Hospital provided services to white individuals only. This racial segregation was commonplace throughout South Africa during apartheid, even in the way that diagnostic radiographers were trained. Although Groote Schuur Hospital and Somerset Hospital in the then Cape Province were partially segregated, radiography students at both hospitals attended the same lectures (i.e. combined lectures) at one venue from 1973 (P Engel-Hills, personal communication in March 2022). This preceded the desegregation of hospitals that was announced on 17 May 1990 by the then National Minister of Health and Population Development, whereby all hospitals were accessible by all citizens of South Africa regardless of race. This led to the first intake of ethnically black students at most previously whites only hospitals (L Munro, personal communication in March 2022).

During the 1960s, the School of Radiography at KEHVIII was the only training institute offering a two-year national diploma for South African students classified as 'non-white'. During the 1970s training of students classified as 'coloured'

was offered at a School of Radiography at Somerset Hospital in the Western Cape. From the 1950s to the mid-1980s black South African students could obtain a one-year qualification in supplementary diagnostic radiography (SDR) at Chris Hani Baragwanath Hospital (formerly Baragwanath Hospital) in Soweto. The SDR programme was also provided for black students during the 1970s to the mid-1980s at Edendale Hospital in Pietermaritzburg (L Munro, personal communication in May 2020). In the mid-1980s training of SDR in South Africa ceased. All of the above educational programmes consisted of formal, theory lectures and workplace learning (F Isaacs, personal communication in July 2020; L Munro, personal communication in May 2020).

In 1953 the first South African examination was written. It comprised theory, practical and oral assessments. Students had to write both the British and South African examinations to ensure reciprocity up until 1961. During 1962 and 1963 candidates had a choice to also sit for the British examination. In 1964 candidates only sat for a South African examination. It was entirely separate from the UK system and reciprocity was not based on writing a British examination. South African radiographers could however continue to further their qualification from the mid-1960s until the late 1970s by travelling to London to sit for the UK higher diploma examination (L Munro, personal communication in May 2020).

In 1976, the three-year national diploma replaced the two-year national diploma. In 1978 the schools of radiography commenced offering the new three-year national diploma. During the late 1970s the South African Medical and Dental Council (SAMDC which is now the HPCSA) professional board for radiography prescribed 3500 clinical hours as a compulsory requirement for the three-year national diploma. It was not until many years later that the hours were decreased. The professional board was also responsible for accrediting training hospitals and undertaking regular inspections to ensure that training hospitals were in good standing to maintain their accreditation; a function that has remained in place through the transitions in higher education and professional regulations in South Africa. In circa 1980s, the then Medical University of South Africa (MEDUNSA), now Sefako Makgatho Health Sciences University, started offering the three-year qualification (L Munro, personal communication in May 2020). Up until the early 1980s radiography students received training at the hospital where they were based and worked in student employment positions. In this period it is posited that the theory component of the curriculum had increased from earlier years and was between 25% and 33% with the remainder being dedicated to workplace learning (WPL).^[12]

During the 1980s there was also a shift of most hospital-based training at the schools of radiography to technikons: career-focused post-school institutions in South Africa. All students had to be registered with a technikon or university after this transition though not all lectures occurred at a technikon/university campus. Some technikons/

universities continued to offer lectures at professional board accredited training hospital sites (F Isaacs, personal communication in July 2020; L Munro, personal communication in May 2020). This move came with challenges for radiography educators as they had to become more knowledgeable about educational discourses and practices, as well as needing the ability to compile more formal documents such as learner guides precisely outlining the learning outcomes and how students would be assessed.

Based on the Natal Technikon (now Durban University of Technology [DUT]) model, a national two-day workshop was hosted in 1989 by the late Prof Marita Horak (then employed at the Port Elizabeth Technikon) in Port Elizabeth. During this workshop standardised learner guides were developed for the country. The guides included the core competencies (essential and desired) that radiography educators intended students to achieve during clinical assessments (L Munro, personal communication in May 2020).

It was also around 1989 that technikons took on the responsibility for managing and conferring radiography qualifications as this was no longer the function of the Department of National Education (L Munro, personal communication in May 2020). The qualifications on offer during the 1980s and 1990s were the three-year national diploma at the technikons and three-year degree in radiography at the universities.^[13] The qualifications were offered through formal lectures and experiential learning by way of WIL, with a big WPL component. During the late 1980s students could also further their education and training by obtaining a national higher diploma, which was later replaced by the bachelor of technology (BTech) degree (L Munro, personal communication in May 2020).

THE POST-APARTHEID SOUTH AFRICA

In post-apartheid South Africa, the drive for social transformation advanced the need to align higher education curricula, as well as teaching and learning practices that would enable students to adapt and operate within the context of an ever-changing society, both socially and professionally.^[14] Radiography education followed suit to align itself with legislative changes. The first of the post-apartheid changes was the publication of the National Qualification Framework (NQF) in 1995 in accordance with the South African Qualifications Authority (SAQA) Act 58 of 1995. This framework obliged students to meet specific learning outcomes and assessment criteria, regardless of the institution at which they studied, before they could be awarded a qualification in diagnostic radiography and register with the Health Professions Council of South Africa (HPCSA) in order to practice. The exit level outcomes of the qualification focused on what a student needed to do.^[15] However, this was not sufficient in an environment of rapid advancement experienced by the medical imaging sciences. Therefore, radiography curricula needed to be of such nature so as to allow the practitioners to keep abreast with these advancements.^[8] As the millennium dawned there were more legislative

changes, which affected radiography education and qualification offerings.

HIGHER EDUCATION QUALIFICATIONS SUB-FRAMEWORK (HEQSF) AND CONTEMPORARY DIAGNOSTIC RADIOGRAPHY EDUCATION

A recent change was the replacement of the Higher Education Qualifications Framework (HEQF) with the Higher Education Qualifications Sub-Framework (HEQSF).^[13] This led to the national diploma and BTech degree being replaced with four-year professional bachelor's degrees, in order to align radiography qualifications with the new HEQSF.^[13] The introduction of the HEQSF resulted in the disposal of the standardised national curriculum for all institutions: each higher education institution (HEI) offering radiography-related programmes became responsible for developing their own curricula.^[13]

These degree programmes are NQF level eight (8) qualifications on the HEQSF and have higher theoretical and research oriented components compared to the previous qualifications.^[15] The purpose of a qualification in general is to equip students with professional education for their chosen career, as well as with an opportunity to progress to postgraduate studies.^[15] The statutory body (i.e., Professional Board for Radiography and Clinical Technology, HPCSA) may also prescribe particular rules pertaining to qualifications. There should be an emphasis on providing students with procedural knowledge related to their chosen career as well as facilitating their ability to apply procedural knowledge in a professional context. Hence, the continued inclusion of WIL in the degree programme.^[15] The arrangement of the WIL (inter alia WPL) curriculum is also dependent on the nature and purpose of a qualification, NQF level, programme objectives and outcomes, institutional capacity to provide WIL opportunities and the systems and structures available at accredited clinical placement sites.^[15] In addition, the development of a WIL curriculum should consider all learning outcomes and assessment criteria of a programme.^[15] Du Plessis^[16] adds that thorough planning is required to ensure a well-rounded, developed WIL curriculum to facilitate the process of achieving the intended end-goal of the curriculum.

REFLECTIONS FOR POTENTIAL FUTURE DIRECTIONS

Higher education programmes need to be responsive to societal needs and changes, as well as to the developments within the profession. Diagnostic radiographers and educators can therefore reflect whether the four-year professional degree currently offered in South Africa addresses the needs of the current healthcare system. Issues that healthcare is plagued with, for example, staff shortages and resource-constraints that can negatively impact the quality of service delivery could be considered.^[17] The question to ponder is whether the four-year qualification is appropriate to the needs burdening the healthcare system. In terms of reflecting on the current status of the profession we argue that limited human resources to provide quality, timeous

patient care and management should be considered with respect to different career pathing, and task-shifting for diagnostic radiographers. This involves thinking through possible role extension and advanced practice to facilitate more equitable healthcare services in South Africa.^[18] Notwithstanding that there are other possible solutions that can also exist to impact on the quality of care.^[19]

With respect to the roots of diagnostic radiography education there is a need to assess how the calls for decolonisation and Africanisation of higher education curricula have been and are currently being addressed. Then we need to go further to consider what more can be done to move towards achieving the development of an African identity underpinning diagnostic radiography education.^[20]

With the more recent non-standardised curricula and diagnostic radiography programme structures, consideration should be given to finding synergies and overlap in curricula in the country to allow for mutual recognition and ease of transfer of students between HEIs in South Africa.^[21] Furthermore, the rapid technological advancements and advent of the 4th industrial revolution calls for possible re-organisation of diagnostic radiography curricula to integrate artificial intelligence and machine learning fundamentals as these have obvious implications for clinical and ethico-legal practice of radiographers.^[18]

LIMITATION

This mapping of diagnostic radiography education has gaps due to the limited currently available published records.

The lived experiences of radiographers with first-hand experience of the developments covered in this paper were furthermore the only available sources to inform the content of this paper and complement the gaps in published records.

CONCLUSIONS AND RECOMMENDATIONS

A broad overview of the development of diagnostic radiography education in South Africa was mapped to focus on historical pathways up to present-day education provisions. Points to ponder were provided to possibly inform future education programme provisions.

It is recommended that similar mappings should be done for ultrasound, nuclear medicine and radiotherapy to establish records of the history of education for the radiography profession as a whole. Furthermore, in-depth analyses of educational programmes offered in the past and at present are recommended to gain deeper insights of educational development in line with the purpose of higher education as outlined at the beginning of this paper and to further inform future directions of radiography education programmes' content, structure and delivery.

CONFLICT OF INTEREST

None to declare.

CONTRIBUTIONS OF AUTHORS

RvdV and PEH conceptualised and contributed to the writing of this article.

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