Cape Peninsula
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EMERGENCY MEDICAL CARE STUDENTS' PERCEPTION ON SELF-ASSESSED COMPETENCE LEVELS IN A SELECTED HIGHER EDUCATION INSTITUTION IN THE WESTERN CAPE, SOUTH AFRICA

by

ROZAAN NORVAL

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Supervisor: Dr Simpiwe Sobuwa
Co-supervisor: Mr. John Meyer

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DECLARATION

I, Rozaan Norval, declare that the contents of this dissertation represent my own unaided work and that the dissertation has not previously been submitted for academic examination towards any qualification. Furthermore, it represents my own opinions and not necessarily those of the Cape Peninsula University of Technology.

The work presented was developed with the help of various digital tools to enhance quality and coherence. Generative AI tools, including ChatGPT40, were used to explain and summarise articles. Grammarly, installed on MS Word, suggested constant grammar, spelling, and tone checks. All these tools aided in refining the study and did not replace my work or insights.

01 July 2024

Signed   **Date**

ABSTRACT

Introduction

The popularity of competence in educational research has grown in recent years. Assessing competence can help identify areas for professional development and educational needs, focusing on self-assessment, which promotes reflection and allows adjustments and corrections.

Competence assessment tools or scales have gathered momentum in the past two decades. Studies show that competency tools and scales can help develop competency-based educational programmes and test their effectiveness.

Purpose

To investigate Emergency Medical Care students' self-assessed competence levels in a selected Higher Education Institution in the Western Cape, South Africa. This also includes the comparison of self-perceived competence and actual competence.

Methodology

The quantitative study examined the self-perceived level of competence in higher education with 317 students. A pilot study of 16 participants was included. Data was collected via Microsoft Forms, and responses were processed in Excel. Statistical analysis was conducted using NCSS, employing descriptive statistics, cross-tabulation, and Analysis of Variance (ANOVA). The reliability of the questionnaire was confirmed with a Cronbach alpha of 0.9. The results indicated that students perceive their self-assessed competence as high. The study used a quantitative methodological approach.

Results

The sample consisted of 109 participants, thus, 34.4% of the study population. The participants scored their self-perceived competence as high. The theory and practical subjects had a higher perceived level of competence in all the year groups except one, ECP1. The Clinical Practice subject had the most variants in results, with six out of the nine-year groups indicating a higher perceived level of competence.

The highest marks received for the actual level of competence were from the first-year students from the bachelor's or extended programme, and the group with the lowest marks were from the first-year group in the Diploma programme.

Participants with no work experience were more accurate in their self-assessment capabilities than those with work experience.

Conclusion

The study showed that most participants overestimated their competencies. This is defined by literature as the Dunning-Kruger effect, where students with lower abilities overestimate their competence through self-assessment.

A competence assessment tool for self-assessment motivated participants to self-reflect on their abilities and highlight areas that need improvement. The combination of competence and self-assessment has immense potential in the educational environment and can be researched more in-depth in the future.

ACKNOWLEDGEMENTS

DEDICATION

To my husband for bringing me snacks and coffee while I write. For believing in me.

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ABBREVIATIONS AND ACRONYMS

AEA	Ambulance Emergency Assistant
ALS CCA	Advanced Life Support Critical Care Assistant
ANC	Ambulance Nurse Competency scale
ANOVA	Analysis of Variance
APCAT	Australasian Paramedic Competency Assessment tool
ASK-SEAT	Attitude, skills, knowledge – State clinical fundamentals.
BAA	Basic Ambulance Assistant
BEMC	Bachelor's degree in emergency medical care
CHE	Council of Higher Education
COPPS	Competence Development of Practical Procedures
CPUT	Cape Peninsula University of Technology
DEMS	Department of Emergency Medical Services
DIP: EMC	Diploma in Emergency Medical Care
ECP	Emergency Care Practitioner
EMC	Emergency Medical Care
EMS	Emergency Care Services
ENCCS	Emergency Nursing Care Competency scale
HCert: EMC	Higher Certificate in Emergency Medical Care
HPCSA	Health Professions Council of South Africa
HWS_REC	Health and Wellness Sciences Research Ethics Committee
IT Centre	Information Technology
NCS	Nurse Competency Scale Tool
NCSS	Number Cruncher Statistical Systems
NECET policy	NATIONAL EMERGENCY CARE EDUCATION AND TRAINING
NQF	National Qualifications Framework
OECD	Organisation for Economic Cooperation
PBEC	Professional Board of Emergency Care
POPI Act	Protection of Personal Information Act
RPL	Recognition of Prior Learning
SOLO	Structure of the Observed Learning Outcome
TCC	Total Client Care Assessment Tool

GLOSSARY

Term

Competence

The verification of a benchmarked standard is assessed or examined by individuals in a mentorship or leadership role.

Nurse's Professional Competence

The practice involves integrating knowledge, experience, judgment, skills, values, attitudes, and personal aspects to adapt to unique contexts, situations, and individual preferences.

Self-Assessment

A student engages in a reflective and critical process regarding their academic performance and skills.

Nurse Competence Scale Tool

This tool is designed to assess nurse competence in diverse hospital work environments, as outlined by Meretoja et al. (2004).

CHAPTER 1

INTRODUCTION

1.1 Introduction

Emergency care is considered a basic human right, with prehospital emergency care focused on preventing significant death and disability worldwide (Tiwari et al., 2021). Emergency Medical Care (EMC) plays a crucial role in the health system and stands out for its ability to provide care in a wide range of settings (Hodkinson et al., 2020).

The continuous growth in the healthcare system and the advancements in the medical field require healthcare professionals to stay updated. This necessitates strong partnerships between educational institutions and organizations to ensure high-quality training and advancements (Sobuwa & Christopher, 2019; Immonen et al., 2019). While higher education contributes to quantity and scale, it can raise concerns about the quality of education. In the constantly changing medical field, teaching methods and educational quality present ongoing challenges (Bai et al., 2022).

Competence has gained popularity in educational research in recent years (Schneider, 2019). Assessing competence is crucial as it helps identify areas for professional development and educational needs (Meretoja et al., 2004; Juntasopeepun et al., 2019). Being competent involves possessing a specific set of knowledge, skills, and attitudes (Schneider, 2019).

Various definitions of competence have emerged over time, including "the ability to meet individual or social demands successfully or to carry out an activity or task" (Schneider, 2019). The Nursing and Midwifery Council (2018) defines competence as "the integration of skills, knowledge, attitudes, values, and technical abilities that form the foundation of safe and effective nursing practice and interventions." More recently, Williams (2018) described it as "the acquisition of a benchmarked standard, which is either observed or tested by those in a mentorship or leadership position." The ongoing debates about competence indicate that its meaning varies depending on the context in which it is used (Schneider, 2019).

Qualified healthcare practitioners and students in healthcare are deemed competent at their level of qualification with a set competence in knowledge and skills (Cape Peninsula University of Technology, N.d.). But, assessing competence is a complex process, partly due to the instability of the concept of competence itself. Points of view and attitudes vary depending on the conceptions of assessing individuals (Cohen-Scali, 2012:75).

It is crucial for individuals, particularly students and healthcare professionals, to be aware of their competencies and limitations. Failing to recognize one's limitations can have direct implications on patient care as well as legal and ethical consequences (Eaton et al., 2021). Assessments in higher education play a significant role in guiding student learning by indicating institutional priorities (Bozkurt, 2020). Self-assessment is essential in educational environments as it helps students and educators to focus on strengths, areas for improvement, and balancing capabilities (León et al., 2023).

Self-assessment also facilitates evaluation and revision, allowing practitioners to maintain a balance between everyday medical practice and patient safety (Elhadi et al., 2020). Additionally, self-assessment promotes reflection on learning processes and outcomes, enabling necessary adjustments and corrections (Andrade, 2019). It can also enhance students' self-awareness, self-criticism skills, self-esteem, self-confidence, and motivation towards learning (Bozkurt, 2020).

Competence, as defined by Meretoja et al. (2004) within the Nurse Competence Scale (NCS) Tool, involves the effective performance of tasks with desirable outcomes, the application of knowledge and skills, and the demonstration of expected capabilities in clinical practice. Competence assessment tools and scales have gained significance in the past two decades, wherein they must be reliable, valid, and reflective of real-world clinical settings to accurately measure competence (Unsworth et al., 2020).

Studies have shown that competency tools and scales are crucial for developing competency-based educational programs and assessing their effectiveness (Yoon, 2021). The NCS tool, developed by Meretoja et al. (2004), is a cornerstone for other competency tools and is the preferred baseline for a Competency Tool in EMC.

1.2 Background to the Problem

There is a heightened interest in competence in education due to its functional perspective and the attempt to further it (Schneider, 2019). Competence assessment is key in evolving professional development and educational needs (Meretoja *et al.*, 2004). The concept of self-assessment has also shown an increase in interest in education and is used as a tool to learn more effectively (Bozkurt, 2020). Self-assessment of competence in EMC is a topic not well understood or researched but can become a valuable tool. It may give insight into the future learning needs of students and establish if the teaching and learning techniques utilised by the Higher Education Institute are effective.

Clinical competence is the application of knowledge supported by a blend of cognitive, psychomotor, and affective/attitudinal skills appropriately utilized in a given situation (Nascimento *et al.*, 2021). It is seen as the ability to give safe care to the patient from a greater perspective and the ability to assess precisely and think critically about the best care using evidence-based practice (Salem & Ali, 2020). Thus, clinical competence relies on a practitioner to assess and critically think about patient presentation and choose the best care. A higher level of Clinical competence has been shown to increase the quality of care (Salem & Ali, 2020). Conversely, incompetence is defined by The Britannica Dictionary as the lack of the ability to do something well; the quality or state of not being competent (The Britannica Dictionary, n. d.). Incompetence may lead to ineffective care of a patient, which can endanger the patient's health. Incompetence may cause negligence and malpractice; all three areas can result in legal actions (Salem & Ali*,* 2020).

Previous research on competence and clinical competence mainly focussed on clinical assessments of students during their clinical placements or near graduation (Kajander–Unkuri *et al*., 2020). The latter is mainly related to nursing students, but it is also relevant to paramedic students. There is limited research on the self-assessed competence of paramedic students throughout their studies in South Africa.

Thus, the problem this study aims to address is the perceived level of competence of paramedic students at a selected higher education Institution. This will also include how accurately their perceived level of competence is assessed, the comparison between perceived and actual levels of competence, different programs and year levels, as well as students with previous experience and school leavers.

By utilising a self-assessment tool to evaluate their competence, students must think honestly and self-critically about their level of competence (Bozkurt, 2020). Self-assessment tools ensure that students take responsibility at every stage of the learning process and support skills development by comparing their capabilities with the acceptable expected standards (Bozkurt, 2020). Williams (2018) states that students should understand their role in education, it is a significant role to maximise their learning experience with numerous responsibilities (Williams, 2018).

With mentors and educators also being responsible for student learning objectives and activities, giving students the opportunity to explore their own competence through a self-assessment competence scale, may help identify areas of strength and weakness, which can be investigated for improvement (Williams, 2018).

1.3 Aim of the Study

1.3.1 Aim:
The study determines EMC students perceived self-assessed competence using a modified competence scale in the Western Cape, South Africa.

1.3.2 Objectives:
Considering the research problem, this research explored the following objectives:

- Determine self-assessed competence levels for EMC students at an Emergency Medical Sciences Department in the Western Cape, South Africa.

- Compare students' perceived level of competence to their actual level of competence using specific subject marks focusing on cognitive and psychomotor.

- Determine the variants of self-assessed competence levels between year groups and programmes in the Department of Emergency Medical Sciences, Western Cape, South Africa.

- Determine whether there is a significant difference in self-assessed competence levels between school leavers and students with prior EMC work experience.

1.4 Significance of the Study

Understanding the perception of EMC students' self-reflected competence in their respective programmes and how it compares to the standard competence levels for each programme gives insight into the student's view of their knowledge and capabilities. The study can contribute to developing a competence scale specific to the needs of EMC students.

1.4.1 Researchers Interest

The researcher has a bachelor's degree in EMC and started working for a tertiary institution offering programmes in EMC. During the years of developing experience in the educational environment, the researchers' interest in how students reflect and assess themselves compared to how they are by lecturers in competence played a role in the development of the study.

The researcher has observed that with the various possibilities of assessments in education and the world evolving daily in all aspects, the student's responsibility in their tertiary education becomes more important daily.

The researcher has hypothesized that students at an exit level will perceive their competence status as higher, compared to an entry-level student. Other factors that could influence the competence levels, will include age, sex, and previous experience.

1.5 Outline of the Dissertation

Chapter 1: Introduction

Chapter 1 of this study introduces the background of the research topic. The chapter briefly overviews EMC in South Africa, its history, and its educational aspects. Further, it touches on competence and the role of self-assessment in education. The background of the study is also discussed, and the motivation and interest behind the study are given.

The chapter concludes with the aim and objectives of the study, including the research questions. The significance of the study, with the researcher's interest, is mentioned.

Chapter 2: Literature Review

Chapter 2 looks at the role of EMC in South Africa, delving into the profession's history and its role in education. The development of education, specific learning theories, learning paradigms, and learning taxonomies are also discussed, along with their role in education specific to EMC programmes.

The concept of competence is touched on with aspects surrounding how it is defined, including the definitions of competence over the years. Self-assessment is discussed, looking at the risks and benefits of this assessment and how it can be utilised more effectively. The Nurse Competency Scale tool, which is based on the study questionnaire, is introduced. Ending with the chapter's conclusion.

Chapter 3: Research Methodology

In Chapter 3, we provide an in-depth analysis of the research process. The chapter commences with a concise introduction to the topics that will be covered. It encompasses the research design, research setting, and the population, along with the inclusion and exclusion criteria. Additionally, it outlines the questionnaire generation process, which includes the pilot study, and discusses the validity and reliability of the study.

Data generation, collection, analysis, and interpretation are explained. Ethical considerations include the right to self-determination, the principle of beneficence, the principle of Justice, the right to privacy, anonymity, confidentiality, and the right to full disclosure. The chapter is then concluded.

Chapter 4: Results

This chapter briefly looks at the response rate of the questionnaire, how long it took participants to complete the questionnaire and the overall socio-demographics of all the participants.

Chapter 4 is structured into separate objectives; the results address them all. Various tables are presented, explaining how they relate to the study. These include the overall result of participants' perceived level of competence, how they compare with their actual level of competence, and whether work experience plays a role. The chapter concludes with a summary of the significant findings.

Chapter 5: Discussion

In this chapter, the results and findings of the previous chapter of the study are integrated and discussed, with a comparison to what is already known on the subject. The discussion chapter revolves around how the objectives are analysed and their relevance in correlation with other literature. The conclusion of the chapter summarises the overestimation and underestimation of students and their potential with self-assessment.

Chapter 6: Conclusion

Chapter 6 summarises the research findings, giving recommendations on the self-assessment of students and how it could be utilised in education, specifically in EMC. Future recommendations for further studies and the study's limits are mentioned.

1.6 Conclusion

This chapter introduced the study, looking at the background of the problem. The aim, objectives, and research questions are presented with an outline of the dissertation. The significance of the study, with the researcher's interest in the topic, is mentioned.

The following chapter contains relevant literature on the history of EMC, including its role in education, how competence is used, and the assessment of competence. The NCS tool is introduced with an overview of other competency tools.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Chapter 2 delves into several topics relevant to the study. The first three sections revolve around EMC in South Africa, including the history, teaching, and training of EMC.

The next section discusses learning theories, learning paradigms and educational taxonomies. It looks at theories and paradigms and how they fit into education, including the responsibilities of lecturers and students during the learning and teaching process.

Competence and Clinical competence are discussed in the next section, followed by an overview of self-assessment. We will look at the benefits and downfalls of the assessment and how it can be incorporated.

Last, an overview of different competency assessment tools is scrutinised, looking at various competency assessment tools, with emphasis on the Nurse Competency Scale Tool developed by Meretoja *et al.* (2004). The chapter ends with the conclusion, summarising some of the key points.

2.2 Emergency Medical Care in South Africa

In the South African constitution, emergency care is recognized as a fundamental human right (Tiwari, et al., 2021). Prehospital emergency care has the potential to effectively mitigate a significant amount of global mortality and disability (Tiwari et al., 2021) and is therefore a crucial component of healthcare systems (Hodkinson et al., 2020).

EMC consists of three components: care in the community, during transport, and care on arrival at the receiving facility. It is an essential part of the health systems, and an increase in the disease burden creates a need for a robust health system, which can translate to improved health outcomes (Tiwari *et al.*, 2021). EMC is unique in providing care in a broader range of settings compared to other medical fields focusing on facility-based care (Hodkinson *et al.*, 2020).

Remember that the South African healthcare system is structured into two separate systems, comprising the government-funded public sector and the private sector. In the private healthcare sector, individuals are required to have private medical insurance in order to receive treatment at private facilities (Mothibi et al., 2019). Healthcare professionals in South Africa are typically employed by government institutions or work independently or for private sector organizations (Mothibi et al., 2019).

A study done in 2021 estimated the emergency care workforce in South Africa to be 56 894 emergency care personnel. Approximately 42% are between 30 and 39 years old, and the majority, 55%, are male. A steady decrease in healthcare professionals has been observed, leading to the hypothesis that there will be a shortage in 2030 (Tiwari *et al.*, 2021).

According to the World Health Organisation, increasing the number of healthcare professionals and Ensuring Quality education is imperative to all (Immonen *et al.,* 2019). The constant development of the healthcare system, evolving roles and responsibilities of prehospital emergency care personnel, and advancements in the medical field highlight the need for collaboration with an academic platform (Sobuwa & Christopher., 2019). Strengthening collaboration between healthcare organisations and higher education institutions is important to ensure quality and constant advancements (Immonen *et al.*, 2019).

2.2.1 Emergency Medical Care Education History in South Africa

Since the 1980s, South African Emergency Medical Services have undergone significant changes. The historical evolution of ambulance and emergency services is closely tied to developments in emergency care education and the training of ambulance personnel. Ambulance staff received education and training at ambulance training colleges overseen by the Emergency Medical Services (Sobuwa & Christopher, 2019).

Before the 1980s, ambulance services were primarily managed by municipal government authorities, with assistance from volunteer first aid organizations such as the South African Red Cross Society, St. John Ambulance, and the South African First Aid League. The primary objective during that period was to administer first aid to patients and swiftly transport them to a hospital. At that time, the country was divided into four provinces, each with its own unique implementation of the Department of Health's provincial ambulance services (Sobuwa & Christopher, 2019).

The Medical Association of South Africa identified a need for improved training in emergencies, leading to the creation of the first ambulance training course. In 1978, a college in Cape Town introduced a one-week Basic Ambulance and Rescue Medic course for ambulance personnel (Sobuwa & Christopher, 2019).

In the 1980s, the Basic Ambulance Assistant (BAA) program, consisting of two weeks of training, and the Ambulance Emergency Assistant (AEA) program, lasting 12 weeks, were established. Additionally, in 1985, a four-month Advanced Life Support Critical Care Assistant (ALS CCA) course was introduced. Subsequently, in 1987, a three-year National Diploma program was launched, marking a significant milestone in the professionalization of emergency care and training (Sobuwa & Christopher, 2019).

In 1992, the Professional Board for Emergency Care (PBEC), initially known as the Professional Board for Emergency Care Personnel, was established under the Health Professions Council of South Africa (HPCSA). Its primary responsibility is to develop national curricula and protocols for individuals with emergency care qualifications recognized by the HPCSA. Qualifications registered with the HPCSA under the professional board of EMC must meet the minimum standards outlined in the respective program (Health Professions Council of South Africa, n.d.; Sobuwa & Christopher, 2019).

All emergency care personnel must be registered with the PBEC and adhere to the scope of practice, ethical rules, and protocols established by the Board (Sobuwa & Christopher, 2019). The HPCSA oversees various healthcare professions in South Africa, focusing on education, training, registration, professional conduct, ethical behaviour, ensuring Continuing Professional Development, and enforcing adherence to healthcare standards (Health Professions Act 56 of 1975, n.d.).

In the year 2000, the National Committee on Emergency Medical Services and the PBEC recognized the necessity to update the education and training of emergency care personnel. This included the revision of short course curriculums, skills, and scopes of practice (Sobuwa & Christopher, 2019). The existing courses had become outdated and lacked adequate supervision in both clinical and public/private Emergency Medical Services settings (Tiwari et al., 2021; Sobuwa & Christopher, 2019). In 1997, the Higher Education Act introduced bachelor's degree programs, offering National Diploma graduates the opportunity to expand their scope of practice and pursue further qualifications such as master's or doctoral degrees (Sobuwa & Christopher, 2019).

The National Emergency Care Education and Training (NECET) policy, as outlined by Sobuwa and Christopher (2019), introduced new prehospital emergency care courses. These courses include a one-year higher certificate, a two-year Diploma, and a four-year professional degree in EMC. The primary goal of the policy is to establish a cadre of professional emergency care personnel equipped with clinical knowledge and decision-making skills to elevate prehospital emergency care in South Africa (Sobuwa & Christopher, 2019). Furthermore, the policy aims to institute a professional career pathway in emergency care to ensure the provision of high-quality prehospital care to the population of South Africa (Sobuwa & Christopher, 2019).

The three programmes under the NECET policy include various outcomes and standards, similar in some respects and different in others. All three programmes focus on preparing students for Emergency Medical Services (EMS). Each programme has a different scope of practice, from basic to advanced. The higher certificate in EMC (HCert: EMC) is one year at an NQF level 5 (HPCSA, 2022). The Diploma in EMC is two years of study at NQF level 6. The bachelor's degree in EMC (BEMC) consists of 4 years of study at National Qualifications Framework (NQF) level 8. All three programmes produce qualified practitioners deemed competent in their level of knowledge and skills (Tiwari *et al.,* 2021).

2.2.2 Teaching and Training of Emergency Medical Care in South Africa

South Africa has two universities offering all three emergency care programmes. All the programmes include theoretical and practical learning, as well as rescue education and training. The aim is to prepare students for the EMS environment specific to South Africa. Qualified practitioners can perform skills as independent or supervised practitioners, ranging from basic skills to more advanced skills requiring intrinsic theoretical knowledge (Cape Peninsula University of Technology, N.d.).

The HPCSA outlines the purpose statement for each qualification, which will allow a person to register under their respective qualification as an Emergency Care Practitioner (ECP), which is the BEMC qualification, as a Paramedic (DipEMC), Dip: EMC qualification, or as an Emergency Care Assistant (ECA), which is the HCert: EMC qualification. All three qualifications aim to enable further personal and professional development for lifelong learning (Health Professions Council of South Africa, N.d).

Emergency Care Practitioners (ECPs) serve as prehospital clinicians, inter-facility transfers clinicians, and medical rescue practitioners, often operating independently. This qualification equips individuals with the knowledge, skills, attitudes, and insights necessary to provide a comprehensive, high-quality emergency care and rescue service across all community sectors (HPCSA, n.d.).

Paramedics (DipEMC) are mid-level health workers who work primarily on ambulances in prehospital emergency care and rescue environments. The qualification develops focused knowledge, skills, applied competencies, and professional attributes required for rendering emergency care to the community within the paramedics' scope of practice (HPCSA, N.d).

ECAs are entry-level health workers who work under supervision and primarily on ambulances within the prehospital emergency care environment. The qualification develops the foundational knowledge, skills, applied competencies, and professional attributes required for rendering quality emergency care to the community within the ECA scope of practice.

The emergency medical services environment is often seen as unpredictable, presenting challenging and complex situations. Given this, it's crucial for students enrolled in DEMS programs at institutions offering these three programs to receive high-quality education (Afshari et al., 2021). A previous study also emphasized the importance of proper education and sufficient professional experience as essential prerequisites for effective decision-making in emergencies, stressing that EMS personnel should avoid relying on trial-and-error methods (Afshari et al., 2021).

Students registered for the three courses under the Department of Emergency Medical Sciences (DEMS) must meet specific objectives and outcomes to advance to the following year until the end of their respective courses. The learning outcomes and objectives for the subjects are based on the study level and the programme (Cape Peninsula University of Technology, N.d.). Thus, the difficulty level for a subject is based on which programme a student is registered for and the year of study. Three subjects, namely EMC Theory, EMC Practical, and EMC Clinical Practice make up the EMC Module, which is the core of each program and each year of study in DEMS.

Even though the EMC Module consists of three subjects, all three play a vital and integrated role. EMC Theory consists of theoretical work, which, after successful completion, will ensure a student can apply a combination of theoretical principles, techniques, practical experience, clinical procedures, and skills relevant to the subject outcomes. EMC Practical converts theoretical knowledge into practical work; students must apply their knowledge into practice, learn skills, and participate in simulated assessments. Both subjects complement the third subject, EMC Clinical Practice, where students are expected to put their knowledge, skills, and simulated scenarios into practice in the clinical setting. Clinical Practice is seen as a vital component. Students work with qualified healthcare professionals, gain experience, apply knowledge in 'real-life' situations, and treat patients under supervision. Students must complete several clinical shifts, skills, and reflective narratives throughout the Clinical Practice subject. The skill requirements are based on the HPCSA requirements, where a student qualifies as an independent practitioner if they have met all the requirements set out by the university and the HPCSA.

In order to uphold their duty to patients and their well-being, it is crucial for healthcare practitioners to possess strong communication and critical thinking skills. Therefore, educational programs should focus on enhancing students' knowledge and practical abilities in these areas (Afshari et al., 2021). While traditional teaching methods like lectures are still prevalent, fostering passive learning in students, problem-based learning stands out as a method to cultivate problem-solving and critical thinking skills, thereby enhancing decision-making abilities (Afshari et al., 2021).

2.3 Learning Theories, Learning Paradigms, and Educational Taxonomies

This section explores foundational theories and practical approaches to education. The discussion delves into the theoretical underpinnings that shape how learning and teaching are understood. Various learning theories are examined, such as behaviourism, cognitivism, and others, which provide insights into how knowledge is acquired, processed, and retained. This segment addresses learning paradigms like online learning and critical pedagogy, which will guide educators in crafting effective learning experiences. Educators can establish captivating and impactful learning environments by comprehending theories and practical paradigms, ensuring a solid foundation for effective teaching and learning experiences (Toka & Gioti, 2021).

The rapid expansion of medical knowledge across various disciplines has heightened the expectation for healthcare professionals to stay current with advancements. As the medical field evolves, so must the knowledge, skills, and attitudes required for effective patient care. This dynamic is mirrored in medical education, which increasingly demands the adoption of contemporary learning techniques rooted in modern educational theories (Boulet & Durning, 2018). Consequently, traditional teaching methods must be reassessed and adapted to keep pace with the accelerating rate of innovation (Boulet & Durning, 2018).

Previous research has underscored the critical importance of education and substantial experience as fundamental prerequisites for effective emergency decision-making. It is imperative for educational institutions to furnish pertinent clinical and prehospital settings, enhance clinical competencies, provide training in clinical protocols, and promote autonomous practice (Afshari et al., 2021b).

Knowledge of learning theories helps educators to make informed decisions about instructional strategies, assessment methods, and classroom management techniques. Educators can tailor their teaching approaches to meet diverse learning needs. Familiarity with different learning theories can enhance active learning, collaborative activities, and technology-enhanced instruction to create engaging and effective learning environments (Toka & Gioti, 2021).

The management of classrooms can be more efficient and create a conducive learning environment. By applying relevant learning theories, educators can personalise instruction to meet the individual needs and abilities of students (Waseem & Aslam, 2020). It may also help to professionally develop educators, engage in reflective practice, improve teaching methods, and foster lifelong learning among educators (Toka & Gioti, 2021).

Learning theories guide instructional designers to create well-structured and engaging learning experiences. Courses that promote meaningful learning outcomes can be designed by aligning course objectives, content, and assessments. Interactive multimedia materials, online simulation, and adaptive learning platforms can be designed to align with the principles of cognitive, constructivist, or social learning theories. User-centred instructional materials, which are accessible, inclusive, and engaging, support learner engagement and success and cater to diverse learning styles and preferences (Toka & Gioti, 2021; Waseem & Aslam, 2020).

Learners aware of learning theories are empowered to take an active role in the learning processes. It can lead to effective study strategies, enhance self-regulated learning practices, and help retain information more effectively (Waseem & Aslam, 2020). They may monitor their learning progress, identify goals, and adjust learning strategies. It can encourage self-reflection, where areas of improvement could be identified, and the development of complex concepts is better understood (Toka & Gioti, 2021).

In the field of medical sciences, educational curricula must be continually updated to address rapid changes in healthcare delivery, technological advancements, emerging diseases, evolving patient expectations, and growing knowledge about the human body (Afshari et al., 2021b). Failure to revise curricula accordingly can lead to significant shortcomings in emergency medical services (EMS) education (Afshari et al., 2021b). Therefore, regular curriculum updates are essential to ensure that EMS education remains effective and relevant in the face of these ongoing changes. Behaviourism and cognitivism are still appropriate and effective in some instances, but constructivism meets the needs of rapid change and the growth of knowledge in the present time. Learning consists of several dimensions, and it is interlinked to create the most effective learning tool for an individual. Learning should be self-regulated, experiential, need-based, relevant, collaborative, and goal-orientated.

Connectivism effectively addresses the challenges posed by the rapid expansion of knowledge and technological advancements in the modern era (Gvozdii et al., 2023). This theory emphasizes that decision-making occurs on the basis of rapidly changing information and stresses the importance of continually acquiring new knowledge (Gvozdii et al., 2023). According to connectivism, students should integrate and synthesize thoughts, theories, and general information to make learning more relevant and practical (Gvozdii et al., 2023). Additionally, connectivism highlights the crucial role of technology in the learning process (Gvozdii et al., 2023), reflecting its relevance in navigating today's dynamic informational landscape.

According to theorists, adult education goes beyond simply imparting knowledge and acquiring skills. It involves empowering learners to think critically, question assumptions, and adjust their attitudes. Active engagement, collaboration, autonomy, and reflection are considered crucial aspects of reflective learning. Therefore, theorists concur on utilizing certain methods and techniques to encourage active participation (Toka & Gioti, 2021).

One advantage of learning theories is the importance of understanding how students acquire and retain information, their comprehension, and their perception of how learning occurs. There are various learning theories, and each has merit within the higher education learning environment. These theories belong to several paradigms. Learning paradigms refer to overarching frameworks or models that guide the understanding of learning and how educational practices should be structured. They focus on the perspective of learning, the roles of educators and learners, and the design of instructional strategies (Waseem & Aslam, 2020). Paradigms allow educators to understand, design, and facilitate learning experiences. The possibility of creating diverse and engaging learning environments catering to the needs and preferences of all learners is heightened (Toka & Gioti, 2021). There are five main learning paradigms: behaviourism, cognitivism, constructivism, connectivism, and humanism.

The behaviourism paradigm is based on the concept that praised behaviours will continue, and punished behaviours will halt at one point; this may lead to positive or negative environments associated with specific conditioning. Cognitivism is based on the psychological science of learning - how to learn; learning also depends on internal concepts, not environmental influences or tap here to enter text. Constructivism forms the basis for adult self-regulated and self-directed learning; knowledge is formed by integrating experiences with learning activities (Waseem & Aslam, 2020).

Connectivism is a conceptual framework that conceptualizes learning as a network-based phenomenon shaped by technology and social interactions and views it as a process of pattern recognition (Gvozdii et al., 2023). The core premise of connectivism is that learning begins when individuals apply knowledge through connections and active participation within a learning community (Gvozdii et al., 2023). In contrast, humanism represents an advanced approach to self-regulated and self-directed learning, which is crucial for graduate and postgraduate education (Waseem & Aslam, 2020).

Connectivism has sparked debate regarding its value as a learning theory compared to behaviourism, cognitivism, and constructivism, particularly concerning its role in learner development (Hendricks, 2019). The latter three theories are traditionally employed in designing instructional environments and were established before the pervasive influence of technology and rapid information advancement (Hendricks, 2019).

The traditional methods, like lecturing, are still widely used in education, where instructors are actively involved while students primarily act as passive listeners. EMS students require enhancement of their problem-solving and critical thinking skills by utilizing methods such as problem-based learning (Afshari et al., 2021b).

The importance of aligning settings with practical teaching approaches, addressing challenges in educational settings, and fostering continuous professional development may enhance the effectiveness of teaching and learning practices in higher education (Toka & Gioti, 2021). Waseem and Aslam (2020) discuss key findings regarding the contextual relationship between paradigms and educational learning theories in their research. The shift in learning approaches focuses more on student-centred and interactive learning methods. Instructional design of courses and curriculums are affected by different paradigms, offering unique insights into how learning can be enhanced. From a medical perspective, paradigms like experiential learning and self-regulated learning theory emphasise hands-on experience and self-directed learning. The educational setting aims to create dynamic and effective learning environments that promote student success and engagement (Waseem & Aslam, 2020).

The integration or combination of multiple learning paradigms or strategies to create more comprehensive and effective educational experiences can be seen as an interplay or hybrid approach regarding learning theories. Interplay creates interactions between various learning theories and paradigms, integrating a balanced and overall look of learning and teaching. Hybrid approaches combine areas of learning paradigms to create an adaptable educational framework. This approach takes all the strong elements of various paradigms, minimises their limitations, and creates a more flexible and adaptive approach to teaching and learning (Toka & Gioti, 2021).

Waseem and Aslam (2020) describe interplay and hybrid approaches, including integrated curriculum, blended learning, flipped classrooms, project-based learning, and personalised learning. The integrated curriculum design focuses on educators combining behaviourism, cognitivism, and constructivism elements in curriculum design. The integration creates a more holistic approach, allowing students to engage in hands-on activities, critical thinking tasks, and collaborative projects to promote their understanding. Combining traditional face-to-face instruction with online learning is seen as blended learning, integrating elements of humanism, constructivism, and technology to provide students with a flexible and interactive learning environment catering to different learning styles (Waseem and Aslam, 2020).

One way to promote active learning and student engagement is through the flipped classroom model. Students engage in self-directed learning activities outside the classroom and participate in collaborative, application-based activities during class time. Working on real-world projects, working with peers, solving problems and promoting a deeper understanding of a subject can be done through project-based learning. This is incorporated through constructivism, experiential learning, and social learning theories. Promoting personalised learning through self-directed learning, metacognition, and differentiated instruction helps tailor instruction to individual student needs and preferences (Waseem and Aslam, 2020).

There are constantly evolving paradigms in education and learning addressing the complexities of teaching and learning in the modern world (Toka & Gioti, 2021). They reflect the ongoing efforts to improve teaching and learning practices, enhance learning outcomes, and meet the needs of learners in a rapidly evolving society (Waseem and Aslam, 2020).

Taxonomies in education are structured frameworks or systems that categorise and organise learning objectives, outcomes, and cognitive processes at hierarchical levels (Jaiswal, 2019). Aripin et al. (2020) provide a definition of taxonomy as a hierarchical model employed to categorize educational learning goals or objectives according to their level of complexity.

Educational taxonomies, such as Bloom's taxonomy, classify educational objectives and learning outcomes into hierarchical levels of cognitive processes, including knowledge, understanding, application, analysis, and evaluation (Aripin et al., 2020). Typically represented in a pyramid model, these taxonomies illustrate the progression from lower-order to higher-order cognitive skills (Aripin et al., 2020). In contrast, the SOLO (Structure of the Observed Learning Outcome) taxonomy differentiates between surface learning and deep learning. Surface learning focuses on the acquisition of factual knowledge and basic information, while deep learning emphasizes meaning-making, critical thinking, and reflective understanding (Aripin et al., 2020).

Taxonomies systematically help educators classify and assess student learning based on the complexity of their understanding and the depth of their cognitive engagement. It helps with essential tools for guiding curriculum design, instructional strategies, and assessment practices. Taxonomies support the alignment of teaching methods, assessment tasks, and intended learning outcomes to ensure coherence and consistency in the teaching-learning environment (Jaiswal, 2019).

Learning theories explain the "how" of learning, and learning paradigms provide the "what" or overarching approach. Educational taxonomies offer the "how to" in the implementation of the above-mentioned into practice (Jaiswal, 2019).

It is important to invest in research on identifying the qualities of a proficient practitioner, in conjunction with appropriate assessment tools and relevant skills. This is essential to ensure that competency assessments and learning initiatives effectively contribute to the development of qualified professionals. With the evolution of learning theories, paradigms, technology, patient care models, and scope of practice, practitioners must continuously adapt and acquire new skills and techniques (Boulet & Durning, 2018).

2.4 Competence and Clinical Competence

The significance of competence in educational research has been increasingly recognized in recent years. One contributing factor to the growing interest in competence research is the practical perspective of competence and the pursuit of its advancement. Despite the abundance of studies on competence, the ambiguity makes it challenging to assess research findings (Schneider, 2019).

Numerous authors debate the controversy regarding competence; for example, Weinert expressed that "the many implicit and explicit definitions of competence are so diversified that only a small, vague conceptual core remains" (Weinert, 1999; p. 26). Or, as for other authors such as Ashworth and Saxton, it is "not clear whether competence is a personal attribute, an act, or an outcome of actions" (Ashworth & Saxton, 1990, p. 3). In Britain and America, two similar yet distinct concepts exist regarding the meanings of competence: "competence" in Britain and "competency" in America. In Britain, competence refers to the behaviour a person should be able to demonstrate, while in America, competency is defined as an underlying set of personal characteristics that facilitate superior performance (Schneider, 2019).

The concept of competence has sparked debate, with differing interpretations based on its intended use, leading to the assertion that a universally satisfying scientific definition is unattainable (Schneider, 2019). A notable definition, aligned with Weinert's perspective, was put forth by the Organisation for Economic Co-operation and Development as part of the Definition and Selection Competencies project, stating that competence is "the ability to successfully meet individual or social demands or to carry out an activity or task" (Weinert, 1999).

The concept of competence encompasses a combination of knowledge, skills, and attitudes that define an individual's abilities (Schneider, 2019). Within the framework of education and professional environments, competence necessitates responsible action, involving the utilization, integration, and application of knowledge, resources, and skills within a particular professional setting (Schneider, 2019).

Competence concerning training and working practices is associated with professionalisation (Cohen-Scali, 2012: 31). This may be because adult education focuses on traits that can be used directly and effectively in professional situations. The term professionalisation is intended for individuals who want to contribute to developing their competencies through training while increasing the effectiveness of the training process. Various pieces of literature agree that competence cannot be taught but must be developed (Cohen-Scali, 2012:35). This is where professionalisation and professional development are used synonymously despite distinct differences. Professionalisation is linked to social expectations and the training actions offered to support the development of an individual's competencies. In contrast, professional development focuses on how an individual learns for situations they encounter and develops competencies (Cohen-Scali, 2012: 35).

The concept of competence that holds the most relevance to this research is the attainment of a standardized level of proficiency, as evaluated or assessed by individuals in a mentoring or leadership capacity (Williams, 2018). Competence can be viewed as the practical application of knowledge and serves as a link between theory and practice (Bach and Sulikova, 2019). In the literature, various categories of competence are recognized, including professional competence, methodological competence, social competence, and self-competence. Professional competence is essential for addressing common challenges in any given profession. Methodological competence encompasses problem-solving and the direct acquisition of job-specific knowledge (Bach and Sulikova, 2019). Social competence is centred on social interactions, conflict resolution, and communication, while self-competence is tied to personal values, general attitudes, and self-perception, all of which are integral to leadership skills (Bach and Sulikova, 2019).

It is essential to possess all four classifications of competence in order to act creatively and self-organised in chaotic situations (Bach and Sulikova, 2019). Clinical competence entails the ability to provide safe care from a holistic perspective, conduct precise assessments, and make critical decisions based on evidence-based practice (Salem & Ali, 2020). This encompasses general competencies such as management and communication skills, professional abilities, teamwork, and the capacity to deliver both primary and specialized healthcare services. Furthermore, specific competencies involve evaluating quality care, implementing specialized processes, assessing performance, and overseeing health and disease management (Salem & Ali, 2020).

Initially, definitions for Clinical competence were focused on diagnostic problem-solving. Definitions became more detailed over time due to the fast development of healthcare delivery. Various institutes and boards, including the American Board of Internal Medicine, the Institute of Medicine of the National Academies, and the Canadian Medical Education Directions for Specialists, identified core competencies irrespective of each other. The core competencies include problem-solving, knowledge, technical, interpersonal, communication, and professionalism (Cohen-Scali, 2012:76).

In his 1990 model, Miller delineated several hierarchical layers of competence, providing a framework for understanding clinical competence. Each layer in Miller's model represents a developmental sequence of stages or a categorization of clinical competence. Within the framework of clinical competence, a distinction is made between knowledge (knows), competence (knows how), performance (shows how), and action (does). Knowledge is essential for effective function, while competence involves applying knowledge in practical situations, and performance is the ability to apply knowledge to execute actions. Therefore, competence represents what an individual is capable of, while performance reflects what an individual actually does (Cohen-Scali, 2012:43).

Performance must be measured to assess competence and determine Clinical competence. Observing an individual's behaviours in action is necessary, as described in the top layer of Miller's model.

As previously mentioned, qualified practitioners are deemed competent at their level of qualification with a set competence in knowledge and skills, which is achieved according to the outcomes and objectives for each programme (Cape Peninsula University of Technology, N.d.). The assessment of competence is a multifaceted process, in part due to the variability inherent in the concept of competence itself. Furthermore, perspectives and dispositions differ based on the individual conceptions of those conducting the evaluations (Cohen-Scali, 2012:75).

In his 2023 study, Jansson examined the professional competencies of prehospital nurses. His research revealed that despite being classified as nurses, prehospital nurses play a crucial role in emergency medical response. Jansson also discussed the evolving nature of nursing competence, citing different definitions from experts such as Benner (1982) and Girot (1993). According to Benner, nursing competence involves the ability to deliver effective clinical care in various scenarios, while Girot emphasized the importance of psychological components in addition to technical skills.

The concept of nurse competence has evolved over time, leading to various definitions (Jansson, 2023). Recently, these definitions have become more consistent, emphasizing a holistic perspective that consistently incorporates diverse forms of knowledge (Jansson, 2023). Descriptions of nurse competence generally consist of three fundamental elements: the nurse's delivery of nursing practices, their generic knowledge involving critical thinking and problem-solving, and the incorporation of values, attitudes, and judgment (Leksell & Lepp, 2019).

In his work, Jansson (2023) has outlined six fundamental competencies necessary for the provision of high-quality and safe healthcare. These competencies, including person-centred care, team collaboration, evidence-based care, quality improvement, safety, and informatics, are essential for effectively planning, implementing, evaluating, and advancing nursing practices. (Jansson, 2023).

Nurses' professional competence is rooted in a comprehensive, overarching model of professional competence put forth by Cheetham and Chivers (1996; 1998). The dimensions of the model differ based on the specific competence needed for a given professional role (Jansson, 2023). The model comprises four dimensions: cognitive competence, functional competence, personal competence, and ethical competence (Jansson, 2023).

In addition, Jansson (2023) delineated meta-competencies encompassing communication, creativity, problem-solving, learning, analytical ability, and reflection. Furthermore, super-meta competencies, including reflection, were expounded upon.

In 2023, Jansson offered a comprehensive definition of a nurse's professional competence, which encompasses a multifaceted integration of knowledge, experience, judgment, skills, values, attitudes, and personal aspects to adapt the practice to unique contexts, situations, and individual preferences. (Jansson, 2023). The core competencies are essential for planning, implementing, evaluating, and developing nursing care practices (Jansson, 2023).

The study completed by Jansson (2023) found that being a good person, having good social skills, and the ability to solve problems were important competencies. Nurses' professional competence was developed through a process of learning and practice, and this dynamic can be either promoted or obstructed. If focus, education, roles, responsibilities, and requirements remained the same, nurses' continued development risked stagnation (Jansson, 2023).

Individuals should be mindful of their competencies and take an active role in evaluating them. The process of reflection, which can be honed through training and debriefing, plays a fundamental role in analysing and developing competencies (Cohen-Scali, 2012:78). Having relevant work experience is vital for developing clinical competence, which can be achieved through avenues other than formal education. Nurses develop competence by gaining exposure to patient situations, following clinical guidelines, learning from experienced colleagues, receiving supervision, and pursuing continuous education. Lifelong learning is crucial for providing high-quality and safe care. To prevent stagnation, lifelong learners must continually challenge the current perspective of knowledge. (Jansson, 2023).

2.5 Overview of Self-Assessment

An assessment entails gathering information about student learning and performance, which can then be used to identify the further learning needs of the student and to plan activities that will support students in addressing these needs (Immonen et al., 2019). It serves as a way to validate the outcomes and competencies achieved by the student and can be carried out using diagnostic, formative, or summative methods (Immonen et al., 2019).

Assessments significantly influence how students learn in higher education institutions, as they reflect the priorities of the institutions in decision-making processes. It's essential to view assessment and learning as interconnected, with assessment playing an integral role in the learning process (Bozkurt, 2020). Some academic literature defines self-assessment as a descriptive and evaluative process in which students reflect on their work and academic skills (Andrade, 2019). It is considered a form of feedback that guides adjustments to learning processes and outcomes, with the goal of fostering deeper understanding and improved performance. Consequently, the primary aim of self-assessment is to provide feedback that encourages learning and enhances overall performance (Andrade, 2019).

The process of validating non-formal and informal learning in Europe consists of three key phases: identification, assessment, and recognition (Cohen-Scali, 2012:75). This process differentiates between formative and summative validation approaches. Summative assessments offer a conclusive evaluation of the learning attained and centre on formalizing and certifying the learning outcomes (Cohen-Scali, 2012:75).

Formative assessment allows learners to expand and enhance their learning, providing feedback to indicate strengths and weaknesses for personal or organizational improvement (Cohen-Scali, 2012:75).

Self-assessment is commonly employed as a formative assessment tool to prompt students to ponder over their learning processes and outcomes, thereby enabling them to make necessary adjustments and corrections (Andrade, 2019). It also aids students in establishing personal learning objectives (Bozkurt, 2020). Through self-assessment, students take charge of their learning journey and cultivate the ability to gauge whether their work meets acceptable standards (Bozkurt, 2020). Additionally, self-assessment can bolster students' self-awareness, self-critique, self-esteem, self-assurance, and motivation to learn (Bozkurt, 2020).

Students take on the role of judges for their own work during the self-assessment process. This empowers them to be more personally invested in comprehending and mastering the subject matter, as well as gaining a deeper understanding of the assessment process (Bozkurt, 2020). Learning strategies are shaped by assessments, leading students to embrace independent and self-regulated learning (Bozkurt, 2020).

The potential benefits outlined in the literature regarding self-assessment encompass the development of self-criticism skills, enhancement of self-awareness, motivation, and learning, as well as bolstering self-esteem and confidence and enabling deeper subject understanding. Encouraging the cultivation of self-criticism skills fosters self-awareness, boosts motivation and learning, and enhances self-esteem and self-confidence, thereby allowing students to engage in the assessment process (Bozkurt, 2020). Additionally, there are significant advantages associated with collaborative teaching and learning. These include improved interaction between academic staff and students, heightened motivation and learning, increased metacognitive awareness, positive impacts on teaching and classroom experiences, enhanced student and academic staff relationships, and a more robust sense of identity (Bozkurt, 2020).

The latest developments in informal and self-directed learning emphasize the significance of engaging with others and the physical surroundings during the learning process. Nevertheless, learning doesn't occur automatically; it relies on self-efficacy, which involves our capacity to regulate ourselves and partake in self-assessment (Cohen-Scali, 2012:40). Self-efficacy refers to an individual's comfort in participating in activities based on their own expectations and self-perception (Cohen-Scali, 2012:40). It encompasses a person's belief in their ability to successfully execute a behaviour and their confidence that this behaviour will yield the desired results. Self-awareness and self-esteem are integral to an individual's self-concept (Cohen-Scali, 2012:40).

The literature explores students' perspectives in higher education settings regarding the beneficial aspects of self-assessment. These include guiding evaluation and revision, taking responsibility for learning, encouraging critical and deep thinking, applying newly acquired skills, and promoting self-regulated learning through goal setting, planning, self-monitoring, and reflection (Andrade, 2019). Objective assessment of one's performance and skills enables healthcare professionals to strike a balance between everyday medical practice and ensuring patient safety (Elhadi et al., 2020).

The Dunning-Kruger effect shows that people with less skill at something tend to think they are better at it than they really are. And people with more skills might underestimate how good they are (Bradley *et al*., 2022). Individuals with low ability initially have a falsely elevated sense of confidence, whereas individuals who are unable to accurately self-assess, overestimate their abilities. Still, as they gain experience and knowledge, they may realise the complexities of the task, leading to a decrease in confidence. They may regain confidence with further expertise and experience but can be more tempered and realistic (Rahmani, 2020).

According to Rahmani (2020), individuals form perceptions of themselves through various internal and external factors such as self-reflection, feedback from others, social comparison, past experiences, cognitive biases, and cultural and societal influences (Rahmani, 2020). These factors are all crucial to understanding the vital role of accurate self-assessment for professional development and in the context of medical training, specifically patient care (Rahmani, 2020).

Factors such as self-reflection should be seen as an indicator to improve self-reflection, whereas feedback from others may affect the opportunity for meaningful feedback, which can lead to discussion on the feedback, enhancing learning and improving skills (Bradley *et al*., 2022). Feedback from peers, mentors, and instructors, positive or negative, can shape how individuals view their abilities and competencies (Rahmani, 2020). Social comparisons influence self-perception, leading to a feeling of being more or less competent based on others' perspectives. Past experiences may result in knowledge and experience gained from similar experiences being transferred to current experiences, even though it is not exactly the same, which can either boost self-esteem or lead to self-doubt (Bradley *et al*., 2022; Rahmani, 2022). New knowledge and understanding are built on existing knowledge structures by organising previous experiences and what is observed (Bradley *et al*., 2022).

The inaccurate estimation of one's own competence or abilities may develop in short-term and long-term memory, resulting in constant errors (Bradley *et al*., 2022). If students do not know the extent to which they are lacking in knowledge or skills, their learning and clinical application of knowledge can be hindered because they will not recognise a need for improvement (Bradley *et al*., 2022). When learning new skills that require judgment, reasoning, and higher-order thinking, acknowledging the importance of teaching and learning how to accurately self-assess and self-reflect is a call to action (Bradley *et al*., 2022). Dunning and Kruger (1999) describe a double burden for those who lack competence in a specific domain because they also lack the ability to accurately recognise their incompetence; the skills required to demonstrate competence are the same skills required to assess it. Those who are unskilled are also likely to be unaware of how unskilled they are, and thus more likely to overestimate their competence (Bradley *et al*., 2022).

The assessment of another can be influenced by various pitfalls and biases, influencing the accuracy and fairness of an evaluation. This includes an overall favourable assessment either in an individual or in a specific area. The opposite is also true, where a negative impression can lead to an overall unfavourable assessment; thus, deciding on one mistake may overshadow further proof of competencies. Information from pre-existing beliefs may also have a positive or negative effect, ignoring evidence either for or against an individual. Other forms of pitfalls or biased behaviour include extreme ratings rationalised to middle or scale evaluations, assessing recent behaviour only, or stereotyping based on certain demographic factors (Bradley *et al.*, 2022).

Educators can ensure that students learn to self-assess their knowledge and skills through formal and informal assessments, promoting feedback and possible re-training (Bradley *et al.*, 2022). Comparing results and feedback from self, peers, and instructors can help a novice learn to re-calibrate their thinking about their own skill level, leading to a more accurate assessment of their competence levels (Bradley *et al.*, 2022).

The Dunning-Kruger effect can affect healthcare professionals at various stages of their careers, from medical trainees to seasoned practitioners. Strategies, such as objective assessments, feedback mechanisms, mentorship, and self-reflection, can help individuals mitigate the effects of the Dunning-Kruger effect and strive for more accurate self-assessments of their competence (Rahmani, 2020).

2.6 Overview of Different Competence Assessment Tools

2.6.1 Competence Assessment Tools

Numerous resources are available on the topic of competency assessment tools for nurses. These tools are designed to gauge the competence of student nurses, qualified nurses, and specialized nurses. They are also intended to help educators set expectations for student performance based on professional competency standards and to provide guidance on using them in various assessments (Smith et al., 2020). Competency assessment tools have gained considerable traction over the past two decades. To ensure accurate measurement of competence, these tools must be reliable, valid, and reflective of real-world clinical settings (Unsworth et al., 2020). Several studies have demonstrated that competency tools and scales can be instrumental in developing competency-based educational programs and assessing their effectiveness (Yoon, 2021).

The Total Client Care (TCC) Assessment tool was created to comprehensively evaluate various competencies in a cohesive manner, reflecting the expected practice of registered nurses (Unsworth et al., 2020). It assesses a student's ability to deliver holistic care to a client over a defined period (Unsworth et al., 2020). By capturing data on a student's actual care provision, the tool assists mentors in making informed assessments of the student's competence. The TCC assessment measures a student's performance across seven key elements, including communication with patients, needs assessment or reassessment, care delivery, timeliness of care to ensure its safety and effectiveness, observation and reporting, safe medication administration, proper use of medical devices, care evaluation, and documentation and handover (Unsworth et al., 2020).

Educational approaches support students in actively engaging with patients to recognize areas for enhancement. Ideally, students discuss these experiences with preceptors during debriefing sessions to receive feedback and gain a deeper understanding of their clinical reasoning (Plathe et al., 2021). Feedback stands out as the most effective method to make learning evident to students, and reflecting on actions ensures that students actively contemplate their decision-making during clinical practice (Plathe et al., 2021).

The systematic practice of reflection enhances learning and fosters competence. The Competence Development of Practical Procedures (COPPs) assessment tool offers a framework for reflection and constructive feedback. COPPs facilitate student learning in clinical skills, peer assessment, and comprehensive feedback from instructors on the learning process. The five primary categories of the tool encompass the learning environment, a culture of respect, inclusivity, and support; students' reflection on their learning; students' reflection on diverse patient care scenarios; assessment and feedback from students and preceptors; and their experiences with utilizing COPPs in Clinical Practice (Plathe et al., 2021).

The Ambulance Nurse Competency (ANC) scale is suitable for use in future registered/specialist ambulance nurse education programs or as an outcome measure alongside other assessment tools. It includes 43 items covering eight competency areas: nursing care, value-based nursing care, medical care, care environments (emergency and serious events), leadership management, supervision and professional conduct, and research and development. The ANC scale promotes self-reflection and assists in monitoring progress towards learning objectives (Nilsson et al., 2019).

Other tools and scales, including the Competence Scale for Clinical Nursing, the Clinical Competency Checklist for nurses in cardiothoracic intensive care units, the ASK-SEAT scale for students majoring in clinical medicine; the Emergency Nursing Care Competency Scale (ENCCS), have the same goal set in assessing competence either through an educational programme or in specific clinical settings (Yoon, 2021; Huang *et al*., 2022; Salem & Ali, N.d.; Kao *et al*., 2022). The ASK-SEAT scale is a competency-based assessment scale, where the ASK section of the mnemonic stands for attitude, skills, and knowledge, and the SEAT section represents State clinical fundamentals, explains diagnoses and treatment plans, Applies fundamentals in a clinical setting, and transfer knowledge and skills through demonstration or teaching.

To an extent, the ASK-SEAT scale was based on the Chinese doctors' common competency model and Miller's pyramid framework. The scale can be integrated into a formative assessment to facilitate the ongoing development of a student. Students can complete the scale themselves or with instructors and supervisors. (Huang *et al*., 2022).

The Australasian Paramedic Competency Assessment Tool (APCAT) was designed to assess the proficiency of undergraduate paramedic students during their clinical placements. Its aim is to support students in achieving course learning objectives, ensure uniform assessment practices, and demonstrate the required level of practice proficiency within their scope. APCAT also aids in identifying strengths and weaknesses and offers a standardized approach for recording student progress. It evaluates five competency standards: professional practice, professional relationships, clinical practice, critical evaluation of paramedic practice, and professional knowledge (Huang et al., 2022; Smith et al., 2020). By delineating anticipated student performance in accordance with professional competency standards, APCAT enhances the credibility and consistency of assessment results while helping students and assessors comprehend their professional obligations and how the standards correspond to clinical practice (Huang et al., 2022; Smith et al., 2020).

2.6.2 Nurse Competency Tool

The NCS tool, developed in 2004, is used to assess self-reported competence and to evaluate the impact of inter-professional education in prehospital emergency care (Nilsson et al., 2018). It comprises 73 items categorized into Helping Role, teaching-coaching, diagnostic functions, managing situations, Therapeutic Interventions, Ensuring Quality, and work role (Meretoja et al., 2004). This instrument measures nurse competence and can be applied across various hospital work settings. Competence, as defined by Meretoja et al. (2004), encompasses the ability to achieve desired outcomes, the effective application of knowledge and skills, and the integration of interpersonal and technical skills with critical thinking in cognitive, affective, and psychomotor domains.

The Nurse Professional Competence Scale, introduced by the National Board of Health and Welfare in Sweden in 2014, consists of 88 items across eight competence categories (Nilsson et al., 2018). In 2018, the scale was revised and condensed to a 35-item version encompassing six competence categories: nursing care, value-based nursing care, medical and technical care, care pedagogies, documentation and administration of nursing care, and development of leadership and organization of nursing care (Nilsson et al., 2018).

The NCS tool developed by Meretoja *et al. (2004) is the cornerstone for developing other competency scales* focused on nursing. It was seen as the obvious choice for developing a Competency Tool in EMC. The NCS tool was used to develop a tool relevant to EMC by modifying questions and removing sections irrelevant to the specific healthcare profession.

2.7 Conclusion

Implementing the NECET policy in South Africa has created various possibilities in research. The Cape Peninsula University of Technology (CPUT) is one of two universities in South Africa offering all three programmes of the NECET policy. Several similarities and differences are visible in all three programmes, ranging from the more evident to more intricate areas. One area includes the diverse levels of competence and clinical competence of students registered with the DEMS at CPUT. The importance of competence and Clinical competence and the benefits of self-assessment highlight the need for a self-assessment competence tool catered to EMC students.

The proposed research study aims to address this gap by modifying the NCS and utilising it as a questionnaire to determine students' self-assessed competence.

The upcoming chapter will outline the research methodology used in the study.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

The previous chapter demonstrated limited research on competence, specifically self-assessed competence in an EMC setting, and the need for a self-assessed Competency Tool at an undergraduate level among EMC students. In the forthcoming chapter, I will outline the research design and methodology. This section will offer a comprehensive overview of the research design, research setting, and population sampling, including the inclusion and exclusion criteria, the data collection instrument, the pilot study, as well as the validity and reliability of the study. Additionally, it will cover aspects such as data generation, collection, analysis, and interpretation. Finally, ethical considerations addressed during the study will be discussed.

3.2 Research Design

A research project's paradigm delves into the nature of knowledge within a piece of work and outlines a researcher's worldview (Brown & Dueñas, 2019; Kivunja & Kuyini, 2017; Khatri, 2020). It is characterized as the shared beliefs and agreements among scientists regarding how problems should be comprehended and approached (Brown & Dueñas, 2019). This study was carried out from a post-positivist paradigm. The Positivist paradigm depicts a singular, objective reality without any errors, whereas post-positivism acknowledges the existence of errors. Thus, reality is seen as imperfect (Brown & Dueñas, 2019). Post-positivism does not seek to discredit the scientific or quantitative aspects of positivism in research. Instead, it underscores the significance of understanding the orientation and perspectives of any research study from multiple dimensions and methods (Shah et al., 2017).

Paradigms include two elements, epistemology and ontology, which encompass basic assumptions, beliefs, norms, and values. Epistemology examines the methodology and scope of knowledge acquisition, focusing on the processes through which knowledge can be obtained and disseminated. Concurrently, ontology, a pivotal branch of philosophy, scrutinizes the underlying presuppositions that inform our convictions regarding the coherence or existence of phenomena (Kivunja & Kuyini, 2017; Khatri, 2020). Knowledge obtained is subject to human error in the post-positivist paradigm. The reality of the post-positivist paradigm can be known only imperfectly (Brown & Dueñas, 2019).

The study utilized a quantitative method approach, which was deemed the most appropriate option. This approach effectively explores a particular sample population through scientific inquiry, relying on observed or measured data to address inquiries about the group (Ahmad et al., 2019). The descriptive research design, which involves survey research, is a type of quantitative research focused on sampling questionnaires, questionnaire design, and questionnaire administration to collect information from the study population. This approach enhances the analysis to gain a better understanding of behaviours or characteristics (Apuke, 2017).

3.3 Research Setting

The study occurred at the DEMS at a Higher Education Institute in the Western Cape, South Africa. The institute boasts over 30,000 students with over 70 programmes. The department has three programmes: a one-year higher certificate, a two-year Diploma, and a four-year bachelor's degree in emergency medical sciences. About 317 students are registered in the DEMS; more than half are registered for the bachelor's programme, and the rest either fall under the higher certificate or Diploma programme.

3.4 Population

The study population included all 317 EMC students from the programmes at the Higher Education Institute. The participants were registered for these three subjects related to the study: EMC Theory, EMC Practical, and EMC Clinical Practice. Any participants not registered for all three subjects were excluded from the study.

3.4.1 Delineation of the Research

The following inclusion and exclusion criteria were applied to this study.

3.4.1.1 Inclusion Criteria

All students registered under the DEMS at the chosen Higher Education Institute.

3.4.1.2 Exclusion Criteria

Any student not registered under the DEMS or for the three subjects, EMC Theory, EMC Practical, and EMC Clinical Practice at the Higher Education Institute.

3.4.2 Study Participants

The study population consisted of all students registered under the DEMS at the chosen Higher Education Institute. From the study population, a pre-testing was undertaken within the study population, which was the first part of data collection. The pre-test population consisted of the class representatives for each year group and each programme, which had two at the time of data collection.

The total sample was generated from the students who gave consent and completed the questionnaire.

3.5 Questionnaire Generation

The questionnaire distributed to potential candidates was generated based on the Nurse Competency Scale tool developed by Meretoja *et al.* in 2004. The tool assessed and measured self-assessment competence by practising hospital nurses. The questionnaire for this research was based on this tool because there is no tool in EMC to assess the self-assessment competence of practitioners, specifically students.

The NCS tool consists of various statements that participants had to answer from low to very good. The statements in the tool were separated into two categories. One category consisted of statements relevant to the EMS, and the other consisted of statements not relevant to the EMS. The statements were then further separated into categories pertinent to each subject's outcomes, namely EMC Theory, EMC Practical, and Clinical Practice. Some statements related to more than one subject and were categorised as so.

3.6 Pilot Study

A pilot study was conducted before releasing the final questionnaire to participants. The participants selected for the pilot study were chosen within the target population. These participants were class representatives for their year groups and programmes. They consisted of two student groups per year over the three programmes, thus 16. Participants included ten students from the four-year programme, including two from the extended programme, four from the two-year programme, and two from the one-year programme. The extended programme of the four-year programme consists of the first academic year being split into two years, resulting in a 5-year programme.

The original plan was to omit these participants from the primary study in case any changes were necessary. However, since no modifications were made to the questionnaire, the results encompassed the participants from the pilot study. The feedback received from the pilot study was mostly positive, with a few voicings intrigued about how the actual competence would be measured, but there were no changes recommended to the content of the questionnaire. The participants in the pilot study were also provided with an information letter and were required to fill out a consent form.

3.7 Validity and Reliability of Study

In a quantitative study, validity refers to the accuracy with which a concept is measured (Heale & Twycross, 2015; Nha, 2021). To ensure the validity of the quantitative data collection instrument, a comprehensive literature review was conducted before and during the development of the questionnaire. The content of the questionnaire was validated through a pre-test, during which participants were asked to provide feedback on question types, structure, completion time, and complexity. The responses indicated that no changes were necessary for the questionnaire.

Reliability is the degree to which a research tool consistently yields the same results when used under the same circumstances repeatedly (Heale & Twycross, 2015; Nha, 2021). Prior to actual data collection, a pre-test of the questionnaire was conducted to ensure its reliability. Cronbach's Alpha serves as a metric to determine the consistency of responses to a questionnaire. A Cronbach's Alpha value of 0.6 is considered acceptable (Jugessur, 2022). In this study, the obtained Cronbach's Alpha was 0.9, indicating excellent internal consistency among the questions and demonstrating that the questionnaire effectively addressed the same underlying issue throughout.

The validity and reliability of final year marks are ensured by the strict rules and regulations of the Higher Education Institution.

3.8 Data Generation and Collection

An ethics application was submitted to the Faculty Research Ethics Committee (HWS-REC 2022/S12), where ethics approval and gatekeeper permission were obtained. The pilot study comprised 16 target population participants and was conducted following gatekeeper approval. The data from the pilot study was also included in the main study.

The questionnaire, with the information letter and consent form, was sent to possible participants through electronic mail. The email addresses were gathered under the guidelines of the POPI Act by obtaining permission from the Head of the Department. The questionnaire was conducted online and could be accessed through a link sent via email. Participants had to consent to the study before completing and submitting the questionnaire.

Participants only received a week to complete the questionnaire; due to final year marks being released a week after, any data received after the date for final year marks would be obscured and biased. There was an option to collect data at the end of the following year, but it would have added another year to the study.

Data collection for actual competence was based on identifying and analysing final year marks for the EMC Theory, Practical, and Clinical Practice subjects for each programme and each year group. The final year marks had to be accessed through a process that included ethical approval and site permission where after a request was made to the Academic administration's department via the faculty office and the Directorate of Research Development in the Office of the Deputy-Vice Chancellor Research, Technology, Innovation, and Partnership. Permission for these marks was also obtained from the Head of the Department, each year's coordinator, and individual participants.

3.9 Data Analysis and Interpretation

Data was collected and captured on a commercially available online platform, Microsoft Forms. The Microsoft form consisted of a consent form and a modified questionnaire. The submissions were downloaded from Microsoft Forms onto a Microsoft Excel spreadsheet (Microsoft Corporation, Redmond, WA). This allowed for easy identification of consent, incomplete submissions, and duplicates due to the questionnaire's non-anonymous nature. Only the researcher had access to the data. Any submitted form that did not agree to the consent form was removed. Second, duplicate submissions were also removed. There were no incomplete forms that had to be removed. Statistical analysis was conducted using Version 4 and Version 2 of the Number Cruncher Statistical Systems (NCSS). The data were analysed using descriptive statistics, cross-tabulation, and One-way ANOVA.

Descriptive statistics were used to analyse the demographics with the total of each option chosen in a question. Cross-tabulation was used to compare the responses with the courses of each participant, which was indicated on the questionnaire. Cross-tabulation was also used to compare the demographics with the participants' responses. ANOVA (Analysis of variance) analysed each subject using several methods. Statistical testing through the means of the Shapiro-Wilk and Anderson-Darling tests analysed the normality of the residual assumption. The null hypothesis could not be rejected, indicating there was not enough evidence to conclude that the data deviates from normal distribution. The equality of group variances assumption was also analysed using statistical tests such as the Brown-Forsythe, Levene, Conover, and Bartlett tests. The null hypothesis could not be rejected, indicating there was not enough evidence to conclude that data deviates from equal variances. Descriptive statistics examined the mean, median, and standard deviation of the individual year groups and all the groups together. The Tukey-Kramer multiple comparison procedure compared each year's group with the rest, analysing the mean differences between lower and higher simultaneous confidence intervals and p-values.

After analysing the categorical data, all the relevant data was linked to each objective outlined earlier in the study. The results are depicted as graphs, charts, and tables. Narratives, where applicable, also accompany some.

During the item analysis, it was identified that the structure of the questionnaire and the questions were appropriate and well-structured in determining the project's aim based on the relevance of a high Cronbach alpha of 0.9, where the acceptable value is at 0.6, as mentioned before. The questions are consistent and address the same topic throughout the questionnaire.

Actual competence measured through the final year marks for the EMC Theory, Practical, and Clinical Practice subjects for each programme are based on the minimum pass rate requirement needed for each subject, which is 50%, thus the institutional definition of competence.

The results for the actual level of competence through final year marks and the perceived level of competence through the results of the questionnaire were analysed through several steps. The scale of 0 – 5 for the perceived level of competence can be converted to a percentage, where 0 – N/A has no percentage allocated, 1 - Never is equal to 0% and 5 - Always is equal to 100%. The 0 – 5 scale was converted to a percentage in a Microsoft Excel spreadsheet and vice versa was done for converting the percentage to a scale from 0 – 5.

3.10 Ethical Considerations

The Health and Wellness Sciences Research Ethics Committee (HWS-REC) at the Higher Education Institute granted ethical clearance to conduct the study (HWS-REC 2022/S12). Gatekeeper permission was granted by the Research Directorate, the DEMS, and the Directorate of Marks Administration System. No adverse events occurred in connection with the study.

3.10.1 Right to Self-determination

The principle of self-determination guarantees the autonomy of each participant, ensuring their freedom to choose and willingness to take part in the study. We sought informed consent from potential participants, informing them of the voluntary nature of their involvement and their right to withdraw from the study. Notably, no participant chose to withdraw from the study.

The study participants were entitled to request additional information as outlined in the information letter. Throughout the study, the researcher consistently respected and upheld the participants' right to self-determination. The study strictly adhered to all three pillars of informed consent, ensuring that participants were fully informed about the nature and scope of the study, that they comprehended the information provided, and that their participation was entirely voluntary, free from any form of coercion or undue influence (Cilliers & Viljoen, 2021).

3.10.2 Principle of Beneficence

Beneficence involves ethically treating individuals by honouring their autonomy and shielding them from harm (Cilliers & Viljoen, 2021). This principle also necessitates researchers to minimize potential harm to participants, considering risks such as psychological, physical, legal, social, and economic harm (Cilliers & Viljoen, 2021).

Participants were informed that if they experienced any adverse effects or distress during the completion of the questionnaire, it would be addressed by the researcher, the respective supervisors would be informed, and the Ethics Committee. An arrangement was made for student counselling with distress resulting from the study participation. No incident was reported to the researcher.

3.10.3 Principle of Justice

The principle of justice encompasses fairness in distribution and what is deserved. When selecting research participants, it was imperative to carefully consider the process to avoid systematically choosing classes based on convenience, manipulability, or vulnerability (Cilliers & Viljoen, 2021).

The participants were student volunteers from races of various ages and genders and registered within the DEMS. Within the principles of Justice, the selected study population adhered to the criteria.

3.10.4 Right to Privacy

Each participant's privacy was respected throughout the data collection, interpretation, and analysis. Data access was limited to the researcher, research supervisors, and statistician.

Participants had given consent for the researcher to analyse their completed questionnaires and gain access to their final year marks. All this information remained private between the researcher, the research supervisors, and the statistician.

3.10.5 Anonymity

The researcher kept a constant approach to anonymity and confidentiality. The participants were identifiable during the completion of the questionnaire, so comparing individual final-year marks could be completed. This data is only known to the researcher and the statistician. The data was then further anonymised to complete the process of non-identifiable data.

The data is stored on a password-protected spreadsheet on a password-protected laptop. The information letter for the study and the consent form were sent via electronic email, with the questionnaire, to each potential participant through year coordinators, class representatives, and the Head of the DEMS. The forms were completed and returned to the researcher with names, electronic consent, and student numbers. Then, the names of participants did not appear on any research document, including the questionnaire and final year marks.

3.10.6 Confidentiality

The researcher maintained confidentiality throughout the study, as the responsibility lies with the researcher to ensure the safety of each participant's identity and autonomy. All information collected, including the participant's personal information and any information harmful to the institution itself, will remain confidential.

All data is on an electronic platform, which is password-protected. No hard copies of any information were collected. The data is kept and stored with encryption, where individual documents will be stored for five years and destroyed according to the Research Data Management policy set out by the Higher Education Institute selected for the study.

Any published data will not disclose personal information and safeguard participants' privacy rights.

3.10.7 Right to Full Disclosure

All participants had access to an information letter that detailed what the study consisted of what data would be collected, and how it would be used. In order to participate in the study, participants needed to provide consent for their final year marks to be accessed. If they did not provide consent, they would be excluded from the study. Participants were explicitly informed that their participation was voluntary and that they had the right to refuse participation or withdraw at any time.

All the benefits and potential risks were made transparent to participants. Any adverse effects or distress experienced by participants during the completion of the questionnaire were addressed. If it were reported to the researcher, the respective supervisors would be informed, and the Ethics Committee and participant would be referred to student counselling. No such incidents were brought to the researcher's attention.

The researcher was available to all participants with questions regarding the study through an email address and contact number.

3.11 Conclusion

The content in this chapter pertains to the quantitative research design and methodology employed in the study. The researcher maintained transparency in the data collection process and ensured the privacy, confidentiality, and individual autonomy rights of all participants during the data interpretation. The study consistently adhered to principles of reliability, validity, and ethical considerations, which are reflected throughout. The following chapter will delve into the study's findings.

CHAPTER 4

RESULTS

4.1 Introduction

The previous chapter discussed the quantitative research design and methodology used during the study. This chapter presents the findings from the questionnaire and how they correlate with final-year marks. It also outlines all the results that fulfil the study objectives. Before elaborating on the results, the response rate and time taken to complete the questionnaire are discussed. The results cover the participants' demographics, separated under each objective set out by the study.

4.2 Response Rate

Out of the 317 students registered under the DEMS, 116 (36.6%) responses were received. Out of the 116 responses, seven participants did not consent, and the questionnaire was not completed, leaving 109 individual responses (34.4%).

4.3 Time Taken to Complete the Questionnaire

The Flow diagram below briefly summarises the time it took from the ethical approval request for the proposal to the data collection. It is explained more in Chapter 3.
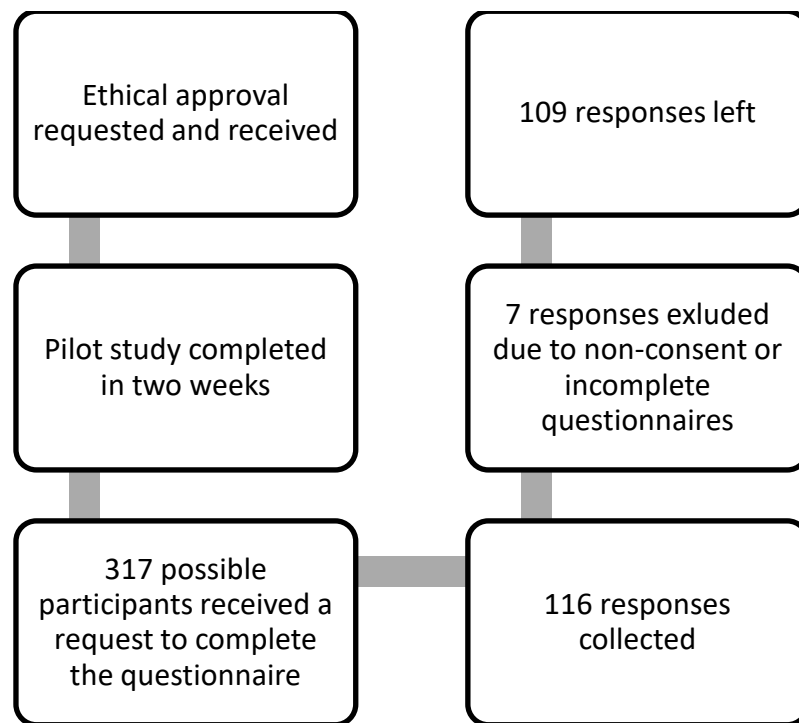
Figure 4. 1Flow diagram depicting data exclusion

4.4 Socio-Demographic Characteristics

Table 4.1 depicts the participants' demographics. Responses came mostly from female students (57.8%) compared to male students (42.2%). Most participants were between 17 and 25 (69.7%), and most had no EMS work experience (77.06%).

Table 4. 1 Demographics of respondents

Demographics		Frequency (n)	Percentage (%)
Sex	Male	46	42.2
	Female	63	57.8
Age	17 to 25	76	69.7
	26 to 30	15	13.8
	31 to 35	9	8.3
	36 to 45	8	7.3
	46 and up	1	0.9
Programme	BEMC	58	53.2
	BEMC extended	24	22
	Diploma	17	15.6
	ECA	10	9.2
Year	1	25	22.9
	2	36	33
	3	14	12.8
	4	18	16.5
	ECP1	9	8.3
	ECP2	7	6.4
Previous work experience	Yes	25	22.9
	No	84	77.1
Years of experience	1 to 3 years	1	1
	3 to 5 years	4	3.7
	Less than one year	5	4.6
	Over five years	15	13.8
	No experience	84	77.1

BEMC: Bachelors in Emergency Medical Care; BEMC Extended Curriculum Program: Bachelors in Emergency Medical Care extended Programme; Diploma: Diploma in Emergency Medical Care; ECA: Higher Certificate in Emergency Medical Care

4.5 Self-Assessed Competence

The table below represents the modified Competency Scale Tool, derived from the Nurse Competency Scale Tool developed by Meretoja *et al. (2004)*. The tool was modified to portray more relevance to students studying in the selected Higher Education Institute under the DEMS. The questions are separated into sections that fulfil the objectives for the theory subject, the practical subject, and the Clinical Practice subject. Some sections show more than one subject relevant to the questions.

Table 4.2 shows a layout of all the responses collected from the participants. The first column depicts the question asked, and the second column shows the options from 1 to 5, including a not-applicable option if chosen. The third column displays the number of participants who decided between 1 and 5, and the last column shows the overall percentage of answers for each participant on a question.

The results in the table depict the answers of the DEMS and do not focus on individual programmes or year groups. Looking at the table, the data suggests that participants overall self-assessed or self-perceived competence levels scored high. Option 4-Often was answered predominantly, whereas 1-Never was answered the least. Most participants answered between 3 and 5, thus, Sometimes, Often, and Always.

Table 4. 2 Self-assessed competence of participants for each question

Question	Scale 1-5	Frequency (n)	Percentage (%)
Section B (Theory Subject)			
1. I am actively taking steps to maintain and improve my professional skills as a student by utilising resources offered by the University and the Department of EMS (e.g., the library)	1-Never	1	0.9
	2-Rarely	8	7.3
	3-Sometimes	27	24.8
	4-Often	44	40.4
	5-Always	29	26.6
2. I can identify situations that may be life-threatening to both trauma and medical patients	1-Never	0	0
	2-Rarely	0	0
	3-Sometimes	10	9.2
	4-Often	62	56.9
	5-Always	37	33.9
Section C (Clinical Practice Subject)			
3. I can identify when a patient needs emotional support	1-Never	0	0
	2-Rarely	2	1.8
	3-Sometimes	22	20.2
	4-Often	55	50.5
	5-Always	30	27.5
4. I can identify when family members need emotional support	1-Never	0	0
	2-Rarely	2	1.8
	3-Sometimes	29	26.6
	4-Often	49	45
	5-Always	29	26.6
5. I am able to give emotional support when/if a patient is experiencing negative emotions	1-Never	0	0
	2-Rarely	8	7.3
	3-Sometimes	30	27.5
	4-Often	47	43.1
	5-Always	24	22
6. I can provide emotional support in a professional manner to the patient's family during a difficult situation	1-Never	0	0
	2-Rarely	9	8.3
	3-Sometimes	30	27.5
	4-Often	46	42.2
	5-Always	24	22

7. I can identify and acknowledge my own limitations when it comes to patient care	1-Never	0	0
	2-Rarely	6	5.5
	3-Sometimes	13	11.9
	4-Often	38	34.9
	5-Always	52	47.7
8. I can identify when I am mentally and physically depleted	1-Never	0	0
	2-Rarely	8	7.3
	3-Sometimes	30	27.5
	4-Often	30	27.5
	5-Always	41	37.9
9. I can evaluate patient satisfaction regarding care	1-Never	0	0
	2-Rarely	8	7.3
	3-Sometimes	34	31.2
	4-Often	48	44
	5-Always	19	17.4
Section D (Theory and Clinical)			
10. I can educate patients on health and wellness when the opportunity presents itself	1-Never	0	0
	2-Rarely	5	4.6
	3-Sometimes	29	26.6
	4-Often	42	38.5
	5-Always	33	30.3
11. I can assess and analyse patient's well-being from a mental health perspective	1-Never	1	0.9
	2-Rarely	11	10.1
	3-Sometimes	50	45.9
	4-Often	35	32.1
	5-Always	11	10.1
	0-N/A	1	0.9
12. I can direct patients to appropriate mental care if the need arises	1-Never	6	5.5
	2-Rarely	22	20.2
	3-Sometimes	34	31.2
	4-Often	31	28.4
	5-Always	12	11
	0-N/A	4	3.7
13. I can complete patient documentation sufficiently and with ease	1-Never	0	0
	2-Rarely	7	6.4
	3-Sometimes	19	17.4
	4-Often	38	34.9
	5-Always	44	40.4
	0-N/A	1	0.9

14. I have the capability to plan patient care based on available resources	1-Never	0	0
	2-Rarely	3	2.8
	3-Sometimes	36	33.03
	4-Often	43	39.5
	5-Always	26	23.9
	0-N/A	1	0.9
15. I can identify areas in patient care that require further development and research	1-Never	0	0
	2-Rarely	14	12.8
	3-Sometimes	45	41.3
	4-Often	36	33
	5-Always	12	11
	0-N/A	2	1.8
16. I can utilise research findings to enhance patient care	1-Never	1	0.9
	2-Rarely	7	6.4
	3-Sometimes	39	35.8
	4-Often	42	38.5
	5-Always	18	16.5
	0-N/A	2	1.8
Section E (Practice and Clinical Practice Subjects)			
17. I can identify when other students require assistance in improving their knowledge and skills	1-Never	0	0
	2-Rarely	7	6.4
	3-Sometimes	29	26.6
	4-Often	42	38.5
	5-Always	31	28.4
18. I can help other students develop their knowledge and skills in the clinical setting	1-Never	0	0
	2-Rarely	5	4.6
	3-Sometimes	28	25.7
	4-Often	46	42.2
	5-Always	30	27.5
19. I always act appropriately in situations that may be life-threatening to patients	1-Never	1	0.9
	2-Rarely	0	0
	3-Sometimes	14	12.8
	4-Often	52	47.7
	5-Always	42	38.5
20. I can manage a team to ensure best patient treatment	1-Never	0	0
	2-Rarely	9	8.3
	3-Sometimes	25	22.9
	4-Often	50	45.9
	5-Always	25	22.9

21. I can fulfil a role as a team member to ensure the best patient treatment	1-Never	0	0
	2-Rarely	4	3.7
	3-Sometimes	13	11.9
	4-Often	48	44
	5-Always	44	40.4
22. I can take a leading role and ensure patient care	1-Never	1	0.9
	2-Rarely	9	8.3
	3-Sometimes	25	22.9
	4-Often	41	37.6
	5-Always	33	30.3
23. I can be part of a debriefing, and identify areas of learning	1-Never	0	0
	2-Rarely	2	1.8
	3-Sometimes	14	12.8
	4-Often	47	43.1
	5-Always	46	42.2
24. I can be part of a team, where multidisciplinary are present (includes in hospital and out-of-hospital staff)	1-Never	0	0
	2-Rarely	2	1.8
	3-Sometimes	19	17.4
	4-Often	40	36.7
	5-Always	46	42.2
	0-N/A	2	1.8

Section F (Theory, Practical, and Clinical Practice Subjects)			
25. I have the capability to plan patient care according to the specific needs of the patient within my year of study	1-Never	0	0
	2-Rarely	1	0.9
	3-Sometimes	14	12.8
	4-Often	51	46.8
	5-Always	43	39.5
26. I can adapt my treatment plan as the patient's condition changes, to ensure best care	1-Never	0	0
	2-Rarely	0	0
	3-Sometimes	12	11.01
	4-Often	56	51.4
	5-Always	40	36.7
	0-N/A	1	0.9
27. I can implement decision-making skills regarding patient treatment guided by ethical values	1-Never	0	0
	2-Rarely	3	2.8
	3-Sometimes	23	21.1
	4-Often	49	45
	5-Always	34	31.2

28. I can assess and analyse a patient's well-being from a physical health perspective	1-Never	0	0
	2-Rarely	3	2.8
	3-Sometimes	27	24.8
	4-Often	52	47.7
	5-Always	27	24.8
29. I can prioritise patient treatment as necessary	1-Never	0	0
	2-Rarely	0	0
	3-Sometimes	14	12.8
	4-Often	40	36.7
	5-Always	55	50.5
30. I can make decisions regarding patient care dependant on the patient's condition	1-Never	0	0
	2-Rarely	0	0
	3-Sometimes	11	10.1
	4-Often	58	53.2
	5-Always	40	36.7
31. I can evaluate patient outcomes and identify areas which need further intervention or were neglected	1-Never	0	0
	2-Rarely	5	4.6
	3-Sometimes	24	22
	4-Often	65	59.6
	5-Always	15	13.8
32. I can use my acquired knowledge to provide optimal care to a patient	1-Never	0	0
	2-Rarely	1	0.9
	3-Sometimes	14	12.8
	4-Often	48	44
	5-Always	46	42.2

Table 4.3 depicts the averages for each category: Helping Role, Therapeutic Interventions, Work Role, Managing Situations, Teaching and Coaching, Diagnostic Functions, and Ensuring Quality received. These averages were calculated by separating each participant into their respective year groups and calculating the average of all the participant's answers from 1- 5 for each question. The questions were then divided into their respective categories, and the averages of each year group's combined answers were used to calculate the average for each category for each year group. This was further used to calculate the total average for each category for all the participants and converted to a percentage. The table shows that the participants scored the highest in the Helping Role Category (4.2 / 84.4%) and the lowest in the Ensuring Quality Category (3.7 / 73.2%).

Although the question that scored the highest fell under the Working Role Category, the question that scored the lowest fell under the Diagnostic Function Category. The question that scored the highest average was 'I can identify and acknowledge my limitations when it comes to patient care' (4.4 / 88%). The question that scored the lowest average was 'I can direct patients to appropriate mental care if the need arises' (3.3 / 66%).

Table 4. 3 Total average of each Category with percentages

Categories	Year Group Average for each Category									Category Average and Percentage	
	BEMC1	BEMC2	BEMC3	BEMC4	DIP1	DIP2	ECP1	ECP2	ECA		
Helping Role	4.5	4.1	4.3	4.3	4	4.4	4	4	4.2	4.2	84.4
Therapeutic Interventions	4.1	4	4.1	4.4	4.4	4.2	3.8	3.8	4.1	4.1	82
Work Role	4	3.9	4	4.2	4.2	4.3	3.9	4	4.1	4.1	81
Managing Situations	4	3.8	4	4.3	4.5	4.2	3.9	3.7	4	4	80.8
Teaching and Coaching	3.9	3.4	3.9	4.1	4.2	4.1	4.1	4.1	4	4	79.3
Diagnostic Function	3.9	3.6	3.8	4	3.9	4.1	4	3.6	3.9	3.9	77.2
Ensuring Quality	3.5	3.2	3.6	3.8	3.9	3.8	3.6	3.8	3.7	3.7	73.2

BEMC1: Bachelors of Emergency Medical Care 1; BEMC2: Bachelors of Emergency Medical Care 2; BEMC3: Bachelors of Emergency Medical Care 3; BEMC4: Bachelors of Emergency Medical Care 4; DIP1: Diploma 1; DIP2: Diploma 2; ECP1: Extended Curriculum Programme for Bachelors of Emergency Medical Care 1; ECP2: Extended Curriculum Programme for Bachelors of Emergency Medical Care 2; ECA: Higher Certificate Programme

4.6 Perceived Level of Competence and Actual Level of Competence

The three main subjects used to analyse participants' competence levels included EMC Theory, EMC Practical, and Emergency Care Clinical Practice.

The actual level of competence was calculated by looking at the average of the year group for a specific subject, thus the mean, and is reflected as percentages. The percentages were then taken a step further and used to calculate a number between 0 – 5.

The perceived level of competence was based on the results of the questionnaires. The questionnaire was structured into sections more applicable to one or more of the three subjects based on each subject's learner outcomes. Each participant's answers were fed into an Excel spreadsheet to calculate the average mark they each got for the three subjects. The total averages for the subjects were used to calculate a total average for the three subjects individually per year group. These mean averages are presented as a number from 0 – 5, due to the questionnaire being presented as options between 0 – 5. They are further used to calculate a percentage.

The actual competence of participants was grouped under the year programme chosen in the questionnaire. The number of participants for each year group is depicted in the tables below under Count, followed by the mean percentage and the mean from 0 - 5. This process was done individually for all three subjects.

4.6.1 Emergency Medical Care Theory

Table 4.4 depicts each year group's actual and perceived competence level for EMC Theory. Of the 109 participants, Diploma 2 had the highest responses, whereas Diploma 1 and ECA had the lowest.

The mean percentages and the mean from 0-5 are calculated and compared in each program. The perceived level of competence results is based on the results from the questionnaires. The mean for the perceived level of competence section was calculated by taking all the questions and answers relevant to the theory subject, calculating the mean for each individual, and then calculating the total average for all the participants in the year group. The mean average between 0 - 5 for each year group was then used to calculate a mean percentage. This calculation is the same for Table 4.5 regarding the practical subject and Table 4.6 with the Clinical Practice subject.

Table 4. 4 Actual and Perceived Level of Competence for Emergency Medical Care Theory Year Groups

Actual Level of Competence				Perceived Level of Competence			
Course	Count	Mean (%)	Mean (0-5)	Course	Count	Mean (0-5)	Mean (%)
BEMC1	11	72.7	3.6	BEMC1	11	3.9	78.8
BEMC2	18	55.7	2.8	BEMC2	18	3.7	73.7
BEMC3	16	58.3	2.9	BEMC3	16	3.9	78.8
BEMC4	16	67.4	3.4	BEMC4	16	4.2	83.5
DIP1	5	43.5	2.2	DIP1	5	4.1	82.8
DIP2	22	58.5	2.9	DIP2	22	4.1	81.1
ECP1	9	63.3	3.2	ECP1	9	3.8	76.1
ECP2	7	60.4	3	ECP2	7	3.8	75.7
ECA	5	56.5	3.9	ECA	5	3.9	78.6

BEMC1: Bachelors of Emergency Medical Care 1; BEMC2: Bachelors of Emergency Medical Care 2; BEMC3: Bachelors of Emergency Medical Care 3; BEMC4: Bachelors of Emergency Medical Care 4; DIP1: Diploma 1; DIP2: Diploma 2; ECP1: Extended Curriculum Programme for Bachelors of Emergency Medical Care 1; ECP2: Extended Curriculum Programme for Bachelors of Emergency Medical Care 2; ECA: Higher Certificate Programme

Table 4.4 highlights that regarding the actual level of competence, the highest mark for theory under a year group is BEMC1, whereas the lowest is Diploma 1. All the year groups perceived their level of competence above 70%, with BEMC2 with the lowest perceived level of competence, 73.7%, and BEMC4, Diploma 1, and Diploma 2 with the highest level of perceived competence above 80%.

4.6.2 Emergency Medical Care Practice

Table 4.5 depicts the year group's actual and perceived competence level for the EMC Practical subject. The mean for the perceived level of competence section was calculated the same as for Table 4.4

Table 4. 5 Actual and Perceived Competence for Emergency Medical Care Practical Year Groups

Actual Level of Competence				Perceived Level of Competence			
Course	Count	Mean (%)	Mean (0-5)	Course	Count	Mean (0-5)	Mean (%)
BEMC1	11	70.3	3.5	BEMC1	11	4.1	82.4
BEMC2	18	58.6	2.9	BEMC2	18	4	79
BEMC3	16	61.2	3.1	BEMC3	16	4.1	82.1
BEMC4	16	62.4	3.1	BEMC4	16	4.2	83.8
DIP1	5	67.8	3.4	DIP1	5	4.2	83.6
DIP2	22	65.6	3.3	DIP2	22	4.3	85.2
ECP1	9	78.9	3.9	ECP1	9	4	78.9
ECP2	7	66	3.3	ECP2	7	3.9	77.7
ECA	5	60.1	3	ECA	5	4.1	81.4

BEMC1: Bachelors of Emergency Medical Care 1; BEMC2: Bachelors of Emergency Medical Care 2; BEMC3: Bachelors of Emergency Medical Care 3; BEMC4: Bachelors of Emergency Medical Care 4; DIP1: Diploma 1; DIP2: Diploma 2; ECP1: Extended Curriculum Programme for Bachelors of Emergency Medical Care 1; ECP2: Extended Curriculum Programme for Bachelors of Emergency Medical Care 2; ECA: Higher Certificate Programme

It is possible to see in the table that the highest mark for the subject under a year group is ECP1, whereas the lowest mark is shown as BEMC2. All year groups perceived their level of competence above 75%, with the lowest perceived level of competence falling to BEMC2, ECP1, and ECP2, under 80%. The highest perceived level of competence falls to Diploma 2, 85.2%.

4.6.3 Emergency Medical Care Clinical Practice

Table 4.6 depicts the year group's actual and perceived competence level for EMC Clinical Practice. The mean for the perceived level of competence section was calculated the same as for Table 4.4 and Table 4.5.

Table 4. 6 Actual and Perceived Level of Competence for Emergency Medical Care Clinical Practice Year Groups

Actual Level of Competence				Perceived Level of Competence			
Course	Count	Mean (%)	Mean (0-5)	Course	Count	Mean (0-5)	Mean (%)
BEMC1	11	81.9	4.1	BEMC1	11	4	79.3
BEMC2	18	61	3.1	BEMC2	18	3.7	74.7
BEMC3	16	74.5	3.7	BEMC3	16	3.9	78.9
BEMC4	16	71.6	3.6	BEMC4	16	4.1	82.5
DIP1	5	60.4	3	DIP1	5	4.2	83
DIP2	22	67.2	3.4	DIP2	22	4.2	83
ECP1	9	80	4	ECP1	9	3.3	77.9
ECP2	7	76.6	3.8	ECP2	7	3.8	75.7
ECA	5	58	2.9	ECA	5	4	79.9

BEMC1: Bachelors of Emergency Medical Care 1; BEMC2: Bachelors of Emergency Medical Care 2; BEMC3: Bachelors of Emergency Medical Care 3; BEMC4: Bachelors of Emergency Medical Care 4; DIP1: Diploma 1; DIP2: Diploma 2; ECP1: Extended Curriculum Programme for Bachelors of Emergency Medical Care 1; ECP2: Extended Curriculum Programme for Bachelors of Emergency Medical Care 2; ECA: Higher Certificate Programme

It is possible to see in the table that the highest mark for the subject under a year group is BEMC1, whereas the lowest mark is shown as Diploma 1. All year groups perceived their level of competence to be above 70%, with the lowest perceived level of competence reflected by BEMC2, which was 74.7%. The highest perceived level of competence falls to BEMC4, Diploma 1, and Diploma 2, above 80%.

4.6.4 Perceived and Actual Level of Competence

Table 4.7 and Table 4.8 depict all three subjects with the actual level of competence compared to the perceived level of competence in mean percentages and a mean from 0 - 5. Most year groups had a higher perceived level of competence than the actual level of competence. BEMC 1 is the only year group with a lower perceived level of competence than the actual level for the Clinical Practice subject.

Two-year groups calculated their perceived level of competence in the same range as their actual level of competence. ECP1's perceived level of competence for the Practical subject and Clinical Practice subject correlates with their actual level of competence. ECP2's perceived level of competence for the Clinical Practice subject correlates with their actual level of competence.

The Diploma 1 year group showed the lowest actual level of competence, whereas their perceived level of competence is depicted as the highest. This is also demonstrated for the BEMC2 year group, where the actual level of competence is low compared to their perceived level of competence.

Regarding the theory subject, BEMC1 had the nearest overall actual versus the perceived level of competence, and Diploma 1 had the most significant discrepancy between actual and perceived levels of competence. The practical subjects show that ECP1 had the nearest overall actual versus the perceived level of competence and that Diploma 2 had the most significant discrepancy between actual and perceived levels of competence. The Clinical Practice subject shows that ECP1 and ECP2 had the closest rated perceived level of competence compared to the actual level of competence.

Table 4. 7 Actual level of competence compared to the Perceived level of competence for each Year Group in percentages.

Course	The actual level of competence (%)			Perceived level of competence (%)		
	THEORY	PRACTICAL	CLINICAL	THEORY	PRACTICAL	CLINICAL
BEMC1	72.7	70.3	81.9	78.8	82.4	79.3
BEMC2	55.7	58.6	61	73.7	79	74.7
BEMC3	58.3	61.2	74.5	78.8	82.1	78.9
BEMC4	67.4	62.4	71.6	83.5	83.8	82.5
DIP1	43.5	67.8	60.4	82.8	83.6	83
DIP2	58.5	65.6	67.2	81.1	85.2	83
ECP1	63.3	78.9	80	76.1	78.9	77.9
ECP2	60.4	66	76.6	75.7	77.7	75.7
ECA	56.5	60.1	58	78.6	81.4	79.9

BEMC1: Bachelors of Emergency Medical Care 1; BEMC2: Bachelors of Emergency Medical Care 2; BEMC3: Bachelors of Emergency Medical Care 3; BEMC4: Bachelors of Emergency Medical Care 4; DIP1: Diploma 1; DIP2: Diploma 2; ECP1: Extended Curriculum Programme for Bachelors of Emergency Medical Care 1; ECP2: Extended Curriculum Programme for Bachelors of Emergency Medical Care 2; ECA: Higher Certificate Programme

Table 4. 8 Actual level of competence compared to the Perceived level of competence for each Year Group in a scale of 0-5.

Course	The actual level of competence (0-5)			Perceived level of competence (0-5)		
	THEORY	PRACTICAL	CLINICAL	THEORY	PRACTICAL	CLINICAL
BEMC1	3.6	3.5	4.1	3.9	4.1	4
BEMC2	2.8	2.9	3.1	3.7	4	3.7
BEMC3	2.9	3.1	3.7	3.9	4.1	3.9
BEMC4	3.4	3.1	3.6	4.2	4.2	4.1
DIP1	2.2	3.4	3	4.1	4.2	4.2
DIP2	2.9	3.3	3.4	4.1	4.3	4.2
ECP1	3.2	3.9	4	3.8	4	3.3
ECP2	3	3.3	3.8	3.8	3.9	3.8
ECA	3.9	3	2.9	3.9	4.1	4

BEMC1: Bachelors of Emergency Medical Care 1; BEMC2: Bachelors of Emergency Medical Care 2; BEMC3: Bachelors of Emergency Medical Care 3; BEMC4: Bachelors of Emergency Medical Care 4; DIP1: Diploma 1; DIP2: Diploma 2; ECP1: Extended Curriculum Programme for Bachelors of Emergency Medical Care 1; ECP2: Extended Curriculum Programme for Bachelors of Emergency Medical Care 2; ECA: Higher Certificate Programme

The following tables depict Table 4.9 in more detail by separating each programme into its table. It is visible in most tables that the perceived level of competence is higher than the actual level of competence for each of the three subjects. Some programmes depict an equal actual versus perceived level of competence, and one or two programmes describe a lower perceived level of competence than the actual level.

The BEMC 1 group shows a higher perceived level of competence in the theory and practical subject, whereas the actual level of competence is higher in the Clinical Practice subject. The BEMC 2 group shows a higher perceived competence level than the group's actual level of competence in all three subjects. The BEMC 3 group shows a higher perceived level of competence in the theory and practical subject. In contrast and a minimal difference between the actual and perceived level of competence in the Clinical subject. The BEMC 4 groups show an overall higher perceived level of competence, compared to the actual level of competence.

The ECP 1 groups show a close correlation between the perceived and actual level of competence for the Practical and Clinical Practice subjects. In contrast, the theory subject has the same trend as other year groups, where the perceived level of competence is higher than the actual level of competence. The ECP2 group shows an almost equal percentage in actual versus perceived level of competence for the Clinical Practice subject. In contrast, the theory and practical subject has a higher perceived level of competence compared to the actual level of competence.

The Diploma 1 group also shows an overall higher perceived level of competence, compared to the actual level of competence. The actual level of competence for the theory subject is almost half of the perceived level of competence of candidates. The Diploma 2 group, shows an overall higher perceived level of competence, compared to the actual level of competence.

The ECA group shows an overall higher perceived level of competence, compared to the actual level of competence.

4.7 Overall actual competence compared to the overall perceived level of competence

Table 4.9 compares the individual subjects and the sections of the questionnaire. The comparisons are based on the mean values, the p-values and the 95% confidence intervals.

Table 4. 9 Simultaneous Confidence Intervals of Mean Difference and P-value of Actual subjects and Perceived sections

Simultaneous Confidence Intervals of Mean Difference and P-value: Actual and Perceived					
Comparison Groups	Mean	Lower 95% simult. C.I.	Mean difference	Upper 95% simult. C.I.	P-Value
Clinical Prac	70.9				
- pCP	79.3	-13.1	-8.4	-3.4	<0.001
- pPCP	81.1	-15	-10.2	-5.4	<0.001
- pT	81	-15	-10.1	-5.3	<0.001
- pTCP	72.3	-6.1	-1.3	3.4	0.9186
- pTPCP	83.3	-17.1	-12.4	-7.6	<0.001
- Prac	65	1.1	5.9	10.7	0.0044
- Theory	61	5.5	10.2	15	<0.001
Prac	65				
- Clinical Prac	71	-10.7	-5.9	-1.1	0.0044
- pCP	79.3	-19	-14.3	-9.5	<0.001
- pPCP	81.1	-20.9	-16.1	-11.3	<0.001
- pT	81	-20.7	-16	-11.2	<0.001
- pTCP	72.3	-12	-7.3	-2.5	0.0001
- pTPCP	83.3	-23.1	-18.3	-13.5	<0.001
- Theory	61	-0.5	5.3	9.1	0.1102
Theory	61				
- Clinical Prac	71	-15	-10.2	-5.5	<0.001
- pCP	79.3	-23.4	-18.6	-13.8	<0.001
- pPCP	81.1	-25.2	-20.4	-15.6	<0.001
- pT	81	-25.1	-20.3	-15.5	<0.001
- pTCP	72.3	-16.4	-11.6	-6.8	<0.001
- pTPCP	83.3	-27.4	-22.6	-17.8	<0.001
- Prac	65	-9.1	-4.3	0.5	0.1102

Clinical Prac: Clinical Practice Subject; Prac: Practice subject; Theory: Theory subject; pClinical Prac: perceived Clinical Practice section; pPrac and Clinical Prac: perceived Practical and Clinical Practice section; pTheory: perceived Theory section; pTheory and Clinical Prac: perceived Theory and Clinical Practice section; pTPCP: perceived Theory, Practical, and Clinical Practice section; 95% simult. C.I: 95% simultaneous Confidence interval

The Clinical Practice subject shows an overall negative mean difference between most of the perceived categories and a positive mean difference for the theory and practical subjects. The negative mean difference indicates that the perceived categories score on average, higher than the Clinical Practice subject. The mean difference between the Clinical Practice subject and the perceived Theory and Clinical Practice category is -1.3, and the p-value is 0.91861, which suggests that the mean difference is not statistically significant, suggesting that there is no substantial evidence to suggest a true difference between the subject and the category.

The Practical subject shows an overall negative mean difference between all the perceived categories, including the Clinical Practice subject and a positive mean difference for the Theory subject. The negative mean difference indicates that the perceived categories score on average, higher than the Practical subject. The p-value for all the categories, except the Theory subject is below 0.05, indicating that the mean difference is statistically significant, suggesting there is strong evidence to suggest a true difference between the Practical subject and other categories. The mean difference between the Practical subject and the Theory subject is 5.3, and the p-value is 0.11020, which suggests that the mean difference is not statistically significant, suggesting that there is no strong evidence to suggest a true difference between the two subjects.

The Theory subject shows an overall negative mean difference between all the perceived categories, including the Clinical Practice and Practical subjects. The negative mean difference indicates that the perceived categories score, on average, is higher than the Theory subject. The p-value for all the categories, except the Practical subject is below 0.05, indicating that the mean difference is statistically significant, suggesting there is strong evidence to suggest a true difference between the Theory subject and other categories. The mean difference between the Theory subject and the Practical subject is -5.3, and the p-value is 0.11020, which suggests that the mean difference is not statistically significant, suggesting that there is no strong evidence to suggest a true difference between the two subjects.

The perceived competence calculated from the questionnaire is higher than all three subjects marked as the actual level of competence.

4.8 Variants of Self-Assessed Competence Between Year Groups and Programmes

The following two tables depict each programme on a table and each year's group on a table. Both tables represent what programme or year group chose Always(A) and Never(N) the most for each question. The Always option equals a high level of self-assessed competence, whereas the Never option depicts a low level of self-assessed competence. It is visible in both tables, that the option Never is excluded as an answer by all the participants for certain questions. Both tables marked Always and Never as A and N, respectively.

Table 4.10 shows the results of the programmes and what questions they chose the option Always or Never the most. Noticeably, the Diploma programme chose the option Always for 24 out of the 32 questions. Thus, they scored their self-assessed competence the highest. This is followed by the ECA programme. Each programme chose Never for at least one question the most, thus suggesting that there are areas of low self-assessed competence. The Never option was not chosen for 27 out of the 32 questions.

Table 4. 10 Highest and Lowest variants of self-assessed competence in each programme

Question	DIPLOMA		ECA		BEMC		BEMC EXTENDED	
	Never	Always	Never	Always	Never	Always	Never	Always
1	X			X				
2		X						
3		X						
4		X						
5		X						
6				X				
7		X						
8		X						
9		X						
10		X						
11		X	X					
12		X			X			
13		X						
14		X						
15				X				
16		X	X					
17				X				
18		X						
19		X						
20				X				
21		X						
22		X					X	
23		X						
24		X						
25				X				
26		X						
27				X				
28				X				
29		X						
30		X						
31		X						
32		X						

Table 4.11 shows the results of the year groups and what questions they chose the option Always or Never the most. It is noticeable that Diploma 2 chose the option Always the most. Thus, they scored their self-assessed competence the highest. This is followed by Diploma 1. Never was not chosen for 25 out of the 32 questions.

There are several questions where year groups answered Always or Never the same number of times. This is visible with questions 12, 13, 16, and 27. BEMC 3 and ECP 1 chose the option Never the same number of times for question 12. Questions 13, 16, and 27 were chosen by BEMC1 and Diploma 2, ECP2 and ECA, and Diploma 2 and ECA, respectively. These year groups chose the option Always the same number of times. This may suggest that the year groups have similar subject outcomes and might be on a similar level of self-assessed competence for those questions.

Table 4. 11 Highest and Lowest variants of self-assessed competence in each year group

Question	DIP 1		DIP 2		ECA		BEMC 1		BEMC4		ECP 2	
	N	A	N	A	N	A	N	A	N	A	N	A
1			X									X
2		X										
3		X										
4		X										
5				X								
6				X								
7				X								
8				X								
9		X										
10				X								
11				X								
12		X										
13				X				X				
14				X								
15										X		X
16					X	X						X
17		X										
18				X								
19		X									X	
20				X								
21										X		
22				X							X	
23										X		
24										X		
25								X				
26								X				
27				X	X							
28										X		
29				X								
30										X		
31				X								
32		X										

N: Never; A: Always; DIP1: Diploma 1; DIP2: Diploma 2; BEMC1: Bachelors of Emergency Medical Care year 1; BEMC2: Bachelors of Emergency Medical Care year 2; BEMC4: Bachelors of Emergency Medical Care year 4; ECP2: Bachelor of Emergency Medical Care Extended Curriculum Program 2nd half of first-year.

On further evaluation of both tables above, it can be noted that the programmes that chose an answer for a question the most have a year group falling under the same degree. For example, question 1 shows the Diploma programme answered Always the most, and the year group that also chose Always the most was Diploma 2. This correlation can also be seen in questions 11, 12, 16, 19, and 22. Even though the ECA programme only consists of one year group, the Diploma programme, BEMC programme, and BEMC extended programme have more than one year. This gives the impression that candidates in the same programme but in different year groups might agree on certain aspects of what is expected in the programme with different levels of subject outcomes.

4.9 Self-Assessed Competence Between School-Leavers and Previous Work Experience in Emergency Medical Care

The results of the questionnaire showed that 23% of the participants answered "Yes" to previous work experience. This is 25 participants from 109. This is separated further into programmes and year groups. In the BEMC programme, 15 participants indicated previous work experience: five in the first year, four in the third year, and six in the fourth year. In the BEMC extended programme, four participants were identified, two in ECP1 and two in ECP2. In the Diploma programme, six students indicated "Yes"; all six participants were in the second year.

Table 4.12 outlines what option from Never – Always was chosen from participants with and without previous work experience. Each question is separated into a "Yes" and "No" column, further divided into the option and percentage. The options columns show what was chosen the most for the specific question and the percentage of the participants that chose the option. This table shows the options with the highest percentage rate.

Table 4.12 Options chosen from participants with and without previous work experience

Question	Work Experience			
	No		Yes	
	Option	Percentage	Option	Percentage
1	Often	35	Often	44
2	Often	59	Always	48
3	Often	57	Often	40
4	Often	51	Always	36
5	Sometimes	35	Often	44
6	Often	38	Often	48
7	Always	46	Always	64
8	Always	41	Always	36
9	Often	47	Often	44
10	Often	38	Often	48
11	Sometimes	45	Sometimes	40
12	Sometimes	33	Often	48
13	Often	38	Always	48
14	Often	44	Often	36
15	Sometimes	44	Often	44
16	Sometimes	39	Sometimes	36
17	Often	41	Often	40
18	Often	48	Always	40
19	Often	48	Always	44
20	Often	46	Often	56
21	Always	42	Always	44
22	Often	38	Always	44
23	Always	44	Always	44
24	Often	43	Always	56
25	Often	46	Always	52
26	Often	56	Always	68
27	Often	47	Often	48
28	Often	51	Often	48
29	Always	48	Always	48
30	Often	57	Always	52
31	Often	57	Often	60
32	Often	44	Always	56

Analysing Table 4.12, it is noticeable that participants who chose "No" chose the option Often the most for 22 questions, followed by Sometimes and Always for five questions each. Participants who chose "Yes" answered Always the most for 16 questions, followed by Often for 14 questions, and Sometimes only for two questions. The other two options, Never and Rarely, did not come up as an option chosen the most for a question.

These results suggest that participants with previous work experience rated their perceived competence higher than those who did not have prior work experience. Table 4.10 shows that the Diploma programme rated perceived competence the highest, with Diploma 2 specifically in Table 4.11. Of the 109 participants, 17 were from the Diploma programme, with 13 participants from the Diploma 2 group. This is almost half of the year group that indicated previous work experience. This could suggest that the reasoning behind the Diploma 2 group's high level of self-assessed competence is that half of the participants from this group indicated previous year experience.

Table 4.8 compares the Actual to Perceived level of competence between subjects in each programme and year group. The Diploma 2 group rated their Perceived level of competence as high, but the Actual level of competence was low. There could be various reasons for this, such as previous work experience giving participants false beliefs about the insight into their knowledge or participants being outdated in studying techniques.

The ECA programme followed as the second highest self-assessed level of competence, but there was no indication from participants in the ECA programme with any previous work experience. Table 4.8 compares the ECA programme's Actual to Perceived level of competence, indicating a lower actual level of competence than the perceived level of competence. Possible suggestions behind the results include participants struggling to adapt to a tertiary education system.

Table 4. 13 The average result for questionnaires and subjects for participants with and without previous work experience

	Average for the questionnaire (%)	Subjects: Perceived level of competence (%)			Subjects: Average actual level of competence (%)		
		Theory	Practical	Clinical Practice	Theory	Practical	Clinical Practice
Yes	84.3	84.4	87.4	84.3			
No	77.8	76.9	80.9	77.6	78.8	81.6	79.4

The table above shows the average result for each questionnaire received from participants with and without work experience. The table depicts participants with work experience had a higher perceived level of competence than those without previous work experience. It also shows that the participants with work experience had a higher average in each subject as well.

The table also shows the average overall result for the actual level of competence for all the year groups together. The perceived level of competence for those with previous work experience was higher in all three subjects compared to the actual level of competence. The perceived level of competence for those without work experience in the subjects was lower than the actual level of competence.

Table 4.13 shows that those with no work experience had an overall closer perceived level of competence than their actual level of competence.

4.10 Conclusion

This chapter presented the results of the study under the study objectives. The response rate indicated a 34.4% participation. Regarding the self-assessed competence questionnaire, participants perceived their competence predominantly as high. The second objective of the study is to compare the actual level of competence with the perceived level of competence. Most year groups indicated their self-assessed competence to be higher than their actual competence based on final year marks.

The mean differences between each subject and the questionnaire categories showed higher averages for the perceived competencies than actual competencies.

Comparing the self-assessed competence levels between the individual year groups and overall programmes indicated that the Diploma programme chose the answer "Always" the most for individual questions; the Diploma 2 programme showed the highest self-assessed competence levels. Only 23% of participants indicated work experience with minimal significant differences in answering the questionnaire.

The upcoming chapter will cover a discussion of the study results.

CHAPTER 5

DISCUSSION

5.1 Introduction

The previous chapter outlined the study's results under the research objectives mentioned in Chapter 1. This chapter discusses the study results with other published literature on students' perceptions of self-assessed competence levels.

This chapter aims to address the research aim by answering the study objectives outlined in Chapter 1: to determine self-assessed competence levels for EMC students at an Emergency Medical Sciences Department in the Western Cape, to compare students' perceived level of competence to their actual level of competence using specific subject marks, to determine the level of variants for self-assessed competence levels between year groups and programmes in the DEMS in the Western Cape, and to determine whether there is a significant difference in self-assessed competence levels between school-leavers and students with previous EMC education.

5.2 Demographics

The study had more female participants (57.8%) than male participants (42.2%). These results contrast previous findings highlighting EMS as a male-dominated profession (Tiwari *et al*., 2021). While these results may be surprising in a previously male-dominated profession, the exact ratio of males to females in the department is unknown to the researcher. Maybe more females responded to the survey. Most participants were between the ages of 17 and 25 (69.7%), and only one was above the age of 46. The study by Tiwari *et al*. (2021) reported the mean age of emergency care professionals registered with the HPCSA was 36, with almost half the workforce being between 30 and 39 years old (Tiwari *et al*., 2021). The participants in the study may be younger than the average emergency care professional registered with the HPCSA, but this could be because a younger demographic is interested in a career in the profession and has the financial capacity to study at a younger age. Tiwari *et al*. (2021) also show that the age group to follow with the most registered emergency care professionals falls under the age range of 25-29, which falls into the same age range of participants in this research study.

Of the 109 participants, 23% had prior work experience, with the majority boasting over five years of experience. The decision of the NECET policy to phase out short courses resulted in emergency care personnel pursuing advanced tertiary education through the three-tiered EMS education and training framework, encompassing the higher certificate, diploma, and bachelor's degree levels. Sobuwa & Christopher (2019) underline the potential strain on higher education institutions and clinical training sites due to the transition of emergency care personnel to the qualification framework. This shift may indicate that a notable portion of the 23% with work experience are actively advancing their careers within the qualification framework. This proportion exceeds the recommended threshold set by the Council of Higher Education Recognition of Prior Learning (RPL) policy, which suggests that no more than 10% of students should be admitted through the RPL process (Council of Higher Education, 2016). It is plausible that some students with work experience met the standard entrance requirements for the respective programs without necessitating the RPL process.

5.3 Discussion

Only two participants in the study rated their perceived competence under 50%. Students with low perceived competence could suggest several factors. It could indicate that they have a relatively accurate perception of their abilities. It could imply room for growth in their confidence level and self-efficacy in abilities, believing more in their capacity to succeed. Participants may have more realistic goals and expectations for their study journey, identifying gaps and striving for continuous improvement and growth. It may indicate a healthy self-perception that aligns with external evaluations and could support individuals in their academic and personal development (Andrade, 2019; León *et al.*, 2023).

Self-assessment plays a vital role in the academic environment but could be detrimental to the student's self-perception, thus requiring educators to encourage and develop a balance between a student's strengths and capabilities and addressing areas for improvement (León *et al.*, 2023). Even though students with low perceived competence may have a more realistic view of themselves, constant underestimation of one's abilities may affect growth and development. This could suggest that they cannot recognise their potential. Students may doubt their capabilities and feel insecure, leading to minimal engagement in learning tasks (Andrade, 2019). It could also hinder the effectiveness of feedback given to students, leading to confusion and misalignment in learning and improvement (León *et al.*, 2023).

In contrast, 64% of the participants rated their average level of competence as equal to or higher than 80%, including the perceived competence for each question, which depicted an average of 60% or higher. Studies have shown that regarding the accuracy of self-assessment, students tend to overestimate their work, which is a common phenomenon among them (León *et al.*, 2023). Overestimation in self-assessment and competence suggests that students perceive their skills, knowledge, and abilities higher than in reality. This phenomenon is also known as the Dunning-Kruger effect, where individuals with lower abilities overestimate their competence (Notamicola *et al.*, 2023).

The Dunning-Kruger effect may have significant implications for learning and professional development. A false sense of confidence may hinder their ability to recognise their limitations and areas needing improvement. More competent students who underestimate their abilities and compare themselves to their less competent peers can result in a lack of confidence and hinder growth. Students may be less accepting of objective feedback, impeding the ability to recognise areas for improvement (Rahmani, 2020). As seen in certain areas of the results from specific year groups, such as the first-year and second year groups in the BEMC programme. The self-perceived competence in both year groups is high, but the second-year group have an inaccurate perception, thus suggesting that students become overconfident. Addressing the phenomenon is crucial for fostering self-awareness, continuous learning, and professional growth (Rahmani, 2020).

A certain degree of confidence and optimism can be beneficial in driving individuals towards success; unchecked overestimation of one's abilities can pose risks regarding professional competence, patient safety, and personal development. Developing a balance between confidence and humility, seeking feedback, and engaging in continuous self-assessment are essential in navigating the complexities of the risk versus the benefit of overestimation (Rahmani, 2020). This is evident in the results, where the actual level of competence for the BEMC program starts with a high actual level of competence, dropping drastically in the second year and increasing steadily from the third to fourth year. Even though the perceived level of competence stays constantly high from the entry-level to the exit level of the BEMC programme, the results may suggest that from an individual student perspective, they explored their abilities, reflecting and focusing on personal development.

The two questions with the lowest average were analysing a patient's mental health and well-being and directing a patient to appropriate mental care, with the latter having the lowest average. These two questions fall under the category of Diagnostics Functions. Both questions surround the mental health of a patient. In a study conducted in the Free State Province, South Africa, it was found that EMC personnel lack knowledge about various aspects of prehospital management of mental care and are not familiar with the Mental Health Care Act 2002 of South Africa (Mothibi et al., 2019). Waltrich et al. (2022) have suggested that the current level of mental health education and training for paramedics is inadequate. The article assessed the sufficiency of training by surveying paramedics about their preparedness to handle mental health emergencies, revealing that 59% of the respondents indicated feeling inadequately trained, responding with "Rarely" or "Sometimes" (Waltrich et al., 2022). This may indicate a gap in education regarding the mental health status of patients, treatment, interaction, and care. This may suggest that students experience the same issues in the academic curriculum, indicating insufficient teaching and learning in mental health.

Psychiatric emergencies entail the sudden onset of disturbances in an individual's behaviour, thought, or mood, which, if left untreated, may harm the individual or others (Mothibi et al., 2019). These emergencies often arise from mental illness, and approximately 60% of cases requiring medical attention occur in non-psychiatric settings (Mothibi et al., 2019). A comprehensive understanding and training in the ethical and clinical principles of mental health can help prevent fatalities and malpractice in these patients (Mothibi et al., 2019). Identifying any perceived competence gaps can help guide students to areas where they need to further develop their knowledge and understanding.

The questions with the highest perceived competence average included knowing their limitations regarding patient care and prioritising patient treatment. These questions fall under the Working Role and the Managing Situations categories, respectively, with the first-mentioned category being the highest average (Eaton, *et al.*, 2021). Even though the results show that students are primarily inaccurate in their self-assessments, they are still aware of their limitations. A practitioner unaware of their limitations may directly affect patient care and can result in legal and ethical implications (Eaton *et al.*, 2021).

Practitioners or students in the work environment may take on tasks or challenges outside their capabilities, increasing the risk of failure. Replacing themselves beyond their limits could lead to burnout, exhaustion, and mental issues. Understanding one's limitations is crucial for personal growth, effective decision-making, stress management, and maintaining healthy relationships. There may be severe consequences in a professional capacity, such as making errors at work or meeting performance expectations (Andrade, 2019). This is also relevant to students; out of an academic and social aspect, errors could lead to possible failure in their studies.

From a medical perspective, making errors could lead to a lack of patient safety, incorrect treatment, malpractice, and the possible death of patients. All medical professionals work within their scope of practice. If this is not upheld, it could result in legal and ethical dilemmas, making it the medical professional's responsibility to ensure patient well-being and adhere to ethical standards (Notamicola *et a*l., 2023). It could promote building resilience and coping with setbacks, specifically concerning patient treatment mistakes (León *et al.*, 2023). This suggests that being aware of one's limitations as a student already promotes resilience and coping with setbacks, which relates to patient treatment and academic performance.

Literature suggests various possibilities regarding the ignorance of a student's or a medical professional's limitations. A lack of experience may limit their ability to assess their capabilities accurately. The importance of constructive feedback or evaluations could skew perceptions, inhibiting self-awareness, strengths, and weaknesses. Personal factors, such as cultural background, could also have an effect; some cultures perceive acknowledging one's limitations as a weakness, leading individuals to mask or ignore their shortcomings (Notamicola *et al*., 2023). Emotional factors, such as ego and pride, protecting one's self-image or maintaining a façade of competence, limit honest self-assessment (León *et al.*, 2023).

Due to the diversity and multi-cultural background of the participants, several factors could be relevant to why students mask, ignore, or are unaware of their limitations. This could fall under the responsibility of lecturing staff to be aware and accommodate students from various backgrounds.

The results showed that the Helping Role category scored the highest, and the Therapeutic Interventions category scored the lowest. The Helping role category, from a medical aspect, could relate to patient care and treatment, support in a personal capacity, and assistance from other medical professionals. This suggests that patients and others receive adequate support and assistance in addressing their needs, challenges, or concerns. Building trust plays a crucial role in the prehospital setting, even if the patient is in their care for a limited time. Patients who perceive a medical professional as knowledgeable and skilled are likelier to open up and interact (Bennet *et al*., 2023; Jansson *et al*., 2021). The high perceived level of competence in the Helping role category suggests that participants were confident in their ability to interact with patients and their families and exhibit a professional and competent perception to others.

The original study that developed and tested the NCST showed a high perceived level of competence in the Helping Role category and the lowest level of perceived competence in the Ensuring Quality category (Meretoja *et al*., 2004). Kajander-Unkuri *et al.* (2020) also used the NCST to assess nursing students' self-assessed competence levels during education. This study showed that the self-assessment was the highest in Helping Roles and the lowest in Therapeutic Interventions.

While there are several common differences described by Jansson (2023) between the nursing and emergency care professions, the Helping Role category is one in which practitioners perceive themselves to be most competent. It suggests that both professions are competent in assisting a patient's physical, emotional, and psychological needs, hoping to improve patient outcomes and satisfaction. It suggests strong communication skills, including active listening, empathy, and clear explanations. They can support patients and their families emotionally, work in a multidisciplinary team, and collaborate with other medical professionals (Notamicola *et al.*, 2023).

Jansson (2023) also discusses additional noteworthy similarities, not only in a helping role but also concerning the scope of practice in nursing and emergency care professions. Both professions involve a diverse array of tasks across different settings, encompassing the management of distinct patient groups with varying medical requirements at different care levels. The provision of safe care hinges on precision and accuracy, encompassing diagnostic and decision-making skills, patient treatment, and the level of care decisions made by both professions. The study also revealed that aspects such as quality improvement, research utilization, evidence-based care, and academic proficiency were not given high priority by either profession. This is concerning as these aspects are crucial for delivering safe, efficient, and high-quality care for patients in both hospital and prehospital care settings (Jansson, 2023).

The category Therapeutic Interventions scored the lowest level of self-perceived competence, which is of concern, with the other qualities mentioned in the previous paragraph outlined by Jansson, 2023. Therapeutic interventions entail the ability to assess patient needs, implement interventions, and evaluate the effectiveness of treatment strategies (Notamicola *et al.*, 2023).

Therapeutic interventions need to be quick and effective in the emergency care environment. The skills and knowledge of an emergency care professional lead to timely and targeted interventions, mitigating risks, preventing complications, and improving patient care outcomes. Triaging and prioritising patient needs, coordination with healthcare teams, crisis mitigation, and continuity of quality care in the prehospital field play a vital role in Therapeutic Interventions (Notamicola *et al.*, 2023). This could indicate that students may lack the knowledge or skills, either due to a gap in a teaching and learning aspect or due to personal aspects.

A low level of competence in Therapeutic Interventions increases the risk of errors and adverse events, which may harm patients, compromise their well-being, and cause serious situations, such as lawsuits (Andrade, 2019). An inefficiency of treatment may delay recovery or poor health outcomes; delaying treatment in emergencies worsens patient conditions and hinders the effectiveness of interventions. Substandard care, errors, and lack of proficiency could diminish a practitioner's confidence and affect the trust of others in the practitioner, affecting credibility and tarnishing their reputation. However, the most significant concerns are legal and ethical complications. Incompetent practice can lead to allegations of negligence, malpractice, disciplinary actions, and breaching professional standards. This poses an extensive risk to patients and healthcare professionals (Notamicola *et al.*, 2023).

Students are taught in simulation environments to mitigate the risks and adverse effects of their interventions. Even though the risks are not completely dissolved, the self-awareness of their limitations could indicate their self-reflection abilities and identify their strengths and weaknesses.

The overall perceived level of competence was higher than the overall actual level of competence, based on year-end marks. The theory and practical subjects had a higher perceived level of competence in all the year groups except one, ECP1, which fell in the same range.

Some literature describes several reasons students may rate their perceived level of competence high. Theory subjects usually include well-defined and structured concepts, making it easier for students to assess their abilities and understanding. Students may have a high sense of confidence. These subjects include clear and objective evaluation criteria, such as definitions, principles, and theories, allowing students to self-evaluate against the criteria. With clear criteria come clear learning objectives and progression, making learning tracking easier. Immediate feedback through tests or assignments will enable students to assess their performance quickly and adjust. This could suggest how the curriculum for the programmes was developed and how they are taught in a way that benefits students. Personal interest and effective study strategies also play a role. Interest in a subject heightens the motivation to learn and engage, and students with effective study strategies have an advantage in a better understanding of study materials (Andrade, 2019; Notamicola *et al.*, 2023). The personal interest in a student's higher education journey is essential since they apply for a specific course in higher education.

Practical subjects include hands-on activities and the application of theoretical concepts. The direct experience allows students to assess their skills and understanding based on real-world practice, leading to more accurate self-assessments. Immediate feedback plays a crucial role, too; students can observe the outcomes of their skills and adjust appropriately; this includes feedback from and to peers, reflecting on their strengths and weaknesses. Transferring theoretical knowledge into practical tasks allows students to evaluate their abilities and develop problem-solving abilities or technical competencies (Andrade, 2019; Notamicola *et al.*, 2023).

Students with high self-perceived competence may suggest that lecturers encourage immediate feedback in practical environments, not just from their opinions but also from peers. They have the opportunity to practice skills and tasks in this environment and be able to observe their peers. This could encourage self-reflection and debriefing skills.

The concern regarding overestimating one's abilities in theoretical and practical subjects may have negative outcomes and hinder student development. Students may not put in more effort to improve themselves, lack motivation to study further, and hinder overall learning and skill development. A false sense of confidence, believing to be more proficient than they are, causes challenges in identifying areas needing improvement and growth. The overestimation of one's abilities may lead to more mistakes or underestimation of the complexity of tasks. This could also create a block regarding feedback, dismissing it and hindering the ability to learn from mistakes and grow academically. The professional consequences, especially in the medical field, could lead to the endangerment of patients, negligence, death, or negative impact on one's reputation (Andrade, 2019; Notamicola *et al.*, 2023).

The Clinical Practice subject had the most variants in the results. Out of all nine-year groups, six indicated their perceived level of competence as higher than their actual level of competence. Two year groups (ECP 1 and ECP2) fell in the range of results for the perceived and actual level of competence, and one of the year groups (BEMC1) had a higher actual level of competence.

The Clinical Practice subject consists of work-integrated learning, which takes theoretical knowledge and practical skills from the academic platform and implements them in the work environment. It also allows students to practice and master their lower- and higher-order thinking skills. Exposing students to the 'real-world' work environment and building relationships with the community and possible future employers promotes confidence, the opportunity for reflection, and the development of practice. It also helps to produce competent, work-ready graduates (Doolan *et al.*, 2019). The higher educational institute used in the study indicated the constant observation, evaluation, and progress of each student in the department.

Jansson (2023) highlights the importance of contextual work experience and developing Clinical competence, which can be created outside formal education. The work-integrated experience may instil confidence in their skills and abilities as the real-world environment develops students' perception of competence and readiness for professional roles. In the real-world environment, feedback from mentors and supervisors can boost a student's confidence in their competence. A supportive work environment where students can integrate knowledge and practice skills with the right mentorship may have positive consequences. The work-integrated experience can empower students to take ownership of their roles and independent decisions. Allowing students to self-reflect, with the help of supervisors and mentors, and continuously seeking growth and development opportunities can support further competence and performance in professional settings (Andrade, 2019; Notamicola *et al.*, 2023).

However, overestimating one's ability in the workplace has several risks and challenges. Students may overestimate their ability and take on tasks in the workplace that are beyond their scope of practice, leading to mistreatment or risk to the patient. Overconfidence can result in poor choices, ineffective problem-solving, or inappropriate actions. It may also suggest that students will not seek feedback from others, such as their supervisors and mentors, leading to delayed skill development and improvement. This could also lead to strained relationships with others in the workplace, missed work opportunities, or employment opportunities due to their overconfidence. It would be beneficial for students to maintain a humble and respectful attitude in the work environment, understanding one's strengths and weaknesses, which are crucial to navigating challenges in the workplace and building successful relationships (Andrade, 2019; Notamicola *et al.*, 2023).

Even though the theory and practical subjects had a higher perceived level of competence in all the year groups, and most year groups indicated the same for the Clinical Practice subject, the actual level of competence based on year-end marks suggested some variants. The Clinical Practice subject had the highest overall average, with the theory subject having the lowest overall average. This suggests that students are more practically orientated compared to their beliefs that they have a theoretical advantage. As mentioned in previous sections, this could indicate that students underestimate their abilities in the Clinical Practice subject. They could be unaware of their capacity to learn in a hands-on environment than in a classroom with passive learning.

The theory and practical subject include a combination of theoretical principles, techniques, practical experience, clinical procedures, applying knowledge into practice, learning skills, and participation in simulated assessment. The two subjects together enhance the capability of a student to flourish in the workplace setting, working with a variety of qualified medical professionals in and out of the hospital environment. It creates an environment where students can practice and implement acquired knowledge and skills (Hashim, 2022).

The year groups that fell in the same range of results for the perceived and actual level of competence and the year group with a higher actual level of competence than the perceived level of competence came from the Bachelor of EMC degree. The study found the BEMC 1 group to have the highest actual competence level for the EMC Theory subject, with a mean of 72.7%. This is in contrast to the Diploma 1 group, which had a mean of 43.5%. The ECP 1 group achieved the highest actual competence level for the EMC Practical subject, with a mean of 78.9%, while the BEMC2 group achieved the lowest mean of 58.6%. The highest actual level achieved for the EMC Clinical Practice subject was the BEMC1 group, with a mean of 81.9%. The ECA group achieved the lowest mean of 58%.

The highest marks received for all three subjects were from first-year students from bachelor's or extended programmes. The first-year of the bachelor's degree, including the extended programme, focuses on the basics of EMC, building the foundation and preparing students for the following years. The content pertains to the cognitive processes at the lower level of Bloom's taxonomy, encompassing knowledge, comprehension, and application. The questionnaire was administered to the participants at the conclusion of their academic year, which could suggest that those in the first-year groups had a basic grasp of lower-order thinking. This might have led them to rate their perceived competence at a level similar to or lower than their actual competence.

Some literature suggests that first-year students may achieve higher results due to being exposed to and informed of opportunities, including admission criteria, the programme chosen to study, personal and external motivation, and positive family support (Husaini *et al.*, 2023). Guiding first-year students through orientation and induction programs is a crucial activity aimed at bolstering their academic performance. These programs provide essential support as students adjust to their new academic environment and course requirements. By nurturing their learning and adaptive skills, students are equipped to approach their studies with confidence and derive lasting value throughout their university experience (Lekhehle, 2020). Support services, such as the library, an Information Technology (IT) centre, and career guidance services have a positive effect (Dicker, 2019).

Although, there is no guarantee that a student with access to all the available resources will perform well in higher education (Husaini *et al*., 2023). This is evident in the case of the Diploma 1 group and the higher certificate programme. Literature suggests that personal and environmental factors, such as financial resources and academic skills, socially disadvantaged groups, self-esteem, first-generation students struggling to adjust to university, and emotional experiences relating to academic processes may hinder student performance, even with all the available resources (Lekhehle, 2020). Bai et al. (2022) explore how a student's academic life is affected by factors such as gender, family income, parental education, and home environment (Bai *et al,* 2022). Below, I delve further into the factors hindering student performance.

Students who come out of an environment surrounded by poverty may experience a continuous negative impact on their access and success in higher education (Lekhehle, 2020). The status of a household's total income may profoundly influence the educational opportunities available to students and their chances of academic success (Olufemi *et al.*, 2018). Even though there may be some financial support from tertiary institutes, students may still be limited and cannot afford the needed resources for studying (Lekhehle, 2020; Bai *et al.*, 2022). These resources could include handbooks, housing, or even day-to-day items such as food and hygienic products.

Transitioning from high school to higher education can pose a significant challenge, as the academic work becomes more demanding. The workload in higher education is new and demanding for first-year students, especially when compared to high school. Unlike high school, higher education requires much more from students academically. It takes time for students to recognize this difference. As a result, they often approach their studies with the same mindset (Lekhehle, 2020). Factors such as academic self-efficacy, self-regulated learning, and engagement beyond the classroom are linked to students' potential success (Bai, 2022). This encompasses study skills like time management, self-discipline, and independence (Lekhehle, 2020). Time management, in particular, focuses on effective planning and organization of studies, playing a crucial role in academic achievement (Fokkens-Bruinsma et al., 2021).

Parental background also affects students' academic performance (Olufemi *et al.*, 2018). Their specific educational background and involvement during the student's academic journey are necessary (Bai *et al.*, 2022). First-generation students struggle a lot more with their studies than those with at least one parent with a degree (Lekhehle, 2020).

Emotional aspects, such as the need to belong in a social community and self-efficacy, can be reflected in academic performance. Students with high self-esteem stand a better chance in their educational career, both in a social and learning aspect (Lekhehle, 2020).

This study indicated participants with the highest and lowest actual competence as first-year cohorts. This may suggest that several factors played a role. The participants from the first-year groups constituted a small subset of the entire cohort, potentially affecting the clarity of the collected and analysed data. Their accuracy regarding their actual versus perceived competence suggests a wide range of overestimating compared to underestimating one's capabilities and competence.

Sheguf and Alhaj (2022) describe several possibilities for accuracy in actual versus perceived competence, such as clear criteria, where students understand various tasks, equipping them to evaluate their performance accurately. Regular and specific feedback regarding students' thinking processes can also develop a more accurate self-assessment of cognitive abilities. Reflection encourages students to identify areas of strength and improvement, setting goals for skill development. Metacognitive strategies, such as self-questioning, self-explanation, and self-monitoring, can promote more self-awareness of their thinking processes.

The year groups that overestimated capabilities and competence may have had limited exposure to areas Sheguf and Alhaj (2022) described, such as feedback, reflection, an understanding of the criteria, self-assessment abilities, and practice time. This could be due to the length of the programmes, with the Diploma programme falling over two years and the higher certificate over one year, giving students limited time to perfect these areas. The content of their respective programmes could also play a role, leading to heightened pressure to learn specific content and skills of lower-order and higher-order thinking. Students may be more accustomed to lower-order thinking and its possible simplicity, thus overestimating higher-order thinking tasks (Sheguf & Alhaj, 2022).

The bachelor's programme showed a significant drop in actual competence from the first to the second year, with a slight increase from the third to the fourth year group. The diploma showed a drop in competence from the first to the second year. The higher certificate is only one year, limiting the possibility of change. This may further strengthen the possibility that the length of the individual programmes, the learning outcomes, and the time constraints give students limited time to perfect certain areas and the heightened pressure to learn specific content and skills of lower-order and higher-order thinking.

The overestimation or underestimation of students' abilities in any year or programme could be influenced by various factors. The abilities of lecturing staff, utilising different teaching and learning strategies by lecturers, their workload, time management skills, and encouraging students' active learning may limit the academic support and experience they need (Mirata *et al.*, 2020; Bai *et al.*, 2022). Encouraging students to engage in self-reflection, providing regular and specific feedback, and cultivating a supportive learning environment can assist students in developing the skills and awareness necessary to accurately self-assess their higher- and lower-order thinking abilities (Sheguf & Alhaj, 2022). Staff turnover or staff changes may also affect students' progress by disrupting the learning process or using different teaching methods (Dicker, 2019).

The field of medicine is continually progressing and expanding, placing an obligation on medical professionals to remain informed and up to date. While higher education contributes to growth in quantity and scale, it also raises concerns about quality. This has emerged as a central issue in higher education (Bai et al., 2022). Education encompasses both knowledge and transferable skills, defining what students should learn and how they can apply their knowledge (Bai et al., 2022). Standard teaching must be adapted, and modern learning techniques must be incorporated (Boulet., 2018). In the ever-evolving medical field, teaching and learning methods and the debatable standard of quality education cause increased constraints on everyone involved. This ever-changing environment demands excellence and specific standards, which may influence a student's actual level of competence and can cause an imbalance between year groups (Bai *et al.*, 2022).

The ever-changing environment of the medical field gives an idea of why the results showed that 23% of participants had previous work experience in EMS. Participants who indicated a higher perceived level of competence also indicated previous work experience. Bennet *et al.* (2023) showed that work experience before entering higher education was crucial in shaping students' confidence and self-perception. They are more inclined to actively seek assistance, participate in educational activities, and employ self-regulated learning strategies. (Dong *et al.*, 2020).

The overall results showed that participants with no work experience were more accurate compared to those with work experience. Dong *et al.* (2020) describe several reasons participants with work experience may have overconfidence in their actual abilities. These include overconfidence, leading to an underestimation of effort required to master new concepts and skills, an inability to unlearn or correct preconceived notions, resistance to incorporate new perspectives or alternative approaches to problem-solving, a narrow focus on a topic leading to restricted intellectual growth, and preventing the development of a broader understanding of diverse fields and perspectives.

According to the study conducted by Kajander-Unkuri et al. (2020), half of the students in their first-year cohort had previous professional qualifications, and almost 50% had work experience in the healthcare sector prior to their education. The investigation revealed that certain factors had a statistically significant impact on the students' competence across all categories during their initial year of education. Specifically, students with prior professional qualifications and work experience tended to perceive their competence at a superior level.

A recent study conducted at a Norwegian university focused on 36 registered nurses who were pursuing a nurse practitioner program. The study aimed to assess the progression of competence in nursing students throughout their academic journey. The findings revealed that, although prior work experience did not initially correlate with clinical competence at the commencement of their education, students with previous exposure to primary health care were able to utilize their professional background to elevate their level of competencies (Taylor et al., 2021). Additionally, research indicates that work experience can contribute to learning, mainly when educators support students in critically reflecting on their experiences and providing constructive feedback (Taylor et al., 2021).

5.4 Conclusion

More than half of the participants rated their perceived competence equal to or above 80%. Based on the existing literature, it is evident that students demonstrate a tendency to overestimate their abilities, a phenomenon commonly known as the Dunning-Kruger effect.

The Helping Role category scored the highest perceived competence, while the Therapeutic Interventions category scored the lowest. The overestimation and underestimation of one's abilities fell to two first-year groups from the Diploma and Bachelor's programmes, respectively. This indicates that factors, from personal to environmental and other resources, affect students individually.

It seems that the overestimation or underestimation of one's actual level of competence or perceived level of competence could have various risks and benefits. The risks could be detrimental, affecting patient safety and treatment, their reputation as future qualified practitioners, and ethical and legal consequences.

Students must embrace a humble and respectful attitude, recognize their strengths and weaknesses, and ponder both achievements and failures in order to foster ongoing growth.

The next chapter outlines the conclusion and the limitations of the research. It also includes suggestions for future research regarding self-assessment, perceived competence, and assessment tools.

CHAPTER 6

CONCLUSION

6.1 Introduction

This study used a modified competence scale to determine the EMC students' perceived self-assessed competence. This was further broken down into four objectives. They were specifically, looking at deciding the self-assessed competence of students, comparing their perceived level of competence to their actual level of competence, and identifying variants between year groups and programmes. Last, we will see if there are significant differences in perceived levels of competence between students who went straight from high school to higher education or students with previous work experience in EMS.

The overall aim of perceived self-assessed competence was determined with a Competency Tool, specifically the Nurse Competency Scale tool, developed by Meretoja *et al.* (2004). The tool was modified to be more relevant to EMC. It was noted that no Competency Tool was available in EMC at the time of the study in South Africa. The study also identified self-assessment as a self-learning tool and the possibility of incorporating it into the educational environment, specifically in the EMC environment.

This chapter includes a summary of the study's findings, recommendations for future research, study limitations, and a conclusion.

6.2 Summary of Findings

The data collected comprised 109 participants from 317 students, 34.4% of the study population, with participants from all three undergraduate programmes in the relevant department at the Higher Education Institute. In the study, over half of the participants rated their perceived competence higher, with an average equal to or higher than 80%. Based on various sources, it is evident that students often overestimate their abilities. This is a prevalent phenomenon, where students with lower abilities tend to overrate their competence through self-assessment. Chapter 5 mentions this phenomenon known as the Dunning-Kruger effect, which has significant implications for personal and professional development.

The study results also identified categories in the questionnaire with the highest and the lowest perceived competence. The Helping Role category scored the highest, and the Therapeutic Interventions category scored the lowest. The Helping Role category also scored the highest in the Meretoja *et al*. (2004) study, which indicates that both nursing and prehospital emergency care professions find the needs of patients critical from a medical and emotional point of view. Both professions are comfortable working in multidisciplinary teams and collaborating with other medical professionals.

The lowest score in the Therapeutic Interventions raised concern since it could harm patients, compromise their well-being, and have dire consequences, such as lawsuits, as described in Chapter 5. Identifying these areas of weakness shows some benefits of self-assessment of students so these areas can be managed from an educational perspective.

The comparison of participants' perceived level of competence to their actual level indicated that the perceived level of competence was higher than their actual level. First-year programmes had the highest and the lowest perceived level of competence compared to their actual level. This is discussed in Chapter 5, which identifies various aspects that could have resulted in this.

Certain literature explores the potential for first-year students to receive guidance in learning and acquire the skills necessary to approach their studies with a positive mindset. However, the literature also suggests that there are no guarantees that having enough access to resources will ensure success in their education. Factors include personal and environmental, which are further discussed in Chapter 5.

The theory and practical subjects had a higher perceived level of competence in all the year groups except one, ECP1, which fell in the same range. The Clinical Practice subject had the most variants in the results. Out of all the nine-year groups, six indicated their perceived level of competence as higher than their actual level. Two of the year groups fell in the same range of results, and one year group had a higher actual level of competence.

According to the literature, the overestimation or underestimation of a student's ability in any year group or programme is influenced by various factors. Lecturing staff, learning and teaching methods, time management skills, encouragement, and academic support are a few mentioned.

More significant findings regarding the differences in results between participants with work experience and students who came directly from high school into the programmes needed to be made. However, the results showed that students with no work experience were more accurate in their answers than those with previous work experience.

6.3 Implications for Practice

The hypothesis at the beginning of this study stated that participants would rate their perceived competence higher than their actual level of competence. This was visible in the results of the study. The implications regarding the results of the study revolve around the competency of students and the use of self-assessment tools. There may be a level of unfamiliarity among students regarding self-assessment and the potential of such a tool.

Research shows there could be a benefit to implementing a Competency Tool that students could utilise during their studies. This presents an opportunity for individuals to contemplate their theoretical and practical knowledge and compare it with the specific outcomes of their studies.

New techniques, such as the flipped classroom, are more in tune with today's academic environment, and students are not passive learners anymore. Students need to participate and be more involved in their educational careers. An emphasis can be put on students' responsibility in their teaching and learning.

The need to stay up to date in the learning and teaching techniques is essential, specifically in the medical career, which is also ever-changing. It is the responsibility of lecturing staff and students to further personal development.

6.4 Recommendations

Future literature can focus on using the Competency Tool in this study for further testing and development. The tool can either be tested in other universities in South Africa that offer the same programmes for further evaluation, the tool can be refined, or another tool can be developed to oppose the tool created in this study.

The research population in this study was limited to one Higher Education Institute in South Africa. Other institutions with similar programmes and degrees could be utilised in further research. The similarities or differences between the actual and perceived competencies of students from different institutes can be identified, and the results from the individual institutes can be assessed and compared.

Another possibility would be to follow students from their entry-level to their exit level of studies. This could help identify the accuracy of the competence tool and if self-assessment could be utilised. This study's participants were from all the programmes but were not tracked throughout their academic careers. Future research could also include in-depth insights from students and their reasoning behind self-assessment.

Further studies could also look at the results of the competence tool and discuss the results with the participants, with feedback on possible changes, which could lead to the refinement of the tool and more accurate results from students. This study was limited to a pilot study, followed by the actual research. There was no discussion with the participants from the pilot study or the actual study to indicate their opinions or suggestions.

Another possibility for expansion of this study is to include steps for educators and policymakers, focusing on actionable steps and strategies to include self-assessment tools into the curricula and training programs. Which will benefit not only the learner but also the educator and program and enhance the knowledge and skills for future development.

6.5 Limitations

The research had various limitations during the entire process. First, there is a large amount of data on competency and competence development in nursing and education. There are also several competency tools focused on nursing. This cannot be said to be the same for the EMC profession and education. Compared to the study results, most of the literature used during the study was from nursing-based data.

The Competency Tool created by Meretoja *et al.* (2004) did not identify areas more relevant to theory subjects, practical subjects, or the clinical working environment. This limited the comparison of the study results with the outcomes from their study.

Competency and competency development in EMC in South Africa is also minimal. Literature suggests a significant gap in education's self-assessed competency tools, specifically in South Africa's EMC. More research data regarding competency and what it is in tertiary education, specifically in South Africa, needs to be conducted.

The study participants were only from one institution and had limited time to complete the questionnaire. Participants had to complete the questionnaire before their year-end results were released to avoid bias. However, the ethics approval took longer than expected. The second option would have been to wait another year to release the questionnaire to students. Thus, the study and its results cannot be generalised to other institutions.

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APPENDICES

APPENDIX A: Letter of Approval from the Cape Peninsula University of Technology's Health and Wellness Research Ethics Committee

Cape Peninsula
University of Technology

HEALTH AND WELLNESS SCIENCES RESEARCH ETHICS COMMITTEE (HWS-REC)
Registration Number NHREC: REC- 230408-014

P.O. Box 1906 • Bellville 7535 South Africa
Symphony Road Bellville 7535
Tel: +27 21 959 6917
Email: sethn@cput.ac.za

22 November 2023
REC Approval Reference No:
CPUT/HWS-REC 2022/S12 (renewal)

Faculty of Health and Wellness Sciences

Dear Ms. Rozaan De Lange (Norval)

Re: APPLICATION TO THE CPUT HWS-REC FOR ETHICS CLEARANCE

Approval was granted by the Health and Wellness Sciences-REC to Ms. Rozaan De Lange (Norval)for ethical clearance. This approval is for research activities related to research for Ms. Rozaan De Lange (Norval) at Cape Peninsula University of Technology.

TITLE: **Emergency Medical Care students perception on self-assessed competence levels in a selected Higher Education Institution in the Western Cape, South Africa**
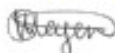
Supervisor: Dr. S Sobuwa and Mr. John Meyer

Comment:

Approval will not extend beyond 23 November 2024. An extension should be applied for 6 weeks before this expiry date should data collection and use/analysis of data, information and/or samples for this study continue beyond this date.

The investigator(s) should understand the ethical conditions under which they are authorized to carry out this study and they should be compliant to these conditions. It is required that the investigator(s) complete an **annual progress report** that should be submitted to the CPUT HWS-REC in December of that particular year, for the CPUT HWS-REC to be kept informed of the progress and of any problems you may have encountered.

Kind Regards

Dr. Samantha Meyer
Chairperson – Research Ethics Committee
Faculty of Health and Wellness Sciences

APPENDIX B: Letter of Approval from the DEMS to Use as Study Site

Cape Peninsula
University of Technology

FACULTY: HEALTH & WELLNESS SCIENCES
Department: Emergency Medical Sciences
Contact: Mr L Christopher (lloydc@cput.ac.za)
Telephone: 021 953 8409

Ref: 184/EMC/22
Date: 23 September 2022

Mrs R Noval (Student No. 221817492)
G04 Villa Della Fonte
34 Arum Road
Table View
7441

PROPOSED MEMC STUDY AT THE CPUT: DEPARTMENT OF EMERGENCY MEDICAL SCIENCES

Your application to this department to pursue a Master's in Emergency Medical Care and the request to use the department as a study site has reference.

Your study "Emergency Medical Care students' perception on self-assessed competence levels in a selected Higher Education Institution in the Western Cape, South Africa" is of relevance to the profession and the department. Your application has been considered and I am pleased to inform you that permission is hereby granted to collect data from the department as per your research proposal. Please note the following conditions:

1. The period of access data is limited to your registration.
2. You are required to attain Faculty Research and Ethics Committee approval for the study.
3. You must notify the department if there are any changes made to your study.

We wish you well on your post-graduate endeavor.

Yours Sincerely

Mr LD Christopher
Head of Department
Department of Emergency Medical Sciences

PO Box 1906   Bellville   7535 South Africa

APPENDIX C: Letter of Information

DEPARTMENT OF EMERGENCY MEDICAL SCIENCE
RESEARCH STUDY INFORMATION LETTER

Good Day

My name is Rozaan de Lange (Norval) **I WOULD LIKE TO INVITE YOU TO PARTICIPATE** in a research study on Emergency Medical Care students' self-assessed competence levels.

Prior to deciding regarding your participation, I would like to provide an explanation of the rationale behind the research and the nature of your involvement. You will receive a detailed information letter outlining the research study, which is expected to require approximately 10 to 20 minutes for review. This study forms a component of my master's thesis.

THE PURPOSE OF THIS STUDY is aimed at assessing emergency medical care students' self-assessed competence using a modified competence scale and comparing it to final year marks of each individual. Thus, comparing self-perceived competence with actual competence.

I have put together a list of questions and answers that should help you understand the important details about participating in this research study. Take a moment to review these. If you have additional questions, I'm here to help.

DO I HAVE TO TAKE PART? Declining to participate is entirely within your discretion. An information sheet, along with a consent form, will be presented for your review. Should you opt to take part, please affix your signature to the consent form.

WHAT WILL BE EXPECTED OF ME IF I CHOOSE TO PARTICIPATE? You will need to complete a questionnaire on the topic, which will take about 10-20 minutes of your time.

WHAT WILL HAPPEN IF I WANT TO WITHDRAW FROM THE STUDY? If you opt to enroll, you retain the right to withdraw your consent at any time, without a requirement to provide a rationale, and without incurring any adverse repercussions.

IF I DECIDE TO PARTICIPATE, WILL THERE BE ANY COSTS OR PAYMENT? You will not be compensated for your participation, and there will be no costs to you.

RISKS INVOLVED IN PARTICIPATION: There are no serious risks to participate in this study.

BENEFITS INVOLVED IN PARTICIPATION: While you may not experience direct benefits from participating, the findings from this research could help improve how self-competence is assessed in students.

WILL MY TAKING PART IN THIS STUDY BE ANONYMOUS? In the initial phase of the study, your identity will be discernible. Subsequently, through an established procedure, your data will be rendered anonymous, with exclusive access granted to the researcher. Your personal identity will in no way be disseminated to the general public at any juncture.

WHAT WILL HAPPEN TO THE RESULTS OF THE RESEARCH STUDY? The findings will be summarized in a research report that will be reviewed. In certain instances, the results may also be published in a scientific journal. Regardless of the outcome, your identity will remain confidential in all documents, reports, or publications. If you wish to review the study's findings, you can contact me to gain access.

WHO IS ORGANISING AND FUNDING THE STUDY? The study is being conducted under my coordination, with the guidance of my research supervisor at the Department of Emergency Medical Sciences at the Cape Peninsula University of Technology. This study has not received any funding.

WHO HAS REVIEWED AND APPROVED THIS STUDY? Prior to the commencement of this study, it underwent a thorough review process to safeguard your interests. The Department of Emergency Medical Sciences conducted the initial review, followed by a secondary review by the Faculty of Health Sciences Research Ethics Committee at the Cape Peninsula University of Technology.

WHAT IF THERE IS A PROBLEM? If you have any concerns or complaints regarding this research study, its procedures, or any potential risks and benefits, don't hesitate to contact me. You can reach out to me at any time if you have any concerns about your participation. My contact details are:

Rozaan de Lange
079 503 7924
delanger@cput.ac.za

You may also contact my research supervisor:
Dr Simpiwe Sobuwa
sobuwas@cput.ac.za

If you believe that any questions or concerns about your participation in this study have not been addressed satisfactorily, you may contact the Vice-Chairperson of the Faculty of Health Sciences Research Ethics Committee at the Cape Peninsula University of Technology:
Dr HM Burger

Email: burgerh@cput.ac.za

FURTHER INFORMATION AND CONTACT DETAILS: If you require more specific details regarding this research project, have inquiries, concerns, or grievances about the study, including its procedures, potential risks, and benefits, please do not hesitate to contact me using any of the provided contact details.

Researcher:
Rozaan de Lange

APPENDIX D: Consent Letter

Cape Peninsula
University of Technology

DEPARTMENT OF EMERGENCY MEDICAL SCIENCES
RESEARCH CONSENT FORM

Emergency Medical Care students' self-assessed competence levels in a selected Higher Education Institution in the Western Cape, South Africa

Please initial each box below:

☐	I confirm that I have read and understand the information letter for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.
☐	I understand that my participation is voluntary and that I am free to withdraw from this study at any time without giving any reason and without any consequences to me.
☐	I agree to take part in the above study.
☐	I confirm by participating in this study and completing the questionnaire, I am also giving permission for the researcher to access my Final Year Marks, available on the Marks Administration System

_____   _____   _____

Name of Participant   Signature of Participant   Date

Rozaan de Lange

_____   _____   _____

Name of Researcher   Signature of Researcher   Date

APPENDIX E: Confidentiality Declaration

POPIA DECLARATION

In respect of research titled EMERGENCY MEDICAL CARE STUDENTS' PERCEPTION ON SELF-ASSESSED COMPETENCE LEVELS IN A SELECTED HIGHER EDUCATION INSTITUTION IN THE WESTERN CAPE, SOUTH AFRICA conducted in partial fulfilment of the requirements of a MASTER OF EMERGENCY MEDICAL CARE degree at the CAPE PENINSULA UNIVERSITY OF TECHNOLOGY.

I, Rozaan de Lange, declare that I am the responsible party in terms of in terms of the Protection of Personal Information Act, No. 4 of 2013 ("POPIA" or "the Act") for purposes of determining the purpose of, and means for, processing personal information during the conduct of the aforementioned research. I undertake to conduct this research in full compliance with POPIA, and to ensure that the rights of research participants ("data subjects") as enshrined in the Act are upheld and respected.

Without derogating from the generality of the aforegoing, in relation to the processing of all personal information, other than information which has been de-identified to the extent that it cannot be re-identified again, I undertake the following –

a) to ensure that the data subjects are aware of the purpose of the collection of their personal information.

b) to obtain the consent of data subjects for processing their personal information, and to refrain from further processing of the personal information of data subjects if they withdraw their consent.

c) to process such personal information lawfully and in a reasonable manner that does not infringe the privacy of the data subject.

d) to secure the integrity and confidentiality of such personal information in my possession or under my control, and to notify the Information Regulator, the data subjects concerned, of any access or acquisition of such information by unauthorised persons; and

e) to retain such personal information for no longer than is necessary for purposes of the research, and thereafter to destroy, delete or de-identify it as soon as reasonably practicable.

APPENDIX F: Self-Administered Questionnaire

EMERGENCY MEDICAL CARE STUDENTS' SELF-ASSESSED COMPETENCE LEVELS IN A SELECTED HIGHER EDUCATION ISNTITUTION IN THE WESTERN CAPE, SOUTH AFRICA

Questionnaire (Will be created on an online platform)

Section A

1.   Age

- ○   17– 25
- ○   26 – 30
- ○   31 – 35
- ○   36 – 45
- ○   46 and up

2.   Sex

- ○   Male
- ○   Female

3.   Programme

- ○   ECA
- ○   Diploma
- ○   BEMC
- ○   BEMC EXTENDED

4. Year

    ○   1

    ○   ECP 1

    ○   ECP 2

    ○   2

    ○   3

    ○   4

5. Do you have previous work experience in Emergency Medical Services?

    Yes / No

6. If answered yes, to above question, please choose the most relevant below.

    ○   Less than 1 year

    ○   1 – 3 years

    ○   3 – 5 years

    ○   More than 5 years

Section B

(Scoring will be from 1 – 5, with a 0=Not Applicable option; 1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, 5 = Always)

Section B (Theory subject)

1. I am actively taking steps to maintain and improve my professional skills as a student by utilising resources offered by the University and Department of EMS (e.g., library)

0=Not Applicable	1 = Never	2 = Rarely	3 = Sometimes	4 = Often	5 = Always

2. I can identify situations that may be life-threatening to both trauma and medical patients

0=Not Applicable	1 = Never	2 = Rarely	3 = Sometimes	4 = Often	5 = Always

Section C (Clinical Practice subject)

1. I can identify when a patient needs emotional support

0=Not Applicable	1 = Never	2 = Rarely	3 = Sometimes	4 = Often	5 = Always

2. I can identify when family members need emotional support

0=Not Applicable	1 = Never	2 = Rarely	3 = Sometimes	4 = Often	5 = Always

3. I am able to give emotional support when/if a patient is experiencing negative emotions

0=Not Applicable	1 = Never	2 = Rarely	3 = Sometimes	4 = Often	5 = Always

4. I can provide emotional support in a professional manner to the patient's family during a difficult situation

0=Not Applicable	1 = Never	2 = Rarely	3 = Sometimes	4 = Often	5 = Always

5.   I can identify and acknowledge my own limitations when it comes to patient care

0=Not Applicable	1 = Never	2 = Rarely	3 = Sometimes	4 = Often	5 = Always

6.   I can identify when I am mentally and physically depleted

0=Not Applicable	1 = Never	2 = Rarely	3 = Sometimes	4 = Often	5 = Always

7.   I can evaluate patient satisfaction regarding care

0=Not Applicable	1 = Never	2 = Rarely	3 = Sometimes	4 = Often	5 = Always

Section D (Theory and Clinical Practice)

1.   I can educate patients on health and wellness when the opportunity presents itself

0=Not Applicable	1 = Never	2 = Rarely	3 = Sometimes	4 = Often	5 = Always

2.   I can assess and analyse patient's well-being from a mental health perspective

0=Not Applicable	1 = Never	2 = Rarely	3 = Sometimes	4 = Often	5 = Always

3.   I can direct patients to appropriate mental care if the need arises

0=Not Applicable	1 = Never	2 = Rarely	3 = Sometimes	4 = Often	5 = Always

4.   I can complete patient documentation sufficiently and with ease

0=Not Applicable	1 = Never	2 = Rarely	3 = Sometimes	4 = Often	5 = Always

5.   I have the capability to plan patient care based on available resources

0=Not Applicable	1 = Never	2 = Rarely	3 = Sometimes	4 = Often	5 = Always

6.   I can identify areas in patient care that require further development and research

0=Not Applicable	1 = Never	2 = Rarely	3 = Sometimes	4 = Often	5 = Always

7.   I can utilise research findings to enhance patient care

0=Not Applicable	1 = Never	2 = Rarely	3 = Sometimes	4 = Often	5 = Always

Section E (Practice and Clinical Practice subjects)

1.   I can identify when other students require assistance in improving their knowledge and skills

0=Not Applicable	1 = Never	2 = Rarely	3 = Sometimes	4 = Often	5 = Always

2.   I can help other students develop their knowledge and skills in the clinical setting

0=Not Applicable	1 = Never	2 = Rarely	3 = Sometimes	4 = Often	5 = Always

3.   I always act appropriately in situations that may be life-threatening to patients

0=Not Applicable	1 = Never	2 = Rarely	3 = Sometimes	4 = Often	5 = Always

4.   I can manage a team to ensure best patient treatment

0=Not Applicable	1 = Never	2 = Rarely	3 = Sometimes	4 = Often	5 = Always

5.   I can fulfil a role as a team member to ensure best patient treatment

0=Not Applicable	1 = Never	2 = Rarely	3 = Sometimes	4 = Often	5 = Always

6.   I can take a leading role and ensure patient care

0=Not Applicable	1 = Never	2 = Rarely	3 = Sometimes	4 = Often	5 = Always

7.	I can be part of a debriefing, and identify areas of learning

0=Not Applicable	1 = Never	2 = Rarely	3 = Sometimes	4 = Often	5 = Always

8.	I can be part of a team, where multidisciplinary are present (includes in hospital and out of hospital staff)

0=Not Applicable	1 = Never	2 = Rarely	3 = Sometimes	4 = Often	5 = Always

Section F (Theory, Practice and Clinical Practice)

1.	I have the capability to plan patient care according to the specific needs of the patient within my year of study.

0=Not Applicable	1 = Never	2 = Rarely	3 = Sometimes	4 = Often	5 = Always

2.	I can adapt my treatment plan as the patient condition changes, to ensure best care

0=Not Applicable	1 = Never	2 = Rarely	3 = Sometimes	4 = Often	5 = Always

3.	I can implement decision-making skills regarding patient treatment guided by ethical values

0=Not Applicable	1 = Never	2 = Rarely	3 = Sometimes	4 = Often	5 = Always

4.	I can assess and analyse a patient's well-being from a physical health perspective

0=Not Applicable	1 = Never	2 = Rarely	3 = Sometimes	4 = Often	5 = Always

5.	I can prioritise patient treatment as necessary

0=Not Applicable	1 = Never	2 = Rarely	3 = Sometimes	4 = Often	5 = Always

6. I can make decisions regarding patient care dependant on patient condition

0=Not Applicable	1 = Never	2 = Rarely	3 = Sometimes	4 = Often	5 = Always

7. I can evaluate patient outcomes and identify areas which need further intervention or was neglected

0=Not Applicable	1 = Never	2 = Rarely	3 = Sometimes	4 = Often	5 = Always

8. I can use my acquired knowledge to provide optimal care to a patient

0=Not Applicable	1 = Never	2 = Rarely	3 = Sometimes	4 = Often	5 = Always

APPENDIX G: Certificate of Comprehensive English editing

University Editor (CC)

Certificate of comprehensive English editing

This document certifies that we have edited the manuscript indicated below for English language, grammar, spelling, clarity, and scholarly writing style.

Manuscript Title:

EMERGENCY MEDICAL CARE STUDENTS' PERCEPTION ON SELF-ASSESSED COMPETENCE LEVELS IN A SELECTED HIGHER EDUCATION INSTITUTION IN THE WESTERN CAPE, SOUTH AFRICA

Author:

ROZAAN NORVAL

Date Issued:

19 July 2024

The author's subject matter contents and intentions were unaltered during the editing **process**. Manuscripts with this certification should be grammatically ready for publication; however, the author/s have the final choice to accept or reject our suggestions and changes. If you have any questions regarding the edited document, kindly contact info@uedit.org or visit us at https://uedit.org

Signed by the editor   in Pretoria

Postal Address: 111 Bronkhorst Street, Pretoria, 0181, Gauteng, South Africa
Email: info@uedit.org   https://uedit.org

Chief Executive Officer: A Apostolides BA (UNISA), MPhil, MA (*cum laude*), PhD (University of Pretoria)