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A Description of Pre-hospital Educator Knowledge of the Educational Theories and Methods defining Simulation-Based Education.

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A research report submitted to the Faculty of Health Sciences, University of the Witwatersrand, in partial fulfillment of the requirements for the degree of Master of Health Science in Education

Johannesburg, 2020

Declaration

I Tanya van Tonder declare that this Research Report is my own, unaided work. It is being submitted for the Degree of Master of Health Science in Education at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other University.



15th day of June 2020 in Midrand

Abstract

Background: The successful and effective use of simulation-based education (SBE) is dependent on the educator's knowledge of educational theories and methods that underpin SBE. There is a paucity of literature that describes educator knowledge of these theories within the context of South African pre-hospital emergency medical services education.

Aim: The study aimed to describe the pre-hospital educator's knowledge of the educational theories and simulation methods defining simulation-based education.

Methodology: A qualitative exploratory, descriptive research design using semi-structured face-to-face interviews were selected for this study. Nine (9) educators using SBE on the Diploma of Emergency Medical Care at a Higher Education Institution in Johannesburg were interviewed. The data were analysed using conventional content analysis.

Findings: Educators using SBE on the Dip. EMC program have limited knowledge of the educational theories and methods that underpin SBE. The approach educator's use is based on their own previous educational experiences as they have limited formal educational training. Components of simulation, such as debriefing and developing the complexity of scenarios in simulation are not fully considered by the educators who have very limited knowledge of their implications in SBE.

Recommendations: Formal education training which includes educational theories and simulation methods that underpin SBE, should be made available to all educators using SBE in their teaching environment. Formal simulation education must include SBE frameworks and debriefing frameworks to guide and develop the educator's SBE practices to ensure students learning with simulation is optimum.

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Abbreviations

AEA	Ambulance Emergency Assistant
BAA	Basic Ambulance Assistant
B.Tech and B.EMC	Bachelor of Technology in Emergency Medical Care
BHS.EMC	Bachelor of Health Science in Emergency Medical Care
CCA	Critical Care Assistant
Dip. EMC	Two year Diploma in Emergency Medical Care presented at selected higher education institutions (private and government) in South Africa.
H.Cert. EMC	One year Higher Certificate in Emergency Medical Care, not yet presented in South Africa. Institutions going through accreditation processes.
HPCSA	Health Professions Council of South Africa
N.Dip	Three year National Diploma in Emergency Medical Care presented at selected South African universities from the early 90's and are being phased out.
NQF	National Qualifications Framework
PBEC	Professional Board of Emergency Care
SBE	Simulation Based Education

CHAPTER 1: OVERVIEW OF STUDY

1.1 INTRODUCTION

This study focused on an investigation and description of pre-hospital educator knowledge of the educational theories and methods defining simulation-based education. This first chapter begins by introducing the background, and context of the study. Thereafter, the problem statement, research question and research aim and objectives of the study are presented. Chapter one concludes by providing a summary of the layout of the research report and the chapters that follow.

1.2 BACKGROUND

As students registered for Higher Education pre-hospital emergency care programmes approach the exit level of their studies, additional focus gets placed on their ability to meaningfully apply previously mastered theoretical understandings and practical competencies into patient care in the real-world environment. One of the educational tools or methods that are available to achieve the above, is education with the use of simulation, known as simulation-based education. Simulation-based education (SBE) replicates realistic patient care experiences through the use of manikins, simulated patients and life-like environments to create safe opportunities for learning and student development. Here, students can recognise and treat simulated patients suffering from injuries and illnesses encountered in the pre-hospital environment safely, without the risk of causing harm to the patient (Abelsson, Rystedt, Suserud & Lindwall, 2015). The SBE environment is also important as educators can create specific environments and opportunities to focus teaching and learning in order to optimise learning opportunities for students.

For SBE to be successful, educators need to use it correctly. In order to use SBE correctly, educators should be familiar with the educational theories and education elements associated with the teaching methodology (Aebersold, 2018). The clinical qualification and clinical experience of educators using SBE is not sufficient for effective use of SBE (Nestel et al. 2016). Understanding educational theories develops the educator from being an instructor to being an

effective educator that can support and motivate students to want to learn (Jeffries, Rogers & Adamson, 2015).

McGahie and Harris (2018) describe a theory as a set of concepts, definitions and suggestions that present a methodical view of a phenomenon by specifying relationships between variables. These relationships may also be used to explain and predict phenomenon. These theories, whether made explicit or not, underpin theoretical, educational and experiential work in simulation-based education (McGahie & Harris, 2018).

Various educational theories define or guide SBE in the health sciences education context. These theories have been identified by several authors (Chauvin, 2015; Issenberg, 2005; McGahie, 2018). Chauvin (2015) identified theories that guide SBE that include the adult learning theory (Knowles, 1984), experiential learning theory (Kolb & Kolb, 2005), constructivist theory, the zone of proximal development, mastery learning (McGaghie et al., 2014) and reflective practice (Schon, 1987). These theories will be expanded upon in the literature review of this research report.

The argument made therefore is that educators require knowledge of educational theories to effectively support education through simulation. Clinical experience (content knowledge) alone is not sufficient for educators to use simulation based education effectively – educators need to know the theories that underpin education, as well as simulation methods to use SBE effectively (Nestel et al., 2016). Educators need to be able to integrate and use clinical knowledge and their clinical skill sets as well as educational knowledge to ensure that an effective environment for learning to occur is created in the SBE environment (Dieckmann et al., 2018).

Literature, however, suggests that educators involved with SBE lack knowledge of the theories and elements associated with the methodology (McClean 2008; Rogers, 2015). Authors such as McClean (2008) and Rogers (2015) indicate that there is a need to educate individuals involved with teaching using SBE (McClean 2008; Rogers, 2015). In addition to the literature presented by authors such as McClean (2008) and Rogers (2015), it is the anecdotal experience of the researcher that educators involved with SBE on the Diploma in Emergency Medical Care

(Dip. EMC) programme have little training or no formal education qualification. Most of the educators are qualified Emergency Care Practitioners that are employed as academic members dedicated to the programme, and as such, are well educated as clinicians, but many of these educators have not completed any education-specific courses or programmes, and are therefore not necessarily well informed as educators.

The problem faced is that, whilst literature on educational theories within health care education is abundant, literature on educator knowledge of these theories in the context of South African pre-hospital emergency care programmes is not available. This study is therefore aimed at exploring and describing what educators teaching on the Diploma in Emergency Medical Care know about the educational theories and simulation methods that guide SBE. A qualitative exploratory, descriptive design was used to answer the research question.

1.3 PROBLEM STATEMENT

The central argument of this research study is that the successful use of SBE is dependent on educator knowledge of educational theories that underpin SBE. Although sufficient literature exists to describe these theories, there is a paucity of literature that describes educator knowledge of these theories within the context of South African pre-hospital emergency medical services education. The lack of this literature makes it difficult to determine whether SBE is successfully used in pre-hospital emergency medical care education programs within South Africa. This study becomes necessary as the description of the knowledge of pre-hospital educators regarding the educational theories and methods that guide SBE may provide the basis of an argument that may guide or inform future research and may highlight the need for future simulation educator programs.

1.4 RESEARCH QUESTION

What is the knowledge of pre-hospital educators regarding the educational theories and methods that guide SBE?

1.5 THE RESEARCH AIM

To address the research problem, the aim of this research project, therefore, is to investigate and describe the pre-hospital educator knowledge of the educational theories and simulation methods defining SBE.

1.6 THE OBJECTIVES OF THE STUDY

In order to achieve the aim, the following objectives were identified.

- To investigate and describe pre-hospital educator's knowledge of the educational theories that underpin SBE.
- To investigate and describe pre-hospital educator's knowledge of the simulation methods that underpin SBE.

1.7 SIGNIFICANCE OF THE STUDY

Describing the pre-hospital educator's knowledge of educational theories and simulation methods of SBE in the Diploma in Emergency Medical Care program may possibly identify gaps of knowledge, if these exist. The research study will add to the local body of evidence on SBE, especially within the context of pre-hospital emergency care education. Should gaps of knowledge be identified, this may lead to the development of initiatives to develop and support educators on the awareness of educational theories and simulation methods underpinning SBE.

1.8 RESEARCHER POSITIONALITY

At the time of writing this research report, the researcher was an academic staff member at a local pre-hospital emergency care education institution. The researcher was not employed at the institutions included in the study. The researcher holds a formal education qualification, and has a special interest in SBE learning and assessment activities. It is because of this interest that this research study was conceptualised. The researcher bracketed her previous experiences, maintaining a clear and objective approach during the individual interviews, data collection, and analysis. The researcher will elaborate on how bias was minimised in Chapter 3 in the section on trustworthiness.

1.9 DEFINITION OF TERMS RELATED TO THE STUDY

The following definitions will apply when these terms are referred to in the study:

Educational theory refers to generalised explanations for natural phenomenon that provide statements and principles that guide teaching and learning (Chauvin, 2015).

Educational science differentiates between theories of learning and theories of teaching. Theories of learning involve the change in biochemical processing of information in the student's brain (Chauvin, 2015). Theories of teaching refer to how the teacher influences the learning process, this involves the teaching simulation methods used, interaction, and the physical and psychological elements of the learning environment (Chauvin, 2015; Pasquale, 2015).

An *Educator* is defined by the Merriam-Webster dictionary as: "one skilled in teaching" (Merriam-Webster.com, 2020). Simulation educators should be skilled in teaching simulation, with the knowledge of educational science the skill involved to know how to design educational simulation experiences to guide the teaching and learning process (Pasquale, 2015). Educator in this study refers to a person that is involved with SBE.

Simulation methods will refer to the different types of approach to simulation teaching and learning sessions within the context of SBE. Simulation method includes the learning environment created through the type of simulation chosen (immersive simulation, computer-based, hybrid simulation ect.), fidelity and how the simulation is presented (the shape and design) including the debrief approach (Chiniara et al., 2013).

Simulation is defined by the Cambridge dictionary as: "a model of a set of problems or events that can be used to teach someone how to do something, or the process of making such a model" (Cambridge.org, 2020). Simulation in this study refers to simulating a real-life patient condition or injury for students to assess, apply critical thinking and manage the simulated patient.

A *simulated patient scenario* refers to the use of full-body computerised manikins and simulated patients (actors) to simulate a condition or injury.

Mastery learning is defined by the Healthcare Simulation dictionary (2016) as: "an instructional philosophy that highlights individualized feedback and adequate time, allowing the learner to progress through the subject in a customized manner, generally in smaller units, to master the subject matter." (2016). Nearly all learners progress and achieve the required level of mastery through a cycle of feedback and corrective procedures.

1.10 OUTLINE OF THE RESEARCH REPORT

This first chapter provides the background and the context of the study.

Chapter 2 describes and presents literature related to simulation history and use, pre-hospital education and the use of simulation in pre-hospital education as well as presenting literature on the need for educator's teaching simulation to have the necessary background and training regarding the educational theories guiding SBE.

Chapter 3 describes the research design and provides a reminder of the aim, and objectives and the simulation methods that were used for data collection and analysis. Ethical considerations and limitations will also be discussed.

Chapter 4 reports on the findings that were analysed and describes the themes that were identified from the transcription and interpretation of the individual interview data.

Chapter 5 focuses on discussing the data analysed in an attempt to answer the research question.

Chapter 6 concludes and summarises the study and provides recommendations for practice and further study.

The next chapter discusses the relevant literature that describes simulation and pre-hospital education.

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

As discussed in Chapter 1, the researcher aimed to investigate and describe pre-hospital educator knowledge of the educational theories and methods defining simulation-based education

The researcher uses this chapter to present literature on emergency care education in South Africa and the importance of simulation-based education (SBE) within the pre-hospital emergency care education environment. Theories that guide SBE, especially pertaining to education theories and simulation methods, are discussed and the need for educators to be familiar with explained theories and methods is made explicit. This literature review is important as it attempts to frame the study within the context of existing knowledge.

2.2 PRE-HOSPITAL EMERGENCY CARE IN SOUTH AFRICA

In South Africa, emergency medical care in the pre-hospital setting is provided by professional personnel who register with the Professional Board of Emergency Care (PBEC) of the Health Professions Council of South Africa (HPCSA) (HPCSA, 2010). Professional registration occurs across several registration categories. The registration categories are linked to the level and type of pre-hospital education that the provider completed (HPCSA, 2010). The registration categories, in turn, relate to clinical practice guidelines with lists of capabilities and approved medications that determine levels of care (HPCSA, 2018).

2.3 PRE-HOSPITAL EDUCATION IN SOUTH AFRICA

Education in the pre-hospital environment has gone through a transformation in the last 20 years (Vincent-Lambert 2015). Pre-hospital education is moving away from predominantly short course training (Annexure A) towards the implementation of higher education qualifications. The most significant difference is that there are currently only three pre-hospital education programmes that lead to professional registration with the HPCSA (Annexure A), available to students (HPCSA, 2020).

These three higher education programmes include the following: a one-year, 120 credit, National Qualifications Framework (NQF) 5 Higher Certificate in Emergency Medical Care, a two-year, 240 credit, NQF level 6 Diploma in Emergency Medical Care and a four-year, NQF 8, 480 credit Bachelors of Health Sciences Degree in Emergency Medical Care (Vincent-Lambert 2011 and 2015). These programs are aligned with the NQF of the South African Qualifications Authority (SAQA). Registration categories at the HPCSA with the professional board of emergency care, linked to the mentioned qualifications, are Emergency Care Assistant (ECA), Paramedic (ANT) and Emergency Care Practitioner (ECP) respectively (HPCSA, 2020).

The different NQF levels that the programmes are aligned to, determines the learning achievement required (SAQA, 2012). At an NQF level 6, where the Dip. EMC is aligned the student is expected to be able to identify, analyse and solve problems in unfamiliar contexts by gathering evidence. They are expected to be able to apply the solutions based on the evidence and procedures (SAQA, 2012)

On completion of pre-hospital emergency care education, graduates provide emergency medical care as independent emergency care providers (HPCSA, 2019). There is no opportunity for graduates to participate in an internship program. Graduates have no time to be guided and become confident after graduation, they are expected to be practice ready to provide emergency medical care without supervision (HPCSA, 2019). Therefore the pre-hospital higher education institutions are responsible to ensure that graduates are competent and confident on completion of their undergraduate studies to provide emergency care independently. This means that the emphasis of the educators should be placed on meaningful learning and mastery of skills during the undergraduate degree.

Simulation provides an opportunity for the student to apply theoretical knowledge and practical skills to obtain the required mastery of skills. It provides an opportunity for educators to simulate real-life scenarios during the student's educational experience and serves as a formative and summative assessment tool to assist in the development of competent students that are practice-ready. Students get the opportunity to be exposed to important conditions and injuries prevalent in the pre-hospital emergency medical care environment and use their skills

and knowledge in a controlled and safe environment that is conducive to learning (Abelsson et al., 2015). Simulation assists in preparing the students for the possible case-mix and different acuity levels that they will see after graduating and provides a greater range of learning opportunities than the chance encounters that non-simulation clinical learning often relies on (McKenna et al. 2015).

2.4 SIMULATION HISTORY AND USE

The origin of simulation stems from the aviation industry (Jones et al. 2015). Jones et al. (2015) indicate that pilots were provided with the opportunity to perform simulated flights, in a flight simulator invented by Edward Albert Link in 1929. The most important contribution that these types of simulations made, was to afford the pilots the opportunity to make mistakes and learn from them, without any real-life repercussions. In the 1960s a plastic toy maker, Ausmund Laerdal, designed a manikin to simulate mouth-to-mouth ventilation after Peter Safar indicated the efficacy of mouth-to-mouth ventilation during cardiopulmonary resuscitation (Chiniara et al., 2013 and Jones et al. 2015). This task trainer simulator was one of the first to be commercialised in healthcare and also one of the most widely used (Chiniara et al., 2013)

Many advances in simulator design followed after this and simulation was incorporated into medical schools and nursing programs (Jones et al., 2015). The simulator also gave rise to the use of simulated patients first reported in 1964 by Howard Barrows (Jones et al, 2015). Abelsson et al. (2015) recognised the potential of this pedagogy used in aviation and earlier medical practices for pre-hospital teaching and learning, the use of a controlled safe environment where students can learn from their mistakes would allow them to gain competency and confidence before being exposed to real patients in a stressful environment.

Simulation in health sciences education has gained exponential favour over the last two decades (Motola et al., 2013). Simulation-based teaching and assessment strategies in the health sciences were developed after a need to correct medical errors was identified by the Institute of Medicine, USA (Chiniara & Crelinsten, 2019). Within the pre-hospital clinical environment, the variety of patient conditions and problems that students encounter cannot be controlled.

Students must have confidence before being exposed to real patients in the clinical context (McGaghie et al., 2014; Motola et al. 2013).

2.5 THEORIES THAT INFORM SIMULATION-BASED EDUCATION

Simulation is used as an effective tool to bridge the gap between theory and practice (Topping et al., 2015). It requires a multiskilled educator that can assist students to combine, knowledge, skills and behaviour in a simulated environment. Simulation-based education will only be effective if it is used well (Motola et al., 2013). Doing simulation well means that educators need to be able to stretch their students to their full capacity, link patient management and their affective and cognitive skills. In order to use simulation effectively, the educator needs to know how their students learn, how to effectively use the simulation tool in education, stimulating students to move through the experiential learning cycle, stimulate higher order thinking and ensure mastery of learning (Nestel et al., 2016).

Various educational theories have been described that provide principles to guide the educator when designing and implementing simulation-based teaching and learning (Chauvin, 2015; Clapper, 2010; and McGaghie, 2014). Educators need to be aware of the educational theories in order to create educational simulation experiences to influence the learning process for students to become clinically competent and confident health care providers (Chauvin, 2015). The most common theories and taxonomies described in the literature that influence and guide simulation-based learning are behaviourism, cognitivism, constructivism, mastery learning, adult learning theory, Jeffries simulation theory and Bloom's and Miller's taxonomies (Chauvin, 2015; Clapper, 2010; and McGaghie, 2014).

Behaviourism is the concept that a stimulus in the environment causes a change in behaviour (Taylor and Hamdy, 2013). The first work of this theory was done by Pavlov (1890's) on his observed responses after stimulation in dogs. He observed every time the stimulus is given the dogs had the same response. Skinner further developed the work of Pavlov (1890's) by expanding on the behavioural theory of his work done on operant conditioning where he observed reinforcement of the response to a stimulus (Taylor and Hamdy, 2013). In pre-hospital education, students need to be taught to have appropriate responses in medical emergencies.

During a simulation, students are given a simulated patient presentation if the treatment they provide is correct or appropriate the condition will improve. The student will see a response to their action by observing a simulated change in the clinical presentation of the simulated patient (Rutherford-Hemming, 2012). If the student observes this change every time the action is performed and then the change does not occur when the action is not performed they should learn the importance of the cause and effect of the action performed or not performed. There should however be clinical reasoning when a student performs an action during the treatment of a patient, in this case, a simulated patient (Roberts et al., 2016).

Cognitivism is focussed on how students perceive and process information (Taylor and Hamdy, 2013). Piaget's theory used children as the basis of his study which was based on the principle that children learn by making neural connections as they grow (Taylor and Hamdy, 2013). In other words, by processing information received learning occurs. Bruner has added to the body of work on cognitivism. He identified three important components of information processing (learning) namely, acquisition, transformation, and evaluation of the information. (Becker & Hermosura, 2019). Cognitivism is used during the debriefing sessions after a simulation. By asking the students several questions and allowing them to reflect and reason, stimulates information processing and therefore according to the cognitivist theory should cause learning (Abelsson et al., 2015).

Constructivism also plays an important part in SBE. Students learn by building on past and educational experiences, through their interaction with equipment, manikins, and reflection (Fenwick, 2001). Several constructivist theorists added to the original body of work on the constructivist theory. Jean Piaget described that students learn when interacting with their environment, and change or provide additional information within their individually constructed knowledge frameworks (Fenwick, 2001). Lev Vygotsky emphasised that learning occurs within the socio-cultural constructs, meaning that students learn through their engagement and discourse in a social environment (Fenwick, 2001).

The constructivist David Kolb's view is based on the work of many other constructivists (Fenwick, 2001). Kolb's view is that learning occurs in a tension and conflict-filled cycle as a student processes and analyses a concept until understanding is achieved, which is done through

reflection on experiences (Fenwick, 2001). Kolb believed that when new information, skills or knowledge are encountered learning occurs through the conflict between concrete experience, reflective observation, abstract conceptualisation and active experimentation (Fenwick, 2001; Kolb and Kolb, 2005). Figure 2.2 illustrates Kolb and Kolb's learning cycle (Kolb and Kolb, 2005).

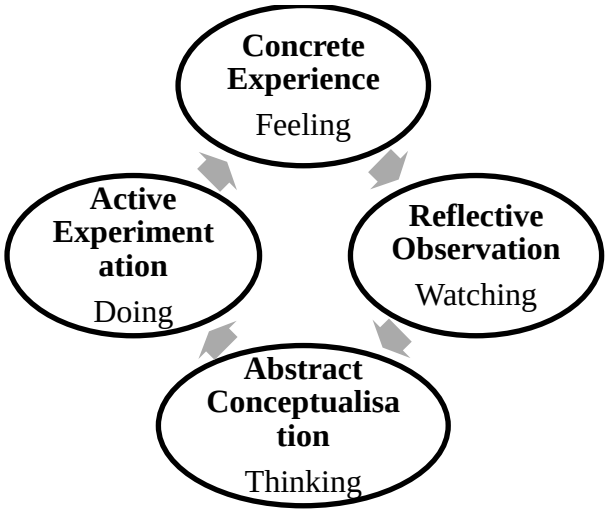


Figure 2.1 Kolb Experiential Learning Cycle (Adapted from Kolb and Kolb (2005))

During a simulation, students are exposed to the clinical presentation and management regimes of a patient. It provides the student with the opportunity to experience clinical presentation and management regimes in a safe and controlled environment where they can reflect on their actions and plan for future interactions or similar experiences (Chauvin, 2015; Taylor, 2013).

Chauvin (2015) includes *Mastery of learning* into the theories that guide simulation-based teaching. Mastery of learning is based on the premise that everyone learns at their own pace but everyone can learn (Chauvin, 2015; McGaghie, 2014). Within the concept of mastery of learning, reflective practice is essential for ongoing learning and development (Chauvin, 2015). Donald Schön's interest in reflection and how it plays a role in the ongoing development and growth of professionals led to his work on reflection (Fenwick, 2001). Schön proposed that learning occurs when there is an experience that is uncomfortable then inquiry and experimentation start to solve the problem that caused the discomfort (Fenwick, 2001). During a simulation, reflection can be encouraged through discourse during debrief and/or during a simulation where a specific difficulty is experienced to allow a student to reflect and talk through their actions (Chauvin, 2015).

The *adult learning theory (andragogy)* was introduced by Knowles and colleagues in the early ’80s (Chauvin, 2015). The theory explained that adults learn best when they are motivated, involved and can relate what they are learning to real-world experiences. They explain that adults are intrinsically motivated. Through SBE extrinsic motivation and reflection assists in changing the way that adults learn. This forms part of the *transformative learning theory* (Mezirow, 1997), students have a zone of reference that their learning experience will be based on. As reflection is encouraged and conflict within the students arise, they can reflect and go through the process of perspective transformation to make the changes needed, for them to own and make the new changes required for meaningful learning to occur.

The Jeffries simulation theory (2015) is based on a framework designed for the use of simulation in healthcare education. This simulation theory is based on the following concepts: context, background, design, simulation experience, facilitator and educational strategies, the participant and outcomes (Jeffries and Adamson, 2015). The context refers to where the simulation activity will be conducted, the place and the purpose. The goal, specific expectations or benchmarks that influence the design of the simulation forms the background of the simulation. Figure 2.1 illustrates the Jeffries simulation theory.

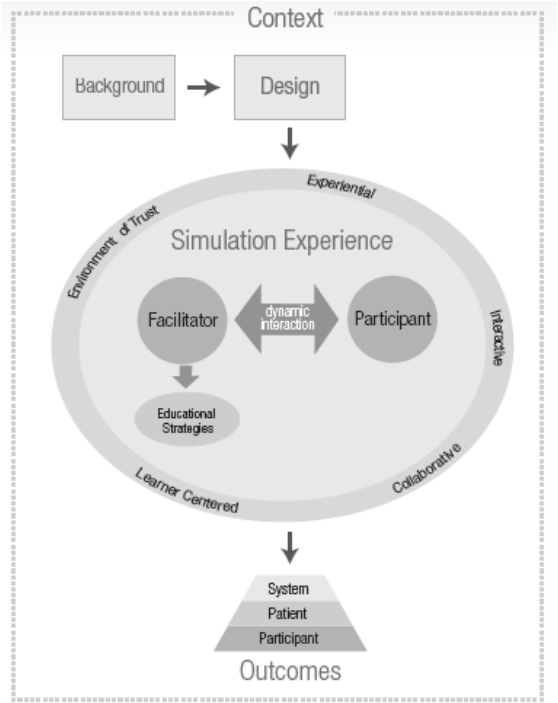


Figure 2.2 NLN Jeffries Simulation Theory (Jeffries and Adamson, 2015)

The design of the simulation experience involves the learning objectives that guide the selection of activities and the scenario. It also involves the fidelity, participant interventions, facilitator responses, roles and briefing/debriefing strategies. The design is followed by the simulation experience which involves a dynamic interaction between the participant and the facilitator. This interaction is characterised by an environment of trust that is experiential, interactive, collaborative and student-centered. The facilitator fulfils a dynamic role, they need to respond to the needs of the participant and adjust the educational strategies as the need arises and alter the plan of simulation activities accordingly. The facilitator needs to provide feedback in the form of prompts or cues from the manikin or verbally and provide a debrief session towards the end of the simulation experience. The participant's qualities (experience, motivation, level of training etc.) also affect the simulation experience and the design of the simulation experience can impact the learning experience of the participant. The outcome of the simulation experience impacts the participant, the patient and the healthcare system.

Authors have identified that taxonomies of learning are important to determine at which level simulation teaching should be initiated and then advanced, to achieve a higher level of thinking and mastery (Chauvin, 2015; Issenberg et al, 2005 and McGaghie, 2014). The Encyclopedia of the Sciences of Learning defines taxonomy as: "a scientific process of classifying things and arranging them into groups" (Gogus, 2012, p469). Bloom and Miller's taxonomies can be used to select the appropriate simulation method and approach.

Bloom's taxonomy is comprised of different levels that involve the affective, psychomotor and cognitive domains. Within these domains, the levels are knowledge, comprehension, application, analysis, synthesis, and evaluation (Wilson, 2016). In the early 1990s, *Miller* created a framework for clinical assessment which comprises of different levels from know (knowledge), knows how (competence), shows how (performance) and does (action) (Miller, 1990). These taxonomies are used during the planning and creating of learning outcomes and assessments (Chauvin, 2015; Miller 1990 and Wilson, 2016). The NQF level 6 description for the Dip. EMC programme includes the domains as described in Bloom's taxonomy. The level descriptor incorporates 10 competencies that describes the learning achievement with a broad indication of learning outcomes and assessment criteria that is appropriate at this level (SAQA, 2012).

Fink (2003) has described the *taxonomy of significant learning* (meaningful learning), learning that it is relational and interactive. Fink (2003) argues that for learning to be significant and meaningful there has to be a change in the student and without this change, there can be no learning. The components of the taxonomy of significant learning are i) Foundational knowledge, ii) Application, iii) Integration, iv) Human Dimension, v) Caring and vi) Learning how to learn (Fink, 2003). If each of these components is studied with their specific kinds of learning under each category, it can be deduced that simulation provides the student with the opportunity to actively learn to manage patients. Management of simulated patients will lead to an increased ability to apply and integrate knowledge, skills and competencies taught in the classroom into patient care, but will also bring about a change and development of the students' ability to care, and change student behaviour when managing patients.

2.6 THEORIES THAT INFORM SIMULATION METHODS

2.6.1 Simulation Approach

Jeffries and Adamson (2015) in their description of the Jeffries Simulation theory refer to the simulation experience. The educational strategies, design and implementation of a simulation will affect the simulation experience. The simulation experience should produce a dynamic interaction between the educator and the student. The design of the simulation will determine the approach used during the simulation. The design of the simulation involves the specific objectives that guide the selection of scenarios and activities with the appropriate level of complexity for the students. The appropriate level of complexity will stimulate problem-solving during the simulation experience.

The level of complexity is linked to scaffolding as described by Bruner and Vygotsky (Becker, 2019). Scaffolding builds on Vygotsky's zone of proximal development, taking a student from what they know with guidance towards what they should know (Becker, 2019). It is important that the simulation design takes into consideration where the students currently are and the plan of how they will be guided to get them where they need to be.

As part of the simulation design, selecting the level of fidelity, which refers to the level of realism in the simulation, is important to ensure that the simulation experience is stimulating

(Jeffries and Adamson, 2015). Fidelity is discussed in detail in this chapter under section 2.6.2. Different roles of the participants and the progression of activities are considered and planned during the design of the simulation. The briefing and debriefing strategies that will be used during the simulation experience also forms part of the simulation design.

Debriefing as part of the simulation experience is important because that is when the significant learning happens (Aebersold, 2018), that is when the knowing and the doing becomes inseparable (Schön, 1987). Debriefing often occurs after the simulation experience has ended and it allows the student, educator and observers to reflect-on-action (Chauvin, 2015). The term reflection-on-action was created by Schön (1987). Reflection-on-action allows the educator and observers to reflect and participate in a discussion related to decisions and actions taken during the simulation experience. Schön (1987) also describes reflection-in-action which occurs while students are immersed in the simulation and the student thinks about what they are doing and can decide to change the course of action (Chauvin, 2015; Pasquale, 2015). The educator can stimulate reflection-in-action during a simulation experience by asking the student what their thoughts are and thereby assisting the student to reflect on what they are doing while they are doing it.

Debriefing, reflection-in-action and reflection-on-action all form part of the experiential learning theory (Kolb and Kolb, 2005). As discussed in section 2.6 of this chapter, through reflection on the simulation experience and the conflict it creates students process and analyses information until understanding is achieved.

2.6.2 Fidelity of Simulation in Pre-hospital Education

Simulation fidelity refers to the degree that a simulation replicates a real-life situation (Jones et al., 2011). Jones et al. (2011) refer to work done by Quinones and Rehman (1995) which summarises important dimensions of fidelity namely: equipment fidelity, environmental fidelity, and psychological fidelity. Equipment fidelity refers to the actual simulator that can range from a manikin on which a student can practice cardiopulmonary resuscitation (CPR) with little feedback (low fidelity) to a manikin that can sweat, change pupil sizes, has pulses, etc. (high fidelity). Environmental fidelity refers to the environment within which the student

does the simulation, the sound, visual and sensory information that makes simulation more realistic. Psychological fidelity refers to the students' performance in a simulated environment, whether they believe that the scenario and conditions that they are presented with, simulate a real scenario. Becker and Hermosura (2019) add functional fidelity which refers to the realism of the simulated responses.

Fidelity does not always require expensive modern technology manikins, a change in the environment, simulated patients and simple techniques, like spraying water on the manikin to simulate sweating can increase the fidelity of the simulation (Jones et al., 2011). Improving the fidelity of the SBE activity that the student interacts with assists in preparing the student for the reality of treating patients in different settings and conditions within the pre-hospital environment.

Educators with formal training in the theories that ground simulation, including the fidelity of manikins, the environment, functional and psychological fidelity, feel more confident and can provide a better and more effective learning experience for their students (Nestel et al. 2016; Topping et al. 2015).

2.7 IMPORTANCE OF EDUCATOR KNOWLEDGE OF SIMULATION-BASED EDUCATION

Knowledge of the educational theories that guide simulation-based education is important as simulation teaching is more than just controlling a manikin and telling a student what they did and did not do. For this reason, educators involved with simulation are required to possess knowledge of educational theory, as well as specific competencies and skills sets to allow them to use simulation effectively. These competencies have been identified and grouped as knowledge, skills, behaviours and comportment by Topping et al. (2015) in a study based on nurse educator competencies required when teaching using simulation. Topping et al. (2015) listed numerous competencies under knowledge, of these the knowledge of learning theories and pedagogies, have been identified by several sources as an important competency for educators (Aebersold, 2018; Chauvin, 2015; Jeffries and Adamson, 2015; McGaghie and Harris, 2018; Rogers et al., 2015).

Knowledge skills imply the collective and interwoven use of educational, clinical and medical knowledge, which is also curriculum-driven for SBE (Topping et al., 2015). Educator behaviours and skills refer to the creation of realistic scenarios, briefing the students, running the simulation and then debriefing the simulation (Topping et al., 2015). The educator will need to master the technical aspects of operating the simulation equipment as well as have the skills to manage equipment malfunction or technical difficulties without causing major interruptions during simulation teaching. These competencies are needed to ensure that the quality of simulation teaching is of a high standard and to maximise the benefit and efficacy of simulation-based education (McLean et al. 2008; Topping et al. 2015).

2.8 CONCLUSION

In conclusion, the researcher explained that pre-hospital education is moving from predominantly short course training towards the implementation of higher education qualifications. The impact on education is that the students on short course training were predominantly taught as technicians with an extensive focus on skill competency. The implementation of higher education qualifications demands the development of students to not only have the technical ability but to develop critical thinking and reflection skills. SBE is implemented in pre-hospital education programmes in South Africa and SBE is underpinned by well-described educational theories. If SBE is used an effective educational method it provides the optimal opportunity to develop students as critical thinkers. The following chapter will describe the methodology used in this research to answer the research question.

CHAPTER 3: METHODOLOGY

3.1 INTRODUCTION

In this chapter, the researcher reminds the reader as to the central aim, objectives and research design applicable to this study, which was to describe pre-hospital educator knowledge of the educational theories and methods defining simulation-based education. This is followed by a detailed description and argument for the selected qualitative exploratory, descriptive design. The chapter concludes with a discussion of ethical considerations applicable to the study and the methods followed to ensure the trustworthiness of the research.

3.2 RESEARCH DESIGN

The research design forms the blueprint of the study and includes logical steps taken by the researcher to answer the research question (Brink, Van der Walt & Van Rensburg, 2018). This study used a qualitative exploratory, descriptive design (Creswell 2014) because the researcher wanted to describe pre-hospital educator knowledge of educational theories and simulation methods that guide simulation-based education (SBE). The researcher wanted to gain insight into the pre-hospital educator theoretical (educational) background and their approach used during SBE.

Qualitative studies are used to understand a phenomenon when little is known about a phenomenon (Brink et al., 2018; Cresswell, 2014). A qualitative research approach enables the researcher to engage with the participants to explore and attempt to understand the pre-hospital educator's knowledge of educational theories used during SBE. To be able to investigate educator knowledge of educational theories and simulations methods, how it manifests and all other related factors the researcher used an explorative design (Polit & Beck, 2012).

A descriptive design is used to describe, observe and document detailed findings regarding the research problem (Brink et al., 2018). The use of a descriptive design in this study allowed the researcher to observe, describe and document the pre-hospital educator's knowledge of educational theories and simulation methods that guide SBE from their own perspective. Describing all aspects of the research problem provides the reader with a documented

comprehensive summary and the extent of the research problem as it naturally occurs (Polit & Beck, 2012).

3.3 RESEARCH AIM

The research aim of this study which was to investigate and describe the pre-hospital educator knowledge of the educational theories and simulation methods defining SBE.

3.4 RESEARCH OBJECTIVES

The objectives that were identified to achieve the aim were:

i. To investigate and describe pre-hospital educator's knowledge of the educational theories that underpin SBE.
ii. To investigate and describe pre-hospital educator's knowledge of the simulation methods that underpin SBE.

3.5 THE STUDY SETTING

The study or research setting refers to the location and environment where the data are collected (Brink et al., 2018). This study was conducted in Gauteng at two satellite sites of a higher education institution. The higher education institution was purposefully selected because at the time of the study it was one of two higher education institutions in Gauteng presenting the Diploma in Emergency Medical Care (Dip. EMC). The institution was also selected because the educators teaching on the Dip. EMC program uses simulation-based education (SBE) as part of the teaching methods on the program. The researcher is employed at the other higher education institution within Gauteng and to avoid researcher bias this institution was not included as a research site.

3.6 POPULATION AND SAMPLING

3.6.1 Population

The population of a study is the targeted group for the study that is of interest to the researcher and meets the study criteria (Brink et al., 2018). The study population was educators using

simulation as a teaching method on the Diploma in Emergency Medical Care the total population in the context of this study was 11 (N=11).

3.6.2 Sampling

The sampling process involves selecting a group of the selected population to collect and document information regarding the research problem in a way that represents the population (Brink et al., 2018).

Convenience sampling was used to select the population as the participants were readily available to participate in the study. Convenience sampling is also known as accidental or availability sampling that involves a choice of readily available participants for the study (Brink et al., 2018). Some elements of purposive sampling were used as this is based on the researcher's judgement regarding participant's that are knowledgeable about the research phenomenon (Brink et al., 2018).

3.6.3 Inclusion and Exclusion Criteria

The inclusion and exclusion criteria enabled the researcher to decide whether an individual can be classified as part of the study population.

Inclusion criteria:

- Educators at either of the satellite sites of the higher education institution.
- Educators teaching on the Dip. EMC program.
- Educators teaching using SBE.

Exclusion criteria:

- Educators at the excluded higher education institution.
- Educators not teaching on the Dip. EMC program.
- Educators that are not involved with SBE on the Dip. EMC program.

3.6.4 Sample Size

The sample size at the selected satellite sites was small and the possibility existed to interview all educators teaching on the Dip. EMC program. At the time of data collection, there were two

educators at one satellite site and nine educators at the second satellite site. A total of eleven educators (N=11) were available to be approached as participants at both the satellite sites. The realised sample of participant's that consented to participate in the study were nine educators (n=9), two from one satellite site and seven from the second satellite site, as two educators at the second satellite site were unavailable to participate in the study.

3.7 DATA COLLECTION PROCESS

3.7.1 Data Collection Method

To address the objectives and aim of the study qualitative data was collected using semi-structured face-to-face interviews. Semi-structured interviews allow the researcher to prepare questions to answer the research question and guides the interview. It also allows the researcher to ask additional probing questions to get a deeper understanding of the topic from the interviewee (Brink et al., 2018). A researcher designed interview-guide was used during the individual interviews (Annexure B). The interview-guide was designed with the research question, aim and objectives of this study in mind. Leading and probing questions were provided in the questionnaire to guide the interview flow.

3.7.2 Data Collection Tool

The researcher plays a vital role during the data collection process in exploratory descriptive qualitative research (Brink et al., 2018; Polit & Beck, 2012). The interview guide used in this study was designed and refined by the researcher and supervisor before being pre-tested by the researcher. The interview guide (Annexure B) consisted of biographical data of participants, three leading questions with probing questions to assist in obtaining a more in-depth understanding of the interviewee's responses. The researcher pre-tested the tool on two candidates. These candidates were educators teaching on the Dip. EMC program that were not employed at the satellite sites used for the context of this study. The findings of the pre-test were not included as part of the main study findings. This provided the researcher with the opportunity to refine the interview guide questions and improve interviewing skills. During the interview, additional probing questions were asked in order to obtain a more in-depth understanding of the educator's knowledge or where the interviewee did not understand the question. These changes were included in the final interview-guide.

3.7.3 The process of data collection

HREC ethics clearance was obtained from the researcher's university ethics committee (Annexure C). The researcher contacted the Head of Department (HOD) of the research institution and forwarded her proposal, information letter (Annexure D) and ethics clearance certificate (Annexure C) to them requesting permission to conduct the study in their institution. Ethical clearance and permission to interview the educators at the satellite sites of the research institution were granted by the HOD of the institution where the research was conducted (Annexure E). After permission was given by the research institution the individual satellite sites were approached and permission was granted by the relevant persons at the satellite sites to interview the educators (Annexure F). The researcher on request of the institution where the research was conducted had to provide the participants with an additional information letter and two consent forms, one for the study and one for being digitally voice recorded (Annexure G). The satellite site managers provided the researcher with the contact details of the educators.

- **Gaining access to the participants**

The researcher contacted the satellite sites and arranged dates that would suit the satellite site and the potential participants to conduct the interviews. The potential participants were greeted and a verbal explanation of the purpose of the study was given. The potential participants were then provided with an information and invitation letter from the researcher's university and the institution where the research was conducted (Annexure D and G) to participate in the study. If the participant agreed to participate in the study, a time was arranged telephonically, that was determined to be convenient for the participant for the interview.

- **The interview process**

Before initiating the interview, the participants were requested to complete the consent forms for participating in the study and for the digital recording of the interview (Annexure G and H). Any questions related to the clarification of the study were answered before participants signed consent. Each participant was informed that they could withdraw at any stage during the study. Each participant signed the consent forms voluntarily. The interview times ranged from 16 and a half to 23 minutes.

The interviews were conducted at the satellite sites at times and dates that were convenient to the participants. The dates and times were confirmed via telephone and all participants that signed consent to participate in the study were interviewed face to face on these dates. The participants chose the locations for the interview, the majority of the participants were interviewed in their own offices. At the one satellite site, the interviews were done in a classroom that was not being used. Data collection stopped once all the participants who signed consent to participate in the study had been interviewed. The interviews were digitally recorded using a voice recorder. The interviews were numbered for the researcher to identify the recordings and to provide anonymity to the participants. The digital recordings from the semi-structured interviews were then transcribed verbatim by the researcher (Annexure I).

3.8 DATA ANALYSIS

To organise, structure and draw meaning from data, data analysis is required (Polit & Beck, 2012). Data analysis enables the researcher to make sense of all the data and to give the data structure. This study used conventional content analysis as described by Hseih and Shannon (2005) to analyse the data. Conventional content analysis involves the following steps: data transcription, data immersion, coding, searching for and categorising themes, identify relationships between categories and relating themes to theories or research findings in the discussion (Hseih & Shannon, 2005).

Transcription of data allows for accurate recording of the interview findings and enables the researcher to familiarise herself with the data (Polit & Beck, 2012). Before analysing the data the digital recordings from the semi-structured interviews were transcribed verbatim by the researcher (Annexure I). Before continuing with coding and further analysis and to ensure more accurate transcribed data the researcher read the transcriptions while listening to the interview audio recordings.

During the data analysis process researchers *immerse* themselves in the data by repeatedly reading the transcripts and looking for new insights to emerge (Hseih & Shannon, 2005). The researcher read the transcribed recordings repeatedly, initially with the recordings and then

without them to become familiar with the data. To search for patterns and meaning, the initial ideas were noted down.

The next stage in data analysis is *coding* of the initial findings. Coding involves inductive and deductive reasoning to categorise the data after finding patterns and explanations for findings that are related to the research problem (Brink et al., 2018). Before starting the coding process the research question and objectives were revisited. The printed transcripts were read word for word and similar ideas that immerged from the data were highlighted in the same colour on the different transcripts. The highlighted ideas were entered into an electronic table to assist with categorisation and coding.

The coded data were *sorted and categorised* to form themes, they were refined, and named while ensuring that the themes identified were distinctly different from each other. Data within the themes were looked at to ensure coherency. The final themes were analysed and related back to the research question and literature. The findings with relevant data excerpts will be discussed in Chapter 4, and in Chapter 5 the data findings will be discussed and supported by the literature.

3.9 TRUSTWORTHINESS

Lincoln and Guba (1985) created a framework to ensure the trustworthiness of qualitative research. Trustworthiness is used to measure the rigour of a qualitative study (Polit & Beck, 2012). Lincoln and Guba's (1985) framework suggests four criteria for trustworthiness, namely i) credibility, ii) dependability, iii) confirmability and iv) transferability. Trustworthiness during the research process was ensured using Guba and Lincoln's (1994) framework.

3.9.1 Credibility

Credibility refers to the certainty of the data collection, the analysis and explanation used to describe the data (Polit & Beck, 2012). In essence, it is the truth of the data presented and the interpretation thereof (Polit & Beck, 2012).

At the start of each interview, the researcher had an informal discussion with the participant to make them feel at ease. To assist the participants to be comfortable with the researcher, they

were assured that their answers will be kept confidential and that there is no right or wrong answer. It was explained to the participants that the study focus was on how they approach simulation and which educational theories and simulation methods they use while using SBE. The participants were reassured that there would be no judgement in the answers they provide. Sharing the data interpretation with participants to ensure that it is accurate is referred to as member checking and adds to the rigour of the findings (Polit & Beck, 2012; Shenton, 2004). Member checking can be done during the interview or afterwards, which is called informal and formal member checking respectively. The researcher used member checking during data collection, while the interview was being conducted. The researcher restated or summarised what the participant said to determine the accuracy of the data collected from the participants.

The researcher is a crucial instrument in the data collection process (Polit & Beck, 2012). Therefore the researcher's credentials are important to establish confidence in the research findings (Polit & Beck, 2012). The researcher holds a Bachelors of Technology in Emergency Medical Care (B.Tech EMC) degree and has completed a workshop on research methodology. The researcher also holds a Post Graduate Diploma in Health Sciences Education and therefore understands the principles of education and how they relate to SBE. The researcher is knowledgeable about the research methods and processes that this study uses.

The research supervisor is experienced and knowledgeable in the research approach of the study. The research supervisor provided an active role in monitoring the processes and procedures of the study to ensure that the methodology was sound. Meetings were held between the researcher and supervisor to ensure that the data analysis is done correctly and to provide constructive direction.

3.9.2 Dependability

Dependability refers to sustainable data (reliable) over time and conditions of a research project or study (Polit & Beck, 2012). Dependability and credibility of a study are related and the one cannot exist in the absence of the other. This research study provides a detailed description of the research methods and processes that were used and followed, providing an audit trail. The detailed description allows readers an opportunity to critique and evaluate the research process

and provides a guideline for replicating the study if they so wish. An external audit function was provided by the researcher's supervisor by giving constructive feedback on data analysis, the interviews conducted and the findings of the study.

3.9.3 Confirmability

Confirmability refers to the objectivity of the data, that the data represents the participants' responses (information proved) and not information that was invented by the researcher (Polit & Beck, 2012), i.e. the data analysed should contain the participants' subjective opinions and not the researcher's assumptions (Brink et al., 2018). To ensure that the data accurately represents what the participants provided, the researcher bracketed her own experiences and preconceptions about the phenomenon being studied. This was done throughout the data collection and analysis stage by remaining focussed and aware of the participant's words and meanings and not interpreting them in a biased manner. The interviews were digitally voice recorded and transcribed verbatim. The supervisor provided guidance and made sure that the researcher adhered to the research plan and monitored the integrity of the data collected.

3.9.4 Transferability

Transferability refers to the ability to transfer the findings of the study to a different group and setting (Polit & Beck, 2012). The research methodology used in this study was described in detail. The reader makes the transferability judgement dependant on their own setting and circumstances, it is the researcher's responsibility to provide a rich account of the research methodology to the reader.

3.10 ETHICAL CONSIDERATIONS

To ensure that the research study is ethically sound and when human subjects are involved in the study their rights are respected, the study was submitted and approved by the relevant research review and ethics committees. All the required committees granted permission to conduct the study and there were no ethical concerns that needed addressing by the researcher. The researcher has no academic influence on the participants.

To ensure that ethical principles were maintained the following was done:

- Participants were informed that participation is voluntary. No participant was coerced to participate in the study.
- A convenient time and place selected by the participant were used for the face to face interview.
- Participants were informed of the purpose of the study and were allowed to ask questions for clarification about the study prior to agreeing to participate.
- All participants were treated with respect.
- Participants did not receive or were not promised any rewards or benefits for being part of the study.
- Participants were reassured that no information shared by them will be used in a punitive manner.
- Participants were informed that their participation in the study would not cause any discomfort or harm.
- All participants were selected based on the inclusion and exclusion criteria and received the same treatment during the study.

3.10.1 Permissions obtained to conduct the study

Permission to conduct the study was obtained and approved by the following committees:

- Faculty of Health Sciences Post Graduate committee of the University of Witwatersrand (Annexure J)
- Human Research Ethics Committee (HREC) of the University of Witwatersrand (Annexure C)
- The utilisation of the institutions' satellite sites was granted by:
    - Head of Department Emergency Medical Care, University of Johannesburg (Annexure E)
    - The principal of the Training Academy of the City of Johannesburg Emergency Medical Services, a satellite site of the University of Johannesburg for the Diploma in Emergency Medical Care Program (Annexure F)

- The principal of the School for Military Health Training, a satellite site of the University of Johannesburg for the Diploma in Emergency Medical Care program (Annexure F)
- Research Ethics Committee of the University of Johannesburg (REC) (Annexure C)

3.10.2 Informed Consent

Informed consent allows participants to have all the necessary information about what the study entails and how the study will impact them before participating in the study (Annexure G and H). Participants should have the opportunity to seek clarity before making an informed decision and consent to participate in the study.

The researcher provided all participants of this study with an information letter (Annexure D and G) and provided a verbal explanation of what the study entails and what would be expected from them when they consent to participate in the study. The information letters were written in English, as English is the language of instruction at both satellite sites. The information sheet provided the participant with information regarding the purpose of the study, the participant commitment, benefits and risks of participation, confidentiality and anonymity, voluntary participation and withdrawal without judgement. Before the participants signed the consent forms (Annexure G and H) they were provided with the opportunity to ask questions and to clarify any uncertainty. The participants received two information letters and consent forms, on request from the research institution (Annexure D, G and H).

Participants that consented to participate in the study signed three consent forms, one from the University of Witwatersrand HREC and two consent forms from the University of Johannesburg REC (Annexure D, G and H). These consent forms included consent to participate in the study and consent to be audio-taped.

3.10.3 Ensuring Confidentiality

To ensure confidentiality, the researcher allocated numbers to each participant that was interviewed. The numbers allocated to participants remained the same throughout the study and

were used in the research report to ensure consistency and accuracy of the data presented. The researcher and the research supervisor only had access to the data. The data was transcribed by the researcher to avoid a breach of confidentiality. The raw data was password protected on the researcher's computer and backed-up on a hard-drive in a password-protected folder.

3.11 CONCLUSION

This chapter presented the research design, aim and objectives. Also introduced in this chapter was the research methods, ethical considerations and trustworthiness of the research process. The following chapter focuses on the findings that emerged from the individual face to face interviews. A more detailed discussion of what these findings mean in the context of the study is provided in Chapter 5.

CHAPTER 4: FINDINGS

4.1 INTRODUCTION

In the previous chapter, the researcher indicated that the data for this study was collected using face-to-face semi-structured interviews. The data was then transcribed and analysed using conventional content analysis. This chapter will present the findings of the data analysis.

4.2 DEMOGRAPHIC INFORMATION

Participants were asked to provide demographic data at the start of the interview (Annexure B). The demographic data was included to gain insight into the participant's educational and clinical experience and to assist the researcher to formulate a more informed understanding of the participant's responses. The demographic information requested from participants included their highest professional qualification, educational qualifications, year's clinical experience, year's educational experience and experience teaching simulation.

The demographic findings are presented in the following tables.

Table 4.1 Highest Professional qualifications

Qualification	**Number of Participants**
Bachelor's of Technology in Emergency Medical Care / Bachelors of Health Sciences in Emergency Medical Care	All participants (a requirement for teaching on the Diploma in Emergency Medical Care)
Master's in Emergency Medical Care	Two participants were current students on Master's programs

All participants completed an educational techniques module as part of their Bachelor's degree.

Table 4.2 Educational Qualifications

Educational Qualification	Number of Participants
None	4
Post Graduate Diploma in Health Sciences Education	3 - participants are enrolled and current students
Other	1 – Participant has completed a Higher Certificate in Occupational Education Training and Development. 1 – Master's enrolled student has an education research topic.

Table 4.3 Years of Clinical Experience

Years of Clinical Experience	Number of Participants
> 20 years	1
15 – 20 years	0
10 – 14 years	2
5 – 9 years	5
< 5 years	1

Table 4.4 Years of Educational Experience

Years of Educational Experience	Number of Participants
10 – 15 years	2
5 – 9 years	5
< 5 years	2

Table 4.5 Experience Teaching Simulation

Years of Experience Teaching with Simulation	Number of Participants
10 – 15 years	2
5 – 9 years	4
< 5 years	3

The important findings that emerged from the demographic data are that none of the participants had formal education qualifications and most of the participants were still fairly new to education.

4.3 DESCRIPTION OF THEMES

The findings (in the form of themes) that emerged from the discussions in relation to each of the questions are presented below. The themes were categorised from the transcribed semi-

structured interview data. Three main themes emerged from the data namely: i) Knowledge of educational theories, ii) Methods used during simulation-based education and iii) Simulation method terminology knowledge. In table 4.6 the themes and sub-themes identified have been summarised. The main themes were developed from categories gotton from the codes during data analysis these themes were then broken into sub-themes.

Table 4.6 Themes and Sub-themes

Themes	**Sub-themes**
1. Participant's knowledge of educational theories that underpin SBE	1.1 Participants had some understanding of the educational theories.
	1.2 Participants use some educational theories during SBE.
	1.3 Participants use theoretical content rather than educational theory sources to prepare for SBE.
2. Simulation methods used by participants in SBE	2.1 Participants base their approach to SBE on how they were taught.
	2.3 Participants approach to SBE changes as their education experience grows.
3. Participants knowledge of simulation method terminology	3.1 Participants use different methods to increase the realism of SBE but are unable to define the method used.
	3.2 Participants were unable to relate the realism of simulation and the term fidelity.

Findings are presented with an introduction to the findings of a theme, followed by the sub-themes and the verbatim participant quotes related to the theme in italics.

4.3.1 Theme one: Participant knowledge of theories that underpin SBE

Educational theory knowledge in this study refers to the participants' perceptions of the educational theories that underpin SBE. Three sub-themes arose from this theme: i) participants had some understanding of the educational theories, ii) Participants use some educational

theories during simulation-based education and iii) Participants use theoretical content rather than educational theory sources during the preparation for simulation-based education.

4.3.1.1 Participants had some understanding of the educational theories

The majority of participants had some understanding of what educational theory is in relation to education and simulation-based education (SBE). Although the majority of the participants could not name the theories applicable to SBE, they managed to define it using their own terms that could be related to the term educational theory to a small degree. As seen by some of the participants' statements below, they broadly defined educational theory as the theories that guide how we teach.

Participant 1 stated: *"Educational theories... I suppose how we define teaching and how we do teaching, taking it from a whole lot of different, I suppose educational experts…".*

Participant 5 provided a similar statement, *"It's, my understanding is basically,… it's, involve a lot of things, including how to deliver the actual learning processes, learning is a process… that experience you give to your learners… the theories we talk about methodologies, which are applied into education."*

There were some participants that did not understand what was meant by the term educational theory. With probing questions posed to these participants, they did elaborate on their knowledge and in their explanations there was some application and use of educational theories during SBE. The use of the theories was not intentional in most cases.

Participant 3 stated, *"I'm not sure"* and participant 2 wanted a further explanation, *"The theory behind education or the theory… No, rather explain what you…"*

Several participants misunderstood what was meant by the term educational theory. The participants explained it as the theoretical content of teaching on the program and that it is different from the practical content. With further exploration of the participants understanding, there was an indication that the participants had some understanding of the difference between the program theoretical content and educational theory.

Participant 8 stated, *"Educational theory, it is like you are teaching a students about the theory stuff, actually there's no practical involved,… for example, in EMC just the diseases, imagine different kinds of emergencies and then you just teach them… they sit in class and they listen..."*

When emphasising the theory that applies to simulation education participant 8 stated, *"… even though I have to recap on them, I heard of Bloom's taxonomy."*

As seen from the above statements from participants, they had limited knowledge of the educational theories that guide simulation-based education.

4.3.1.2 Participants use some educational theories during SBE

The participants use some educational theories during SBE. Majority of the participants discussed how they consider the different learning styles of students during SBE. The terminology used by participants to describe the theory is not as the terms are defined in education but they explained the related idea.

Participant 2 stated the following regarding the learning styles of students, *"…And learning about learning, I realised different people learn differently. So I hope to achieve both learning styles in both sessions."* Participant 2 identified an educational theory relating to students learning styles but did not know who the correct theorist is related to learning styles, participant two stated, *"Uhm, I'd, I, In my research, I spoke about Knowles learning styles... So the visual, the [auditory], the hands-on practical."*

Participant's 7 understanding of educational theory is related to the learning styles of different students. Participant 7 stated, *"Like in relation to the way students acquire knowledge, get to learn, like for instance the students that basically they are theorists, they master the theory, they can read something of a book and understand it and you get those that are, they need to physically see object and do practically, touch stuff to learn and then there's those that like, for instance, they, they master all of them, for instance, the person can listen and grasp the knowledge as opposed to reading off for an instructor…."*

Through the explanations provided by some of the participants on their approach to SBE, it is evident they consider components of the adult learning theory unconsciously during their teaching.

Participant 5 stated, *"... And then it's that type of approach whereby it is interactive between me and the learners and then see what they think about that approach."* The participant refers to active participation and involvement of the students during the simulation education session.

Participant 1 said that changing the approach to the simulation keeps students attention better, *"And that was one way that we find keeps them entertained."*. Participant 1 also mentioned the mature student, defining it as a student with a previous pre-hospital qualification, *"...The mature learner as well, we found the guy that came in with a CCA, we had two on this last course, a lot different approach, a lot different idea, and he was able to, they were a lot easier to bring into a scenario."* As seen by the participant's responses the concept of active participation and motivation for learning, related to adult learners and Kolb's learning cycle, were mentioned by some participants.

Several participants mentioned the use of reflection during SBE. Participants stated that they stop students when mistakes are made and then reflect on the decision making process during the simulation session. Participants also use reflection to engage student during the debrief session.

Participant 2 stated, *"So we actually did a freeze in the middle of the sim, where they would discuss where they were, maybe look at an alternative, decided that was still the correct path and we would carry on."*

Participant 5 stated, *"Sometimes we take videos to enhance the learning, take the videos, you see what you did, and now if you had to critique yourself, what could you have done better in that video and then we come back, we debrief about that..."* As seen from the responses from some of the participants they at times use both reflection-in-action and reflection-on-action during SBE.

Participant 3 stated, *"... give a student homework with a disc or a video that you've loaded on the Ulink and say, go watch the video, when you come back, we'll talk about it further and say*

what they can do differently. And then try to build on what the video has taught you, then you don't have to do the demonstration, just ask the students to mimic what the video said…"

4.3.1.3 Participants use theoretical content rather than educational theory sources during the preparation for SBE.

Participants predominantly use the program's theoretical content outcomes to prepare for SBE. They use the latest clinical practice guidelines, journals articles, videos, recommended readings and case studies to prepare for simulation. None of the participants eluded to using any educational theory sources when preparing for SBE.

Participant 3 stated, *"…So the day before, or sometimes maybe a week, depending on how pressed in time I am, I will check the drugs that is in the scope of practice of the first years, I will check the scope, their scope, because it's not all medical emergencies and cardiovascular system that they are capable of teaching. So I check also that, and I look at the latest text into what that the new recommendations…".*

Participant 4 stated, *"…but what I usually do is, go through what they've learned in class because that's what's important and what they have to implement in the sim lab…"*

Participant 6 stated, *"…So I will basically read up my knowledge and prepare a lesson plan and then go from there…".*

4.3.2 Theme two: Simulation methods used by participants during SBE

The methods that participants use during SBE emerged and provided more insight into their knowledge or unconscious application of educational theories and methods. Two sub-themes arose from this theme: i) Participants base their approach to SBE on how they were taught and ii) Participants approach to SBE changes as their education experience grows.

4.3.2.1 Participants base their approach to SBE on how they were taught

The participants use a step by step approach when using SBE. Some participants base their approach to SBE on how they were taught at university and some of them even before

university. They also base their approach on their clinical exposure and the approaches and discussions held between peers.

Participant 4 stated, *"...I based on, on how I was taught…I think it's also the experience that, that I picked up especially with the first grouping that we had, with the diploma guys."*

Participant 8 stated, *"...I came across it from the university, also from here when I joined the military I started with the basic life support course… it is the same approach everywhere from the Universities."*

Participant 6 stated, *"...there was a group that we had with the educational group, and then when they find anything interesting, they'll just pop it up, look here guys, this is what we found, this might be interesting in your field… So most of the people that have done it with facilitators and instructors, and they always looking for ways to better their, their teachings to the students..."*

Some participants elaborated on the use of demonstration as a starting point for SBE in the classroom. Prior to starting a SBE session the educator provides and example and acts as the role model for the students. The educator demonstrates the correct procedure or system that would be expected from the student.

Participant 5 stated, *"... obviously initially we start by demonstrating, explaining certain things"*

Participant 3 stated, *"... you can use your own demonstrations, you can use the YouTube videos ... some people who would do the sim themselves but with a student as the guide. So I've had facilitators who go in and say, okay, you tell me what I need to do up to ALS... but there are certainly different methods to doing that..."* Here the participant explained that in this situation the students had to explain to the facilitator what needs to be done and the facilitator would provide treatment as guided by the students.

They start with the foundational building blocks and as the student progress through their studies, they build on the complexity of the simulation. There is a distinct difference between how the participants approach SBE in the first year of study compared to the second year of

study of the Dip. EMC. Participants mentioned different methods or approaches that they use in simulation. The explanations provided by participants of the approaches or methods used with SBE are similar.

Participant 6 stated, *"Starting at the beginning so basics and just building on to something... So we do the basics in first years… And then second year, we come to the more complex things… So just building on to start at the bottom and just build on that foundation."*

Participant 8 provided a similar statement, *"Obviously at the beginning of the year we normally start with what we call patient assessment… but following the step by step… after that when they're done we obviously debrief and talk about the positives, the detail, the negatives and then from there we add the recommendations or things to do better…".*

Participants use a combination of the above-mentioned methods, a stop-start-continue method and they attempt to involve and keep students engaged by allowing them to present the simulation.

Participant 1 stated, *"…The other thing that I sometimes like to do is, as a student makes a mistake the student stops and the next student takes over. Cause I find that sometimes students sleep."* The participant explains that a different approach to SBE is used to keep students involved and prevent them from sleeping when they are an observer during SBE.

Participant 4 stated, *"What we have also tried doing, is having the student give the sims, writing them before and then actually, you be there, and they then they give the sim to each other…"*

Participant 5 stated, *"…The one other thing, I sometimes request them to give each other, to that also, for me, kind of tests by the type of sim and give, it will tell me if they have some understanding what they're doing…"* The participant explained that the students are presenting simulations to each other, it is then used by the participant to see whether students have an understanding by looking at the type of simulation scenario they use and how it is presented.

4.3.2.2 Participants approach to SBE changes as their education experience grows

Several participants mentioned changes that they made to their SBE as they became more experienced. Participants responses indicated that this change was made because they are aware that students need to progress from task training to complex interactive scenarios.

Participant 1 stated, *"... I think in the beginning you look at it as an OSCE. You know you look at yourself and you say ok well we have just finished these OSCE's, and this pathophysiology and disease processes so what OSCE is related to that. And then kind of set up a sim around those OSCE's… So, we would rather say look we just treat a patient and try make it as real as possible..."*

This participant explains that when starting teaching simulation, the participant thought of the skills that have been completed and incorporated that into a simulation. After becoming more experienced the participant explained that the aim was to make simulations more realistic and focus on the integration of theory and practice rather than skill competence within SBE.

Participant 2 stated, *"... I don't think I knew how to teach sims then, so you do the best you can and I've realized that a system is needed… It was off the top of your head. When I started here, I was thrown in the deep end and I did not have time to prepare… Now, the preparation that goes into each sim is a lot more time-consuming... "*

The changes that most of the participants made are preparations for the SBE sessions to ensure that the simulations are more real (higher fidelity). One participant's response is below, other responses flowed into the next theme, participants knowledge of simulation method terminology that is discussed in 4.3.3.1.

Participant 2 provided two examples of providing higher fidelity simulation: *"…We've tried the verbal system, where you can sit outside and the doll actually works, to try and make it real for the students."* and *"I found taking especially paeds it is a lot easier, taking them out the classroom. Because I'm going to the swimming pool and doing a realistic drowning where the doll is wet makes a big difference. So there's definitely a need for the high acuity or high fidelity sims."*

4.3.3 Theme three: Participants knowledge of simulation method terminology

Participants are not aware of simulation methods, although they use some methods unknowingly but do not know how simulation methods are defined. Two sub-themes arose from this theme: i) Participants use different methods to increase the realism of SBE but are unable to define the method and ii) Participants were unable to relate the realism of a simulation and the term fidelity.

4.3.3.1 Participants use different methods to increase the realism of SBE but are unable to define the method used.

Almost all participants in their interviews elaborated on making simulations real. They discussed specific methods of how to make it more realistic. Only a few participants were able to identify terminology linked to their explanations.

Participant 7 stated*, "Then you just run them the simulation as it is there, then you add the real-time factor to it so that it can be more like the real situation… avoid saying things are done while they are not done because it is not real." And the participant also stated, "…you can actually do a sim outside of the sim lab, we can go to a sim in a response car or get a vehicle and pretend that it's been in an MVA then use the same equipment that is of the simulation… It becomes a real-time… "*. Participant 7 did not know what this method is called when asked the participant responded with, *"No".*

Participant 8 stated, *"… not talking if they have to talk to that doll, manikin…we actually preparing them for the real-life situation..."*

Participant 9 stated, *"… the different categories of manikins. You find those that can sweat... contributing factor in terms of trying to breach the gap between of the real patient versus the manikin."* This understanding is related to the technology of the manikins and not necessarily related to the realism of simulation. This participant also stated, *"… minimize the non-real versus the real patient…you will see a patient walking and collapsing, I mean the manikin collapsing… I think that is the real one."* When asked how simulation can be made more real, the participant stated, *"… the only thing that you can do is just ok go work here and there… so that you can see a bit of more real patients regarding the conditions..."* The participant

explained here that you need to perform clinical practice work within the real setting to see real patients and that is the only way to have real experiences.

4.3.3.2 Participants were unable to relate the realism of simulation and the term fidelity

Majority of participants were not able to relate the realism of simulation to the fidelity of simulations. Two participants had an idea of what fidelity referred to.

Participant 1 stated, *"…What are these fancy words that they use, I will think of it now. What… high fidelity sims, that's right… My understanding of it is that is has to be as real life as possible, you got to have as little interaction with the student as an instructor as possible..."*

Participant 2 stated, *"…High acuity, high fidelity simulations…now we are trying to make visual stimulation. So it makes it more real for you…"*

4.4 CONCLUSION

In Chapter 4 the findings of the study were presented based on the themes which were derived after analysing the data of the semi-structured interviews that were conducted. A discussion of the findings related to the literature follows in Chapter 5.

CHAPTER 5: DISCUSSION

5.1 INTRODUCTION

Chapter 5 will discuss the themes and sub-themes in relation to the existing literature that emerged from the semi-structured interviews from this study's population (n=9). Interviews were conducted using a semi-structured interview guide with three main themes identified: i) Participants knowledge of education theories that underpin SBE, ii) Simulation methods used by participants in SBE and iii) Participants knowledge of simulation terminology.

5.2 DISCUSSION

This study aimed to explore and describe what the educators teaching on the Diploma in Emergency Medical Care know about educational theories and what basis they use when teaching using simulation. The research question that was asked was: What is the knowledge of pre-hospital educators regarding the educational theories and methods that guide SBE? The three main themes that provided an answer to the research question will be discussed with the sub-themes related to the main themes included in the discussion.

5.2.1 Participants knowledge of education theories that underpin SBE

It became evident in this study that participants had limited knowledge of the theories that underpin SBE. This may be linked to the fact that the participants in this study don't have formal educational qualifications, although the participants all hold a B.EMC /B.Tech EMC qualification. During the participants' undergraduate studies they completed a module called educational techniques. It is important to note that the participants realise that they need more formal education related to SBE and it may be that they want to improve their educational practices when they use SBE. Through trial and error, they attempt to find ways to improve their own approaches to SBE based on what they have experienced.

This finding is consistent with what is reported in the literature that SBE is implemented and used in educational programs but simulation educators are not educated on the educational theories that underpin SBE (Kosoko et al., 2018; Nestel et al., 2016; Sook et al., 2016). It is important for educators to be educated and knowledgeable in the educational theories that

underpin SBE for them to effectively use SBE. The Jeffries simulation theory (2015) describes that; the educator plays an important role in using sound educational strategies to ensure dynamic interaction between the simulation educator and the student during a simulation experience. By understanding the educational theories that underpin SBE, the participants in this study would be able to understand the learning process, educational science, how to design the simulation experience including scenario writing, technology management, simulation facilitation and debriefing.

The knowledge gap of participants related to the educational theories that underpin SBE is also consistent with studies done by Nestel et al. (2016), Pasquale (2015), Rogers et al. (2015) and Sook et al. (2016). This knowledge gap that exists will make it difficult for participants to evaluate their educational practices during the use of SBE, meaning whether they are achieving the learning objectives of the simulation with the use of SBE activity. It also creates difficulty to embed SBE in the curriculum or to evaluate SBE within a curriculum if it not based on educational theories. SBE should not be used as a stand-alone activity, to ensure its success within a curriculum it should be built into the planned educational experiences directed to achieve outcome competencies (Chacko, 2017).

Use of educational theories during SBE

The findings of this study indicated that the participants unconsciously apply some principles of educational theories that underpin SBE when they use SBE. This however does not imply that they know the theories that underpin SBE, they are unconsciously competent. Their unconscious use of the theories may be linked to what participants remember from the education they received during their undergraduate studies. Participants in this study, however, do not use recognised terminology when referring to the educational theories or the way that they use or prepare for SBE. There was evidence in the explanations provided by the participants that they consider the different learning styles of students and they attempt to adjust their approach to SBE to accommodate the different learning styles (Kolb and Kolb, 2005). The participant's also mentioned that their students are adult learners and from the participants' responses, there was some evidence of knowledge of the adult learning theory (Chauvin 2015). From the participants' explanations, a relation can be made to the adult learning theory, in that the participants encourage participation and keep the students involved through discussion. The

explanation used by the participants lacked the use of educational terminology and basis. Even though the participants unconsciously use the educational theories to a small extent, they need to have a better understanding of them in order for them to know how their students learn (Nestel et al., 2016).

Preparation for SBE activities

This study found that the participant's focus on the outcomes of the program theory content when they prepare for simulation. This is a recommended practice that the participants ensure that the theoretical content is linked to SBE. By considering the theory content and outcomes, participants unconsciously attempt to bridge the theory-practice gap. This is important and consistent with literature as they focus on bridging the theory-practice gap when using SBE (Fey et al., 2020; Pasquale, 2015; Tamas et al., 2019).

The participants also indicated that in preparation for their SBE sessions they refer to all the current clinical practice guidelines and recommendations. This is commendable as the basis of the clinical content used during SBE sessions are based on sound clinical practice guidelines and recommendations and they are not teaching outdated guidelines or recommendations (Chacko, 2017).

Majority of the participants in this study rely on their clinical knowledge and none of the participants considers the educational approach to a simulation session. The focus of the participants is on the equipment, outcome and skills that need to be included in the simulation. Most simulation educators use a framework to guide their educational practices even if they are not aware of the educational science or theory that guides their practice, this was also evident in this study (Pasquale, 2015). Magnus et al. (2017) described the levels of understanding teaching in their study related to experienced simulation educators perceptions of their own professional development. Figure 5.1 illustrates the expected levels of understanding teaching for SBE based on educational theories created by the authors (Magnus et al., 2017). As illustrated in the figure the lowest level of understanding SBE is transmission of clinical expertise.

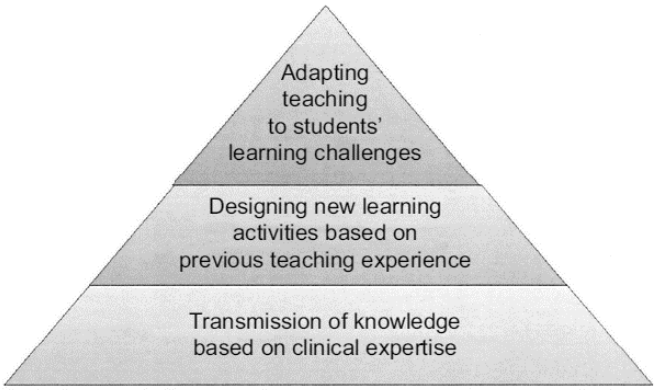


Figure 5.1 Expected levels of understanding adapted for SBE (Magnus et al., 2017)

Topping et al. (2015) also found that educators are not aware of all the required competencies for using SBE effectively. This study's findings are consistent with the findings in the literature by Topping et al. (2015) that participants are unaware of the required educator competencies. The assumption is because the educators are unaware they revert back to teaching the way that they have been taught (Oleson and Hora, 2013). When using SBE the participants need to be aware of and use educational theories that underpin SBE to guide their educational practices. This knowledge will allow them to be able to ascertain that what they are aiming to achieve by using SBE they are actually achieving.

5.2.2 Simulation methods used by participants in SBE

The participants in this study explained that they based their approach to SBE on how they were taught and on discussions with their colleagues. This can also be linked to participants' education related to SBE because they have no formal education they tend to base their SBE approach on the experiences that they had during their undergraduate education. The problem is that educational practices have improved and become more advanced over time. If the participants are basing their approach to SBE on how they were taught then their approach might be outdated. The students in our current times are more technologically savvy and maybe more stimulated by technologically advanced approaches to teaching (Mannino, 2016; Prensky, 2005). It is important that the participants are aware of the current students' needs and are prepared to meet these needs. If the participants are not aware of and implementing new approaches to learning the students may not engage and the full potential of the educational experience may be lost.

A few participants in this study base their approach on their clinical exposure and discussions that they have with their colleagues. It seems that when the participants are not familiar with simulation methods they revert to using what is familiar to them, how they have been taught and their clinical experience. It is, however, important to recognise the participant's previous experience and knowledge and this should be built on to develop them as simulation educators this view is supported by Oleson and Hora (2013).

Participant's approaches to SBE

The methods used by the participants include a step-by-step approach, building from basics to more complex advance simulations, stop-start-continue and allowing students to present the simulated patient scenario. The step-by-step approach used by participants is linked to scaffolding explained by Vygotsky's theory of cognitive development (Becker, 2019). With this approach, the educators have the outcomes in mind of what the students need to achieve and they are focussed to achieve these outcomes. The support provided to the students during this process of development is important (Becker, 2019), as the participants need to ensure that as they increase the complexity of the simulation students are actually at a level where the increase in complexity will not hamper their educational experience and result in no significant learning.

The participants explained, that their approach to SBE is different when teaching a first-year student versus a second-year student. They have a step by step approach for the first-year Dip. EMC student and immerse the second-year Dip. EMC student in more complex scenarios during SBE. Becker and Hermosa (2019) suggested that low fidelity simulation should be used with the novice student and as learners become more advanced higher fidelity simulation should be used which is consistent with the findings of this study. The Jeffries simulation theory refers to a step by step approach used with SBE, which involves the simulation background, design, experience and outcome (Jeffries and Adamson, 2015). This study's findings are different to Jeffries and Adamson (2015) in that the participants refer to using a step-by-step approach during the presentation of a simulation scenario. It is not evident that participants are aware of methods that exist on how to approach SBE. It is evident that participants in this study are inadvertently using aspects of scaffolding as their students progress and they learn throughout the programme.

Allvin et al. (2017), in their study, describe that educators are fascinated by the simulation technology available initially, and as they develop as simulation educators their focus is on choosing technology appropriate for the scenario and the goals of the scenario. Some participants in this study were focussed on the technology and seem to think that you cannot achieve higher fidelity simulations without the high technology manikins and equipment. Participants in this study seem to be confused between the terms used to describe the complexity of a simulation and the technology used with SBE. The lack of knowledge regarding educational theories and methods that guide simulation is also evident as one participant explained that you cannot make simulation real and that the only way to make it more real is to treat real patients in a clinical environment.

Debriefing

Participants in their explanations of their approach to simulation included that they debrief at the end of a simulation scenario. As explained by participants this debrief session includes both positive aspects and negative aspects of the student's actions during the scenario plus recommendations and areas for improvement. The explanations provided by some of the participants indicated some debriefing occurred but there was no indication from most of the participants that they understand the importance of the debriefing session in SBE.

Debriefing and the importance thereof has been reported extensively in the literature (Abersold, 2018; Cheng, 2020; Fey et al., 2020; Schön, 1987), and it is of concern if simulation educators are unaware of, or not using effective debriefing during SBE. It is of concern that participants did not elaborate on or indicated knowledge of the fact that significant and deep learning happens during the debrief session (Aebersold, 2018). The significant learning occurs as debriefing allows the students to reflect on their actions in a safe learning space, allowing them space to work out for themselves rather than being taught what to do to correct their actions. During the debrief session reflection-on-action (Schön, 1987) is used and students are provided with the opportunity for critical thinking and integration of theory and practice (Chauvin, 2015; Pasquale, 2015). Reflection promotes critical thinking and provides depth to the students learning (Pasquale, 2015). Debriefing is the cornerstone of the experiential learning theory (Kolb and Kolb, 2005) and when debrief sessions are not used effectively then the opportunity for critical thinking and reflection is lost. SBE then becomes just a teaching tool and the

opportunity to create a learning experience is lost (Kolb and Kolb, 2005). Participants should be using existing debriefing frameworks and methods to assist them with using debriefing effectively (Cheng, 2020).

The simulation methods described by the participants in this study does not provide sufficient opportunities for reflection-in-action where the educator can interact with the student during the simulation in a non-judgemental manner and stimulate critical thinking (Schön, 1987). By educating the simulation educators on debriefing methods they will be able to use these methods to create opportunities for deep meaningful learning to occur. This will create a dynamic learning interaction between them as a simulation educator and the student during a simulation experience (Jeffries and Adamson, 2015).

Development of SBE practices as educator experience increases

Participants in this study explained that as their teaching experience grows and they teach different types of students on different programmes, they change the way they approach SBE. Some participants explained that as novice simulation educators they concentrate on skills that can be done during a simulation. As their experience grows some participants explained that they have a more guided approach and are focused on providing more complex simulation scenarios. This could be because the participants become more confident and proficient with operating the technology and equipment, they can pay more attention to the simulation experience. This is inconsistent with the literature as Allvin et al. (2017) describe that as the confidence of simulation educators grow they focussed more on the student's needs and less on fancy scenarios and high-tech manikins.

The participants also prepared more when they become more experienced, specifically having prepared simulations or “a plan” of what needs to cover during a simulation session. The participant’s preparation was based on the program theory content and current clinical practice guidelines and not related to educational theories or best practice simulation methods. Therefore the absence of theoretical reference that the participants have, may be related to a lack of theoretical reasoning during SBE sessions (Allvin et al., 2017). The participants may also not be able to adapt their teaching to student’s challenges and improve student’s motivation to learn (Allvin et al., 2017).

As educators use SBE and become more comfortable with the simulation process they may be seeing the potential of SBE to develop clinical judgment and decision making (Allvin et al., 2017). Allvin et al. (2017) found in their study that as educators became more experience in SBE their focus shifted from the context of the simulation to the participants of the simulation. These findings are inconsistent with the findings of this study as the perception from participant's responses in this study is that they build and develop and base the changes they make to their practice on what they have been doing and what they have in place. The participants of this study did not explicitly relate the changes they make to educational theories or simulation methods and did not indicate that they change their approach to be more student-centered.

5.2.3 Participants knowledge of simulation terminology

The terminology that participants in this study use when they refer to educational theories and methods that underpin SBE is not recognised or standardised. Participants were unable to name or define specific terminology related to simulation methods. The majority of participants explained that they focus on making simulation "more real" and only a few participants had an idea that this was related to the fidelity of the simulation. Even though participants in this study reported that they aim to ensure that simulation is more real, they did not understand the term fidelity. Participants in this study have a somewhat inherent understanding of fidelity that might stem from previous clinical or educational experiences. This lack of knowledge can be drawn back to the fact that participants in this study have no formal simulation education and they rely on information received from colleagues and their own previous experience of simulation teaching. These findings are consistent with a study done by Dieckmann et al. (2018) who reported that simulation educators use techniques that they learned from other settings including educational, clinical and private settings.

The International Nursing Association for Clinical Simulation and Learning (INACSL) published standards of best practice simulation glossary (INACSL, 2016). The use of standard terminology when referring to simulation science provides guidance and clear communication (INACSL, 2016). It explains the use of best practice standard terminology when referring to SBE assists the participants to avoid confusion, enhance communication and create consistency between the educators and students during education and practice.

5.3 CONCLUSION

Educator knowledge regarding simulation and educational theories assist simulation educators to develop their own simulation-based activities and without a sound educational background, educators cannot take the student from skill acquisition to a cognitive process of decision making and clinical judgement. These clinical parameters have to be in place in the pre-hospital students in order to be practice-ready on graduation, as mentioned they graduate as independent emergency care providers and do not have a supervised practice period.

This chapter discussed the findings of the study in relation to the literature. Chapter 6 is the final chapter of the research report and will present a summary, the main findings, limitations, recommendations and conclusions.

CHAPTER 6: CONCLUSION

6.1 INTRODUCTION

This chapter provides a summary of the research report, conclusions made from the main findings, recommendations and limitations will be discussed.

6.2 PURPOSE OF THE STUDY

The purpose of the study was to describe the pre-hospital educator knowledge of the educational theories and simulation methods defining simulation-based education.

6.3 RESEARCH OBJECTIVES

To achieve the aim of the following objectives were identified: to describe educator knowledge and the sources of their knowledge regarding the educational theories and methods defining simulation-based education that pre-hospital educators use when facilitating in the Diploma in Emergency Medical Care program.

6.4 METHODOLOGY

A qualitative exploratory, descriptive research design was used by the researcher in meeting the purpose and objectives of the study. In this study, semi-structured face-to-face interviews were used to collect qualitative data. Nine educators teaching on the Diploma in Emergency Medical Care were interviewed using a semi-structured interview guide. The interviews were transcribed and from the transcribed data of the interviews, three themes were identified. The three themes that emerged from the study are: i) Participants knowledge of education theories that underpin SBE, ii) Simulation methods used by participants in SBE and iii) Participants knowledge of simulation terminology. From these themes, sub-themes were identified.

6.5 SUMMARY OF THE MAIN FINDINGS

The main findings that emerged from the study were:

i) Participant's knowledge of theories that underpin SBE: Participants have limited knowledge of the theories that guide simulation-based education. They were unable to

define the term educational theory and could not relate it to SBE. Although there was evidence that the participants were aware of the importance of their simulations being student centered. Some of the participant's explanation of their approach to the teaching of simulation revealed that there is some inadvertent use of the theories. Participant's responses on their preparation for simulation included very little or no educational science resources related to the educational theories that guide SBE.

ii) Methods used by participants during SBE: It emerged through the study that some participants approach SBE the way that they have been taught. Participants use different methods to assist with student engagement during SBE. There was no evidence in this study through the participant's discussions of growth as a simulation educator in the theoretical understanding of teaching and learning. Participant's do not have an in-depth understanding or use of debriefing and its importance during SBE sessions.

iii) Participant's knowledge of simulation method terminology: The central theme from the participant's responses was that they are aiming to ensure that simulations are more real. Participant's responses revealed a limited understanding of the term fidelity and other related simulation method terminology, their understanding of debriefing was also not consistent with simulation terminology. Participants related their method terminology knowledge to discussions that they have with peers and their own previous simulation experience of simulation teaching.

6.6 RECOMMENDATIONS

The following recommendations are made considering the findings of the study.

- Educators that use SBE as part of an educational program should receive formal education that includes the educational theories and methods that underpin SBE. This is to equip simulation educators to use SBE as an effective teaching tool.
- A formal simulation education program needs to be developed to guide simulation educators in the use of SBE.

- Educators should develop themselves as a simulation educator, as there are many open-source resources for simulation educator development that exist. Some examples of these resources are:
    - Coursera – Essentials in clinical simulations across the health professions (https://www.coursera.org/learn/clinicalsimulations)
    - University of Washington: Center for Health Sciences Interprofessional Education Research and Practice: Teaching with Simulation Lessons (https://collaborate.uw.edu/resources-and-training/online-training-and-toolkits/simulation/)
- Education departments that use SBE should have a trained simulation champion/educator available to assist educators to develop their simulation skills in respect of best education and simulation practices.
- Staff members using SBE should plan to pilot their simulation scenarios and peer-reviewing each other's scenarios using a best practice simulation framework or theory. This should include their approach to debriefing.
- Simulation training strategy sessions could be planned for during the academic programme where the department's specific needs and challenges are addressed by a trained simulation educator.
- Simulation educators should use existing frameworks to guide their teaching practices. There are simulation and debriefing frameworks that will provide a structure for educators to use during SBE, to ensure that their students receive the best opportunity to develop critical thinking through best simulation practices.

6.7 LIMITATIONS

The researcher wishes to acknowledge the limitations of this study:

- The research setting was limited by the fact that at the time that the study was conducted there were only two academic institutions that presented the Dip. EMC. The researcher was employed at the one institution and therefore it would have been a conflict of interest to use this site and interview the researcher's peers thus further limiting the study.

- Due to the paucity of literature available in the pre-hospital setting and the researcher had to refer to literature based on other healthcare education which might not have the same requirements or needs that is specific to the pre-hospital emergency medical education setting.

6.8 FUTURE RESEARCH

- Limited research exists related to simulation-based education use in pre-hospital emergency medical care programs. Further studies could be conducted to explore educator readiness and preparedness to use simulation-based education in pre-hospital emergency medical care programs on a national level across all pre-hospital emergency medical care programs to improve the knowledge of educator knowledge when using simulation-based education.
- A description of the use of simulation-based education in pre-hospital emergency care programs within South Africa should be done to grow the knowledge regarding the use of simulation within our local context.
- The research could be expanded to other medical fields within South-Africa. Nursing and medicine are using simulation but it is not known if educators are trained and how many are trained in simulation. Nursing is the only field that requires an education qualification at some institutions. A study can be conducted to describe how the fact that the nursing educators (or other trained healthcare professionals) are trained impact the use of simulation.
- A comparison between having experience in using simulation and having a qualification and whether this impacts the final result can be studied.

6.9 CONCLUSION

This study was a description of pre-hospital educator knowledge of the educational theories and methods defining simulation-based education. Semi-structured interviews were conducted and the data collected and transcribed to identify themes. From the themes the findings were discussed and related to the literature on the subject. Educators using SBE on the Dip. EMC program have limited knowledge of the educational theories and methods that underpin SBE. The approach educator's use is based on previous experiences due to their limited formal

educational training. Important components of education principles when using SBE like the use of simulation frameworks to ensure that SBE meets the student's learning objectives were not used by the participants. Education theories such as Kolb's and Schön's reflective practice are not consistently applied in SBE, especially during debriefing and educators have very limited knowledge of the implication of this in SBE learning. It is important that the training establishments embed formal simulation training for educators. Thus growing the simulator educator strengths within the pre-hospital setting and could lead to more research within the pre-hospital education field.

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ANNEXURES

Annexure A: Pre-hospital Education Programmes

Short course programmes phased out:

- Basic Ambulance Assistant (HPCSA register closed on 26 January 2018)
- Ambulance Emergency Assistant (HPCSA register closed on 26 January 2020)
- Operational Emergency Care Ordely (HPCSA register closed on 26 January 2018)
- Critical Care Assistant (HPCSA register closed on 26 January 2018)
- National Diploma in Emergency Medical Care (HPCSA register closed on 26 January 2018)

Educational programmes that do not lead to professional registration (Continued professional development programmes):

- Basic Life Support for Healthcare Providers
- Advanced Cardiovascular Life Support
- Peadiatric Advanced Life Support
- Neonatal Resuscitation Providers/ Neonatal Advanced Life Support
- International Trauma Life Support with paediatric and military versions
- Airway management programs – EMOVA and AIME

Higher Education programmess that lead to professional registration with the HPCSA:

- Higher Certificate in Emergency Medical Care
- Diploma in Emergency Medical Care
- Bachelor's Degree in Emergency Medical Care

Annexure B: Semi-Structured Interview Guide

Biographical Information

Highest Professional Qualification	
Educational Qualification/s	
Years Clinical Experience	
Years Educational Experience	
Experience teaching simulation (years)	

Interview Schedule

1. What do you understand by the term ‘educational theory’?

   Probing questions:

   a. What approach do you follow when teaching using simulation?

   b. Describe how you teach a simulation session?

   c. Describe the steps you follow when teaching using simulation?

2. How are you applying these theories in your teaching?

   Probing questions:

   a. Which theories do you commonly use?

   b. If not, have you heard any buzz words about theories being used in education?

      i. Describe what the buzz words mean to you?

      ii. Explain how these buzz words affects/affected your approach to teaching simulation.

   c. Describe the tools or information you make use of when teaching simulation?

3. What do you understand by the term simulation methods?

   Probing questions:

   a. Which methods do you use when teaching using simulation?

   b. If no understanding, what approach do you use when teaching simulation?

Annexure C: University of Witwatersrand Ethical Clearance Certificate



FACULTY OF HEALTH SCIENCES

RESEARCH ETHICS COMMITTEE

NHREC Registration no: REC-241112-035

REC-01-26- 2018

14 May 2018

TO WHOM IT MAY CONCERN:

Researcher: **VAN TONDER, T**

TITLE OF RESEARCH PROJECT:	A Description of Pre- Hospital Educator Knowledge and the Educational Theories and Methods Defining Simulation Based Education
DEPARTMENT OR PROGRAMME:	NON – DEGREE PURPOSES
SUPERVISOR: Dr H Thurling	**CO-SUPERVISOR:** -

The Faculty Research Ethics Committee has scrutinised your research proposal and confirm that it complies with the approved ethical standards of the Faculty of Health Sciences; University of Johannesburg.

The REC would like to extend their best wishes to you with your postgraduate studies.

Yours sincerely,

Prof C Stein

Chair : Faculty of Health Sciences REC

Tel: 011 559 6564

Email: cstein@uj.ac.za

Annexure D: Univ. of Witwatersrand Invitation and Information Letter

_____2019

Invitation to Participate in a Masters Research Project

Good day Sir/Madam,

My name is Tanya van Tonder and I am currently registered with the University of Witwatersrand in Johannesburg for a Master of Health Science Education, which is a course work Masters. As part of my studies I have to undertake a research project and I am conducting research to describe the knowledge of educator's educational theories and methods defining simulation based education, who are currently teaching in a two year Diploma in Emergency Medical Care at a higher education institution. My research topic is *"***A Description of Pre-hospital Educator Knowledge of the Educational Theories and Methods defining Simulation Based Education***"*

As part of this project I would like to invite you to take part in an interview. The interview will involve a discussion around semi-structured questions and will take around an hour. With your permission I would like to record the interview using a digital device.

You will not receive any direct benefits from participating in this study, and there are no disadvantages or penalties for not participating. You may withdraw at any time or not answer any question if you do not want to. The interview will be completely confidential and anonymous as I will not be asking for your name or any identifying information, and the information you give to me will be held securely and not disclosed to anyone else. I will be using a pseudonym (false name) to represent your participation, in my final research report. If you experience any distress or discomfort, we will stop the interview or resume another time.

If you have any questions afterwards about this research, feel free to contact me on the details listed below. This study will be written up as a research report. If you wish to receive a summary of this report, I will be happy to send it to you upon request. If you have any queries, concerns or complaints regarding the ethical procedures of this study, you are welcome to contact the University Human Research Ethics Committee (medical), telephone + 27 011 717 1252/2700/1234/2656, email zanele.ndlovu@wits.ac.za.

Yours sincerely,

Tanya van Tonder,

E-mail: tanya.vantonder@vodamail.co.za

Telephone: 082 326 5424

Hilary Thurling

E-mail: Hilary.Thurling@wits.ac.za

Annexure E: University of Johannesburg Study and Ethics Approval

UNIVERSITY OF JOHANNESBURG

FACULTY OF HEALTH SCIENCES

RESEARCH ETHICS COMMITTEE

NHREC Registration: REC-241112-035

14 May 2018

Dear Ms van Tonder

REVIEW OF RESEARCH PROPOSAL

Your application for expedited review of the research proposal "A DESCRIPTION OF PRE-HOSPITAL EDUCATOR KNOWLEDGE AND THE EDUCATIONAL THEORIES AND METHODS DEFINING SIMULATION BASED EDUCATION" refers. Both reviewers have approved the proposal, with the following comments:

1. If the aim of the research is to describe sources of educator knowledge, it would make sense to ask this directly as one of the interview questions.
2. Please take into consideration important considerations of trustworthiness (dependability, confirmability, transferability etc.) during all phases of the research – these were not mentioned in the research proposal.
3. Please ensure that permission is obtained from the Head of Department: Emergency Medical Care and from the Head: Department of Institutional Planning, Monitoring and Evaluation after you have received the ethical clearance letter and before any interactions with research participants.

The Faculty Administrator will issue your research ethics clearance letter within the next day or two.

Sincerely,

Prof. Christopher Stein
Chairperson: Research Ethics Committee
cstein@uj.ac.za

Annexure F: Written Permission from Satellite Sites

Thu 2018/01/11 03:10 PM

Wynand van der Net <WynandV@joburg.org.za>

RE: Research Study at COJEMS

To Tanya Van Tonder

Cc Makkink, Andrew; Hilary Thurling; Vincent-Lambert, Craig

Follow up. Start by 11 January 2018. Due by 11 January 2018.



Good Day Tanya

The COJEMS training academy are more than willing to provide you with the assistance you require, and will make the lecturing staff available to you for the interviews in a time that is convenient to all, without impacting on the training.

Kind Regards

Wynand Van Der Net

Principal Training Academy: EMS, Public Safety

Medical Training Academy

Florida Park Fire Station

Thu 2018/02/01 09:04 AM

christopher maluleka <malulekachristopher@gmail.com>

Re: FW: Research Study at SAMHS SMHT

To Tanya Van Tonder

Cc Maluleka, Christopher

You replied to this message on 2018/02/01 09:07 AM.

Good Morning Ms Tanya

This email serves as the authority for Ms T van Tonder to do research in the SAMHS Satellite Campus of the University of Johannesburg.

Ms Tanya may communicate to the members direct as follows:

Mrs MM Baloyi email: ofentsemaureen@gmail.com
Ms NF Dlungele email: mzelemuz@gmail.com
Mr SBM Ndzungu email: solam@webmail.com
Mr S. Baloyi email: sthee10111@yahoo.com
Ms N Maluleka: email: nomzozom@webmail.co.za
Ms R Chetty (Peterson) email: rennayc@yahoo.com
Ms R Kgasi email: Reniahkgasi@gmail.com
Mr R Chander email: rcsoldier207@gmail.com

I'm currently on a course and you can communicate to Mrs Baloyi, and her details are as follows:

Mrs MM Baloyi email: ofentsemaureen@gmail.com 071 869 9339

Regards

Maj CM Maluleka
Principal
SAMHS College (SMHT)

Annexure G: University of Johannesburg Information, Invitation Letter and Consent

UNIVERSITY OF JOHANNESBURG

DEPARTMENT OF EMERGENCY MEDICAL CARE
RESEARCH STUDY INFORMATION LETTER

31 January 2019

Good Day

My name is Tanya van Tonder **I WOULD LIKE TO INVITE YOU TO PARTICIPATE** in a research study on pre-hospital educator knowledge of the educational theories and methods defining simulation based education.

Before you decide on whether to participate, I would like to explain to you why the research is being done and what it will involve for you. **I will go through the information letter with you and answer any questions you have.** This should take about 10 to 20 minutes. The study is part of a research project being completed as a requirement for a Master's Degree in Health Science Education through the University of Witwatersrand.

THE PURPOSE OF THIS STUDY is to describe the sources of educator knowledge of the educational theories and methods defining simulation based education, who are currently teaching on a two year Diploma in Emergency Medical Care at identified higher education institutions.

Below, I have compiled a set of questions and answers that I believe will assist you in understanding the relevant details of participation in this research study. Please read through these. If you have any further questions I will be happy to answer them for you.

DO I HAVE TO TAKE PART? No, you don't have to. It is up to you to decide to participate in the study. I will describe the study and go through this information sheet. If you agree to take part, I will then ask you to sign a consent form.

WHAT EXACTLY WILL I BE EXPECTED TO DO IF I AGREE TO PARTICIPATE? If you decide to participate you would take part in an interview. The interview will involve a discussion around semi-structured questions and will take around an hour. With your permission the interview will be recorded using a digital device.

WHAT WILL HAPPEN IF I WANT TO WITHDRAW FROM THE STUDY? If you decide to participate, you are free to withdraw your consent at any time without giving a reason and without any consequences. If you wish to withdraw your consent, you should inform me as soon as possible.

Participant Initials:_____ 1

IF I CHOOSE TO PARTICIPATE, WILL THERE BE ANY EXPENSES FOR ME, OR PAYMENT DUE TO ME: You will not be paid to participate in this study and you will not bear any expenses.

RISKS INVOLVED IN PARTICIPATION: There are no risks involved in participating in the study.

BENEFITS INVOLVED IN PARTICIPATION: You will not receive any direct benefits from participating in this study.

WILL MY PARTICIPATION IN THIS STUDY BE KEPT CONFIDENTIAL? Yes. Names on the questionnaire/data sheet will be removed once analysis starts. All data and back-ups thereof will be kept in password protected folders and/or locked away as applicable. Only I or my research supervisor will be authorised to use and/or disclose your anonymised information in connection with this research study. Any other person wishing to work with you anonymised information as part of the research process (e.g. an independent data coder) will be required to sign a confidentiality agreement before being allowed to do so.

WHAT WILL HAPPEN TO THE RESULTS OF THE RESEARCH STUDY? The results will be written into a research report that will be assessed. In some cases, results may also be published in a scientific journal. In either case, you will not be identifiable in any documents, reports or publications. You will be given access to the study results if you would like to see them, by contacting me.

WHO IS ORGANISING AND FUNDING THE STUDY? The study is being organised by me, under the guidance of my research supervisor at the Centre of Health Sciences Education in the University of Witwatersrand. The study has not received any funding.

WHO HAS REVIEWED AND APPROVED THIS STUDY? Before this study was allowed to start, it was reviewed in order to protect your interests. This review was done first by the Centre of Health Sciences Education at the University of Witwatersrand, and then secondly by the Faculty of Health Sciences Research Ethics Committee at the University of Johannesburg. In both cases, the study was approved.

WHAT IF THERE IS A PROBLEM? If you have any concerns or complaints about this research study, its procedures or risks and benefits, you should ask me. You should contact me at any time if you feel you have any concerns about being a part of this study. My contact details are:

Tanya van Tonder
Tel: 082 326 5424
Email: 1262100@students.wits.ac.za

You may also contact my research supervisor:
Ms. Hilary Thurling
Email: Hilary.Thurling@wits.ac.za

If you feel that any questions or complaints regarding your participation in this study have not been dealt with adequately, you may contact the Chairperson of the Faculty of Health Sciences Research Ethics Committee at the University of Johannesburg:

Prof. Christopher Stein
Tel: 011 559-6564
Email: cstein@uj.ac.za

FURTHER INFORMATION AND CONTACT DETAILS: Should you wish to have more specific information about this research project information, have any questions, concerns or complaints about this research study, its procedures, risks and benefits, you should communicate with me using any of the contact details given above.

Researcher:

Tanya van Tonder



UNIVERSITY OF JOHANNESBURG

DEPARTMENT OF EMERGENCY MEDICAL CARE
RESEARCH CONSENT FORM

A Description of Pre-hospital Educator Knowledge of the Educational Theories and Methods defining Simulation Based Education

Please initial each box below:

☐ I confirm that I have read and understand the information letter dated 01 May 2018 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.

Name of Participant	Signature of Participant	Date
Name of Researcher	Signature of Researcher	Date

4



DEPARTMENT OF EMERGENCY MEDICAL CARE
RESEARCH CONSENT FORM OR INTERVIEWS TO BE AUDIO-TAPED

A Description of Pre-hospital Educator Knowledge of the Educational Theories and Methods defining Simulation Based Education

Please initial each box below:

☐ I hereby give consent for my interview, conducted as part of the above study, to be audio-taped.

☐ I understand that my personal details and identifying data will be changed in order to protect my identity. The audio tapes used for recording my interview will be destroyed two years after publication of the research.

☐ I have read this consent form and have been given the opportunity to ask questions.

Name of Participant	Signature of Participant	Date

Name of Researcher	Signature of Researcher	Date

5

Annexure H: Consent Form

_____2019

Consent form to participate in a Master's research study

A Description of Pre-hospital Educator Knowledge of the Educational Theories and Methods defining Simulation Based Education

Tanya van Tonder

I …….. agree to participate in this research project. The research has been explained to me and I understand what my participation will involve.

(Please circle)

I agree that my participation will remain anonymous

YES NO

I agree that the researcher may use anonymous quotes in her research report

YES NO

I agree that the interview may be audio recorded

YES NO

I agree that the information I provide may be used anonymously by other researchers following this study

YES NO

…… (Signature)

…… (Name of participant)

…… (Date)

Annexure I: Example of a Transcribed Interview

Participant 5:

I: So what is your highest professional qualification?

R: It's a B.tech in EMC.

I: And educational qualifications?

R: Any other?

I: Yes, educational? So like, specific to education.

R: Okay, no I have facilitation.

I: So short courses, facilitation and any others?

R: And assessor.

I: And no other formal qualification?

R: I have financial management.

I: Management, ok. Are you intending on doing any education courses or qualifications?

R: Well, I have started this year.

I: You started, what are you doing?

R: It's a post grad diploma in health education.

I: In health science education, you have enrolled now for 2019?

R: Yeah.

I: And how many clinical years' experience do you have?

R: As a B.Tech, since 2016.

I: And educational experience?

R: Since 2013

I: And that was before you were a B.Tech?

R: Yeah. National Diploma.

I: A National Diploma. And then your years, how many years would you say you've got experience in teaching simulation specifically?

R: Plus minus five years.

I: Five years and before the diploma what courses did you teach simulation on?

R: Before the Diploma. Prior to 2013 I did not teach.

I: You didn't teach?

R: I was working on an ambulance.

I: Okay, so all your experiences simulation is on the diploma programme?

R: No, I started with the former ECT since 2013 until 2015. Because we only started 2016 with the Diploma programme.

I: So, if I say the term educational theory, what do you understand? If I say that term, about educational theory?

R: It's, my understanding is basically, the, it's, involve a lot of things, including how to deliver the actual learning processes, learning is a process. So education is that experience you give to the learners. And when you talk about the theories, we talk about methodologies, which are applied into education.

I: Okay, do you know some of those methodologies?

R: I have read quite a few, now I have forgotten. Socialism, is one of them. It’s not coming to me now, no, I cannot remember anything, none pops up now. I think there is about three.

I: Okay. All right. And how does that, you mentioned socialism, how does that apply in simulation? And have you thought about applying that in simulation?

R: In fact, my, I would say education should be viewed as, everyday life thing, as socialism, socialism. So it's not, you don't want to hammer something into someone. You want to make an environment whereby it feels, it feels like students wants to learn, a student gives their sort of understanding education and you guide them towards the goal that you want. So it's more social approach rather than stiff autocratic type of approach.

I: And when you teach simulation, what approach do you follow?

R: That's [pause], obviously initially we start by demonstrating, explaining certain things. And then I actually want a more of a pragmistic, I want them to actually physically go on, to different scenarios students will perform and then we comment based on what the student has done, and

what should be done, and how well we can improve or learn from what another learner has actually done. And then it's that type of approach whereby it is interactive between me and the learners and then see what they think about that approach.

I: Okay, and then, how this approach that you use, what do you base it on?

R: Mainly it's based on previous experience in varsity, previous experience also here in the work environment.

I: In the work environment. And have you changed that, you said, you've been doing some sims for about five years now, since the first day, you've done simulation up until now? Is there anything that you've changed? And what have you changed?

R: Not so much what I have changed, it's the programs have changed, and that's the methods that have been applied, as you know UJ applied the SATLAB. So that's been more the approach in terms of simulation.

I: So when you teach simulation do you use the SATLAB principles to teach as well?

R: Yes, we just implemented as from 2016 we started. So one, two, because, like I said, it must not be something you just want to enforce for exam purposes. So it must be like a life thing you go with. So if it's like a normal everyday life when you come to the simlab, you do it, it becomes easier and you grasp more information. So yes, that approach for me, I think is much better.

6:21

Okay, and can you explain the SATLAB approach to me that you follow?

R: You basically, the simlab, you have three types, not, three, 1234, about five broad categories under the the, the, the assessment criteria, whereby you rate the students not according to fail or pass rather, according to best practice, or not best practice or not yet competent. And whereby if a learner does something harmful, or what you consider harmful to the patient, you award a negative work towards that. And then you have a set criteria, like, these are the following things I want to see you doing, like, I want to see the airway opening, I want to see you check the breathing, you have that systematic approach. So now you look at those things and you say, in this type of scenario, this would weigh this much, so if you do it like this, this is how much you would get. So you are not yet best practice or you are already there but let's work on this or.

I: And do you do that with every single simulation session that you run?

R: It's pretty new so I have not done it with a simulation. Yes, since last year started doing it, so we working towards that every simulation that's the way that it must be.

I: And then before you used this SATLAB tool, how did you run a simulation?

R: Okay, basically, then it was either competent or not yet competent. So we would have like core objectives that we preset on a sim, so if you say you're sim is an asthma patient for example, we would say okay, depending on the severity as well, we would say, we want this learner to assess the severity. So therefore, severity will be a core objective, the learner must assess, if the learner does not assess this, the learner is basically is not yet competent. And we'll have another criteria in order for them, once they identify it as asthma, they must manage it using this and this and this, if the learner does not manage using this safely, the learner is basically, that is another core objective, so the learner basically fails. So it was not marks related anymore, it was just a matter of not yet competent.

I: And do you teach according to those principles or is it just during assessment that you follow those principles?

R: The SATLAB?

I: Or the, not competent, competent one that you just explained?

R: We [pause], okay, I'll say when we teach, the aim is to, we, we teach in such a way would you know, what is best practice, how you should, first of all is how you should manage this patient, this is satisfactory, you just manage it like any other. But then there are certain things that differ, that distinguishes you from other learners that would possibly make you a best practice learner.

I: So If I understand what you, correctly what you are saying is, you are saying that when you practice simulation you take the assessment principles that you are going to assess them with and you apply that in your teaching.

R: Yes

I: And then after every simulation do you give them an outcome? Competent, not yet competent?

R: We cannot do that until the results are officially released however we do have a debriefing session whereby we feel some areas were grossly not met, so you won't say you pass, you fail, what what. Basically saying this area was poorly done by the majority of you and this area was mostly done well by majority of you.

I: And when you teach them, do you then give them a result? Because you said you teaching according to the assessment principles. So when you teaching, not an assessment. Do you then give them an outcome after their practice simulation, if I can put it like that?

R: No, there is no self-marks but I will say, okay, on this area you're poor, on this area you are good, work on this, work on this in order to get that best practical.

I: And let's say you have tomorrow's your, you are allocated to teach simulation? How do you prepare for that simulation session? What do you use to prepare?

R: Okay, first of all, it's the simulation laboratory, and then with all the, the, what are the module requirements in terms of your medication, your skills that the students must do for that assessment. And then the knowledge behind it would have been done in class. So we expect that knowledge to come and be shown, demonstrated in the simulation. So my preparation is in terms of, the one thing that students tends to do is that they learn this, the OSCE's, if I may put it that way, an OSCE of how to open the mouth. As soon as you start integrating everything, they forget how they should be opening the mouth. So you want to see that, that integration of the different skills becoming an OSCE, coming through as they demonstrate a simulation.

I: Is there any specific reading or way that you prepare to teach a simulation?

R: I read the prescribed textbooks, and then some articles. I generally search for articles, if I found that I find an interesting article, which I first get it to the others and see what was the thought and then I'll bring that across. But specifically, the American Heart Association is the one source that you look at it for, for new research, as well as CPG lately, just came out last year June. So that is, as well now has been the way we go forward, we look at it.

I: Any educational things that you refer to, in preparation for simulation?

R: Educational meaning?

I: So, like looking for new methods, or theories or ways to approach it?

R: It's, the, the, I wouldn't say, *per se*, but in theory, I know I would use the audio visuals, you choose your board to draw. So you choose, demonstrate while you are there mainly for theory, but for prac, it's mostly, you demonstrate and you're actually give the thingy you expect them to use.

I: And then while you are now, you're enrolling in a study, to study further and dealing with your colleagues and maybe at university with their guys at universities are there any buzzwords or any thing that came up for you regarding simulation, things that people commonly talk about educational things relating to simulation?

R: Not to simulations? No. Reason being, for now, I've just, I'm just downloading my articles on my own. And I'm still reading, so I haven't really spoken to anyone about it.

I: So there are no specific buzzwords that come to mind that you can think of relating to simulation?

R: No

I: So, have you used any different methods of teaching simulation? Or do you always sit, give them the simulation, they do the simulation and you give them feedback or debrief?

R: The one other thing, I sometimes request them to give each other, to that also, for me, kind of tests by the type of sim and give, it will tell me if they have some understanding what they're doing. So that I use and then I just guide there and there. But mainly, yes.

I: So it's mainly those two, either the students do it, or you do the sim. And then these simulations that you do, what do you, where do you get them, is it a prepared simulation, do you use patients that you've interacted with?

R: For practice?

I: Yeah. So like the simulation that you use? Where do you get the patients from?

R: Well, the patients, mostly from experience, or and then some you add with your preparation, some interesting simulation that you actually heard off, even if you physically did not see it, and some that you may think of as you read, and then you write it down, sort of, so it's a combination of things experience, you actually track down some and obviously, and then some previous sims that you've had your try and set up.

I: And would you use simulation as a teaching tool? Do you think it's a good teaching tool versus practice? And how would you differentiate between practice and teaching tool using simulation as teaching?

R: I definitely think simulations have a place in education, I wouldn't be so comfortable someone just going straight to alive patients without having done anything, besides anything else, nervous, people tend to be very nervous and now if you have to practice on a human being, ethically as well, it would not work. So for me simulations are definitely good because it gives you the confidence to go and do it practically on a real situation. And also when you come back from pracs and feel you are lacking somewhere you can still practice on the manikins as oppose to real prac situations, where you can actually cause harm that may have dire consequences.

I: Ok, and would you use, teach, simulation to teach a concept or theory concept? Would you use simulation to teach that concept?

R: Definitely. Because we have different types of learners, some learn by visualizing, some learn by actually doing things, some learn by just seeing others do it. So there's definitely a need for, for, for, for us to be diverse and use learning.

I: And currently, do you do anything to engage with, you just mentioned there is different learners, do you currently do something in your simulation session to engage the different learners?

R: Um, I try, like with reflective, you ask for example, they do a sim and then I'll tell you go reflect on this and then we'll speak about it tomorrow and go and research in terms of how this should be managed and how should it be assessed and managed as compared to what you did. Sometimes we take videos to enhance the learning, take the videos, you see what you did, and now if you had to critique yourself, what could you have done better in that video and then we come back, we debrief about that. What do you think we did for and why is that.

I: Ok, that's, that's it from my side? Is there anything you would like to add regarding teaching using simulation or education and simulation?

R: Other than that simulations are, are long hey, they are long hey, as we know, because we assess students individually. The only thing I would hope for, I think some people are doing it alrady, if the learner can perhaps be alone in the actual assessment room and you watch them over recording or videos or something like that, because I think sometimes they get intimidated by the panel of a assessors, especially once you have an external assessor coming in. So I think those factors also cause some nervousness which may not be a true reflection the capability of the student. Other than that.

I: Okay so during assessment and during teaching, do you think that would be a benefit during teaching?

R: If we have a, definitely I mean, I feel people tend to be very comfortable with their colleagues and their friends around, so if it is just the two of them and they'll be very comfortable, knowing we just watching over there, the video and then we give the voice, other than you being there giving them that nervousness.

I: Ok, good, then that's it. Thank you very much.

Annexure J: Study Approval from University of Witwatersrand

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

27 November 2017

To Whom It May Concern

SUBJECT: **CONFIRMATION OF PROVISIONAL STUDY APPROVAL**
(This letter is not a clearance certificate - not yet cleared)
Protocol Ref No: M171043
Protocol Title: A Description of Pre-hospital Educator Knowledge of the Educational Theories and Methods defining Simulation Based Education
Principal Investigator: Ms Tanya van Tonder
Department: Centre for Health Science Education

This letter serves to confirm that the Human Research Ethics Committee (Medicall) has granted provisional approval for the above mentioned study subject to receipt of written permission to do the study from the CEO of the study site and if required from the Gauteng Provincial Research Committee (GPRC).

Please note that this provisional approval letter does not permit data collection/secondary data analysis or any other form of research. Research may only be started when an applicant has received the final clearance certificate from the HREC (Medical) Secretariat.

Should you have any queries, you may contact me at tel: 011 717 1234/2700/2656 or by email Rhulani.Mkansi@wits.ac.za or HREC-Medical.ResearchOffice@wits.ac.za

Yours Faithfully,

.....
Mr Rhulani Mkansi
Administrative Officer
Human Research Ethics Committee (Medical)

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27 NOV 2017
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