CLINICAL SIMULATION TO ENHANCE UNDERGRADUATE MEDICAL EDUCATION AND TRAINING AT THE UNIVERSITY OF THE FREE STATE

by

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DECLARATION

I hereby declare that the work submitted here is the result of my own independent investigation. Where help was sought, it was acknowledged. I further declare that this work is submitted for the first time at this university/faculty towards a Philosophiae Doctor degree in Health Professions Education and that it has never been submitted to any other university/faculty for the purpose of obtaining a degree.

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DEDICATION

I would like to dedicate this thesis to my wife and best friend, who has been my consistent inspiration, support and source of wisdom. Without her love and sacrifice this work would never have been possible, and to Bea and Marian, my two daughters who offered me unconditional love and support throughout the course of this thesis.

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LIST OF ACRONYMS

ACLS	:	Advanced Cardiovascular Life Support
AIDS	:	Acquired immunodeficiency syndrome
ATLS	:	Advanced Trauma Life Support
CME	:	Continuing Medical Education
CMSA	:	The Colleges of Medicine of South Africa
CNSH	:	Canadian Network for Simulation in Healthcare
cont.	:	continue
COREQ	:	Consolidated criteria for reporting qualitative research
CPD	:	Continuing Professional Development
CPR	:	Cardio Pulmonary Resuscitation
CRM	:	Crisis Resource Management
DASH	:	Debriefing Assessment for Simulation in Healthcare
DoH	:	Department of Health
DoHE	:	Department of Higher Education
ECFMG	:	Educational Commission for Foreign Medical Graduates
ECG	:	Electrocardiogram
ENT	:	Ear Nose and Throat Department
HIV	:	Human Immunodeficiency Virus
HOD	:	Heads of Departments
HPCSA	:	Health Professions Council of South Africa

ICU	:	Intensive-care unit
IMSH	:	International Meeting on Simulation in Healthcare
IT	:	Information Technology
kg	:	Kilogram
M.B., Ch.B.	:	Baccalaureus in Medicine and Baccalaureus in Surgery
MCQs	:	Multiple Choice Questions
M.Med.	:	Magister in Medicine
MOCA	:	Maintenance of Certification Assessment
NESC	:	National Health System Education South Central
NQF	:	National Qualifications Framework
OSCE	:	Objective Structured Clinical Examination
OSPE	:	Objective Structured Practical Examination
OSVE	:	Objective Structured Virtual Examination
PBL	:	Problem-based learning
Ph.D.	:	Philosophiae Doctor
RCSA	:	Researchers of Clinical Skills Assessment
SA	:	South Africa
SAHP	:	School for Allied Health Professions
SAQA	:	South African Qualifications Authority
SBE	:	Simulation-based education
SBME	:	Simulation-based medical education
SEME	:	Simulation-enhanced medical education
SESAM	:	Society in Europe for Simulation Applied to Medicine

SoM	:	School of Medicine
SPs	:	Standardised patients/ Simulated patients
TB	:	Tuberculosis
UFS	:	University of the Free State
UK	:	United Kingdom
USA	:	United States of America
USMLE	:	United States Medical Licensing Examination
UV	:	Universiteit van die Vrystaat [Afrikaans translation for UFS]
WHO	:	World Health Organization

SUMMARY

Key terms: clinical reasoning; clinical simulation; clinical skills; clinical training platform; enhancement of teaching and learning; focus group interview; integrated into curriculum; multidisciplinary training; patient safety; safe environment; semi-structured interview; simulation-based assessment.

An in-depth study was carried out with a view t compile recommendations for the use of clinical simulation as enhancement of undergraduate medical education and training at the University of the Free State. Clinical simulation plays an important role in the development of clinical skills and competence, and in creating a safe environment where students can learn without harm to patients while improving clinical reasoning and multidisciplinary training. Clinical simulation must be fully integrated with the curriculum, so that students can move between theory, simulation- and clinical training continuously. Assessment of skills and competence is a key component in clinical simulation-enhanced teaching and learning.

In this study, the potential of clinical simulation was investigated as enhancement of undergraduate medical education and training. The extent to which clinical simulation could address the problems related to a decreasing clinical training platform, change in case mix and the demand for more health care professionals was investigated. Clinical simulation was considered as a complementary asset to enhance teaching and learning at the School of Medicine, UFS.

The research methods comprised literature reviews, semi-structured interviews, focus group interviews, and observations during international visits.

The literature review provided a background for a conceptual framework and contextualised the problem against related theory and research. Data were collected by means of semi-structured interviews with international experts to gain expert opinions on the use of simulation as teaching and learning tool, simulation-based assessment and the establishment of a simulation centre. Focus group interviews with lecturers and heads of departments at the UFS were conducted with the intent to evaluate the personal opinions and attitudes of the participants on these issues.

The compilation of recommendations for the use of clinical simulation to enhance undergraduate medical education and training at the UFS and the planning and implementation of a simulation centre was achieved with the aid of the data collected. The premises, points of departure and role players were examined in order to make recommendations in this regard.

The study originated from the recognition that a gap exists in the use of clinical simulation in the education and training of medical students at the UFS, but also in South Africa and the rest of Africa. To bridge the gap, the researcher compiled educational recommendations for the integration of clinical simulation as a required component and enhancement of the current curriculum. The development and implementation of a new simulation centre for the UFS School of Medicine was discussed in order to reach the goal of clinical simulation teaching and learning.

A valuable contribution to knowledge was made by providing recommendations for developing and implementing a simulation centre for the School of Medicine, UFS. By developing the strategy, the identified gap is bridged, in that it can aid in integrating clinical simulation with current curricula, show how skills development and competence of medical students can improve and provide pointers for simulation-based assessment of medical students. Recommendations in this regard were made.

The sound research approach and methodology ensured quality, reliability and validity. The completed research can form the basis for a further research undertaking.

OPSOMMING

Belangrike terme: Kliniese redenasie; kliniese simulasie; kliniese vaardighede; kliniese opleidingsplatform; versterking van onderrig en leer; fokusgroeponderhoud; integrasie in kurrikulum; multidisiplinêre opleiding; pasiëntveiligheid; veilige omgewing; semi-gestruktureerde onderhoud; simulasie-gebaseerde assessering.

'n Diepgaande studie is onderneem met die doel om riglyne vir die gebruik van kliniese simulasie as versterking van voorgraadse mediese onderwys en opleiding aan die Universiteit van die Vrystaat (UV) daar te stel. Kliniese simulasie speel 'n belangrike rol in die ontwikkeling van kliniese vaardighede en bedrewendheid, die skep van 'n veilige omgewing waar studente kan leer sonder skade aan pasiënte asook die verbetering van kliniese redenasie, en multidissiplinêre opleiding. Kliniese simulasie moet ten volle geïntegreer word met die kurrikulum, sodat studente deurlopend tussen teorie, simulasie- en kliniese opleiding kan beweeg. Assessering van vaardighede en bedrewendheid is 'n kern komponent van simulasie-versterkte onderrig en leer.

In hierdie studie is kliniese simulasie ondersoek as versterking van voorgraadse mediese onderwys en opleiding om die probleme rakende die verkleinende opleidingsplatform, verandering in kliniese gevallesamestelling en die behoefte aan meer gesondheidspersoneel aan te pak. Kliniese simulasie is oorweeg as aanvullende modus om onderrig en leer by die Skool vir Geneeskunde by die UV te ondersteun.

Die navorsingsmetodologie gevolg het bestaan uit 'n literatuuroorsig, semi-gestruktureerde onderhoude, fokusgroeponderhoude en waarnemings tydens internasionale besoeke aan simulasiesentrums.

Die literatuuroorsig het as agtergrond gedien vir 'n konseptuele raamwerk en om die probleem in die lig van toepaslike navorsing in verband te plaas. Data is ingesamel met behulp van semi-gestruktureerde onderhoude met internasionale kundiges met die doel om kundige opinies rakende die gebruik van simulasie as middel tot onderrig en leer, simulasie-gebaseerde assessering en die daarstelling van 'n simulasiesentrum te bekom. Fokusgroeponderhoude is met dosente en departementshoofde van die Skool

vir Geneeskunde is gevoer met die doel om die persoonlike sienings en houdings van die deelnemers oor die gebruik van simulasie te ondersoek.

Die samestelling van aanbevelings vir die gebruik van kliniese simulasie om voorgraadse mediese onderwys en opleiding by die UV te versterk is bereik met behulp van die data wat ingesamel is. Die stellings, uitgangspunte en rolspelers is ondersoek met die doel om aanbevelings te maak rakende die gebruik van kliniese simulasie in hierdie opsig.

Die studie het voortgespruit uit die identifisering van 'n gaping in die gebruik van simulasie aan die UV, in Suid-Afrika en ook in die res van Afrika. Om die gaping te oorbrug, het die navorser onderwysaanbevelings vir die integrasie van kliniese simulasie as 'n verpligte komponent en versterking van bestaande kurrikulums aanbeveel. Die ontwikkeling en implementering van 'n nuwe simulasiesentrum vir die UV Skool vir Geneeskunde is bespreek met kliniese simulasie onderrig en leer as mikpunte.

Die voorsiening van aanbevelings vir die ontwikkeling en implementering van 'n simulasiesentrum vir die UV Skool vir Geneeskunde verteenwoordig 'n waardevolle kennisbydrae. Die strategie oorbrug die gaping deurdat dit aandui hoe kliniese simulasie met die bestaande kurrikulums integreer kan word, vaardigheidsontwikkeling aangehelp kan word en simulasiegebaseerde assessering aangepak kan word. Die studie vervat aanbevelings hieroor. Die grondige navorsingsbenadering het kwaliteit, betroubaarheid en geldigheid verseker. Die afgehandelde navorsingsprojek kan die basis vir verdere navorsing vorm.

CLINICAL SIMULATION TO ENHANCE UNDERGRADUATE MEDICAL EDUCATION AND TRAINING AT THE UNIVERSITY OF THE FREE STATE

CHAPTER 1

ORIENTATION TO THE STUDY

1.1 INTRODUCTION

In this research project the researcher carried out an in-depth study with the view to make recommendations for the use of clinical simulation as enhancement of undergraduate medical education and training at the University of the Free State (UFS). Simulation is used to develop skills that cannot be developed on real patients, and before students have the skills to treat real patients. Simulation also plays an important role in the development of essential skills, attitudes and behaviours in a safe, non-threatening environment. It provides the opportunity to students to move from theory to practice in a realistic, yet safe environment and allows them to review, repeat and practice certain skills, and reassess their performance without compromising patient safety. Glavin (2011:5) describes *education* as an agent of change and transformation where the learner or student is a willing partner. The change in behaviour requires more than knowledge, it requires cognitive, psychomotor and other abilities and a predisposition on the part of the learner to make use of those abilities. The same author describes *training* as being confined to procedures or linked psychomotor activities, but does not always share the transformative role of education.

According to Scalese (2009:65) the trend worldwide is to utilise simulators for teaching, learning and assessment. Simulation-based medical education (SBME) plays an important role in enhancing medical training and minimising risk to patients. Medico-legal issues and demands for accountability can be important driving forces for the integration of a simulation centre into the curricula of health care education (Ziv, Erez, Munz, Vardi, Barsuk, Levine, Benita, Rubin, Berkenstadt 2006:1091).

SBME can be described as the use of simulation technology as a tool to engage students in an active learning process (Scalese 2009:65), and provides a hands-on empirical educational modality, enabling controlled, proactive exposure of trainees to both regular and complex, uncommon clinical scenarios. SBME creates opportunities for team training and reproducible, standardised, objective settings for formative as well as summative assessment (Ziv *et al.* 2006:1091). SBME provides opportunities for best practices in terms of care and training, error management and patient safety (Ziv, Wolpe, Small & Glick 2003:783).

The phrase "simulation-enhanced medical education" as used by Scalese (2009:65), describes the position of simulation for the development of a simulation centre for the School of Medicine at the University of the Free State (UFS) aptly. Simulation-enhanced medical education is defined as training where simulation is used as a valuable addition to traditional clinical experiential learning and a reliable and valid measurement tool to assess performance in a practical environment (Gropper, Harnett, Parker, Pearce, MacIver, Murray, Ramsay, Ripley, Sands, Zychla 2010:Online; Scalese 2009:65). Maran and Glavin (2003:22) emphasise that simulation training, at any level, must be integrated with clinical practice. Furthermore, simulation may sometimes be the only way to expose students to the management of less common conditions, while it also enables experienced practitioners to keep their skills up to date.

A simulation centre can play an important role in both undergraduate and postgraduate training programmes, as well as in Continuing Professional Development (CPD) programmes. Simulation plays an important role in the learning needs of Generation Y students by making learning interactive and fun and incorporating teamwork in the learning process (Mangold 2007:22).

Kneebone, Scott, Darzi and Horrocks (2004:Online) summarise clinical simulation as follows: "Simulation offers a safe environment within which learners can repeatedly practise a range of clinical skills without endangering patients. Comprehensive simulation environments allow a move away from isolated tasks to more complex clinical situations, recreating many of the challenges of real life."

The Clinical Skills Unit of the School of Medicine, UFS, is involved in the training of second and third year medical students in Phase II of the undergraduate medical (M.B., Ch.B.) programme (University of the Free State, Faculty of Health Sciences

Home Page 2010:Online). This forms part of the pre-clinical training of students in the programme. The functions of the Clinical Skills Unit is to assist in the early training and practise of basic clinical skills, integration of theory and practical skills and teaching and learning of clinical skills such as:

- Taking history
- Performing physical examinations
- Aseptic techniques
- Taking blood samples
- Giving intra-muscular injections
- Suturing of wounds
- Radiological examinations
- System-specific directed practical sessions
- Selected, module-orientated dissections are performed on cadavers.

The ideal position of a simulation centre in a medical programme is in the clinical phase (Phase III). The basic skills must have been mastered by this stage so that the emphasis can be on the training of critical thinking, clinical scenarios and teamwork with colleagues and other members of the health professional team, e.g. nurses and emergency personnel. Debriefing and feedback plays an important role in the promotion of learning and reflection after simulation-based learning.

Simulation prepares students for situations they may encounter in future. When using simulation in medical training, it should be kept in mind that the education and training should adhere to the principles of SBME, as mentioned above.

In the words of Dr Carl Hillermann, Head of the Simulation Centre, Coventry in the UK, during a visit to the centre in October 2010: "I think simulation for South Africa is really important, because there is a problem that once the undergraduate students leave the university environment and do their community service, they get sent to places where there are no senior doctors, no specialists, so they go from a very protected environment and they suddenly are thrown into the deep end. I think this is where simulation can play an important role to prepare them for that environment".

This study can serve as a directive for higher education institutions to incorporate clinical simulation in undergraduate curricula of medical education and training and for the development of simulation as an integral part of current curricula.

The aim of the first chapter is to orientate the reader to the study and provide background to the research problem.

1.2 BACKGROUND TO THE RESEARCH PROBLEM

The burden of disease plays an important role in the planning of medical undergraduate and specialist training. A decreasing clinical training platform and the demand for more health care professionals (Matlala 2009:9-10:Presentation; Veller 2009:Presentation) in South Africa, necessitates the investigation of additional options for clinical training and assessment of students at the School of Medicine, UFS.

The main causes of death in South Africa in 2007 were: "Certain infectious and parasitic diseases" (26%), cardiovascular diseases (10%), respiratory infections (10%), and ill-defined causes (14%) (Bradshaw 2009:Presentation). According to Bradshaw (2009:Presentation) in 2009 the leading causes of death in South Africa were HIV/AIDS, tuberculosis, interpersonal violence, road traffic injuries and a range of other conditions that result in ill health of South African citizens. Tuberculosis had a prevalence of 998 per 100 000 population in South Africa in 2006 (Bradshaw 2009:Presentation). This is considerably higher than in Cambodia, the Democratic Republic of the Congo, Ethiopia and Mozambique. HIV and AIDS were considered responsible for 31% of all deaths countrywide in the year 2000, according to the revised SA national burden of disease estimates for 2000 (Bradshaw 2009:Presentation).

Training of medical students has to provide for these causes of death as well as a wide spectrum of other conditions. With the current case mix in academic and public sector hospitals and the need to train students in the whole spectrum of diseases and conditions, the training platform should be expanded. It should be kept in mind that the training platform has, however, actually decreased over the past few years in South Africa. The smaller teaching platform (patients used for training of medical students and postgraduate specialist training) and smaller variety of conditions (case mix) admitted to the academic hospitals than before can be attributed to the burden of HIV and related diseases and the financial constraints on public hospitals. Combined, these factors have a noteworthy effect on the number of patients available for training purposes and ultimately on the quality and competence of health care professionals leaving medical schools (CMSA 2009:3,10).

To cope with this burden, Mayosi (2009:Presentation) suggests that the existing specialities and specialists for the public sector should be increased. Integrated care and prevention of chronic diseases should play a more important role in training of medical professionals. According to Mayosi (2009:Presentation), specialists should also play an active role in the training and supervision of primary health care professionals and undergraduate medical students. This implies that the number of doctors trained must be increased dramatically in order to supply the demand for more specialists.

South Africa does not have enough medically skilled professionals in all areas of health care to meet the needs of its population. According to an article by Hudson (2011:11) in *The Bulletin,* published by the Health Professions Council of South Africa (HPCSA), South Africa has 37 333 doctors registered with the HPCSA, 22 820 General Practitioners and 12 238 specialists. Although there is a 29.9% vacancy of public sector posts, a quarter (25%) of clinical posts in the public sector were abolished in favour of a 30% increase in administrative posts (Hudson 2011:21). South Africa has about 5 000 specialists but needs about 13 000; similarly, there are 13 000 general practitioners, but South Africa needs an extra 20 000 (Hudson 2011:21).

Medical education is a long and expensive process and it is not possible to address the problem with a "quick-fix" solution (Matlala 2009:Presentation). There should be a 58% increase in registrar admissions to achieve a 15 specialist/100 000 population norm in 15 years (Matlala 2009:Presentation; Hudson 2011:24). According to the report of "The Colleges of Medicine of South Africa (CMSA) on Training of Medical Specialists and Subspecialists 2010-2015" the ratio of medical professionals per 1000 population is 0.55 (CMSA 2010:9), compared to countries like the UK where the ratio is 2.3/1000, and Australia (2.47/1000) (CMSA 2010:8). The report further states that South Africa has 25 000 doctors for 50 million people, compared to the United Kingdom with 120 000 doctors for 60 million people (CMSA 2010:8).

In 2009, the CMSA undertook a survey to assess the need for specialists. The recommendation was to increase the ratio from the current 0.15 specialists per 1000 population to 0.25/1000 population (CMSA 2010:8). This in other words, means a total increase of 4 596 specialists was recommended.

In 2005, the population of the Free State Province, South Africa, was 2 574 156 and, in addition, the Universitas Academic Hospital Complex was also responsible for a population of 5 404 052 from surrounding provinces and 1 845 243 from Lesotho. The potential total catchment population serviced by the tertiary health sector in the Free State is thus 9 845 243 (Universitas Academic Hospital 2007:15), which should be taken into account in considering the needs and in planning for doctors and undergraduate medical training in the Free State.

The situation is not unique to South Africa. When increasing numbers of students enter medical schools and more students compete for a limited number of clinical cases, problems regarding the provision of enough opportunities to train on real patients was described in a paper by Maran and Glavin (2003:22). The number of conditions the primary health care professionals are expected to deal with (case mix) has an influence on the quality of training of medical students and the doctors entering the workforce worldwide.

Another obstacle is that patients are better informed and have greater expectations of health care professionals and may exercise the right not to be involved in student education (Bradley & Postlethwaite 2003:6), resulting in an even smaller teaching platform.

Patient safety is another important factor that has a limiting effect on the training of medical students; for instance, students are not allowed to perform certain procedures on patients (e.g. difficult intubations or in paediatric cases). In these situations, simulation can be used to fill the gap in the training of medical students (Maran & Glavin 2003:22).

According to the Strategy for Clinical Simulation Training 2008-2011 published by NHS Education South Central, in the United Kingdom, simulation training is becoming an accepted part of training curricula to allow for educational opportunities and help reduce training time (NESC 2011:Online).

Against this background, it may be concluded that the need exists for the use of clinical simulation in the education and training of undergraduate medical students at the UFS, South Africa. The role of simulation is not to replace real patients, but to enhance the training and fill the gaps in students' training caused by the change in case mix and reduction in the teaching platform in the hospital environment. Simulation serves to direct attention to the importance of teamwork in certain scenarios and also forms and directs the thinking processes of students.

1.3 PROBLEM STATEMENT AND RESEARCH QUESTIONS

The following concepts are key to the problem statement and formulation of the research questions and therefore defined contextually for the sake of clarity:

- **Simulation** in the context of clinical practice is an attempt to recreate one or more aspects of clinical practice. This ranges from a very simple task to recreating a whole clinical environment with interactive, high-fidelity simulators, representing patients in a relevant clinical setting (Glavin 2008a:71).
- **Health care simulation** is defined by the Canadian Network for Simulation in Healthcare (CNSH 2011:Presentation) as an instructional medium used for education, assessment and research, which includes several modalities that have in common the reproduction of certain characteristics of clinical reality. As a fundamental requirement, they must allow participants to affect, to different degrees, the course of the educational experience through verbal or physical interaction with the simulated components or patients.
- **Simulation-based medical education (SBME)** is defined as simulation technology and a tool to engage students in the active learning process (Scalese 2009:65), and provides a hands-on empirical educational modality, enabling controlled proactive exposure of trainees to both regular and complex, uncommon clinical scenarios. SBME supplies opportunities for team training and a reproducible, standardised, objective setting for training, formative assessment and summative assessment (Ziv *et al.* 2006:1091). SBME provides opportunities for best standards of care and training, error management and patient safety (Ziv *et*

al. 2003:783). SBME activities rely on experiential learning (CNSH 2011:Presentation).

- **Simulation-enhanced medical education (SEME)** is simulation used as a valuable addition to traditional clinical experiential learning; a reliable and valid measurement tool to assess performance in a practice and practical environment (Gropper *et al.* 2010:Online; Scalese 2009:65).

In this study, clinical simulation was investigated as the enhancement of undergraduate medical education and training and to address the problems related to a decreasing clinical training platform, change in case mix and the demand for more health care professionals (Matlala 2009:Presentation; Veller 2009:Presentation). Clinical simulation was considered as a complementary asset in the School of Medicine, UFS, with emphasis on the role simulation can play in the training of medical students.

In order to address the problem stated, the following research questions were formulated:

1. *What role can be formulated for clinical simulation as an addition to the current undergraduate medical curriculum?*
2. *How can clinical skills and competence development be improved by the integration and implementation of clinical simulation into the current undergraduate medical curriculum as a required component and not only as an optional activity?*
3. *What are the assessment tools and criteria for assessment of clinical competence of undergraduate medical students, in a simulation centre?*
4. *What are the factors that should be considered in the development and implementation of a new simulation centre for the School of Medicine, Faculty of Health Sciences, UFS?*

The research was carried out and completed based on these research questions. The findings of the research may serve as the foundation for the implementation of clinical simulation as addition to the education and training of undergraduate medical students at the UFS.

1.4 GOAL, AIM AND OBJECTIVES OF THE STUDY

The goal, aim and objectives of the study were as follows:

1.4.1 Goal

The overall goal of this study was to investigate the role clinical simulation can play in the education and training of undergraduate medical students and whether this serves an adequate motivation to invest in a simulation infrastructure for the School of Medicine, UFS.

1.4.2 Aim

The aim of the study was to investigate how simulation can be used for the enhancement of the education and training of undergraduate medical students in the School of Medicine, UFS.

1.4.3 Objectives

To achieve the aim, the following objectives were pursued:

- To formulate the role of clinical simulation as an integral part of the current undergraduate medical curriculum. This was done by means of a literature review of simulation, semi-structured interviews with experts, and focus group interviews with the different module leaders and lecturers of the School of Medicine, UFS.
  - This objective addresses research question 1.

- To determine how the implementation and integration of simulation in the current undergraduate medical curriculum as a required component and not only as an optional activity, can improve clinical skills and competence development. This was done using the findings of semi-structured interviews with international simulation centre experts; focus group interviews with heads of departments, module leaders and lecturers in School of Medicine at the UFS; a literature review; and observation during international visits.
  - This objective addresses research question 2.

- To specify the tools and criteria for assessment of the clinical competence of undergraduate medical students in a simulation centre. These were investigated by means of semi-structured interviews conducted with international simulation centre experts, focus group interviews with School of Medicine module leaders and lecturers at the UFS; literature reviews; and personal observation during international visits.
    - This objective addresses research question 3.

- To enumerate the factors that should be considered in developing and implementing a simulation centre. Data were collected internationally using semi-structured interviews at different simulation centres and observation during visits.
    - This objective addresses research question 4.

1.5 DEMARCATION OF THE FIELD AND SCOPE OF THE STUDY

This study was conducted in the field of Health Professions Education (HPE). Clinical simulation is a rapidly developing field that has become popular in medical education over the past few decades. The improvement of simulators and technology has made simulation more realistic and user friendly, especially since the introduction of high fidelity simulators, that can simulate physiology and changes in physiology. In the current field of HPE, simulation is an important new development that should be considered for implementation in educational programmes.

A thorough review of simulation in HPE was done and the challenges facing the School of Medicine, UFS, in implementing simulation in the medical programme, investigated. The results of the study can be applied to medical programmes of other medical schools in South Africa and the rest of Africa with similar challenges in terms of financial and technical support, as well as changes in the teaching platform and case mix. The study was conducted between 2009 and January 2012, with the empirical research phase from 2010-2011.

1.6 SIGNIFICANCE AND VALUE OF THE STUDY

The value of the research will ultimately reside in the development of clinical simulation as an enhancement of the current curriculum with clear objectives and alignment with content and outcomes of the different programmes and the integration of simulation into the current curriculum as a required component and not only as an optional activity.

The School of Medicine at the UFS has approved the establishment of a simulation centre and this study could assist in the development of clinical simulation at the simulation centre in the School of Medicine, UFS, for the enhancement of education and training for undergraduate students.

1.7 RESEARCH DESIGN OF THE STUDY AND METHODS OF INVESTIGATION

Basic (generic) as well as grounded theory, qualitative research designs were used in this study. Basic qualitative research makes use of data collection through interviews, observations and document analysis. The overall aim of grounded theory is to seek patterns in data, which are then arranged in relationship to each other – and becomes the theory grounded in data (Beylefeld 2010:Presentation).

The methods that were used and which formed the basis of the project comprised literature reviews, semi-structured interviews, focus group interviews, and observations. The qualitative methods used to collect data were observation, analysis of text books and documents, interviews, recordings and transcriptions (Silverman 2005:11-12). A combination of these methods was used.

1.7.1 Literature review and observations

Information gathered from literature and documentation, together with the experience gained and observations made by the researcher during international visits and international congresses were used to formulate a conceptual framework and guide the implementation of a simulation centre as an enhancement for undergraduate medical students at the School of Medicine, UFS.

Detailed descriptions of the research design, population, sampling methods, data collection procedures and data analysis and reporting are provided in Chapter 3: Research Methodology.

1.7.2 Semi-structured interviews

Semi-structured interviews were conducted to obtain information applicable to simulation centres internationally, to collect information on the integration of simulation training in medical curricula, the assessment of students and the development of a simulation centre. A full description, data analysis and discussion will follow in Chapter 4.

1.7.3 Focus group interviews

The purpose of focus groups was to develop a broad understanding, rather than a quantitative summary. The emphasis was on insights, attitudes, responses and opinions of the participants (Burns & Grove 2001:425). The focus group interviews in this study aimed to gather input from heads of departments and the different module leaders and lecturers (session presenters) in the clinical phase (Phase III) of the undergraduate medical programme at the UFS. The focus fell on the opinions and attitudes of the participants concerning the value that a simulation centre can play in the training and assessment of students in the different modules and the integration in the curricula as an enhancement of training for the School of Medicine, UFS. A full and detailed description of the focus group interviews, data analysis and discussion of results are given in Chapter 5 of the thesis.

1.8 IMPLEMENTATION OF THE FINDINGS

The research findings will be submitted to the Management Committee of the Faculty of Health Sciences and the School of Medicine, UFS, with recommendations that the findings of this study could be used to:

- implement simulation into the current undergraduate medical programme,
- improve patient safety,
- use simulation as assessment tool, and

- help with the development and implementation of a simulation centre for the School of Medicine, UFS.

The results of this research can play a proactive role in the need to use modern educational techniques such as high-fidelity simulation, appropriate use of e-learning, simulation, clinical skills and other innovative approaches to health care education. Improvement of patient safety can be achieved by the use of simulation in the education and training of the undergraduate and postgraduate students in the various programmes in future.

The research findings will be submitted to academic journals, for publication as articles. This study should make a meaningful contribution to the use of simulation for the enhancement of undergraduate medical education and training.

The findings of the research will be brought to the attention of other medical schools in South Africa and the rest of Africa and can be adapted or used as such by these schools as a guide for the implementation of simulation in their undergraduate medical programmes.

1.9 ARRANGEMENT OF THE REPORT

The report of the research findings and the final outcome are arranged as follows:

Chapter 1: **Orientation to the study.** In this chapter the background to the study was provided. The problem statement as well as the goals, aim and objectives were stated. The research design and methodology were discussed briefly to give the reader an overview of the contents of this report.

Chapter 2: **Simulation-enhanced clinical medical education.** In this chapter attention will be paid to simulation as an enhancement of the undergraduate medical programme and a literature review of the role of clinical simulation in the education and training of health care professionals. This chapter deals with the educational and practical implementation of simulation in the medical programme.

Chapter 3: **Research methodology.** In this chapter the methodology that was applied in this study will be explained. The theoretical aspects of the methods used will be discussed and the reasons for deciding on the approach and methods explained. Semi-structured interviews were conducted with experts regarding centres in the United States of America (USA) and United Kingdom (UK) to obtain information from simulation centres internationally, to gather information on the integration of simulation training in medical curriculums, the assessment of students and the development of a simulation centre. The focus group interviews were used to develop a broad understanding rather than a quantitative summary. The emphasis was on insights, attitudes, responses and opinions of the participants. The aim of the analysis was to look for trends and patterns that reappear within a single focus group or among various focus groups (Lewis 2000:Online). The way in which the tools were used and the data were gathered during the literature review and observation, as well as the analysis of data will be discussed and explained.

Chapter 4: **Results of semi-structured interviews: analysis and discussion** will provide information in this regard. This chapter deals with the international expert opinions.

Chapter 5: **Results of focus group interviews: analysis and discussion** will provide another angle on the topic. This chapter deals with the personal opinions and attitudes of the participants of the focus group interviews regarding clinical simulation for the School of Medicine, UFS.

Chapter 6: **Clinical simulation to enhance undergraduate medical education and training at the UFS** will be discussed. This chapter deals with the recommendations that are made regarding the use of clinical simulation as educational tool and the implementation thereof.

Chapter 7: **Conclusions, recommendations and limitations of the study.** This chapter will give a summative conclusion of the study and recommendations as to the value and application of the results. The ethical aspects of simulation in health care are discussed. The limitations of the study are also outlined.

1.10 CONCLUSION

Chapter 1 provided the introduction and background to the research undertaken regarding the use of clinical simulation as enhancement of undergraduate medical education and training at the UFS.

The next chapter, Chapter 2 entitled: **Simulation-enhanced clinical medical education,** will be a synthesis of the relevant literature.

CHAPTER 2

SIMULATION-ENHANCED CLINICAL MEDICAL EDUCATION

2.1 INTRODUCTION

The application of new learning technologies in medical education escalated in recent years. Simulation is currently utilised globally for teaching, learning and assessment across all health care professions. Scerbo, Murray, Alinier, Antonius, Caird, Striker, Rice and Kyle (2011:S20) describes simulation in health care training as a technique that can replace or amplify real clinical experiences with guided experiences. In the past decade, medical schools have increasingly included clinical simulation technology in their programmes (Scalese 2009:65). Scalese (2009:65) uses the term "simulation-enhanced medical education" and this term describes the role of simulation as enhancement and addition to current curricula, but not as a replacement of real patients. Michael Gordon, as quoted by Scalese (2009:65), emphasised that clinical simulation for medical education should comprise the following three essential components:

- Curricula with clearly identified objectives and educational content
- Simulation integrated as a required component of the curriculum
- Assessment as to whether the students have mastered the content and attained the objectives.

In this chapter, the role of clinical simulation as addition to current curricula, simulation as a required component of curricula to improve clinical skills and competence, and the assessment of clinical competence with simulation will be investigated with a literature review in order to develop the theoretical framework to support the empirical part of this study. To incorporate clinical simulation into the clinical phase of the undergraduate medical programme, it is essential to look at the development and implementation of infrastructure to accommodate such initiatives. Figure 2.1 provides a schematic overview of the different aspects that will be discussed and that will constitute the theoretical framework for the study.

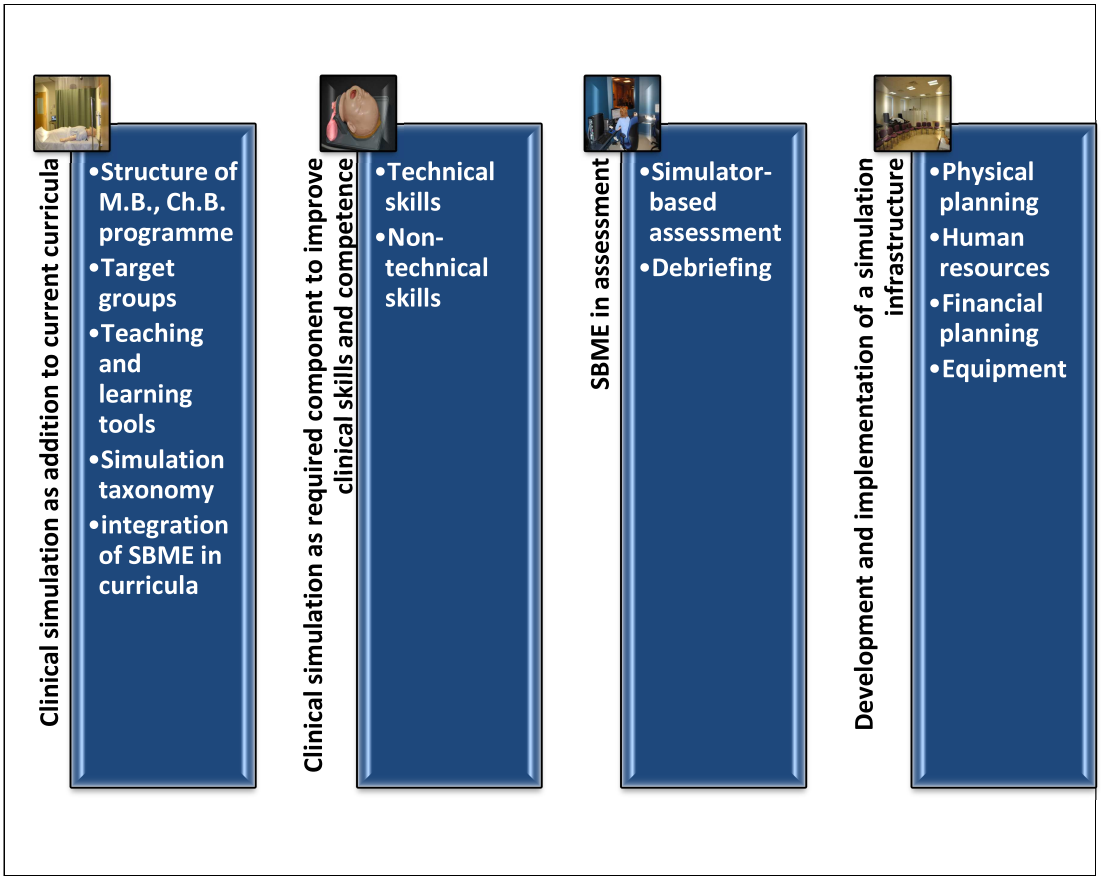


FIGURE 2.1 THEORETICAL FRAMEWORK OF THE STUDY

[Compiled by the Researcher, Labuschagne 2011]

2.2 CLINICAL SIMULATION AS ADDITION TO CURRENT CURRICULA

In an effort to position clinical simulation that can be used to enhance the current undergraduate medical programme at the School of Medicine, UFS, the structure of the current programme will be explained.

2.2.1 Structure of the current M.B., Ch.B. Programme at the School of Medicine, UFS

In the Yearbook 2011: School of Medicine (2011:24-25) of the University of the Free State, the Programme is divided into three phases and ten semesters, namely:

- Phase I: Semester 1 of the first year.
- The following modules are included in Phase I: Health Psychology; The Doctor and the Environment; Concepts of Health and Disease; Tissues of the body; Structure and development of the body and General skills.
- Phase II: Semester 2 of the first year, including the second year (Semester 3 and 4) and the first semester of the third year (Semester 5).
- The following modules are included in Phase II: Membranes, Receptors and principles of Pharmacotherapy; Structure and Development of the Body; Molecules of the Body; Metabolism; Mechanisms of Disease; Infections and Antimicrobial Drugs; Epidemiology, Biostatistics and Special Study Module; Urinary system; Respiratory system; Haematology and Immunology; Cardiovascular system; Genital system; Gastrointestinal system; Nervous system; Endocrine system; Health and disease in populations; Human diversity; Human Rights and Legal ethics and Clinical skills.
- Phase III: Semester 2 of the third year (Semester 6) and the fourth (Semester 7 and 8) and fifth years (Semester 9 and 10).
- The following modules are included in Phase III: Health Policy and Service Provision; Human Life Cycle; Reproduction; Internal Medicine; Surgery; Paediatrics; Obstetrics and Gynaecology; Psychiatry; Family Medicine and Anaesthesiology; Otorhinolaryngology; Ophthalmology; Urology; Oncology and Orthopaedic Surgery.

Clinical simulation will fit into Phase III of the Programme and will provide a service to all the clinical departments and will be multi-disciplinary, scenario-based. The aim will be to make simulation a required component of the curriculum to improve clinical skills and competence and to be used as a tool for formative and summative assessment of clinical competence in a non-threatening environment.

2.2.2 Target groups

Simulation-based medical education (SBME) can be used to aid clinical training of health care professionals. In the Israel Centre for Medical Simulation in Tel-Hasomer the following medical groups were included in their SBME programmes: medical school candidates, medical students, postgraduate training, residents, fellows, attending physicians and military physicians (Ziv *et al.* 2006:1094). SBME can be a tool in the training of undergraduate, postgraduate and even Continuing Medical Education (CME) programmes. "Train the trainer" programmes can be a useful tool in the standardisation of instructors and moderators for different courses and disciplines (Rothgeb 2008:492). Objective performance evaluation can be used to evaluate the competence of practicing physicians and surgeons.

Apart from medical trainees, other target groups for training at a simulation centre can include: paramedics, nurses, pharmacists, social workers, physical and occupational therapists and health managers (Ziv *et al*. 2006:1093).

Wiley and Murray (2008:309) list educational needs of the user groups for learning in a simulation centre as: clinical skills; physical diagnosis; standardised patients; OSCE and multi-disciplinary laboratory. The use of simulation in medical education provides unique opportunities for increasing the quality of the educational experiences of students (Rosen, Salas, Silvestri, Wu & Lazzara 2008:Online).

In a study by Laack, Newman, Goyal and Torsher (2010:Online), an intensive course of one week (Internship Boot Camp) with simulated, longitudinal patient-care scenarios was designed to prepare medical students for internship. They use high-fidelity simulation, standardised patients, procedural task trainers and problem-based learning to help students apply knowledge and develop a framework for response to the challenges they will face as interns. The Internship Boot Camp is a unique environment that is rated by the participants as the most useful, of all components of their medical school education, in preparation for internship.

In developing a simulation and skills learning facility, it is important to identify the main stakeholders. Health care professionals both at undergraduate and postgraduate level are potential users. Encouragement of collaborative working is an important starting point for inter-professional learning opportunities (Bradley & Postlethwaite 2003:7) In the Institute of Medicine report, *To Err is Human: Building a safer health system* it is recommended that team training programmes can improve safety, because people make fewer mistakes when they work in teams (Kohn, Corrigan & Donaldson 2000:17). Teamwork within the interdisciplinary team is a necessary complementary aspect of technical skills training to improve quality and patient safety. Simulation-based team training addresses the interrelated conceptual levels of team work, addressing the learning needs at the level of the individual, the team, the organisation and the health care system and it is advised that it should be incorporated into curriculum development programmes (Eppich, Howard, Vozenilek & Curran 2011:Online).

In the development of a Simulation Centre for the School of Medicine, UFS, the initial plan is to implement simulation for undergraduate education and training, especially in Phase III (Clinical phase) of the undergraduate programme, but postgraduate and inter-disciplinary training should follow shortly.

2.2.3 Teaching and learning tools

SBME is a useful tool for clinical training and learning of communication and examination skills and can easily be aligned with different curriculum outcomes. Models of learning and teaching with simulators are described in the literature, namely:

- The *Craft-orientated approach* which includes the steps of demonstration and explanation by tutors, practice under supervision with feedback and constructive critique (Bradley & Postlethwaite 2003:7).
- The *Spiral curriculum model* where skills learned increase along a continuum from novice towards expert and allows for multiple repetitions of the same or similar cases during the course and allows students to perform several cycles, allowing students to understand curriculum content at various levels of performance and higher order cognitive levels of reasoning (Bradley & Postlethwaite 2003:7; Kozmenko, Kaye, Morgan & Hilton 2008:143).

These models comprise a combination of the following education learning theories; constructivism learning theory, adult-learning theory, brain-based learning theory, social-cognitive learning theory, experiential learning theory and novice-to-expert theory (Rothgeb 2008:490).

A combination of the two models can be used as training tools with simulators. In short learning courses and Continuing Medical Education (CME) activities, it is useful to use the craft orientated approach, but when integrating simulation into a curriculum, the spiral model is better to use. These models of teaching and learning will be further discussed in Chapter 6 (cf. Point 6.2).

A wide range of learning tools can be used in simulation-based medical education. Role play, real patients, simulated and standardised patients (SPs) and audio and video recordings can form part of the tools used to help with the teaching and learning process (Bradley & Postlethwaite 2003:7). Small group work or senior students tutoring junior students can be utilised as tools in the training process (Issenberg, Pringle, Harden, Khogali & Gordon 2003:45).

Clinical reasoning skills can be improved with diagnostic reminder systems (informatics tools) or flat screen (computer-based) simulation. In a study by Carlson, Abel and Bridges (2011:Online) the diagnostic accuracy of students improved after the use of diagnostic reminder systems. Simulated case scenarios offer an appropriate platform for introducing diagnostic support tools to students within a clinical context.

The teaching methods used in 'Harvey' and the 'UMedic' programmes include lectures and symposia, small group problem-based learning, independent study by using computer-based learning, clinical skills of history taking and physical examination in a skills laboratory, hospital ward-based teaching, community-based teaching in primary care and tutoring by senior students (Issenberg *et al.* 2003:45).

Simulations create the opportunity for medical students and educators to 'practice' medicine without risk in a non-threatening environment. Patients and students are not exposed to unnecessary risk (Maran & Glavin 2003:23). Medico-legal risk is also excluded by the use of SBME (Ziv *et al.* 2006:1091).

The process of learning with simulators should involve demonstrations by tutors, followed by explanation, practice under supervision and feedback (Bradley & Postlethwaite 2003:7). Skills can be practiced repeatedly (often not possible on real patients) and training can be tailored to fit the needs of individual students (Maran & Glavin 2003:23); for instance, if a specific student has problems in mastering a certain aspect or part of an examination, the student can practice only that part until it is mastered. This has the additional advantage of better retention of knowledge and mastering of clinical skills. SBME can play an important role in the enhancement of the application of theoretical knowledge to the simulator and then applied in practice. This is confirmed by a study performed by McGaghie, Issenberg, Petrusa & Scalese (2006:792) that indicated that there is a strong association between hours of practice on high-fidelity medical simulators and standardised learning outcomes.

The components of the Simulation Learning Plan are described in the literature and include the following: simulator plan, simulation, debriefing and transference. The Simulation Learning Plan represented in Figure 4.2 and adapted from Doerr and Murray explains the transference of knowledge and skills from simulation to the clinical aspects. Debriefing forms the bridge to help students with the process. The trainers and lecturers should be involved in this process and they should be trained to do so. Teachers should keep students motivated by demonstrating to the students that they are concerned about the education of students and want to help them to develop solutions to the problems the students may experience (Doerr, & Murray 2008:773-775).

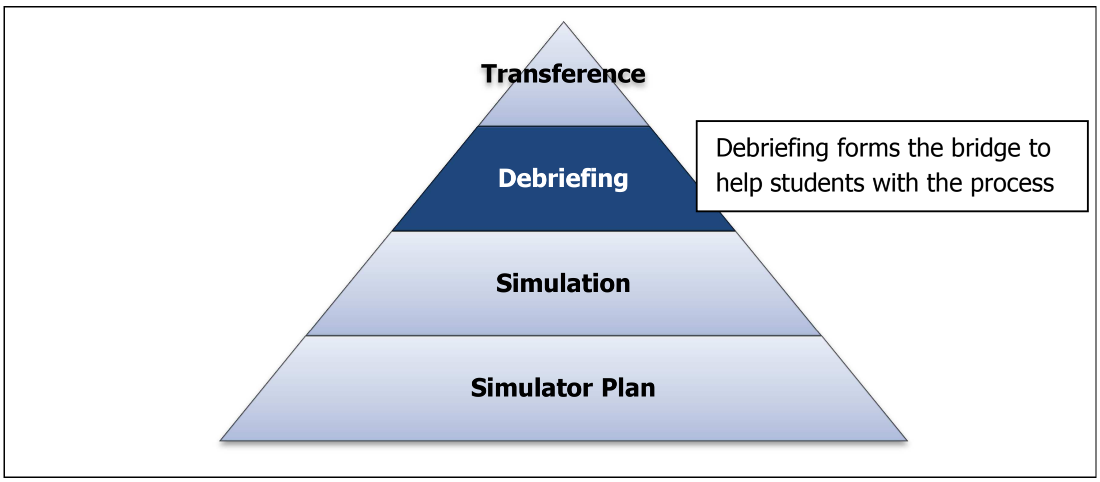


FIGURE 2.2 SIMULATION LEARNING PLAN, ILLUSTRATING HOW THE THREE PHASES OF SIMULATION SUPPORT EDUCATIONAL TRANSFERENCE (Doerr & Murray 2008:773-775)

Patient substitutes that can be used in clinical training include video or sound recordings of a patient, simulators or computer simulation (Collins & Harden 1998:9). The value of simulators as an additional tool in clinical training was already described in 1985 by McLeod and Harden. These models can be static or interactive. Simulation tools and approaches used in SBME as described by Ziv *et al.* (2003:784) are low-tech simulators; simulated or standardised patients; screen-based computer simulators; complex task trainers and realistic patient simulators.

2.2.4 Simulation taxonomy

There is much confusion in the literature regarding simulation taxonomy. Terms like "high-fidelity mannequin-based simulation", "clinical simulation", "human patient simulation", "full-scale simulation", "high-technology patient simulation", and several other terms are used haphazardly in the literature. The Canadian Network for Simulation in Healthcare's working group presented a taxonomy and conceptual framework for instructional design and media selection at an international meeting, IMSH-2011, in New Orleans in the USA. This framework can be summarised in Figure 2.3. This framework helps to standardise the terminology and the tools (technology) and the educational experiences (CNSH 2011:Presentation). This framework is easy and simple to use and useful for instructional design and research.

The taxonomy and conceptual framework can be explained as follows:

- Level one is the *instructional medium* and can include lectures, textbooks, television and simulation
- Level two is the *simulation modality* and includes procedural simulation, standardised patients (SPs), computer-based simulation (flat-screen simulation) and simulation in clinical immersion
- Level three represents the *instructional methods* and includes self-directed learning and instructor-based learning. It is explicitly stated that observation is not an instructional method for simulation
- Level four is *presentation* and include feedback, fidelity, simulator type, scenario and team composition (CNSH 2011:Presentation).

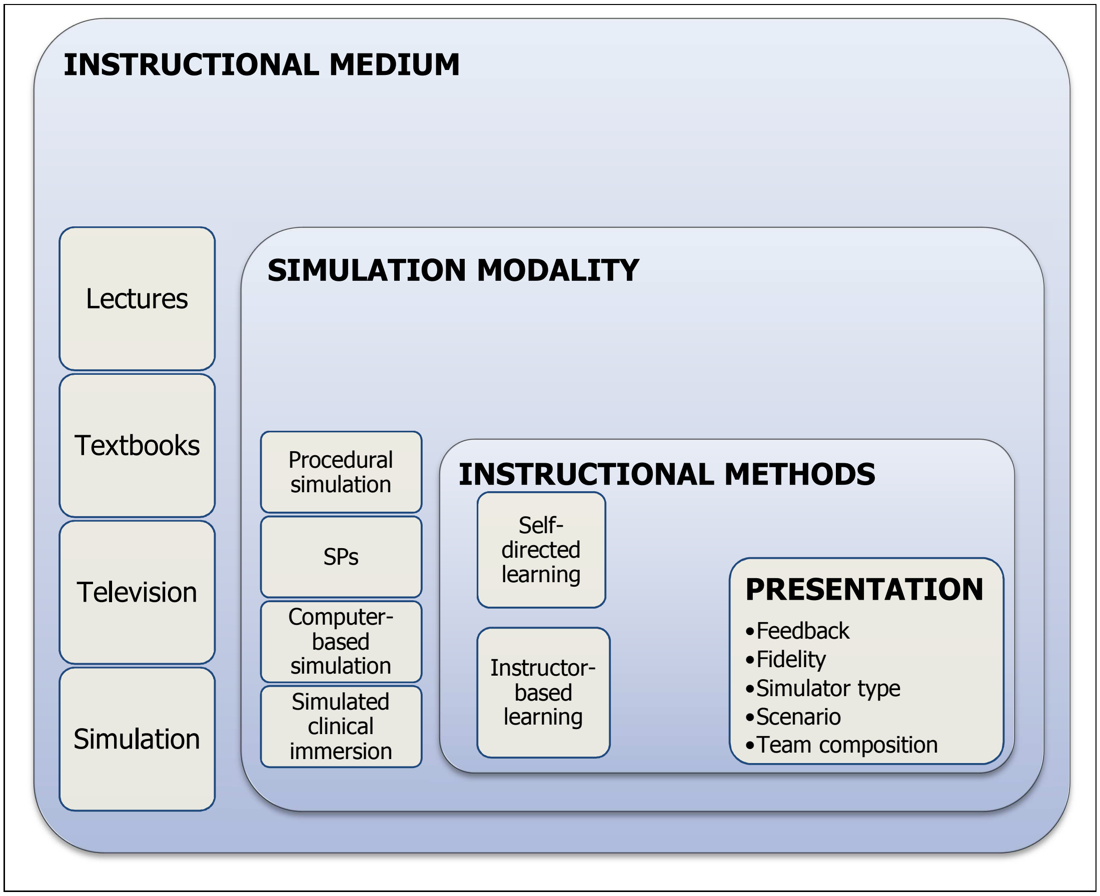


FIGURE 2.3 TAXONOMY AND CONCEPTUAL FRAMEWORK FOR INSTRUCTIONAL DESIGN AND MEDIA SELECTION (ADAPTED FROM CNSH, 2011:PRESENTATION) [Compiled by the researcher, Labuschagne 2011]

2.2.5 Integration of simulation-based medical education (SBME) in a current curriculum

SBME is one of the educational activities in which students have the time and opportunity to be guided in the reflection of a clinical task they have just undertaken. The use of clinical, technical (skill, psychomotor elements or cognitive elements) and non-technical (professionalism, values, humanism) frameworks to help students make sense of what has happened in a simulated scenario and how students may use those findings to change subsequent behaviour (Glavin 2011:6). The integration of SBME into curricula can help students explore personal and professional value systems in the context of their professional role and the teachers can utilise simulation to teach students these values and attitudes, resulting in better, more professional doctors leaving Medical School. Glavin (2011:7) advocates that a framework should be developed and behavioural markers should be used to describe the professional behaviours in an educational taxonomy.

Integration of simulation in curricula promotes aspects that are difficult to train on real patients e.g. team training and interdisciplinary training. Effective simulation-based team training instruction can be improved by standardising the curriculum design, debriefing approaches and validated assessment tools (Epich *et al*. 2011:Online). In a study by Ten Eyck, Tews, Ballester and Hamilton (2010:Online), the impact of simulation-based instruction significantly improved student performance as team leaders and additional sessions provided further improvement of team leadership. Crisis Resource Management (CRM) interdisciplinary team training and team practice in an environment of high-fidelity simulation and facilitated debriefing have significant effects on team effectiveness and on the team process (Jankouskas, Haidet, Hupcey, Kolanowski & Murray 2011:Online).

Integration of SBME in the current curriculum should be aligned with the current undergraduate programme of the School of Medicine, UFS. The integration into the curriculum is a key element to the success of SBME and should be a required component and not only an optional activity. Synergy between theory and practical application of knowledge should form the basis of the integration into the curriculum and should also be an assessed component of the curriculum. SBME should be seen within the context of the whole curriculum (Bradley & Postlethwaite 2003:8). Integration of simulation into the undergraduate medical curriculum can enhance skills training as well as team training, interdisciplinary training and promotes patient safety.

Based on the indications in the literature SBME should form a compulsory and also assessed addition to the undergraduate programme of the School of Medicine, UFS.

2.3 CLINICAL SIMULATION AS REQUIRED COMPONENT OF CURRICULA TO IMPROVE CLINICAL SKILLS AND COMPETENCE

Training has a role in education, but does not always share the transformative role of education as described in Chapter 1 (cf. Point 1.1). Training is confined to procedures or linked psychomotor activities, while education is described as an agent of change and transformation where the learner or student is a willing partner. The change in behaviour requires more than knowledge, it requires cognitive, psychomotor and other abilities and a predisposition on the part of the learner to make use of those abilities (Glavin 2011:5). Non-technical skills describe the cognitive, social and personal resource skills that complement the technical skills collectively contributing to safe and efficient task performance (Glavin 2011:4). Simulation can play an important role in developing these skills. Experiential learning can be established through simulation. "*Experiential learning*" is defined by Patricia Benner as: "clinical learning that is accomplished by being open to having one's expectations refined, challenged, or disconfirmed by the unfolding events" (Beeman 2008:109). The theory is based on the use of repetition to improve outcomes and create permanent new behaviour. The theory suggests reflective thought that is important in the development of critical thinking and to improve comprehension and performance (Rothgeb 2008:490).

Several goals can be achieved by incorporating SBME into existing curricula. Beeman (2008:109-110) describes the following goals:

- Evaluation of reasoning-in-transition and application of clinical judgement
- Development of reasoning and coping skills in a safe environment
- Critical thinking development, development of skills and assessment thereof
- Application of critical problem-solving and creative problem-solving development
- Application of clinical inquiry, evidence-based practices and clinical knowledge through interactive, patient-orientated scenarios
- Discover and explore what lies beyond the point of "gone too far", without risk to real patients (Beeman 2008:109).

Important factors to take into account when using high-fidelity medical simulation, include the following:

- Feedback is provided during experiential learning
- Students engage in repetitive practice
- Students practice with increasing levels of difficulty
- Simulators are adaptable to different learning strategies
- Clinical variation can be captured by simulators
- Simulation is in a controlled and non-threatening environment
- Individualised learning is permitted

- Outcomes are defined and measured
- High-fidelity simulators are valid representation of clinical practice (McGaghie *et al*. 2006:792-793).

Repetitive practice where high-fidelity simulation is used resulted in improved outcomes. This was applicable to all levels of learners (students, residents, fellows and senior doctors) over a wide variety of specialisations and other professions, e.g. pilots (McGaghie *et al*. 2006:795).

In a study by Wayne, Butter, Siddall, Fudala, Wade, Feinglass and McGaghie, as quoted by McGaghie *et al.* (2006:795) there was a 38% increase in residents' skills due to simulator-based deliberative practice. Deliberate practice involves repetitive performance of cognitive and psychomotor skills in a focused domain, skills assessment with specific informative feedback resulting in better skills performance in a controlled setting (McGaghie *et al*. 2006:795).

The ability to practice without risk must be weighed against the cost of using simulation technology (Gordon, Wilkerson, Shaffer & Armstrong 2001:469). Practice without risk is beneficial resulting in patient safety and patient satisfaction. The benefits to the staff include a safer training environment; a supportive, non-threatening environment and reduced working hours as clinicians get things right the first time more often (NESC 2011:9).

The use of simulation as a required component of a curriculum improves clinical skills and competence, improves patient safety and helps students practice in a safe, non-threatening environment to improve their skills and competence, resulting in shorter surgery times and fewer complications. However, the non-technical skills will also be enhanced with simulation, because with debriefing activities, the teachers can help students to make sense out of what happened during a scenario. This will result in changing students' behaviour and explore personal and professional values in the context of their professional role (Glavin 2011:6).

2.4 THE ROLE OF SIMULATION-BASED MEDICAL EDUCATION (SBME) IN ASSESSMENT OF CLINICAL COMPETENCE

Assessment of clinical competence plays an important and integral part in the undergraduate programme of the School of Medicine, at the University of the Free State. Clinical competence assessment on patients forms an integral part of the undergraduate programme, but with the changing teaching platform, alternative and additional ways of assessment should be considered and implemented.

The importance to include patients in assessment opportunities is highlighted by the National Board of Medical Examiners in the USA. They added a clinical skills examination to their three-part examination in 2004 by using standardised patients. Standardised patients can be defined as people with or without actual disease who have been trained to portray a medical condition in a consistent fashion. These people may portray their own problems or ones based on those of other patients and are used in assessment opportunities (RCSA 1993:475-7).

Pugh (2008:657) explains that this was a step toward increasing accountability in the medical profession in that higher standards for assessing clinical competence were set. There are three variables in clinical examinations; namely the student, the examiner and the patient. The aim therefore is to standardise the examiner and the patient so as to measure the competence of the student optimally (Collins & Harden 1998:4).

There is a continuum of patients that can be used for assessment. According to Collins & Harden (1998:3) this continuum ranges from real patients with no training, trained simulated patients, simple simulators and sophisticated simulators. Simulated patients include healthy persons or *actors* who have been coached to present symptoms and signs of actual patients (CNSH 2011:Presentation). A patient simulator is defined as a life-size *mannequin* representing a patient, which can simulate behaviours and characteristics of an actual patient (CNSH 2011:Presentation).

2.4.1 Simulator-based assessment

Simulation technologies offer new possibilities for skills evaluation and clinical competence development. Assessment with simulators can furthermore be divided into: standardised patients and the objective structured clinical examinations (OSCE); integrated high-fidelity mannequins; virtual clinical stations and the objective structured virtual examination (OSVE) (Srinivasan, Hwang, West & Yellowlees 2006:Online).

Simulators can be utilised to assess students more effectively in the higher-order thinking skills (according to Blooms Taxonomy), by evaluating application, analysis, synthesis and evaluation. Multiple-choice questions test mostly knowledge (lower-order thinking skills) and often ignore skills and behaviours (Pugh 2008:657), high psychological fidelity or the extent to which simulation requires the user to perform or cognitively progress through a real world task (Salas & Wilson 2005:363). An example of high-fidelity simulation is a mannequin-based or robotic trainer that responds to intravenous medication, talks, has a pulse and produces the appropriate physiological reactions on actions of students (Pugh 2008:657).

According to Pugh (2008:658), high-fidelity simulation has many features that make it attractive to use in higher-order thinking skills testing, such as:

- High-fidelity simulation is close to clinical practice situations
- Computer-generated scores are objective and some actions and behaviours are automatically detected
- Simulation-based assessment can complement examination results by assessing psychomotor skills
- It can provide relevant feedback about abilities and areas for improvement
- It can provide feedback to lecturers on modules and areas for improvement
- Simulators can provide multiple variations of normal and abnormal conditions
- Students can be motivated to practice specific tasks
- Simulators can be used for assessment (formative and summative), day-to-day instruction and learning.

Different scenarios can provide more reliable estimates of clinical competence and ability. Simulator-based assessment can overcome many of the risks involved in training and assessment on real patients. For simulation-based assessments, the instructor must know that the scores are reasonably accurate reflections of the skills that are evaluated (Boulet & Murray 2010:1049). The unpredictability and complexity of the human body, the lack of physiological data and the limitations of simulators contribute to the limitations in the assessment with current high-fidelity simulators (Maran & Glavin 2003:27). Simulation-based assessment can make a meaningful and positive difference in credentialing, licensing and certification programmes, but the authors admit, however, that there is still a lot to learn about incorporating simulation into regulatory-based assessments (Holmboe, Rizzolo, Sachdeva, Rosenberg & Ziv 2011:Online).

Simulator assessment should form an integral part of Phase III of the undergraduate medical programme as an additional tool for training and formative and summative assessment in the School of Medicine, UFS.

2.4.1.1 *Debriefing*

Debriefing after an assessment or training opportunity should serve two major functions; namely, to help the candidate deal with emotional stress that the scenarios create and to learn from the situation through self-reflection (Dieckmann, Reddersen, Zieger & Rall 2008:667). Feedback is an important component of simulation training and can be described as facilitated reflection in the experiential learning cycle of Kolb (Eppich 2011:Presentation).

Feedback can be structured using Kolb's four-stage model of experiential learning, as quoted by Glavin (2008b:755). Concrete experience (scenario to encourage the student to focus on a particular concept that is related to the outcomes) → Observations and reflections (conducted during debriefing) → Formulation of abstract concepts (during the debriefing or feedback) → Testing implications of concepts in new situations (active experimentation can be difficult on real patients, but is allowed in simulation).

There are four phases in the structure of debriefing as described by Dieckmann *et al.* (2008:669), namely structuring, de-roling (put participants in an analysis mode, reintegration of participants into training group, discover problems), description and analysis (give feedback, analyse strengths and weaknesses, integrate the remaining group, watch selected video clips) and integration (facilitate learning).

Elements of an effective debriefing according to the Rater's Handbook of Debriefing Assessment in Simulation Healthcare (DASH©) from the Center for Medical Simulation in Cambridge, are the following elements:

- Establishing an engaging learning environment
- Maintaining an engaging learning environment
- Structuring the debriefing in an organised way
- Provoking engaging discussions
- Identifying and exploring performance gaps
- Helping students to achieve and sustain good future performance (DASH 2011:3).

Eppich (2011:Presentation) uses the following algorithm to explain debriefing, as seen in Figure 2.4.

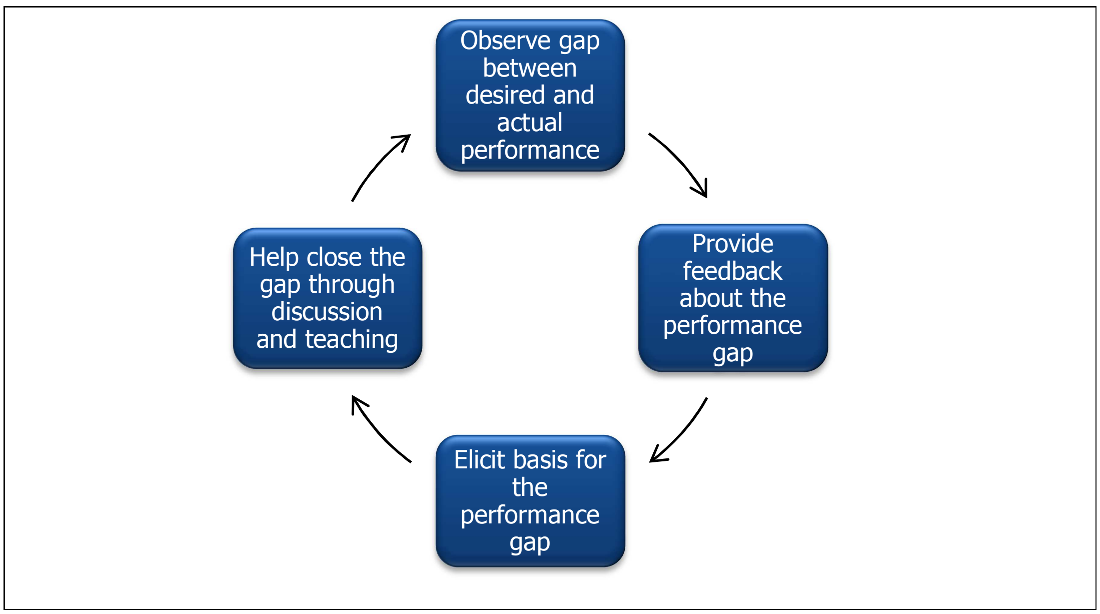


FIGURE 2.4 DEBRIEFING ALGORITHM (ADAPTED FROM EPPICH 2011:POWERPOINT PRESENTATION)

[Compiled by the Researcher, Labuschagne 2011]

The gap between desired and actual performance should be identified, feedback about this performance gap should be given, where after the basis for the performance gap elicited and then the gap should be closed through discussion and teaching.

2.5 FACTORS IN THE DEVELOPMENT AND IMPLEMENTATION OF A SIMULATION CENTRE

The factors that influence the development and implementation of a simulation centre include the physical planning, human resources, financial planning and equipment. The steps in designing a simulation-based instructional system were described in a recent article by Scerbo *et al.* (2011:S20). Simulation has aspects that can be adjusted, providing the opportunity to enhance efficacy. These aspects include simulator-technology, the environment including the participants and the infrastructure and tools which support the learning environment (Scerbo *et al.* 2011:S20). The path to better simulation systems requires integration of systems design (Scerbo *et al.* 2011:S22). These aspects will be discussed in the following section.

2.5.1 Physical structure planning (buildings)

A simulation facility should be built around the concepts of the overall mission, vision and values of the institution and the stakeholders. The experience base of simulation facility design is not standardised and it is recommended that when designing a simulation centre, set parameters regarding control, balance, collaboration and inclusiveness with the planning and design team should be established (Seropian & Lavey 2010:Online). For any new educational facility to be successful, the thoughts, ideas and creativity of the owner, users and stakeholders must be taken into account when designing and building a simulation centre (Seropian & Lavey 2010:Online).

Simulation centres can range from virtual hospitals to a room with a model or simulator. The facility at the Israel Center for Medical Simulation was designed as a virtual hospital with multiple clinical environments, e.g. emergency room, operating room and intensive care units as well as outpatient facilities. It has the ability to create various pre-hospital environments. The centre has dedicated units for trauma, cardiology and surgical simulation (Ziv *et al.* 2006:1092). The physical planning that goes into the planning of a simulation centre is of paramount importance. The type of space allocated for the establishment of a simulation facility is critical, because renovating a space that is fitted for another purpose versus constructing a centre in an open shell space can add considerably to the cost (Seropian & Lavey 2010:Online).

2.5.1.1 *Teaching and assessment spaces*

According to Bradley and Postlethwaite (2003:8) the facility should be flexible, so that spaces can be used for different settings. Large, open spaces provide a great deal of flexibility (Bradley & Postlethwaite 2003:8; Seropian 2008:182), e.g. virtual reality areas, partial-task trainers or activities requiring tables rather than beds. Smaller side rooms are also important for certain situations and skills development, e.g. patient rooms, physical examination rooms and areas for confidentiality and communication skills. The overall feel of the facility should give the sense of a clinical environment (Bradley & Postlethwaite 2003:8). Some areas must be dedicated to a certain function, e.g. a simulation operating room, intensive care unit or emergency room.

A high-fidelity mannequin-based area is an area with special requirements, for instance a conference room, control room, simulation room and supply area (Rothgeb 2008:492; Seropian 2008:182). Careful planning should go into this specific area to ensure the flow of students and staff without disruption of other simultaneous activities in the centre.

2.5.1.2 *Self-directed learning spaces*

Students should be encouraged to and have the opportunity to make use of equipment and facilities outside normal teaching slots. Suitable support and supporting staff should be available to assist students, especially with the simulators and equipment. A booking system through managed learning environment or the internet (Bradley & Postlethwaite 2003:8) should be implemented. Computer-based learning areas should be in a larger area, divided into smaller cubicles. Computer-based learning can be decentralised and one can make use of other computer centres on campus (Seropian 2008:182).

2.5.1.3 *Offices*

Offices should be provided in the simulation centre for teaching staff, support staff, technical and information technology (IT) staff (Bradley & Postlethwaite 2003:8; Rothgeb 2008:492-493). Visiting lecturers that are brought in for specific sessions should also have space to consult students, finish administrative tasks and have internet access (Bradley & Postlethwaite 2003:8).

2.5.1.4 *Storage*

Storage is an essential part of any simulation centre. The importance of storage space is often overlooked. Expensive equipment, part-task trainers and mannequins should be stored in appropriate spaces where accessibility is also very important. The storage space should be big enough to store large equipment and beds. The planning should take the size of equipment into account; otherwise one could end up storing equipment and beds in corridors (Bradley & Postlethwaite 2003:8; Brost, Thiemann, Belda, & Dunn 2008:196; Seropian 2008:183).

2.5.1.5 *Other considerations*

Other important factors that should be taken into consideration are gasses and suction to deliver to high fidelity simulators and to drive equipment (Rothgeb 2008:493; Seropian 2008:183).

Sound should also be taken into account in the setting up for of video and audio recordings. In addition, the space should be soundproof (Bradley & Postlethwaite 2003:8; Rothgeb 2008:493; Seropian 2008:183).

Lighting affects the experience of the participant, and creates the mood for the activity and the quality of video recordings. It can affect virtual displays if the lighting is not appropriately placed. Functionality, e.g. theatre lights must be considered (Seropian 2008:183).

Electricity points and electrical output are important to take into account when planning a simulation centre. Most of the equipment and simulators have specific electrical needs and enough electrical points should be available for the smooth-running and functioning of a centre (Seropian 2008:183).

Information technologies (IT) and internet facilities are essential for accessing information and to stream audio-visual data and it can also be used for tele-medicine for broadcasting to peripheral centres (Rothgeb 2008:493; Seropian 2008:183).

Security to protect the centre against theft of equipment, materials and confidential information is very important and should be taken into account when planning a simulation unit (Seropian 2008:183).

2.5.2 Human resources (staff)

The size and the activities of the facility will determine the composition of the staff.

2.5.2.1 *Support staff*

The support staff is the permanent staff working in the simulation centre and they should have specialised training and functions.

- The Head of the Centre must be medically qualified (responsible for day-to-day running, strategic planning, curriculum development, planning of activities, monitoring and promoting the centre, and engagement in research projects).
- A teaching assistant or facilitator can be a medical doctor or senior registered nurse (support and assist the head in the day-to-day running of the centre, involvement in research projects, training of lecturers and students).
- Receptionist/secretary (general office support, runs booking systems, provides first contact with users and enquiries).
- Technicians (planning; buying; development and maintenance of simulators; problem-solving and IT maintenance; ensuring availability of mannequins, models and equipment for use by students) (Bradley & Postlethwaite 2003:9-10).

2.5.2.2 *Teaching staff*

The teaching staff is not permanently affiliated to the simulation centre, but are lecturers from different departments and disciplines that are appointed on an *ad hoc* basis for teaching of undergraduate classes. Teaching staff should also be trained and "train the trainer" programmes should form an integral part of the centre's functions.

The teaching staff should also be involved in the development of research projects (Bradley & Postlethwaite 2003:10).

2.5.3 Financial planning

Ideally the budget should be based on the functional requirements and desired capacity of the building; but when this is not the case, prioritising of the needs of the simulation centre should take place (Seropian & Lavey 2010:Online).

There are different ways of funding such a centre, as described in the literature. The *Israel Center for Medical Simulation* was established as a non-profit educational organisation, with funding from a large private donation, which covered the initial purchase of equipment and smaller simulators. The building and staff were provided by the *Sheba Medical Center*. They secured financial stability through a model of fee-for-service contracts with hospitals, medical schools, private bodies and the Ministry of Health. Medical school candidates pay indirectly through registration and admission fees. They also created partnerships with pharmaceutical and medical device industries. Some finance is generated through academic and research grants and private donations (Ziv *et al.* 2006:1095).

The *HealthPartners Simulation Center for Patient Safety* at the Metropolitan State University, St Paul, Minnesota, USA, was funded through the care delivery partner who bought the initial equipment. The academic partner provided the space and the University's Foundation (fund-raising division) raised funds. The centre anticipates revenue from three sources; namely fees, grants and partner contributions. A business plan is essential to sustain such a centre (Denning, Jewitt-Johnson, Johnson, Loen, Patow, Brannen 2008:337-8). Networking, negotiation and collaboration can be useful means to help raise funds for a simulation centre (Alinier 2008a:491). In a feasibility study by Calhoun, Boone, Peterson, Boland and Montgomery (2011:Online) substantial savings in cost was demonstrated by implementing an *in situ* simulation programme using minimal permanent institutional space and cost-neutral redirected faculty time.

2.5.4 Equipment

The equipment in a simulation centre include the part-task trainers, patient simulators and clinical equipment as well as the IT, communication and audio-visual equipment.

2.5.4.1 *Part-task trainers, patient simulators and clinical equipment*

A large range of part-task trainers, mannequins, and diagnostic and therapeutic equipment is available and will be determined by the users and the curriculum development requirements. Bradley & Postlethwaite (2003:11) emphasise that the model should be an accurate reproduction of the underlying human structure and functionality.

The different types of simulators that can be used are role play, part-task trainers, computer-based systems (flat-screen simulation), virtual-reality standardised patients, simulated clinical immersion (simulated environment) and fully-integrated simulators (CNSH 2011:Presentation; Eppich 2011:Presentation; Rothgeb 2008:493).

An example of high-fidelity simulation is a mannequin-based or robotic trainer that responds to intravenous medication; talks; has a pulse; and produces the appropriate physiological reactions to actions of students (Pugh 2008:657). The CNSH (2011:Presentation) define these simulators as "patient simulators".

The outcomes have to be defined before a simulation system is designed, resulting in integration of educational objectives and assessment of skills and competence into the design and development process. The educators must be working with simulation engineers throughout the design process through the integrated systems design approach to ensure the development of successful simulators with valid and reliable assessment and competency measures (Scerbo *et al*. 2011:S22).

2.5.4.2 *IT and communications*

Information technology (IT) forms an integral part of a simulation centre and can provide mechanisms to upgrade systems, collaborate with other centres, aid in research and support the individual learning of students (Rothgeb 2008:493; Seropian 2008:183).

2.5.4.3 *Audio-visual facilities*

This is necessary to create a means of analysis, assessment and feedback of sessions to students and teachers. Interactions between patients and students can be recorded and used for feedback and debriefing (Rothgeb 2008:493; Seropian 2008:183).

2.6 CONCLUSION

In this chapter, Chapter 2, an overview was given of what the literature states on the following aspects:

- The role of clinical simulation as addition to current curricula (cf. Point 2.2)
- Simulation as a required component of curricula to improve clinical skills and competence (cf. Point 2.3) and
- Assessment of clinical competence with simulation (cf. Point 2.4)
- How to implement and develop a simulation centre (cf. Point 2.5).

The literature review was conducted with the view to form the theoretical framework and to support the empirical part of this study.

In the next chapter, Chapter 3, ***Research design and methodology***, the methods used to conduct this study will be reported and discussed.

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

3.1 INTRODUCTION

In this chapter the research design and research methodology are dealt with and discussed. The methods used in this study comprised a literature review, semi-structured interviews, observations by the researcher and focus group interviews. Information on sampling, data collection and analysis, ethical considerations and validity and reliability will be included in the discussion.

3.2 THEORETICAL PERSPECTIVES ON THE RESEARCH DESIGN

3.2.1 Theory building

Theory building comprises two parts, namely, theoretical and empirical aspects. After identifying the concepts for the theory, the interaction and relation to each other, this culminates in the theoretical framework, as discussed in Chapter 2. The empirical cycle comprises data collection and interpretation of the data.

3.2.2 Types of methods

In this study, qualitative research methods were employed. Basic (generic) as well as grounded theory, qualitative research designs were employed.

Basic qualitative research makes use of data collection through interviews, observations and document analysis (Beylefeld 2010:Presentation). Other methods of qualitative data collection include analysis of texts and documents, interviews, recordings and transcriptions. A combination of these methods is often used (Silverman 2005:11-12).

The notion *grounded theory* is described as a systematic, qualitative research methodology that emphasises the generation of theory from data generated in the research process. The grounded theory collects data from all resources regarding social interactions. The data may be collected from observations, recorded interactions, examination of written documentation and literature or obtaining perspectives from various people involved. The method used to reach a grounded theory is called the constant comparative method, where collection of data and analysis of data occurs concurrently (Byrne 2001:Online). The four stages of data analysis are coding, grouping into concepts, categorisation and theory generation. The overall aim of grounded theory is to seek patterns in data. The patterns are thereafter arranged in relationship to each other and that becomes the theory grounded in data (Beylefeld 2010:Presentation).

3.2.3 The research design of this study

A qualitative research design is used. This research focuses on the investigation and description of a phenomenon as it occurs (Polgart & Thomas 1995:109-110). Qualitative designs are used for social and educational research activities as they lend themselves more to the collection and analysis of qualitative data and attempt to understand perceptions and views (Leedy 1997:160-162). The qualitative analysis adapts to meet the demands of the specific context and data (Skinner 2007:323). Qualitative research methods can be described as a process of moving from specific observations to general theory (Byrne 2001:Online).

3.3 RESEARCH METHODS

The qualitative methods that were used and which formed the basis of this research comprised a literature review, semi-structured interviews, observations by the researcher and focus group interviews.

3.3.1 Literature review

A literature review has as aim the contextualising of the problem against related theory and research, as well as to ensure that the researcher is sufficiently knowledgeable about the topic to be able to investigate the topic in an informed manner (Singleton & Straits 1999:544). Bowen (2005:210) suggests that the researcher should read extensively as that ensures an overview of the existing literature and approaches to a particular topic. This helps the researcher to determine gaps and areas where further research is needed. Literature reviews provide a background and establishes a bridge between the research project and the existing knowledge (Bowen 2005:210). It is suggested that one should continue reading even during the fieldwork phase of the study.

These aspects are also echoed by the Writing Centre of the University of Cape Town (Writing Centre UCT 2011:Online). A literature review should offer a synthesis of:

- "What has been written on the topic
- What has not been written on the subject
- How the researcher's proposal addresses the "gap", silence or weakness in the existing knowledge base".

Information gathered from literature and documentation, together with the observations, workshops and notes obtained during international visits and attendance of the 11th International Meeting on Simulation in Health Care in New Orleans in the USA in January 2011, was used to formulate recommendations for the implementation of simulation for the enhancement of undergraduate medical students education and training at the School of Medicine, UFS.

3.3.2 Semi-structured interviews

3.3.2.1 *Theoretical aspects*

Semi-structured interviews are used for the collection of qualitative data. An interview is usually set up by the researcher to allow the respondents to talk about their opinion on a specific subject. The focus of the semi-structured interview is usually determined by the researcher.

The objective of the semi-structured interview is to understand the respondents' point of view. The researcher develops and uses an interview guide, usually in the form of a list of questions or topics that need to be covered during the semi-structured interview, usually in a particular order (Cohen 2006:Online). Open-ended questions are used in the semi-structured interview. Sometimes questions can naturally arise during the semi-structured interview. The semi-structured interview can be like a conversation and the researcher can ask questions when the interviewer feels it is appropriate to ask them (Livesey 2010:1). The effect of this can be that prepared questions (interview guide), as well as questions that may arise during the interview, can be used in the semi-structured interview. This entails that all the wording of questions used will not necessarily be the same for all respondents. It is usually recommended that semi-structured interviews should be recorded so that they can be transcribed and analysed later (Cohen 2006:Online).

According to the Qualitative Research Guidelines Project of the Robert Wood Johnson Foundation's (RWJF) (Cohen 2006:Online), the benefits of semi-structured interviews are:

- "Questions can be prepared in advance, allowing the interviewer to be prepared and appear competent during the interview
- Participants are allowed to express their views in their own terms
- Data provided is reliable and comparable".

Semi-structured interviews were conducted in the current study in order to obtain information from simulation centres internationally and to gather information on the use of simulation. The decision to use semi-structured interviews to gather data was based on the following:

- There were limited opportunities to interview the international experts on clinical simulation during the international visits, as postulated by Cohen (2006:Online)
- The interview guide provided clear instructions and open-ended questions to provide reliable and comparable qualitative data
- Relevant and meaningful questions could be added to the interview guide after observations during the international visits
- The interview guide allowed for open-ended questions and diversion from the guide to provide the opportunity to probe areas suggested by the answers of the respondents. Livesey (2010:Online) report that the researcher could identify and understand the topics better and gather more and broader opinions from the experts, allowing for improved validity of the data collected.

3.3.2.2 *Target population*

Two world-renowned centres of excellence on clinical simulation, one in the USA and one in the UK, were visited to get information and input from different parts of the world and to obtain data from persons with different perspectives on the topic. The simulation centres were visited from 11 to 17 October 2010. The centres visited were: Coventry in the UK and Pennsylvania State University College of Medicine, Pennsylvania, USA. The simulation centre at the Pennsylvania State University College of Medicine is one of six simulation centres in the USA that are accredited by the Society for Simulation in Healthcare (SSH).

In January 2011, more semi-structured interviews were conducted with attendees at the International Meeting on Simulation in Healthcare (IMSH 2011), held in New Orleans, Louisiana, USA.

3.3.2.3 *Survey population*

Directors, managers and teaching staff of these centres, and attendees at the IMSH-2011 who were willing to participate in the study were contacted and asked to be interviewed by the researcher through semi-structured interviews. Letters of invitation to participate in a semi-structured interview (Appendix A1), consent forms (Appendix A2) and a copy of the semi-structured interview guide (Appendix A3), were e-mailed to the different centres three weeks prior to the visit to obtain permission to conduct the semi-structured interviews. Hard copies were taken along and handed out to the participants. Hard copies of the signed consent forms were collected during the international visits. Attendees at the congress were contacted personally by the researcher and the documentation was handed out personally and signed consent obtained.

3.3.2.4 *Description of sample*

Directors, managers, technical and teaching staff of the simulation centres and attendees at the IMSH-2011 who were willing to participate and gave consent to interviews were interviewed. The ideal was to interview various people, working at the simulation centre to obtain data from all levels and viewpoints. The semi-structured interviews were recorded for transcription and analysis later. Notes were made during the semi-structured interviews by the researcher for later reference.

During the visit to the Simulation Centre of the Coventry Medical School, three persons were interviewed on 15 October 2010, namely the Medical Director, as well as the Course Developer Medical Simulation (clinical user) and the Clinical Skills Simulation Technical specialist (technical user). The interview guide was used and the interviews were recorded for post-interview transcription and analysis. The centre is smaller than the centre visited in the USA and there are not as many permanent staff members. It is for this reason that only three interviews were conducted.

At the Pennsylvania State University College of Medicine, Hershey, Pennsylvania, USA, eight persons gave consent to be interviewed. The Associate Director, Simulation Development and Cognitive Science Laboratory, four clinical users (medical teaching staff) and one nursing teacher and two technical users were engaged in the semi-structured interviews. The interviews were conducted on 12 and 13 October 2010 in Hershey at the simulation centre.

Another semi-structured interview was conducted with the Manager of the Simulation Centre of the Northwestern University Feinberg School of Medicine, Chicago, USA on 24 January 2011 at the International Meeting on Simulation in Health Care. It was difficult to conduct any more semi-structured interviews at the congress, because of the tight schedule of presenters and organisers.

3.3.2.5 ***Sample size***

A total of twelve semi-structured interviews were conducted for this study.

3.3.2.6 ***Pilot study***

In a pilot study the head of The "SPACE" Simulation Centre of the School of Nursing, UFS, and one lecturer involved in the Skills Unit of the School of Medicine, UFS, were interviewed to finalise and streamline the questions of the interview guide and to determine the time frame of the semi-structured interviews. The questions were evaluated and uncertainties in the formulation of some of the questions were clarified.

The interviews were conducted according to the interview guide, prior to the overseas visit. Two persons were interviewed by the researcher for the pilot study. These interviews did not form part of the data gathered for the Ph.D. study.

3.3.2.7 *Data collection*

Semi-structured interviews were audio-recorded for reference and for transcription later. The researcher also made notes during the interviews. All the interviews were conducted by the researcher. The same semi-structured interview guide was used for all the interviews.

Semi-structured interview guide

The questions used in the interview guide were gathered by the researcher after literature review and theory building. The semi-structured interview guide, used in this study, comprised the following questions:

1. What role can simulation play as an additional mode for undergraduate medical training?
2. How can simulation be integrated into current undergraduate medical curriculum?
3. What role can simulation play in the assessment of undergraduate medical students?
4. What lessons did you learn by using simulation as undergraduate training tool?
5. In your opinion, what are the important factors to take into account in the planning of a simulation centre?
6. What recommendations can you make to take into account when acquiring simulators?
7. What is your advice on the financial considerations for a simulation centre?
8. Can you describe the staff requirements for a simulation centre?
9. What lessons did you learn regarding the planning and implementation of a simulation centre?

3.3.2.8 *Data analysis*

The qualitative data were analysed by the researcher. The levels of qualitative data analysis included:

- Reflections on impressions, relationships and patterns while still in the field, conducting semi-structured interviews
- Organising the data thematically and making detailed notes
- Considering the logic of previous analytic outcomes after one month (Beylefeld 2010:Presentation).

Some wordings of the questions in the semi-structured interviews were changed to prevent confusion about the term "undergraduate students" in the USA. Transcriptions of the semi-structured interviews were typed by an independent typist and the transcriptions and audio tapes were checked by an independent person, a lecturer at Division of Health Sciences Education, Faculty of Health Sciences, UFS.

The trustworthiness of content analysis of the semi-structured interviews was determined by the researcher's ability to categorise into themes, to define the categories and to show the connection with the interview question. The data analysis was controlled by an independent researcher, appointed by the supervisors.

The reliability of the semi-structured interviews was ensured by the consistent method in the interviewing procedure, by using the same interview guide and by the fact that all the interviews were conducted by the researcher. The audio recordings and transcribed interviews were controlled by the same independent person, a lecturer at Division of Health Sciences Education, Faculty of Health Sciences, UFS, to ensure the reliability of the gathered data.

3.3.3 Focus group interviews

The third method used to collect data for this study was focus group interviews, conducted at the Faculty of Health Sciences, UFS.

3.3.3.1 *Theoretical aspects*

The purpose of focus groups is to develop a broad understanding rather than a quantitative summary. The emphasis is on insights, attitudes, responses and opinions of the participants; in short, the ideas and feelings of individuals on certain issues are determined (Burns & Grove 2001:425; Rabiee 2004:656). Focus groups generate data on the basis of the synergy of group interactions (Rabiee 2004:656). Members of a focus group should feel comfortable with each other, so that every member will partake in the discussion and it is therefore recommended that the selection of members for the focus group should be selected with care and caution (Rabiee 2004:656). The focus groups usually have 6-10 participants. Multiple groups are recommended, until a clear pattern emerges and theoretical saturation is reached (Rabiee 2004:656). Focus groups usually run for one to two hours. A 90- to 120-minute interview is ideal to prevent concentration loss of participants, which could make control of the sessions difficult (Maynard-Tucker 2000:400).

3.3.3.2 *Sample selection*

In this study, two focus group interviews were arranged. The first focus group interview in this study was held on 07 April 2011 in the Francois Retief Building, Room A126, University of the Free State, Bloemfontein. In this focus group, the selection of participants were the different module leaders and lecturers (session presenters) in the clinical phases (Phase III) of the undergraduate medical programme. The second focus group was held on 10 May 2011 and a number of heads of departments from the following departments participated: Anaesthesia, Critical Care, Dermatology, Family Medicine, Internal Medicine, Oncology and Ophthalmology. The focus was directed at the opinions and attitudes of the participants concerning the value that a simulation centre can have in the enhancement of education and training of undergraduate medical students in the different modules and the integration in the curricula for the SoM, UFS.

The environment of the focus group interviews is important, because participants must be comfortable in a non-threatening environment (Katzenellenbogen, Joubert & Karim 1999:178). According to Krueger (2002:Online) the environment where the focus group interview takes place should be comfortable, have circle seating and the interview should be tape recorded. The focus group interviews in this study were conducted in Bloemfontein in room A126, Francois Retief Building, UFS. The seating was around a conference table and the interviews were audio recorded.

The supervisors appointed a facilitator to facilitate the focus group discussion and one independent observer was present to eliminate bias. The researcher was present as an observer and note taker of non-verbal interactions. The facilitator should be an independent, competent individual, because the data that emerge are dependent on the facilitator's competency (Maynard-Tucker 2000:399). The facilitator should have the social competency and self-knowledge to encourage participants of the focus group to act interactively so that contributions can be made that have not been mentioned before (Maynard-Tucker 2000:399; Rabiee 2004:656). The facilitator should be skilful in group discussions, use pre-determined questions and establish a permissive environment (Krueger 2002:Online; Lewis 2000:Online). The facilitator in this study was a head of a department who had previous experience in facilitating focus group interviews and complied with the characteristics mentioned previously. He used a focus group interview guide (Appendix B5) to facilitate the process of the focus group interview. The discussion was audio recorded with permission of the participants. The rationale of the focus group interview was to gather additional information and identify factors affecting the implementation of a simulation centre; the information could be used to refine the process.

3.3.3.3 *Target population (units of analysis)*

The focus groups were constituted as follows: heads of departments in one group and session presenters in a second group.

3.3.3.4 *Survey population and sample size*

For the first focus group that took place on 7 April 2011, the selection of participants was the representative module leaders and lecturers (session presenters) in the clinical phase (Phase III) of the undergraduate medical programme. Nine participants were involved in the first focus group. Participants were from the following clinical departments: Anaesthesia, Family Medicine, Internal Medicine, Otorhinolaryngology, Paediatrics, and Surgery.

The second focus group took place on 10 May 2011 and the selection of participants comprised heads of departments. Seven heads of departments participated and included the following departments: Anaesthesia, Critical Care, Dermatology, Family Medicine, Internal Medicine, Oncology and Ophthalmology. The focus fell on the opinions and attitudes of the participants concerning the value that a simulation centre can have in the enhancement of education and training of undergraduate medical students in the different modules and the integration in the curricula for the School of Medicine, UFS.

Request forms were used to invite the participants (Appendices B1 and B2). The request forms were sent out electronically via e-mail to the different heads of departments and session presenters of the clinical disciplines involved in Phase III of the medical programme at the School of Medicine, UFS. Consent forms to participate in the focus group interview were sent out electronically, but signed hard copies were collected before the focus group interview started (Appendices B3 and B4).

3.3.3.5 *Description of sample*

The sample included the above-mentioned lecturers who consented to participate in the research process.

3.3.3.6 *Pilot testing*

The focus group interview guide was piloted by the facilitator and independent observer. No changes were made to the interview guide.

3.3.3.7 *Focus group process, data gathering and analysis*

The focus group process, data collection and data analysis will be discussed.

<u>Focus group process</u>

Krueger (2002:Online) suggests the following format for a focus group interview, which was indeed used for the focus group interviews:

Welcome: Introduced the facilitator, assistant and independent observer.

The topic is: Clinical simulation to enhance undergraduate medical education and training at the University of the Free State.

Guidelines: Were explained to the group by the facilitator:

- No right or wrong answers, only different points of view.
- We are tape recording, so only one person can speak at a time.
- We are using the number in front of the person and will mention your number when you are speaking, for the sake of confidentiality and the recordings.
- You do not need to agree with others, but you must listen respectfully as others share their views.
- We ask that you turn off your cellular phone during the interview.
- My role as facilitator is to guide the discussion.
- Talk to each other.

Opening question: A well structured question, based on the aim of the study, was supplied in Afrikaans and English to each of the participants and the facilitator read the question out to the group. If all the members of the focus group were Afrikaans-speaking, the focus group interview was conducted in Afrikaans, (the heads of departments focus group was conducted in Afrikaans), but there were members present in the lecturers' focus group that could not speak or understand Afrikaans, so the first focus group interview was conducted in English.

"Wat is u persoonlike mening en houding ten opsigte van die waarde wat 'n simulasiesentrum kan speel in die opleiding van voorgraadse mediese studente binne die Skool vir Geneeskunde, Universiteit van die Vrystaat?"

"What is your personal opinion and attitude concerning the value that a simulation centre can play in the training of undergraduate medical students in the School of Medicine, University of the Free State?"

The following aspects were kept in mind during the focus group interview:

- The group had to be focused on the subject.

- Good balance was maintained between the participants, e.g. quiet participants should be encouraged to give their opinion.
- The facilitator's contribution to the discussions was minimal in order to avoid dominance (Katzenellenbogen *et al*. 1999:178).

Conclusion: Summarised with confirmation, reviewed the purpose and asked if anything had been missed, thanked the group and dismissed the group.

The facilitator made use of the focus group interview guide (Appendix B5).

<u>Data collection during the focus group interview</u>

The data were gathered with the help of the audio recordings made during the focus group interviews. Transcriptions of the interviews were made after the focus group interview by the researcher. The facilitator read through the transcriptions and it was controlled by the independent observer, by listening to the recordings and comparing it word for word with the transcriptions. The transcriptions were sent to all the participants to read it through and confirm via e-mail or letter that they were satisfied that it was the correct version of the focus group interview. This ensured the trustworthiness of the focus group interviews.

The researcher read through the transcriptions a few times and with different types of underlining and notes; repeated opinions and attitudes were thematically grouped (Polit & Hungler 1999:580). The data were analysed by the researcher according to the grounded theory analytic process which includes:

- open coding (data broken down into discrete parts, examined, compared for similarities and differences and questions asked about the phenomena as reflected in the data);
- axial coding (put parts of the data identified and separated in open coding back together to make connections between categories);
- selective coding (selected one core category and relating the other categories to it) (Mertens 2005:424).

Data analysis of the focus group interview

The aim of the analysis was to look for trends and patterns that reappear within a single focus group or among various focus groups (Lewis 2000:Online). The data collection and analysis were continued till regularities that were mentioned previously, emerged. Saturation of data was reached when no new information emerged, and the process was stopped at that point.

The trustworthiness of content analysis of the focus group interview was determined by the researcher's ability to categorise, to define the categories and to show the connection with the focus group interview question. The data analysis was controlled by an independent researcher, appointed by the supervisors.

The reliability of the focus group interviews was ensured by the consistent method applied in the interviewing procedure, by employing the same facility and the same facilitator for the different focus group interviews. The audio recordings and transcribed interviews were controlled by experts appointed by the supervisors to ensure the reliability of the gathered data.

3.4 ENSURING THE QUALITY OF THE STUDY

The quality of the study was ensured by means of the following: trustworthiness, validity and credibility. These aspects will be discussed under the following section.

3.4.1 Trustworthiness

The term "trustworthiness" is explained by referring to the "believability" of a researcher's findings (Maykut & Morehouse 1994:64). De Vos, Strydom, Fouche and Delport (2002:277-278) quote Guba, who identified trustworthiness as having four aspects, namely credibility, transferability, dependability and conformability. To ensure reliability in qualitative research, the examination of trustworthiness is very important. A qualitative study cannot be called transferable unless it is credible and it cannot be deemed credible unless it is dependable (Babbie & Mouton 2001:277-278).

- Credibility can be addressed by triangulation. Triangulation refers to an approach to data collection, deliberately sought from a wide range of different, independent sources and by different means (Mays & Pope 1995:110). There are two methods of data triangulation described in a paper by Golafshani (2003:603). The first method is a combination of more than one complementary and independent source of data (convergence of data) and the second method is methodological triangulation where multiple research methods are used in a project (Bowen 2005:215).
- Transferability refers to the degree to which one can generalise results to other situations, and according to Mertens (2005:423) researchers should provide sufficient detail to enable the reader to determine the degree of similarity between the study site and the receiving context.
- Dependability in qualitative research can be addressed by adopting an auditing approach. Change is expected and therefore tracking of change is ensured by the researcher (Mertens 2005:423).
- Confirmability means that the reader should be able to track data to the source and the data must be used logically to interpret data and the researcher must show that he/she acted in "good faith" and "not overtly allowed personal values or theoretical inclination manifestly to sway the conduct of the research and findings deriving from it" (Bowen 2005:216).

The credibility in this study was addressed by the process of triangulation by using the data collected through observations, semi-structured interviews, published literature, opinions of experts in the field and the opinions given during the focus group interviews as well as proper record keeping, transcriptions and audio recordings of the semi-structured interviews and the focus group interviews. Triangulation of the different methods and data made the qualitative research credible.

Transferability was addressed by collecting sufficient detailed transcriptions of data followed by detailed reporting on outcomes of analysis. Rich data means that the data should be in detail. Data from semi-structured interviews and focus group interviews were transcribed and checked for accuracy by comparing it to the audio recordings. Copies were sent to participants in the focus group interviews and the semi-structured interviews to read and confirm the authenticity of the transcriptions.

Dependability was addressed by keeping a complete set of records of all the phases of the process (audit trail).

Confirmability was ensured by making sure that the researcher acted in good faith and did not allow personal values or theoretic inclinations to sway the conduct of the research and findings. "Bracketing" the researcher's personal view or preconceptions was ensured by the use of an independent facilitator to conduct the focus group interviews, while the researcher observed and made field notes only. The semi-structured interview guide was sent by e-mail to the participants in the international simulation centres, so that the questions were known to them, before the interview. That ensured a non-threatening situation and they could form opinions without being influenced by the researcher.

The reliability and validity of these qualitative research methods ensured the trustworthiness of the study.

3.4.2 Validity

Validity is defined as the extent to which the instrument measures what it is supposed to measure (Leedy & Ormrod 2002:31). An instrument would then be declared valid after it has been satisfactory tested, repeatedly in the population for which it was designed (Bowling 2002:150). According to Katzenellenbogen and Joubert (2007:117), validity is an indication of the truth or accuracy of the measurement; to what extent an instrument measures what it is intended to measure. The trio of validity is good craftsmanship (checking, critically questioning, ongoing interpretation, discussing and sharing actions with peers), open communication (ask participants, acceptance of good ideas, publish findings) and action (build possibility for action into design) (Beylefeld 2010:Presentation).

The validity of the findings of this research was established by the broad collaboration by which the research instruments were designed (semi-structured interviews, focus group interviews and literature reviews) as well as the expertise of an independent facilitator who asked a pre-arranged list of questions while conducting the focus group interview in a non-threatening environment.

3.4.3 Reliability

Reliability as defined by Goodwin (1995:96) is the extent to which a measurement instrument yields consistent, stable, uniform results over repeated observations or measurements under the same conditions every time.

The reliability in this research was therefore established by means of well-constructed questions for the semi-structured interviews and focus group interviews, carefully piloted and reviewed by experts in the area of research.

Mays and Pope (1995:110) recommends the following steps to ensure rigour in a study:

- Systemic and proper research design to ensure congruence between research questions and methods used
- Independent but direct data collection with appropriate sampling mechanisms
- Concurrent data analysis and plausible interpretation to ensure intimate understanding of theory and the research setting
- Communication of the results presented with evidence from the actual data gathered.

To conclude, the above mentioned steps were taken to ensure trustworthiness, reliability, and validity of data in order to ensure rigour.

3.5 ETHICAL CONSIDERATIONS

3.5.1 Approval

Permission to perform the study was obtained from the Ethics Committee of the Faculty of Health Sciences on 01 November 2010 with the allocated ETOVS nr 122/2010. The allocated Ethics Committee number was used on all documents pertaining to the study. Permission from the Faculty Management Committee of the Faculty of Health Sciences and the Executive Committee of the School of Medicine was obtained. The Vice-Rector Academic Planning, UFS, was informed about the study.

3.5.2 Informed consent

All members of the target population for the semi-structured interviews received information about the study only in English, because of the international visit to the USA and the UK. The participants in the focus group interviews received information in Afrikaans and English. The participants received a description of the study and the expected duration of participation. Participants were guaranteed that all information would remain confidential. The name and contact details of the researcher as well as the allocated Ethics Committee approval number were made available to the participants.

3.5.3 Right to privacy

The information collected by means of the semi-structured interviews and focus group interviews were dealt with in a strictly confidential manner and no names or personal information was made known. The nature and quality of the responses of the participants were confidential. No respondent's name appeared on any document. Only a code number was used, which was not linked to any names.

3.5.4 Minimising of potential misinterpretation of results

The researcher is convinced that all possible measures were taken to ensure that the study complied with high ethical standards (cross-referencing and scientific referencing).

3.6 CONCLUSION

Chapter 3 provided an overview of the research methodology involved in the study and the procedures that were followed.

In the next chapter, Chapter 4, ***Results of semi-structured interviews: analysis and discussion***, the results of the semi-structured interviews as data collection method will be reported and discussed.

CHAPTER 4

RESULTS OF SEMI-STRUCTURED INTERVIEWS: ANALYSIS AND DISCUSSION

4.1 INTRODUCTION

The purpose of this chapter is to present the results of the semi-structured interviews conducted for this study. Twelve semi-structured interviews were conducted in this study in order to obtain information from simulation centres internationally on how simulation can be used to enhance undergraduate medical education and training in the School of Medicine, UFS. As described in Chapter 3 (cf. Point 3.3.2.9) the main aim of the data analysis and interpretation is to categorise the data into themes, define the categories, identify the patterns in the categories, and show the connection with the interview questions.

Data for this study was collected at two world-renowned simulation centres; the first centre was in the USA and the second centre was in the UK. The main aim was to gather information and input from different parts of the world and to obtain data from persons with different perspectives on the topic. In January 2011, another semi-structured interview was conducted with a manager of a simulation centre in Chicago, USA. This interview was conducted at the International Meeting on Simulation in Health Care (IMSH 2011), held in New Orleans, Louisiana, USA.

4.2 DATA ANALYSIS OF THE SEMI-STRUCTURED INTERVIEWS

The process of data collection is described in Chapter 3 (cf. Point 3.3.2.7) and can be summarised as follows:

- Semi-structured interviews were audio recorded for reference and for transcription later.
- The researcher made notes during the interviews, for reference later.
- All the interviews were conducted by the researcher.
- The same semi-structured interview guide was used for all the interviews (cf. Appendix A3).

The qualitative data were analysed by the researcher as described in Point 3.3.2.8. The researcher started organising the data thematically and made detailed notes and considered the logic of previous analytic outcomes, while doing the fieldwork.

Some wordings of the questions in the semi-structured interviews were changed to prevent confusion about the term "undergraduate students" in the USA, because in most States, students obtain a pre-medical degree before starting with medicine, which is in fact a postgraduate degree.

Transcriptions of the semi-structured interviews were typed by an independent typist and the transcriptions and audio tapes were checked and controlled by the researcher and an independent person, who is a Lecturer at Division of Health Sciences Education, Faculty of Health Sciences, UFS.

The analysis of the semi-structured interviews was carried out by the researcher. The process of data analysis included the following steps: categorise into themes, define the categories and show the connection with the interview questions. The process is summarised in Figure 4.1. The data analysis was controlled by an independent researcher, appointed by the supervisors. This process contributed to the trustworthiness of the research.

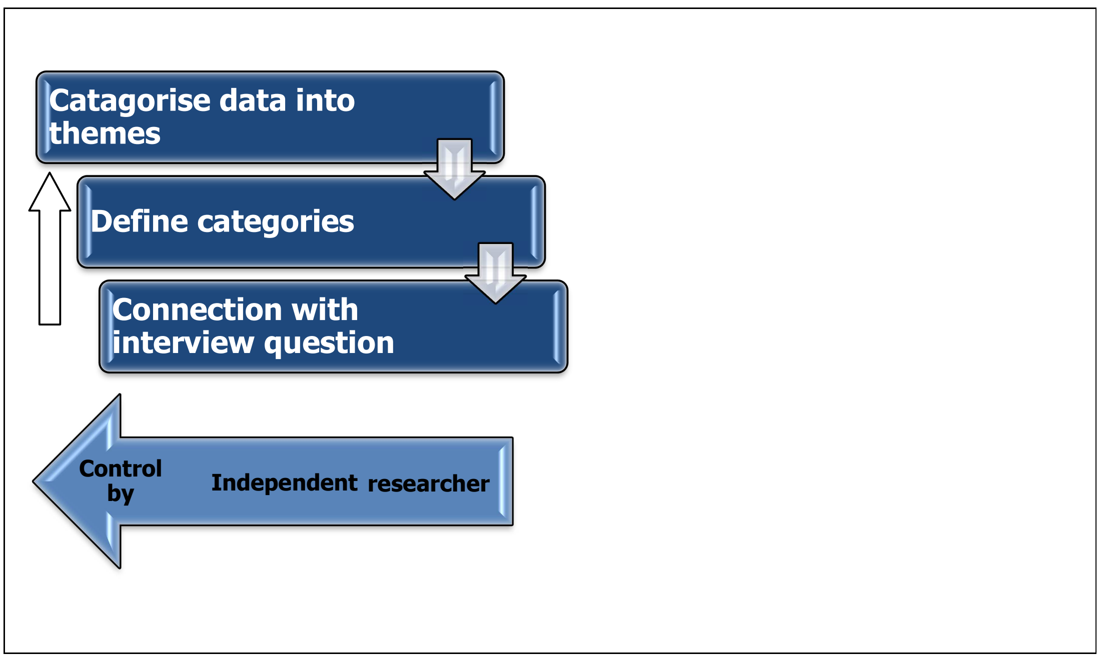


FIGURE 4.1 SEMI-STRUCTURED INTERVIEW DATA ANALYSIS
[Compiled by the Researcher, Labuschagne 2011]

The reliability of the semi-structured interviews was ensured by the consistent method of the interviewing procedure, by using the same interview guide and by the fact that all the interviews were conducted by the researcher himself. The audio recordings and transcriptions were verified by the researcher and an independent person, to ensure the reliability of the gathered data. Similar concepts were grouped and grouped again, reducing the variety of responses and to simplify the reporting process. The simplification was done with caution to avoid changing the meaning of responses. Phrases were linguistically adjusted or abbreviated to simplify the reporting of the results. Data was analysed and interpreted by the researcher.

The interviewees have been assigned numbers to use in the reporting. These numbers were assigned randomly, but they were divided into:

- directors/managers of simulation centres [D1-3]
- clinical users [C1-6]
- technical staff [T1-3].

In the analysis of the data, it is important to interpret the remarks of the responses from the background and the position where the person is employed. The same number was used for the same respondent throughout the report. This will enable the reader to compare the responses of the participants, but also to compare different responses from the same participant. In some cases direct quotes of the interviewees are given in quotation marks to enhance the trustworthiness of the study.

The results are displayed in Tables 4.1 – 4.9.

4.3 REPORTING OF THE RESULTS, DATA ANALYSIS, DESCRIPTION AND DISCUSSION OF FINDINGS OF THE SEMI-STRUCTURED INTERVIEWS

In order to simplify the analysis process, each question of the semi-structured interview guide will be analysed and discussed separately.

4.3.1 The role simulation can play as an additional mode for undergraduate medical training

The first question in the semi-structured interview guide was: "What role can simulation play as an additional mode for undergraduate medical training?" The question was asked to all participants and the answers that were given, by all 12 respondents were arranged into themes and the themes were in turn arranged into categories. The themes that emerged were:

- Theme 1: Non-threatening environment
- Theme 2: Skills training
- Theme 3: Standardised patients/Simulated patients (SPs) and scenarios
- Theme 4: Patient safety.

Each theme, with their categories are summarised in Table 4.1 and will be discussed. Direct quotes of the interviewees are given in the text to enhance the trustworthiness of the study.

TABLE 4.1 THE ROLE OF SIMULATION AS AN ADDITIONAL MODE FOR UNDER-GRADUATE MEDICAL TRAINING

THEMES	**CATAGORIES**
1. Non-threatening environment	**Positive attitude** • Non-threatening environment to develop and improve skills [C1] • "...all work and all play" [C1] • Enjoy it [C2, C4] • Friendly atmosphere [C1] • "...it is great, students love it" [C4] • Simulation offers a more tangible clinical experience [T2] • Teach staff that it is enjoyable to work here [D1]

TABLE 4.1 THE ROLE OF SIMULATION AS AN ADDITIONAL MODE FOR UNDER-GRADUATE MEDICAL TRAINING (CONT.)

2. Clinical skills	**Skills and competence** • Skills development[C1,T1, D1] • Improve skills[C1, C4, T1] • Reinforcement of core skills [T3] • Practise a skill over and over again [C1, C2, C3, C4, C6, D2, D3] • Practise slower to master skill and then in real time to simulate real situation [C1, C4, T1, T3] • Improves hand-eye coordination [T1, D1] • Students should be very familiar and skilful with the skills part of it [T2] • Simulation is a good tool to bring across the skills portion [T2] • Gives them confidence to go to their first post [C6] • Students request to practise scenarios in own time [C1, C4]
	Diseases training • Help their understanding of conditions[C2, C3] • Present diseases one do not see often [C3, C4, C6, D1] • Subtle diseases (heart) can be more blatant on simulator and easier for students to hear [C3] • Comparison of different conditions [C3] • Acute management of illness, simulation fills a gap [D2] • Practise over and over same situation or condition [C1, C2, C4, D3, T1]
	Education and training • Learn more than what they do by reading a piece of paper[C2, C4] • "...we want them to be good. They want to be good. And this is how we help them to be good" [C4] • Eventually students become experts [D3] • Not replace clinical experience, but just another component of the clinical experience [D3] • Stop scenario at point, discuss teaching points and then continue with scenario [T1, T3] • Flat-screen simulators are very useful [C5] • Take book knowledge in what they've learned and actually apply it to make it complete [T2] • Application and integration of knowledge [T2] • Pitfalls in decision-making [T2] • Providing students with clinical experience that they wouldn't get in a traditional classroom [T2] • Large numbers of students through the same scenario [D1] • Look at patient and student, difficult in clinical environment if large numbers [D1] • Stepwise approach of integration in curriculum [D2]

TABLE 4.1 THE ROLE OF SIMULATION AS AN ADDITIONAL MODE FOR UNDER-GRADUATE MEDICAL TRAINING (CONT.)

3. Standardised patients/simulated patients and scenarios	**Training with SPs** • Communication skills [C4, D3, T3] • Team work skills [T3] • Theatre Department to train actors for manipulative, suicidal and psychotic behaviours [C4] • Simulation could be standardised patients, with manikins or flat screen simulation [C5]
4. Patient safety	**Safety** • A lot safer than to practise on patients or even other medical students [C2, C4, T1] • "...there is no question that we have to do more and more with simulation before we release these people to touch their patients" [C2] • Learn where safe limits are [C1, C4] • See what the complications can be [C1, C4] • Improving patient outcomes [D3] • Gives them a sense of security [C5] • Gives them a safe short home to develop those skills [T3] • Assessing an acute illness in a safe environment [C6] • Test clinical limitations to the point where you can go in that situation [C1, C4, C5]

4.3.1.1 *Theme 1: Non-threatening environment*

In the first theme one category, namely, positive attitude emerged.

Data analysis and description: Three clinical users, one technical staff member and one director specifically mentioned non-threatening environment during the semi-structured interview and all of the respondents had a very positive attitude. The participants emphasised that the non-threatening environment plays an important role in the learning environment of students.

Discussion: Simulation and the simulation environment should be non-threatening to students so that they can be allowed to push the limits and test the boundaries. One of the participants used the phrase: *"all work and all play"* [C1], which illustrates that students work hard, but it is still enjoyable. Students must be allowed to practise clinical skills over and over and develop skills, without the fear for failure or harm to patients. This friendly atmosphere and environment will promote learning. This will encourage students to go and practise on their own if they enjoy the experience.

4.3.1.2 *Theme 2: Clinical skills*

The second theme that emerged was skills development and training. The skills development part was mentioned by all the participants. The categories that emerged from this theme were: skills and competence; disease training and education and training.

<u>Skills and competence</u>

The category dealing with skills and competence will be analysed, described and discussed.

Data analysis and description: In the category dealing with skills and competence, seven of the participants mentioned the fact that a skill can be practised over and over again. Skills development and improvement and reinforcement of existing skills were mentioned by five of the participants.

Discussion: Skills development is one of the major advantages of clinical simulation and was mentioned by all the participants. The fact that skills and competence can be practised, improved and manipulated, in a safe environment, improves the confidence of the students.

The fact that students can practise skills repeatedly is a very important component of simulation. Skills can be practised till the students master the skill. This improves the hand-eye coordination of students so that students do not have to think about actions, but it becomes part of them and they act automatically e.g. in cardio pulmonary resuscitation (CPR).

Another important benefit of simulation is that simulation can be at a slower pace till they master the skill and then it can be practised in real time. This factor was mentioned by four participants. Certain parts or components of a skill can be practised till it is mastered. These factors mentioned above cannot be practised on real patients, and therefore simulation plays an important role in the development of skills and competencies. This makes the students better and gives them confidence to go out into real life practice.

Kneebone (2004:1095-1102) summarised clinical simulation as follows: "Simulation offers a safe environment within which learners can repeatedly practise a range of clinical skills without endangering patients. Comprehensive simulation environments allow a move away from isolated tasks to more complex clinical situations, recreating many of the challenges of real life." This is in line with what the interviewees mentioned during the semi-structured interviews.

Disease training

In the category dealing with disease training, the analysis, description and discussion will follow.

Data analysis and description: The fact that simulation can be used for training regarding different diseases and uncommon or rare conditions was stated by five of the six clinical users and by two directors and one technical staff member. Simulation of rare conditions and diseases was one of the sub-categories that was mentioned by four of the interviewees. To practise rare conditions repeatedly, was an aspect that was mentioned by five of the interviewees. Four participants mentioned that students can practise slower till they master the skill and then it can be simulated in real time. This is especially important in uncommon conditions.

Discussion: The use of simulation to train students regarding diseases that are not often seen in practice or to train students' scenarios that cannot be trained in real situations on real patients, e.g. acute emergency situations or paediatric emergencies is a major advantage of simulation. Simulation also helps students to compare and understand conditions and provide the chance to experience the reactions and complications of different treatment options. Simulation can play an important role to expose students to conditions and situations that are not often seen because of the change in case mix and the smaller teaching platform as described in paragraph 1.2.

This fact is confirmed in the literature by Maran and Glavin (2003:22) who emphasises that simulation training, at any level, must be integrated with clinical practice and simulation may be the only way to expose students to the management of less common conditions.

Education and training

The educational and training aspects of simulation was the following category that emerged and the analysis, description and discussion will follow.

Data analysis and description: The educational aspects of simulation in the training of students were mentioned by all three of the Directors/Managers and by four of the clinical users and by all technical staff members, who participated in the semi-structured interviews. A number of 13 aspects were mentioned and the fact that a scenario can be stopped, the teaching points discussed and the scenario then be continued with, was mentioned by two of the technical staff members from different simulation centres. Flat-screen simulation was an aspect that was mentioned by an interviewee. The importance of the application of theoretical knowledge in practical aspects was mentioned on five occasions.

Discussion: One of the directors stated that the integration of simulation in the curriculum should have a stepwise approach. In the interview, he mentioned that one should not try to incorporate simulation at once into the curriculum, but should do it gradually. He also mentioned that as more and more departments realise the benefits, the use of simulation in the different curricula will escalate. A very important component of simulation training, in the education of medical students, was mentioned by a participant, namely that simulation is not there to replace the clinical experience, but just another component of the clinical experience.

A participant mentioned the importance of the teaching of clinical reasoning and the pitfalls in decision-making. Flat screen simulation is especially useful to teach students clinical reasoning skills and to improve outcomes, because the students can practise these skills over and over at their own time and even at home. It was mentioned that the students have to hand in their best effort, encouraging them to do the work and repeat it to achieve their personal best, resulting in the students to learn on their own in their own time. The aim of simulation training is to make the students experts and this is an aim of the students and the lecturers. This was voiced by one interviewee in the following words: *"...we want them to be good. They want to be good. And this is how we help them to be good"* [C4]. With simulation, a scenario can be paused, teaching points can be discussed and then the scenario can continue. This is an important fact that cannot be done with real patients in real situations.

Another very important fact was mentioned by two directors, namely: the teaching of large classes. It is difficult to teach students the same scenario or condition over and over on real patients and here, simulation can play an important role in the education and training of students in the health care professions.

4.3.1.3 ***Theme 3: Standardised patients/Simulated patients (SPs) and scenarios***

The category that emerged from this theme was training with SPs.

Data analysis and description: This aspect regarding the training with SPs was mentioned by one director, three clinical users and a technical staff member. Four aspects were mentioned and the teaching of communication skills came out most prominent, because it was mentioned by three participants in the semi-structured interviews.

Discussion: The importance of SPs in the training of medical students to improve the communication skills was mentioned by three participants. The skills of history taking, communication with patients and their family and the skills of persuasion and breaking bad news, are important aspects that can be taught to students with the use of SPs.

Team work skills are important aspect in the training of students and here the use of SPs can play a significant role, for instance, to use actors as team members who cause distractions and interference in the scenario. This prepares students to manage difficult patients, family members, colleagues and unforeseen or unexpected situations.

Most centres, as observed by the researcher at the centres visited and at the IMSH-2011, make use of persons trained to be SPs, and actors from local drama departments to act as SPs. The researcher attended a workshop at IMHS-2011 on SPs. The importance of SP training and even the use of SPs as assessors during assessment opportunities were emphasised. SPs should get information beforehand to familiarise themselves with the conditions or scenarios, attend training sessions before each session and intensive training in the assessment and assessment criteria. Most centres make use of a pool of actors or patients to use as SPs on a regular basis. A specific person should be responsible for the recruitment and training of SPs. Feedback to the SPs, after each session, is also an important factor to take into consideration. The feedback helps to improve the quality of the SPs' performance and assessment abilities.

Trained actors, used as SPs, are especially useful for training students to manage patients with manipulative, suicidal and psychotic behaviours as stated by a participant.

4.2.1.4 ***Theme 4: Patient Safety***

The safety of patients was the fourth theme that emerged from the first semi-structured interview question.

Data analysis and description: Patient safety was mentioned by eight of the twelve participants. They all emphasised the importance of this aspect and the role simulation can play. Safety aspects were mentioned at least nine times during the semi-structured interviews.

Discussion: The aspect of patient safety is a very important and essential advantage of using simulation in the training of undergraduate health care students. The different aspects that emerged were patient safety, test the limits, experience complications, and give students a safety net to practice scenarios and improve patient outcomes.

By using simulation for the training of students, the safety of patients and even fellow students can be ensured, because the students do not have to practise on real persons. Psychomotor skills can be practised and the skills can be mastered on simulators before the students are exposed to real patients.

The use of simulators to test the limits was mentioned by two participants. One elaborated on the topic: "*It is important for the students to see and to experience the limits to where they can go. One of the first things that you learn is that male students always try and kill the simulator. I don't know why but they try to do things that'll kill the simulator. So if you've got a programme, you must try to let that simulator die. This is bit of a joke but there is a sting in the joke because there is a lot of debate in simulation society whether you let the simulator die or not. You've got to let it die and let it die fast. If he does something stupid, it must punish immediately and that simulator must die. Because your male students will push their boundaries, female students never seem to do it. You asked me what did I learn, that's what I've learned*".

It is also important for the students to see what the complications are and what the results of certain actions (or doing nothing), can be.

Simulation provides a safety net for students to practise under safe circumstances. This gives them confidence and helps them to cope in real-life situations. The opportunity to practise and develop the skills of acute illness management in a safe environment improves the confidence of students and the patient outcomes. The sense of security promotes a learning environment where students can be challenged and pushed to the limits, without harm to patients.

By using simulation in training of students the outcomes of patients are improved. In a document by NESC (2011:Online), the benefits of using simulation includes higher patient safety and satisfaction, calmer, more effective clinicians, better communication skills of clinicians and fewer repeat procedures as clinicians get things right the first time.

4.3.2 The integration of simulation into the current undergraduate medical curriculum

The second question asked in the semi-structured interviews was, "How can simulation be integrated into current undergraduate medical programme?" This question in the semi-structured interview guide was asked to all respondents and the answers that were given, by all 12 respondents, were arranged into themes, and the themes were arranged into categories. The themes that emerged were:

- Theme 1: Problem-based learning (PBL)
- Theme 2: Scenarios
- Theme 3: Alignment of simulation and the curriculum.

For each theme, the categories are summarised in Table 4.2 and will be discussed thereafter. Direct quotes of the interviewees are given in the text to enhance the trustworthiness of the study.

TABLE 4.2 THE INTEGRATION OF SIMULATION INTO THE CURRENT UNDER-GRADUATE MEDICAL CURRICULUM

THEMES	**CATAGORIES**
1.Problem-based learning (PBL)	**Advantages of PBL** • We use problem-based learning (PBL) in curriculum [C1,C2, D1] • Go in their PBL groups to the simulator and watch when the manikin goes in such a situation [C2, C3] • Where possible try to put the simulators together with the PBL learning cases [C2, C3] • PBL groups should have seven or eight students; if larger groups, you have students just standing around, not really being involved [C2, C4] • In later years of study and more difficult cases groups of 2-4 students [C3, C4] • Better than didactic learning, more retention, more enthusiasm [C4] • Didactic teaching, prepping people for a test, a majority of what we want them to do we did in simulation [T2] • Voluntarily simulation over lunch-time [D1] • PBL: 3 hours per day five days a week, we are allowed to use one of those hours [D1]

TABLE 4.2 THE INTEGRATION OF SIMULATION INTO THE CURRENT UNDER-GRADUATE MEDICAL CURRICULUM (CONT.)

1. Problem-based learning (PBL) (cont.)	**Decision-making and reasoning skills** • Simulation in acute medicine block • Flat screen simulation teach decision-making and reasoning [C5] • Computer not the best way to teach facts [C5] • Flat screen simulation test decision-making and reasoning skills [C5] • Teach the students the facts first, but as soon as you want to start testing decision-making and reasoning, let them play with the simulator, so that they can see the different outcomes and the different things, finally you can use it for assessment [C5] • Nursing is allowed to do 60% of the cases in simulation [D1] • Fourth and final years do simulation in acute block (8 weeks) [C6, D2] • Students who are clinically based in A&E or ICU and they have simulation of acute management for acutely ill patients [C6, D2]
2. Scenarios	**Clinical scenarios** • Different scenarios to demonstrate different clinical situations and principles [C1] • Structured simulation scenarios "bank" and students can use it to practice in their own time on their own in small groups [C1, C4] • Before going to clinic, come and practise in simulation centre first [T1] • Incorporation of small groups and small manikin time, getting more creative and start creating scenarios [T1]
	Realistic scenarios • Learn to use monitors which are identical to the monitors in hospital [C2, C4, T1] • You have to consider all the possible things that the people might do, not only the obvious things [T3] • You need blood results, ECGs, X-rays, you know you need somebody to pull all these things together and there is a huge amount of work that goes into this kind of stuff [T3]

TABLE 4.2 THE INTEGRATION OF SIMULATION INTO THE CURRENT UNDER-GRADUATE MEDICAL CURRICULUM (CONT.)

3. Alignment of simulation and the curriculum	**Align with curriculum** • Just in time learning to connect simulation lab experiences with something they are doing in their curriculum at the same time [C2, C4] • Develop learning objectives appropriate for each year group is the key [C3, T3] • Use physical diagnosis and do it with simulator [C3] • Systematically look at your curriculum and identify how simulation should fit in [C4] • "look at the whole curriculum and what skills and safety issues are important at each course or module or section and where simulation best fitted to do that" [C4] • Incorporate simulation into leadership course "we use kind of a crisis recourse management scenario to have them apply leadership"[C4] • Learn about gaps in curriculum [C4] • Very important to integrate simulation in the curriculum from the beginning of the Programme [D3] • Accumulative effect over the years of training [D3] • Simulation tests higher levels of Blooms taxonomy [D1] • Decide what your objectives are first and then play your simulation around that [T3]
	Train the trainer • Train the trainer to identify people in different disciplines with an interest in simulation to help with training of medical students and lecturers to facilitate sessions [C1]
	Problems with aligning simulation and curriculum • To get people to write a piece of simulation into the curriculum - I don't know about anybody who could achieve that [D1] • Get the College not to look at contact hours, because one hour lecture for 150 students and one hour simulation for 4 students is not the same [D1] • Evaluation forms with open line at the end - contact students that don't have a good experience to make it better [D1] • Problem: Nobody wants to give up time from their curriculum to do simulation [D1]

4.3.2.1 *Theme 1*: *Problem-based learning (PBL)*

When the participants were asked to give their opinions and views on how simulation can be integrated into current curriculums, all the participants answered the question and the categories that emerged were: problem-based learning (PBL) advantages, decision-making and learning skills and acute medicine block.

Problem-based learning: advantages

The category dealing with problem-based learning advantages, will be analysed, described and discussed.

Data analysis and description: In the responses of the participants, the advantages of PBL were discussed. The use of simulation in the groups was mentioned by three participants. Three of the interviewees mentioned problem-based learning. Problem-based learning (PBL) and the advantages were mentioned by six of the interviewees and nine sub-categories emerged.

Discussion: The use of PBL is viewed by a participant as better than didactic learning, because students have better retention and are more enthusiastic about learning. At the centre in the USA, the students have three hours per day, five days a week allocated for PBL and the simulation centre has permission to use one of those allocated hours for simulation. The students use the lunch hour for simulation on a voluntary basis. The students go in their PBL groups to the simulator to practice and observe what happens in certain situations under certain circumstances. These scenarios should be linked to their PBL learning cases, as mentioned by two clinical user participants. PBL learning cases and the simulation should be aligned.

The most effective PBL groups are groups of seven or eight students. Two of the participants stated that if the groups are larger, then there are problems that students are not really involved and are standing around. In the senior years when the work is more advanced and cases more difficult, the groups should be even smaller, e.g. two to four students. The conclusion is that the groups should be smaller for better, more effective use of simulation as a training tool.

Decision-making and reasoning skills

The second category that emerged was decision-making and reasoning skills. The category dealing with decision-making and reasoning skills will be analysed, described and discussed.

Data analysis and description: One participant, involved in flat screen simulation, described the advantages of flat-screen simulation to teach students decision-making and reasoning skills.

Discussion: Flat-screen simulation is particularly useful for the training of clinical reasoning skills and to teach the students how to reach decisions. The most effective method is to give the students the facts first, and then, when it comes to application of knowledge, allow them to play with the simulator so that they can see the different outcomes. Simulation can play an important role in the clinical phase of the undergraduate medical programme, because at that stage, they have the facts and background, and the simulation can play an important role in the application and integration of knowledge, reasoning skills and skills and competency development of the students.

The final stage is to use flat-screen as an assessment tool. Flat-screen simulation can be used for formative and summative assessment of the reasoning and decision-making skills of the students.

Acute medicine block

The medical school in the UK makes use of simulation in the acute medicine block. Simulation is used for the fourth- and final-year students in the block of eight weeks. The students in the rotation at Intensive Care Units (ICU) and Acute and Emergency (A&E) Departments use simulation to train them in the management of acutely ill patients.

Data analysis and description: The participants in the semi-structured interviews who specifically mentioned acute medicine were from the UK. Two of the interviewees mentioned how simulation can be integrated into the acute medicine blocks of their medical programme.

Discussion: The important aspect of simulation training in acute medicine was emphasised, because it is unethical and unsafe to allow students to train on patients with acute, often life-threatening conditions, e.g. acute myocardial infarctions, asthma and paediatric emergencies like croup. In these cases simulation can play a very important role in the training of students. The opportunity to practise these conditions on simulators will give the students confidence to manage these acute conditions in real life and it will improve patient safety and patient outcomes (Kohn *et al.*2000:17).

4.3.2.2 *Theme 2: Scenarios*

The theme that emerged next namely scenarios, concerned clinical scenarios and realistic scenarios.

Clinical scenarios in simulation will be analysed, described and discussed.

Data analysis and description: The participants in the semi-structured interviews who mentioned the clinical scenarios were two clinical users and one technical staff member. The interviewees mentioned four different aspects of clinical scenarios.

Discussion: The use of scenarios to demonstrate certain principles in diagnosis and management of clinical conditions and situations can play a very important role in the training of students. One of the participants mentioned the fact that students can practice certain scenarios before they go into the actual situation, e.g. before they go to a clinic for the first time and have contact with real patients. This improves the confidence of students and promotes patient safety.

Two participants mentioned a "scenario bank" where scenarios that are already developed can be used to help with the development of new scenarios and to apply to similar conditions or similar scenarios. In the simulation literature, scenarios for all kinds of conditions and situations are published that can be adjusted and adapted for local conditions and situations and help add to the scenario bank. The bank can develop over years and some of the scenarios can be adjusted to changing circumstances. Staff members and clinical users will develop more and more scenarios and they will become more creative with the development of scenarios, as they become more experienced.

Realistic scenarios

Aspects of realistic scenarios were mentioned during the semi-structured interviews and will be analysed, described and discussed.

Data analysis and description: during the semi-structured interviews, four of the participants mentioned the different aspects necessary to create realistic scenarios. Specifically three aspects emerged and will be discussed.

Discussion: It is important to use the same monitors and equipment that are used in the hospital or in the real situation. The students should train and do the scenarios with the same equipment to ensure comfort and acquaintance with it in real situations. This will ensure patient safety and smooth mechanical actions on the side of the students in real situations. It is also important to have ECGs, X-rays and blood results available to make the scenarios more realistic. Gisin (2011: PowerPoint) even mentions the use of dry leaves (for sound) or to switch off the lights to simulate darkness in an accident scene to make it more realistic and train students to adapt to different scenarios and circumstances that are not ideal so that they would be able to make a plan when it is necessary (training for difficult scenarios).

An important factor to take into account when training students in South Africa and the rest of Africa is the 'difficult scenario.' Junior doctors who are doing their Internship and Community Service often have to work in hospitals where there are shortages of equipment and medicines. This will help students to adapt to situations in peripheral health care facilities where equipment and resources are limited. If students are only trained for and used to first world, tertiary hospitals they may experience various difficulties and emotional stress when they have to work in primary or secondary health care facilities. With simulation, students can be prepared for difficult scenarios and circumstances. This can train them to improvise and adapt to a health care environment that is not ideal.

The sites of simulation as described in the literature are: dedicated simulation centre, "in-situ" simulation, moving patient simulation and mobile simulation (Gisin 2011:Presentation). These sites of simulation should be incorporated into the education and training of medical and other health care students to prepare them for the difficult situations outside tertiary training facilities.

4.2.3.3 *Theme 3: Alignment of simulation and the curriculum*

When the participants were asked to discuss their opinions and views on how simulation can be integrated into current curriculums, all the participants answered the question, and the categories that emerged were: align with the curriculum, train the trainer and problems with aligning simulation and the curriculum. The data analysis, description of findings and discussion of each category follow below.

<u>Align simulation with the curriculum</u>

To align simulation with the curriculum is an important aspect that was mentioned during the semi-structured interviews.

Data analysis and description: The importance of alignment of simulation with the curriculum was mentioned by two directors/managers, three clinical users and one technical staff member. The 13 aspects that were mentioned will be discussed as well as the two aspects that were mentioned by two interviewees, namely, *"...just in time learning to connect simulation lab experiences with something they are doing in their curriculum at the same time"* [C2, C4] and the development of learning objectives appropriate for each year group is the key for success [C3, T3].

Discussion: The importance of aligning simulation with the curriculum forms the basis of integration of simulation into the current curriculums. This means that one should first look at the objectives and then decide where simulation best fits in. The learning objectives should be developed appropriately for each year group (mentioned by two participants). One of the managers mentioned that simulation should be integrated into the curriculum from the beginning of the programme, resulting in an accumulative effect over the years of training. This is an important recommendation to take into account - that simulation should be an integral part of the curriculum and not something separate from the clinical training of students. Students should gradually be introduced to simulation and they should be equally comfortable doing simulation and seeing real patients. Another clinical user advised that one should systematically consider one's curriculum and identify how simulation should fit in.

The curriculum should be developed in such a way that there should be a connection between the simulation experiences and something they are doing in their curriculum at the time. The connection is important so that students once again experience simulation as an integral part of the curriculum. The gaps that exist in the curriculum should be identified and can be filled by simulation. One of the clinical users advised that one can take a diagnosis and build the scenario and simulation around the condition.

Another clinical user said: "*Look at the whole curriculum and what skills and safety issues are important at each course or module or section and where simulation is best fitted to do that*." [C4]. The user also advised that simulation can be incorporated into leadership courses: "*We use kind of a crisis resource management scenario to have them apply leadership*" [C4].

<u>Train the trainer</u>

The notion of training the trainers was another category that emerged during the semi-structured interviews.

Data analysis and description: One of the participants in the semi-structured interview mentioned the very important aspect of "train the trainer". This is a key aspect in the success of simulation and it is therefore necessary for the trainers to know how to use simulation in their own disciplines. In the words of the participant: "*Train the trainer to identify people in different disciplines with an interest in simulation to help with training of medical students and lecturers to facilitate sessions*" [C1].

Discussion: A crucial factor in simulation-based education (SBE) is the training of the trainers. Trainers are often experts in the relevant medical field, but have limited experience in SBE. The Society in Europe for Simulation Applied to Medicine (SESAM) listed the minimum required qualifications of an instructor of a simulation course as follows:

- Expert in the clinical field that is to be discussed
- Knowledge about adult education
- Knowledge about non-technical skills issues, human factors, crisis resource management
- Knowledge about the functional principles, the possibilities and limitations of the systems used (Vollmer, Mönk & Heinrichs 2008:632).

To be able to comply with these requirements, trainers should be trained to do the training. SESAM has specific regulations and prescribes specific topics that should be covered in the training courses for instructors. These include debriefing techniques, development of scenarios, psychology of training, team interactions, error evolution and crisis resource management (Vollmer *et al*. 2008:632).

Training of the trainers should be an important and essential aspect of the integration of simulation into the curriculum. This part of the integration should not be neglected. The fact that this aspect was only mentioned by one participant during the semi-structured interviews is interesting, but it should actually form an integral part of the integration process and should not be neglected.

<u>Problems in integrating simulation and the curriculum</u>

Integrating simulation in the curriculum is not without problems.

Data analysis and description: One of the participants mentioned a few problems in integrating simulation into the curriculum. The problems that were mentioned were:
"To get people to write a piece of simulation into the curriculum - I don't know about anybody who could achieve that" [D1]. The factors mentioned as problems were: to write simulation in the curriculum, to find time for simulation in the curriculum, the contact time with students (subsidy), and students with negative experiences in the simulation centre.

Discussion: To integrate simulation into the curriculum will not be without problems. The participant mentioned that the time factor is a major issue which ties in with the fact that simulation should be an integral part of the curriculum and not an optional extra. The time needed for simulation should be integrated into the curriculum. Modules should be evaluated; unnecessary material should be eliminated and replaced by essential material and work that can be done in simulation. It is thus essential to convince the module leaders and lecturers to integrate simulation into the different modules. This is in line with the other problem that was mentioned; to get people to write simulation into the curriculum.

The contact hours and the fact that simulation is more labour intensive than to give a lecture to a large class, is another factor to take into account when simulation is integrated into the curriculum. This fact should be taken into account when looking at subsidy and staff requirements.

Evaluation forms should form an integral part of the simulation centre. These evaluations can help identify problems with simulation and the processes during the scenarios. This can then be used to address and rectify problems. These evaluations can and should be used in research.

4.3.3 The role of simulation in assessment of undergraduate medical students

The third semi-structured interview question dealt with the assessment of students, using simulation. The question asked was: "What role can simulation play in assessment of undergraduate medical students?" All the participants answered the question and the answers were divided into themes and categories. The themes that emerged were:

- Theme 1: General assessment remarks
- Theme 2: Formative assessment
- Theme 3: Summative assessment
- Theme 4: Recertification.

Each theme, and its categories are summarised in Table 4.3 and will be discussed thereafter. Direct quotes of the interviewees are given in quotation marks to enhance the trustworthiness of the study.

TABLE 4.3 THE ROLE OF SIMULATION IN ASSESSMENT OF UNDERGRADUATE MEDICAL STUDENTS

THEMES	CATEGORIES
1. General assessment remarks	**General remarks** • Assess the higher levels of Bloom's taxonomy[D1] • Formative and summative [D1] • People should not feel threatened [T3] • People don't behave naturally in that environment [T3] • There is a place for assessment, but there should be a clear distinction between training and assessment [T3] • Effective tool for assessment, but not for the first time they're exposed to simulation. You probably wouldn't get an accurate reflection of their ability [C6] • Assessment should have the remedy built into the assessment [D1]
	Assessment not implemented • We didn't achieve it to write the objectives into the summation [D1] • We went through validation process, but we didn't introduce it, because it is quite extensive [D2] • Currently no assessment modules [D1, D2] • "...necessary but not sufficient" [D1] • Assessment in simulation is a problem [D1]
2. Formative assessment	**Assessment of reasoning skills** • Simulation as learning experience [C1, C4] • Assessment of reasoning skills with flat screen simulation [C2] • Assessment of knowledge base without MCQs with flat screen simulation [C2] • Integration of different clinical components to make a diagnosis [C3] • Excellent tool for evaluation to see how much they retained and their thought processes and how much they understand [T2] • Assessment of the different steps [D1] • Checking whether they met a certain number of steps[C5] • Assessing problem solving skills in content and time [C5]

TABLE 4.3 THE ROLE OF SIMULATION IN ASSESSMENT OF UNDERGRADUATE MEDICAL STUDENTS (CONT.)

2. Formative assessment (cont.)	**Debriefing** • Different forms of assessment , basic form is standard debriefing after simulation session, formative and summative assessment [C1, D2] • Observer: observe, making notes and feedback after session [C1, D3, T1] • Debriefing after assessment to tell them why they failed. That is subjective [D1]
	Assessment of interpersonal skills • "I think we will be using simulation techniques, not just for ordinary physical skills, but especially for group interactions" [C2, C4] • OSCE use different stations skills, interpersonal, equipment setup, SP [T1] • Integral part of assessment of behavioural skills, interpersonal skills and attitude [D3, T1]
3. Summative assessment	**Qualification** • At end of clerkship they are given exam by Harvey manikin [C3] • Grading as follows: ability to perform examination 25%; completeness of examination and the ability to detect abnormalities is 50%; Diagnosis is 5% and the justification, using the history, cardiac auscultation and palpation is 20% and they have to pass the clerkship[C3] • "They know they have to pass an exam to pass, so they know they have to take it seriously" [C3] • Flat screen simulation as part of the final exam for primary care internship for third year students [C2] • Anaesthesia residents' final exam [T3]
4. Recertification	**Recertification process** • Recertification of qualified clinicians [C1] • Maintenance of Certification Assessment (MOCA) Process [C1] • Standardisation of assessment is problem [C1]

4.3.3.1 Theme 1: General assessment remarks

The third semi-structured interview question addressed the aspects of assessment in simulation. The participants raised a few general aspects that did not fit into a specific theme or category.

<u>General remarks</u>

Data analysis and description: Some of the aspects that were raised by three of the participants are highlighted here. The factors mentioned were: higher levels of

Bloom's taxonomy; formative and summative assessment; non-threatening environment*; "...people don't behave naturally in that environment"* [T3]; clear distinction between training and assessment; effective assessment tool (not for the first time students are exposed to simulation); the remedy built into the assessment.

Discussion: An important point mentioned by a director/manager was that one tests for the higher cognitive levels of Bloom's taxonomy with simulation. Simulation can be used for formative and summative assessment. Simulation can be used to assess all levels of Bloom's taxonomy, but the use of scenarios and interdisciplinary teamwork lends itself especially to the higher levels of Bloom's taxonomy (Pugh 2008:657). With high-fidelity simulation the higher-order thinking skills like application, analysis, synthesis and evaluation are being evaluated. With simulation one can assess skill, behaviour and attitude and not only knowledge. Simulation assessment fits in well with the Miller's pyramid as a framework for assessing clinical competence. The pyramid is explained in Figure 4.2 and assesses cognition and behaviour.

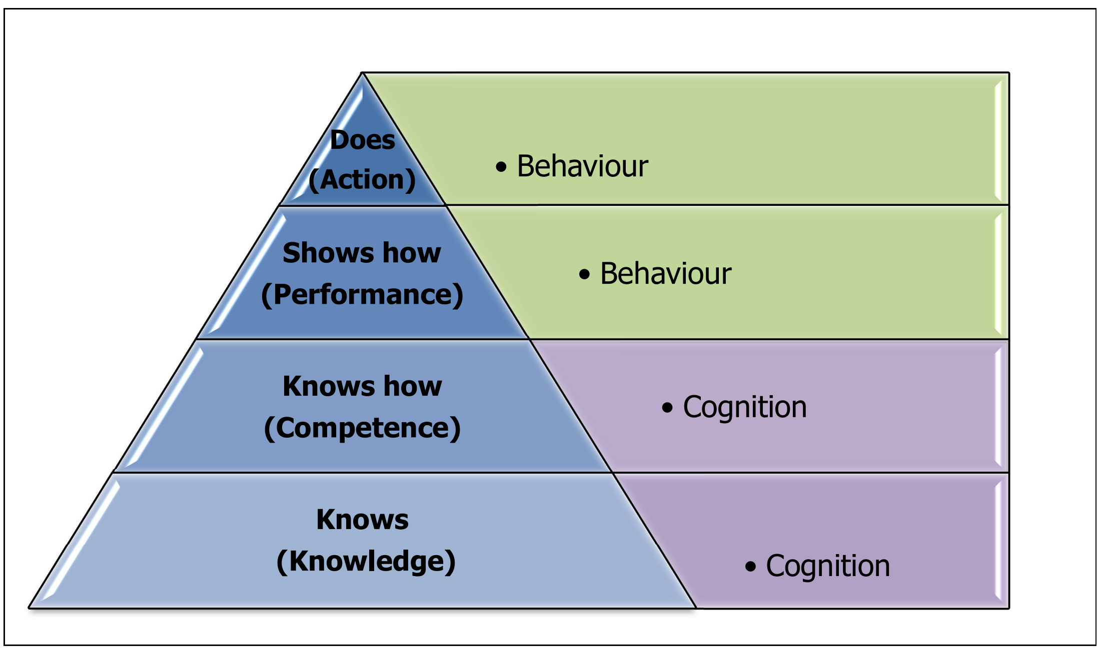


FIGURE 4.2 MILLER'S MODEL OF CLINICAL COMPETENCE (MILLER 1990:S63) [Compiled by the Researcher, Labuschagne 2011]

The interviewee mentioned that assessment should have the remedy built into the assessment, the student should learn from the assessment opportunity. In the interview, the point was stressed that students should be assessed on every aspect of a task and not only the end point. If students do not comply with all the requirements or skills to perform a safe procedure, the gaps should be identified and addressed. High-fidelity testing has the potential to point out gaps in the competency of the individual as well as gaps in the curriculum. To fill these gaps, a pathway for remediation should be determined. This will help to maintain the morale in the programmes and facilitate learning (Pugh 2008:665).

Another remark made by one of the technical participants was that there should be a clear distinction between training and assessment. He mentioned that people should not feel threatened and assessment can be threatening. This links up with the importance of a non-threatening environment. The interviewee was of the opinion that people do not behave naturally in an assessment environment.

One of the clinical users said that simulation can be an "...e*ffective tool for assessment, but not for the first time they're exposed to simulation. You probably wouldn't get an accurate reflection of their ability".* This statement correlates well with the remark in the previous paragraph that the students should know and realise a clear distinction between training opportunities and assessment opportunities. If students know what to expect and when assessment will take place, one reduces the fear and promotes a non-threatening environment.

<u>Assessment not implemented</u>

Assessment was not implemented in the simulation centres visited. The data analysis, description and discussion on this aspect follows below.

Data analysis and description: Two of the directors mentioned that assessment was not yet implemented in their simulation centres. During the semi-structured interviews, five aspects were raised by the interviewees. The one centre had gone through the validation process, but had not implemented it yet because of the extent of the implementation process.

Discussion: To implement assessment in the curriculum, alignment with the curriculum is essential. The assessment components should be written into the objectives of the modules in the curriculum. This is an important aspect to take into account when establishing a simulation centre. The assessment and especially summative assessment should be aligned with the curriculum and should be an integral part of the curriculum or module, when starting with simulation. At this stage assessment in simulation is a problem to implement, but it is a necessary component, as mentioned by the interviewees, *"Necessary but not sufficient"* [D1]. There is limited evidence and not many published articles on assessment in simulation, making this an important point for further research.

4.3.3.2 Theme 2: Formative assessment

Most of the participants mentioned formative assessment in some way when they responded to the semi-structured interview question. The categories that emerged were the following: assessment of reasoning skills; debriefing and assessment of interpersonal skills. The sub-categories that emerged will be discussed.

<u>Assessment of reasoning skills</u>

Simulation is an excellent way to test reasoning skills and the incorporation of different clinical components to make a diagnosis. Simulation is a useful tool to assess problem-solving skills, thought processes and integration of clinical components in the learning process and to evaluate how much students understand and retain knowledge. The data analysis, description and discussion follows.

Data analysis and description: The point that reasoning skills can be developed and assessed with simulation was mentioned by five clinical users, one director and one technical user. The point that simulation can act as a learning experience was voiced by two interviewees.

Discussion: The learning experience and integration of clinical components can be assessed using simulation. The reasoning skills and problem-solving skills can be evaluated. Flat-screen simulation is a very important tool to use for the assessment of reasoning skills and problem-solving skills. It is an excellent tool to use for formative assessment and one of the participants mentioned the fact that students can do an assignment and hand in the best effort. This means the student repeats the assignment, in their own time, sometimes more than once - resulting in the student learning, without more work for the lecturer. This helps the students to use clinical knowledge, integrate this knowledge and use the reasoning skills and problem-solving skills to make a diagnosis and learning in the process, which are decisive aspects of formative assessment.

Formative assessment with simulation is an important tool to assess the different steps in a clinical skill or scenario. In this assessment it is important to have check lists to evaluate whether a student met all the criteria and steps necessary for each assessment. This aspect helps to identify gaps in the knowledge and modules and how to fill these gaps with certain measures, e.g. debriefing, re-training or re-practise of skills or changes in scenarios or in the modules.

Debriefing

Debriefing is considered the heart and soul of simulator training (Dieckmann *et al.* 2008:667).

Data analysis and description: Five of the respondents specifically mentioned debriefing as a part of formative assessment. Debriefing was mentioned by all three directors/managers interviewed. Observation during the session and giving feedback after the session was mentioned by three interviewees.

Discussion: Dieckmann *et al.* (2008:667) mentioned the two main functions of debriefing in simulation as: make the participant in the "hot seat" deal with the emotional strain that the scenario puts on them and learn from the scenario via self-reflection.

Two of the participants mentioned that debriefing should form part of the assessment process and should be used for formative and summative assessment. Three of the participants described the process of debriefing as follows: observation, making notes, and giving feedback after the session. At both centres, video recordings are being used during the scenarios and the video formed an integral part of the debriefing process. Debriefing is a subjective method of assessment and informs the students exactly what happened and what went wrong during the assessment opportunity to identify the performance gaps. The aspects discussed fit in with the debriefing algorithm described by Eppich (2011: Presentation) (cf. Figure 2.2). The elements of an effective debriefing should be introduced to create a structured and effective debriefing session (cf. Point 2.4.1.1).

<u>Assessment of interpersonal skills</u>

The next category that emerged was the assessment of interpersonal skills.

Data analysis and description: The aspect of interpersonal skills development was mentioned by four participants in the semi-structured interviews. Two interviewees voiced their opinions as follows: *"...think we will be going to use simulation techniques, not just for ordinary physical skills, but especially for group interactions"* [C2, C4].

The fact that simulation can be used to assess behavioural and interpersonal skills was mentioned by two interviewees. In the words of one interviewee:"...*integral part of assessment of behavioural skills, interpersonal skills and attitude* "[D3].

Discussion: Group interactions, inter-professional relations and communication skills can be assessed with simulation. The advantage of simulation to assess physical skills and interpersonal skills, behavioural skills and attitude is highlighted by two interviewees. Certain scenarios can be developed to expand and assess these aspects that cannot easily be done in real life situations. The assessment of interpersonal skills complies with the higher order cognitive skills of Bloom's Taxonomy and simulation is therefore a useful tool to use in these assessment situations.

4.3.3.3 Theme 3: Summative assessment

The third theme that emerged from the semi-structured interview question regarding assessment was summative assessment. One category, namely qualification emerged.

<u>Qualification</u>

The category that emerged was qualification and qualification requirements.

Data analysis and description: The aspect of a summative assessment to obtain a qualification was mentioned by three of the participants. The fact that simulation can be used for summative assessment or for qualifying examinations forms part of the summative assessment in some departments.

Discussion: The use of simulation in summative assessment is an important application and should be utilised. The participants emphasised the fact that students have to pass the final examination. The students take simulation seriously if they know they have to pass the examination. Some aspects of a summative assessment can be done in simulation; for instance, some stations in an Objective Standardised Clinical Examination (OSCE).

Pugh (2008:659) highlighted some difficulties when using simulation in high-fidelity assessment. One of the major difficulties in assessment is to set a relevant, reproducible and reliable scoring system. Assessment in simulation requires more testing time with more expensive people per unit of measurement than other forms of assessment. Linkage between assessment, preparation for the assessment and real life skills places a high demand on simulation-based training and assessment. Simulation and simulation assessment can be time consuming and expensive to develop. The minimum requirements for simulator-based assessment are relevant, reliable and reproducible simulator devices and a reliable and valid scoring system.

4.3.3.4 Theme 4: Recertification

The fourth theme that emerged was recertification. This aspect of assessment was mentioned by one of the clinical users.

Data analysis and description: The participant voiced the following aspects: recertification of qualified clinicians, certification for anaesthetists in the USA (Maintenance of Certification Assessment (MOCA)) and the problem to standardise the assessment.

Discussion: Simulation-based assessment can form an additional component in Continued Professional Development (CPD) programmes and recertification courses, e.g. Acute Trauma and Life Support (ATLS). An important aspect to take into account when using simulator-based assessment is that examinees should have access to comparable pre-examination familiarisation with the simulation equipment. Simulation-based assessment can be expanded to use in all spheres of the heath care professions to use for recertification and CPD programme purposes, but it is going to be expensive, labour intensive and at the moment there are not enough trained trainers and assessors to implement such a programme. In future, clinical simulation can be utilised for these purposes.

4.3.4 Simulation as undergraduate training tool

The fourth question asked in the semi-structured interview was, "What lessons did you learn by using simulation as undergraduate training tool?" All the participants answered the question and the answers were divided into themes and categories. The themes that emerged were:

- Theme 1: Teaching and learning tool
- Theme 2: Flat-screen simulation
- Theme 3: Debriefing.

Each theme, with its categories and sub-categories, is summarised in Table 4.4 and will be discussed separately. Direct quotes of the interviewees are given in the text to enhance the trustworthiness of the study.

TABLE 4.4 SIMULATION AS UNDERGRADUATE TRAINING TOOL

<table>
<tr><th>THEMES</th><th>CATEGORIES</th></tr>
<tr><td rowspan="3">1. Teaching and learning tool</td><td>Teaching
• Correct tool for what you want to teach [C1, C3, D1]
• Students sometimes have flawed reasoning processes and are unaware of it [C2, C4, D1]
• Enjoy this kind of experience so they practice it [C2, C4, T1]
• Keep the scenarios simple for medical students [T1, D1, D2]
• “What you teach is not necessarily what they learn” [C1]
• What does a practicing physician need? [C3]
• Data collection, integration and rewrite programmes [C3]
• Better tool to present with in certain circumstances [T2]
• Simulation make us realise our poor training [D1]
• Educate to introduce new policies [C6]
• Teach simple things vs. complexity [D1]
• Start from the learning outcomes to what you want to achieve [T3]
• Know what your learning objectives are [C5]</td></tr>
<tr><td>Team work
• Medical and nursing students working together helps them to realise early on we each have areas of expertise and we can complement each other [C4, T3]
• Collaboration between nursing and medical students, because they recognise the expertise each has [C4, T3]
• Team work/multidisciplinary [T3, C6]
• Interdependent [C4]
• Combination, a holistic approach of taking a curriculum and pushing it through the traditional methods [T2]
• Bring everybody in room, facilitator prompts them in the beginning to make the scenario flow [D2]</td></tr>
<tr><td>Simulation technology
• You should never build a curriculum around simulation, you should always have a backup, because it is technology and sometimes technology will fail [T2, T3]
• Students will show the ‘bugs’ out it is like computer programming [C1]
• It is a technique not technology[C1]
• Change with changes in technology[C3]</td></tr>
</table>

TABLE 4.4 SIMULATION AS UNDERGRADUATE TRAINING TOOL (CONT.)

1. Teaching and learning tool (cont.)	**Patient safety** • Clinical adverse events [C6] • Serious ended events [C6] • Works well in these things that are not formally taught [T3] • Managing skills in high stress situations [T3] • Helps to pull these soft skills together[T3] • Male students push the boundaries – they want to kill the simulator Female students never seem to do it [C5] • Practise before exposure to patients, teaching institution, reassuring for patients [T1] • Patients' safety [T1]
	Psychological competence • "...suspension of disbelief" is very important [C1] • Make sure that as many people as possible buy into the idea [C1] • Proof confidence [D3] • Psychological competence [D3]
2. Flat-screen simulation	**Reasoning skills** • Flat-screen simulation helps with reasoning process, thinking process [C2] • Flat-screen simulation gives sense of satisfaction to students because they learned and analysed a problem [C2] • Printout of minute to minute analysis of what they did [C2] • Flat-screen simulation helps with management plan, problem list and sub-notes and every step along the way is recorded on a server [C2] • Write out justification for diagnosis so one can see how they are thinking [C2]
	Training tool • Tools should be developed for level of training [C3] • Flat-screen simulators are very useful [C5] • Identify gaps in curriculum with flat screen simulation [C2] • Flat screen simulation is different from book learning [C2]
3. Debriefing	**Process of debriefing** • Mode of decompression, put student on 'hot seat', it is more emotional aspect of debriefing [C4] • Gives students opportunity to 'vent' and learn from experience[C1] • If you run a really good, really effective debrief, it doesn't really matter how well the simulation went, because there would still be so much to learn from it and we spent at least twice as long on the debrief than we do running the simulation [T3] • We do a ten minute scenario and we do at least twenty to thirty minutes on the debrief [T3]

TABLE 4.4 SIMULATION AS UNDERGRADUATE TRAINING TOOL (CONT.)

3. Debriefing (cont.)	**Assessment** • Interview students with problems [C2, C3] • Simplest form of assessment is debriefing [C1]
	Trainers' training • Courses to instructors to do debriefing [D3]

4.3.4.1 *Theme 1: Teaching and learning tool*

All the participants responded to the question and the categories that emerged were divergent and seen from different angles by the participants. The categories that emerged were: teaching, team work, simulation technology, patient safety and psychological competence. These categories are discussed below.

<u>Teaching</u>

The first category that emerged was teaching.

Data analysis and description: All six of the clinical users, two of the managers and three of the technical staff members mentioned simulation as a teaching tool to teach certain aspects, in this category, in their responses to the question. The most prominent aspects that emerged were the following:

- Choose the correct tool for what you want to teach [C1, C3, D1]
- Students are unaware of flawed reasoning processes [C2, C4, D1]
- Students who enjoy the experience will practise it [C2, C4, T1]
- Keep the scenarios simple for medical students [T1, D1, D2].

In each case it was mentioned by three interviewees. The other nine aspects were voiced only once by seven different interviewees.

Discussion: An important statement was made by one of the participants regarding the outcomes: *"What you teach is not necessarily what they learn",* implying that the scenarios should be carefully thought through and thought out to insure that you reach the teaching and learning objectives. This fact was also echoed by other participants. They mentioned that one should start from the learning outcomes and decide what you want to achieve. One should be clear about the learning objectives and build simulation around the objectives. Three of the participants said that the correct tool should be developed for what you want to teach. Simulation is sometimes a better tool to teach certain aspects, e.g. paediatric resuscitation. The modules should then be developed specifically around the objectives and outcomes. One of the directors mentioned the fact that simulation can help identify the gaps in training and so improve the training.

Another important aspect that emerged was that the scenarios should be relevant for the level of the students. One should know what a practising physician needs and keep the scenarios simple for undergraduate students and more complex for registrars or practising doctors doing refresher courses. One of the directors mentioned the important rule of teaching simple things vs. complex scenarios.

The reasoning skills and thinking processes of students were mentioned by three of the participants; more specifically that students are often not aware that they have flawed reasoning skills and clinical thinking. Simulation and in particular flat-screen simulation can help reveal these problems to the lecturers and students. Sometimes scenarios and programmes should be re-written to correct the shortcomings. The fact that students enjoy simulation was also mentioned and resulting in students practising more and becoming better and the learning process is much more effective, without more effort from the lecturers.

One of the interviewees raised another application for simulation that was not mentioned previously, namely that simulation can be used as a tool to introduce new policies and educate and train staff members to implement these new policies in the hospitals and health care system. This aspect can be utilised in CPD and refresher courses and staff development in the hospitals.

<u>Team work</u>

Team work was another category that emerged. The data analysis will be described and discussed below.

Data analysis and description: The fact that team work can be taught through simulation was mentioned repeatedly. Two participants said that medical students and nursing students recognise the expertise each group has. The same interviewees mentioned that the students then realise that they can complement each other [C4, T3]. The other factors that were mentioned by other interviewees will be discussed next.

Discussion: The importance of using simulation to teach and improve team work was mentioned by five of the participants in the semi-structured interview. The category that emerged was team work. Two of the participants mentioned that simulation can be used to help medical and nursing students to work together and to realise that each have areas of expertise and that they can complement each other. Simulation is the ideal tool to improve training of interdisciplinary teams and expose students to interdisciplinary team work before they encounter this in real clinical situations (Jankouskas *et al*. 2011:Online). This helps to highlight the interdependency of the different members of the health care team. At the moment the different students are trained in isolation and the first encounter with the other profession is in the clinical setup. Here simulation can play an important role in filling this gap in the training programmes.

Another aspect is the team work among colleagues. Simulation can play an important role in the teaching of team work among doctors, for instance the inter-collegial team in a theatre where there are anaesthetists, surgeons and family practitioners. The team work in an emergency situation where each member has a specific task to perform as well as leadership in a team can be practised with simulation. This will improve confidence of the students to go out and perform in the "real world".

Simulation technology

Another lesson mentioned by some of the participants concerned simulation technology and the challenges regarding technology.

Data analysis and description: Two of the interviewees mentioned that a curriculum should not be build entirely around simulation, because technology can fail. They advised others to have a backup system or plan. This was mentioned by two technical staff members because they had firsthand experience. Two other clinical users mentioned simulation technology among lessons learned; this will be discussed below.

Discussion: Two of the technical users warned that there should be a backup system in place. Technology may fail and therefore one should be able to adapt and not only rely on the simulation. Simulation is a technique and not only technology; one should not only rely on the technology. Students are technologically literate (Generation Y) and can easily identify and point out faults and weaknesses in the simulation. The one clinical interviewee warned against this. One should anticipate that problems can arise during a scenario.

Another lesson one of the clinical users highlighted was that with the developments in technologies and new simulators, one should adapt to these changes, and try to replace and upgrade simulators as the technology changes.

<u>Patient safety</u>

The next category that emerged was the important factor of patient safety.

Data analysis and description: The eight aspects regarding patient safety that emerged were mentioned by four different interviewees. The aspects mentioned were the following: clinical events with adverse outcomes, managing skills in high stress situations, skills that are not taught formally, can be addressed here, pushing boundaries and practise acute emergency situations before exposure to real situations. These aspects will be discussed below.

Discussion: The use of simulation to teach students in a safe environment without a risk to patients is an important application of simulation. Training students on simulators or SPs before exposure to real patients was mentioned by a technical staff member and it was noted that it is reassuring to patients to know that. Students can develop skills that are not formally taught in the classroom or clinical setup.

The use of simulation to expose students to clinically adverse events and serious ended events is an important lesson and should be utilised to train students in managing these skills and pulling these skills together without putting patients at risk. Students are trained to manage and develop skills in high stress situations under these conditions. These situations cannot be taught on real patients in real clinical situations and here simulation can play an important role in training these skills. All the factors mentioned boils down to the safety of patients and creating a safe environment for students to acquire skills.

Psychological competence

This category deals with the development of psychological competence and was mentioned by two participants.

Data analysis and discussion: Two factors regarding the psychological aspects of simulation emerged, namely, development of psychological confidence of students and that students and lecturers should develop confidence in simulation as tool.

Discussion: The one director specifically mentioned the advantage of exposing students to scenarios where they can develop psychological confidence. Students are young and their life experiences limited. By exposing them to adverse events and unfavourable outcomes on simulators can help to develop their psychological competence and give them confidence to handle these situations in the clinical setup with real patients. This is an important lesson to take into account when developing a simulation centre.

Another psychological aspect of simulation was mentioned by another participant. It was mentioned that people should buy into the idea of simulation and students should treat a manikin the same way they would have treated a real patient. They must buy into the idea of simulation. Simulation is an additional training tool and not a replacement for real patients. With simulation the students are prepared for real life situations that cannot be trained on real patients. It was mentioned that *"suspension of disbelief"* is very important [C1]. The psychology behind simulation plays a vital role in the successful incorporation of simulation into a curriculum.

4.3.4.2 *Theme 2: Flat-screen simulation*

Flat-screen simulation is an important part of simulation and was mentioned by two of the participants that use flat-screen simulation extensively in their training programmes. The categories that emerged were reasoning skills and training tools. Each of the categories will be discussed separately.

Reasoning skills

The one participant, an expert in the development of flat-screen simulation, mentioned a few important facts about flat-screen simulation.

Data analysis and description: The aspects mentioned were reasoning process, thinking process, sense of satisfaction, analysis and development of a management plan and problem list, and students have to justify their diagnoses. These aspects will be discussed in turn.

Discussion: Screen-based computer simulators (also known as flat-screen simulators) are programmes to train and assess clinical knowledge and decision-making, e.g. problem-based learning and acute cardiac life support (Ziv 2003:784).

The use of flat-screen simulation is a useful tool for developing the reasoning and thinking skills of students. Especially the clinical reasoning abilities of students need to be developed and here flat-screen simulation can play a very important role in that it can help with the development of management plans, problem lists and sub-notes. The students should also write a justification for their diagnosis to help the lecturer assess their thinking and reasoning skills.

The technology allows one to get a printout of a minute-to-minute analysis of what the student did. The management plan and problem lists are also recorded to allow the lecturer to go back to the server and assess the thinking processes of the students. The technology allows students to work on their own in their own time at their own pace and so the lecturer can also evaluate the working pace of the student. This can be a very important and helpful tool for medical students with different backgrounds and students with language barriers. This is a relevant application in the South African setup to help students develop reasoning skills at their own pace.

Flat-screen simulation gives students a sense of satisfaction, because they learned and analysed a problem to reach the point of making a diagnosis. With flat-screen simulation, however, it is not only the diagnosis that counts, because the lecturer can see and assess every step of the student's reasoning process. Another factor that was mentioned previously, is that students can hand in the best effort, implying that students can repeat a simulation, till the student is satisfied and have learned during the process.

<u>Training tools</u>

The second category that emerged was training tools. The data analysis, description and discussion follow.

Data analysis and description: The tools for flat-screen simulation were mentioned by three clinical users. The aspects that arose were that tools should be developed for the level of training [C3]; that flat-screen simulators are very useful [C5] and that with flat-screen simulation one can identify gaps in the curriculum [C2].

Discussion: A crucial factor mentioned is that the tools should be developed for the level of the training in mind. The level should be adjusted to the level of the student. Flat-screen simulation is a useful tool allowing students to learn. With flat-screen simulation, gaps in the curriculum can be identified – as was mentioned above. It is a relatively cheap form of simulation. If it is incorporated in e-learning programmes, students can complete the cases at home in their own time. Large classes can also be managed easier. The one participant mentioned that flat-screen simulation is different from book learning because it is interactive and responds to actions of the students. Flat-screen simulation is thus a useful, cheaper and user-friendly training tool in simulation training.

4.3.4.3 *Theme 3: Debriefing*

The third theme that emerged from the question regarding the lessons learned when using simulation as a training tool was debriefing.

Six of the participants mentioned debriefing as a useful training tool. The categories that emerged were: the debriefing process, assessment and training of the trainers. The categories will be discussed in this order.

<u>Process of debriefing</u>

The debriefing process emerged as a category and three interviewees described the process.

Data analysis and description: Three participants mentioned the process of debriefing. Two clinical users and one technical staff member described the following: to put the student in the 'hot seat', it is the more emotional aspect of debriefing [C4]; students get the opportunity to 'vent' and learn from experience [C1]; there will be so much to learn from that they spend at least twice as long on the debrief as running the simulation [T3].

Discussion: The use of debriefing is to help students to decompress and "vent" after a simulation session. The aim is to allow students to learn from the process. One of the technical staff members summarised the debriefing process as follows: *"If you run a really good, really effective debrief, it doesn't really matter how well the simulation went, because there would still be so much to learn from it…".* The emotional aspects of debriefing and putting a student in the "hot seat" were also mentioned by one of the clinical users. This can be linked to the psychological aspects of simulation and helps students to get acquainted with situations in the clinical setup where they have to handle emotional aspects of unfavourable outcomes. Learning is enhanced by reflection on a certain experience, whether it is in a simulation centre or in the real clinical environment. Alinier (2008b:748) proposes a reflective simulation framework, which is an interactive, learner-centred model that can be used to explore the simulated experience in order to enhance learning and practice. A reflective simulation framework is explained with a diagramme first compiled by Jones and Alinier in 2005 and used by Alinier (2008b:748) and is summarised in Figure 4.3. The framework was adapted by the researcher to explain the process, but it can be used in a flexible way (as indicated by the arrow) to explore the simulated experience and enhance the learning experience.

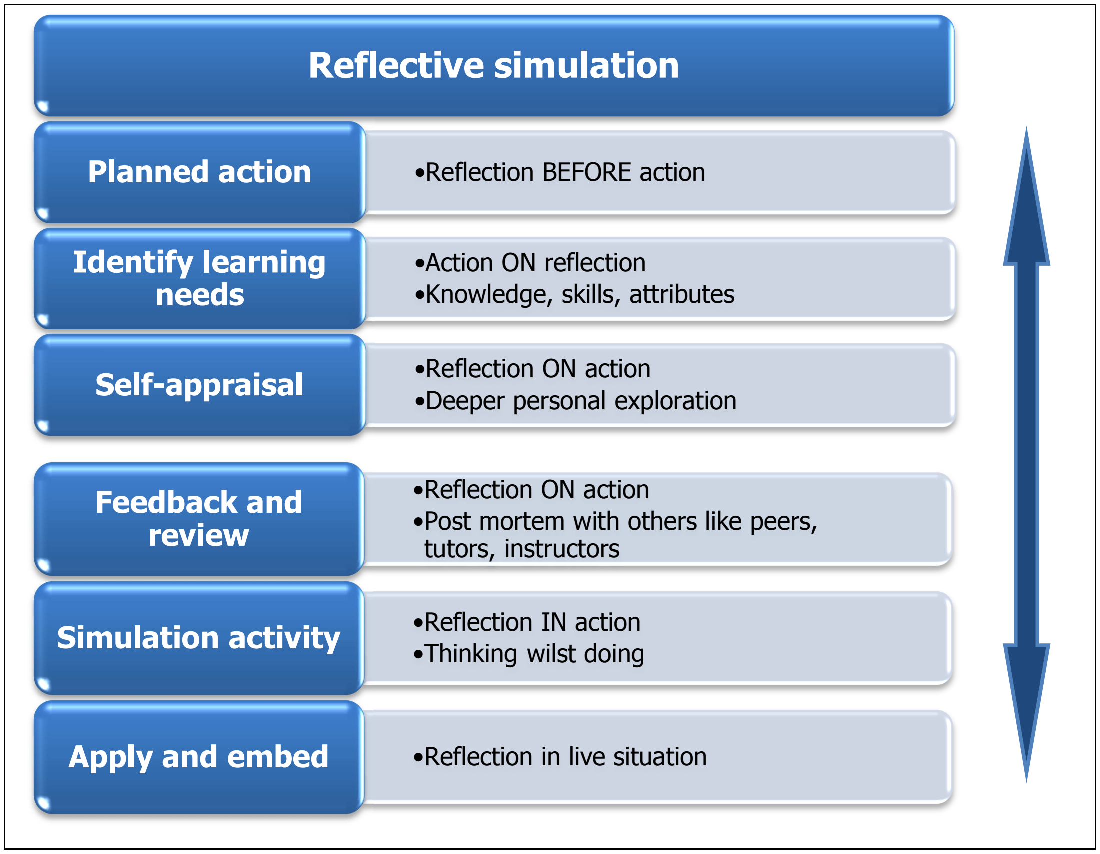


FIGURE 4.3 REFLECTIVE SIMULATION FRAMEWORK (ADAPTED: ALINIER 2008b:748)
[Compiled by the Researcher, Labuschagne 2011]

The debriefing process usually takes twice as long as the scenario. This was mentioned by a technical staff member. This emphasises the importance of debriefing as a training tool to help students to learn from the process.

<u>Debriefing and assessment</u>

Debriefing can be used as an assessment tool and was mentioned by three interviewees.

Data analysis and description: Three of the clinical users mentioned debriefing as a form of assessment. Two interviewees mentioned that students with problems can be interviewed and one mentioned that simulation can be described as "...*simplest form of assessment is debriefing"* [C1].

Discussion: Two of the clinical users mentioned the fact that students with problems can easily be identified and interviews can be conducted to help solve problems. This can be used to identify and solve emotional problems of students, but clinical in-competencies (performance gaps) can also be identified with simulation and addressed during an interview (DASH 2011:1-2). Debriefing can be used as description of the lecturers' assessment of the performance gap and the identification of the shortcomings resulting in addressing the problems of the students. Debriefing can help improve poor performance or reinforce good performance by discussion and critique actions of the students (DASH 2011:2).

<u>Training of the trainers in the art of debriefing</u>

Train the trainer courses were mentioned by one of the interviewees.

Data analysis and description: One of the directors mentioned the importance of courses for instructors on debriefing. He mentioned: "*Courses to instructors to do debriefing*" [D3]. This is echoed in the literature (cf. Paragraph 2.2.2).

Discussion: The fact that reflection should be an important aspect of simulation is emphasised repeatedly in the literature and was also at the IMSH 2011. For this reason it is recommended that the simulation team members meet after a simulation session and discuss (debrief) the session. This is essential to help the facilitators develop their debriefing skills and expertise. This should, however, be treated with caution and confidentiality (Alinier 2008b:748). For the simulation team, group reflection (debriefing) can be used to consider the participants' feedback, improve the running of the session, modify scenarios and develop new props. The training of the trainers to do debriefing is a vital part of the success of simulation-based medical education and training (DASH 2011:2-3).

4.3.5 Factors to take into account in the planning of a simulation centre

The fifth semi-structured interview question dealt with the important factors to take into account when planning a simulation centre. The question asked to all the participants was: "What are the important factors to take into account when planning a simulation centre?" All the participants answered the question and the answers were divided into themes and categories. The themes that emerged were:

- Theme 1: Teaching programmes
- Theme 2: Physical spaces
- Theme 3: Technology
- Theme 4: Equipment and supplies.

Each theme, with its categories are summarised in Table 4.5 and will be discussed separately. Direct quotes of the interviewees are given in the text to enhance the trustworthiness of the study.

TABLE 4.5 FACTORS TO TAKE INTO ACCOUNT WHEN PLANNING A SIMULATION CENTRE

THEMES	CATEGORIES
1. Teaching programmes	**Objectives** • Learning objectives and what you want the students to do [C3, C6, D2, D3] • "...you design your teaching programmes around what you want them to be able to do and then you test it" [C2, D3,] • What you want the students to do is where simulation comes in [C3, D2, D3] • Sustainable model [D3] • Start small and grow with the needs [D3]
	Target groups • Finding new, unique ways to do things differently [D3] • Identify target group and determine their needs [D2] • We don't have drop-in sessions for medical students. Can be a waste of time and money [C6] • Problem: Different classes discuss cases, not ideal for learning [C2]

TABLE 4.5 FACTORS TO TAKE INTO ACCOUNT WHEN PLANNING A SIMULATION CENTRE (CONT.)

2. Physical spaces	**Adaptable spaces** • Adaptability of spaces so that one room can be used for multiple purposes [C1, C4, T1, T2] • Growth in student numbers, space to expand [C4, C6, T1] • Structural planning important to plan ahead for 5-10 years [C6] • A lot of our clinicians like us to do simulation in normal clinical areas [C6]
	Flow of People • Space is very important; rooms, hallways and corridors; flow of persons in centre [C1, C4] • Flow and resting places for SPs [C1, T1] • Simulation centre in the middle between the hospital and the Med School [T1]
	Facilities • Space where students can go and practise unsupervised [C4] • Group training spaces, one-on-one training spaces, multiple room training [D3, T1] • Room for skills training [T1] • Rooms for small groups [T1] • Classroom or meeting room [T1] • Good air-conditioning for IT equipment and computers [T3] • You need four bank gasses: medical air; oxygen; CO_2; Nitreous oxide [T2, T3] • Get gasses built into the walls [T1,T3] • Drainage in floors, helps with clean-up [T3] • Counter spaces to work on that aren't in the simulation room to do setups [T1] • Computers and telephones in every room [T1]
	Offices • Office for staff located in the centre [T1] • Offices more centrally located to see when people come in [T1]
3. Technology	**Access** • Swiping cards to sign in and out [C4]
	Audio-visual equipment • Videotaped and reviewed by faculty leader (☐ lecturer or staff member) [C4] • See monitors on tapes for playback purposes [C4] • Audio-visual component very important [C1] • Audio-visual equipment - look at what you actually need [C6] • Portable cameras save money and can be used in different locations [C6]

TABLE 4.5 FACTORS TO TAKE INTO ACCOUNT WHEN PLANNING A SIMULATION CENTRE (CONT.)

3. Technology (cont.)	**Computers and IT** • Laptop problems: Security, Google information, internet security on every laptop, different brands, crash of systems [C2] • Technology and engineering designed that it can be upgraded with change and development in technology [C1, T2] • Flexibility in technology for multiple use [T2] • Computer lab where every student has his own computer [C2] • Change with changes in technology [C3] • Keep up with new devices around education [D3] • Wireless more versatile [T2, T3, C6] • Wireless addresses, Bluetooth, outside signals; systems can be blocked speak to IT people [T2], versatility [T2, T3] • Keep backups of computer programmes [T3] • Computers and telephones in every room [T1]
4. Equipment and supplies	**Equipment** • Stretchers, beds, IV poles [T1] • Hospital spends millions of dollars on equipment, so the company can donate at least one piece of equipment for training purposes [T1] • Everything is on wheels or portable and light enough to move around [T1] • Use same monitors, syringes etc as in hospital "make it as realistic as possible" [C4]
	Supplies • Use same syringes etc. as in hospital "make it as realistic as possible" [C4] • Supplies that you would use in real situation [C4] • Salvage from expired, supplies [T1] • Counter space, zincs, cabinet space, to keep supplies and setup of scenarios. [T1] • Storage is a big thing [T1, T3] • Curtains to cover storage spaces [T1] • A lot of the consumables are donations[T1] • A lot of what we get has expired [T1] • Some companies will donate consumables [T1] • Centre is open 24 hours per day and equipment and consumables are reserved for students wanting to use it [T1] • Recommend not more than two sticks (needles) per student [T1]

4.3.5.1 *Theme 1: Teaching programmes*

When the participants were asked to discuss their opinions and views on the factors to take into account when planning a simulation centre, they all answered the question. The first theme that emerged was the teaching programmes and the planning regarding these programmes and simulation. The categories that emerged were objectives and target groups. They will be discussed.

Objectives

In the responses, five interviewees mentioned the importance of determining the objectives and what one wants the students to do in the planning and where simulation fits in.

Data analysis and description: The most prominent aspect (mentioned by four interviewees) dealt with the alignment of the learning objectives and what the students must be able to do [C3, C6, D2, D3]. Three interviewees added that simulation comes in at the point where one want the students to be able to do things. Two interviewees said the following: *"You design your teaching programmes around what you want them to be able to do and then you test it"* [C2, D3,]. The feedback part should form an integral part of the programme. One of the directors mentioned that one should start small and grow with the needs and also that one should develop a sustainable model.

Discussion: The importance of the learning objectives and what one wants the students to be able to do when planning to implement simulation as part of the curriculum, was mentioned by four interviewees. They mentioned that it is important to set one's objectives and design one's programme around the objectives and that one has to see where simulation fits in. It was also mentioned previously that the programme should not be designed around the simulation. Three of the participants mentioned that simulation fits into the part where one wants the students "to do" something. This indicates that the practical training of students and the importance of simulation as part and addition of this practical clinical education and training should be integrated in one's objectives from the beginning of one's simulation centre. Two of the participants mentioned that one should design the teaching programmes around what students are required do and then test it (formative and summative assessment). This is important to see if the objectives are reached and to determine the success of your simulation programme.

One of the directors mentioned that the programme should be sustainable and he also advised that one should start small and allow the simulation centre to grow with the needs. This indicated the importance of running an effective and efficient simulation centre that it is user-friendly for education staff, and students. If the teaching staff sees the benefits and effectiveness of simulation, it may encourage them to make use of simulation in their training programmes more and more. The benefits to students are numerous and if they start using the simulation centre for practising skills and group scenarios, the centre will be utilised progressively. To be able to supply in the demands and expectations of students and lecturers, the centre should be sustainable regarding simulators, supplies of consumables and availability of support staff. If one starts small it is easier to supply in these demands. This will also ensure a firm base to start from and this will make it easier to grow and expand. These aspects were mentioned in the literature and were described in Chapter 2 (cf. 2.5.1.1 and 2.5.2.2).

Target groups

The second category that emerged was the target groups and the aspects will be discussed.

Data analysis and description: Four of the participants mentioned the importance to identifying the target groups and determining the needs in the planning of a simulation centre. The aspects mentioned were to find unique ways to do things differently, determine needs of target groups, sessions with medical students and that discussions between classes pose problems. These factors will be discussed below.

Discussion: In terms of the teaching programme the importance of identifying the target groups is vital in the planning of a simulation centre. The various groups have different and unique needs which should be identified and accommodated if possible. One of the directors mentioned the fact that one should find new, unique ways to do things differently. In doing so, one can fulfil the needs of the different target groups.

The first major target group is the *lecturers* who are using simulation for education and training. The needs for the different users will differ, e.g. the needs for surgeons, paediatricians and physicians will be completely different. To run a successful simulation centre, the needs should be addressed accordingly and the need for innovative and "out of the box" thinking will be essential. To get the lecturers on board and to listen to their inputs and suggestions is going to be essential in the planning of the centre. The lecturers should be allowed to feel part of the process and take ownership of the centre and the implementation process. These facts are echoed in the literature and is summarised in the words of Brost, Thiemann, Belda and Dunn, (2008a:186), "Our job as a simulation staff is to enhance the educational environment and opportunities available to the educators, who have as their primary customer, the learner."

The other target group is the *students*. The needs of the students will be to practise skills in their own time and formal training sessions with scenarios and involved lecturers. The one participant mentioned that they do not have unscheduled student sessions at their centre. This makes sense, because if students drop in at any time there will not be any control and supervision to make these sessions worthwhile for learning. The participant mentioned that this can be a waste of time and money. The centre should have a scheduling system so that students practising will come at certain times and not interfere with formal training sessions and scenarios.

One of the participants mentioned that students from different classes discuss cases, which is not conducive to learning. There should be a system in place to prevent classes from discussing cases and being able to share information about cases. This can be a challenge when starting a simulation centre, but innovative thinking and systems can help counteract these problems.

4.3.5.2 *Theme 2: Physical spaces*

The second theme that emerged regarding the planning process was the physical spaces. The categories that emerged were: adaptable spaces, flow of persons in the centre, the facilities and the offices. The aspects will be discussed under each category.

<u>Adaptable spaces</u>

The adaptability of spaces was the next category that emerged.

Data analysis and description: A major factor regarding the physical spaces was the adaptability of spaces so that one room can be used for multiple purposes and was mentioned by four of the interviewees [C1, C4, T1, T2]. With the growth in student numbers, there should be space to expand and this was raised by two clinical users and a technical staff member. One of the interviewees mentioned that as far as the structural planning, is concerned, it is important to plan ahead for 5-10 years. The same interviewee said that several of the clinicians prefer to do simulation in normal clinical areas which can save physical spaces if such scenarios are done in the hospital.

Discussion: The point that the spaces in the simulation centre should be adaptable is crucial and was mentioned by four of the participants. The spaces should be designed so that they can be used and easily changed for different scenarios. During the visits to international simulation centres, the researcher observed interesting ways to make spaces interchangeable. Some of the examples were to use decor to allow the scenario to be as realistic as possible, e.g. an accident scene or an operating theatre. These canvases are easy to set up and disassemble and can be stored easily. All the spaces should be adaptable for different scenarios. One of the participants mentioned that one can do simulation in a clinical area, e.g. in a ward or in the intensive care unit. This makes simulation even more adaptable for clinical users and helps with realistic scenarios in the hospital. These facts are confirmed in the literature and it is mentioned that institutions are required to provide a simulation environment that is adaptable to a variety of disciplines and learner levels, e.g. allied health, nursing, medical students, residents, fellows and staff physicians (Brost *et al*. 2008a: 186). Spaces can look totally different by simply changing key furniture, from inpatient spaces to outpatient rooms.

Three of the participants mentioned the importance to plan for expansion in student numbers. It was also mentioned that with regard to structural planning, it is important to plan ahead for 5-10 years. As mentioned earlier, in the beginning simulation can start slow, but when people realise the benefits of it, more and more people are going to use simulation as part of the training programmes of the different modules. With the initiative of the Minister of Health, Dr A Motsoaledi, to train more medical students to supply in the demand for more doctors in South Africa, it is important to plan ahead for more students and for bigger classes (Hudson 2011:21).

Flow of persons

In the physical planning of a simulation centre the flow of persons is an important factor to take into account and should be kept in mind when planning a centre.

Data analysis and description: Three of the participants mentioned the flow of persons and SPs in the centre and the location of the centre was also mentioned. Two of the interviewees said the following: *"Space is very important; rooms, hallways and corridors... flow of persons in centre..."* [C1, C4]. Two of the interviewees also mentioned the resting places of SPs and the flow of these persons. One mentioned the location of the simulation centre. These aspects will be discussed.

Discussion: Three of the participants in the semi-structured interviews mentioned the importance of flow of persons and equipment. The corridors and hallways should be planned to accommodate people and equipment and even hospital beds. The need to move a patient or a simulator from one room to another should be considered in the planning. Understanding and controlling people flow within the simulation centre is vitally important to the success of the students and the sanity of the staff members (Brost *et al*. 2008a: 189). When visiting the centre at Pennsylvania State University, the researcher observed the importance of flow and the layout of the rooms so that students and staff can move from one area to another without disturbance to fellow users, and when doing an OSCE assessment, students can move from room to room, without contact with fellow students or actors and SPs. Hallways and room entrances should be large enough to accommodate the maximum number of learners per session. Movement of large equipment can be accommodated through the use of double doors or sliding doors.

One of the participants mentioned that the centre and hospital should be connected for easy access. When doing scenarios in the hospital itself, it helps to have easy access with simulators and equipment. The centre should be easily accessible for lecturers and students.

Facilities

Facility planning is another important category; different aspects were mentioned by the interviewees.

Data analysis and description: The following spaces and recommendations were suggested by the interviewees:

- Unsupervised practising spaces [C4]
- Group training spaces [D3, T1]
- One-on-one training spaces [D3, T1]
- Multiple room training [D3, T1]
- Room for skills training [T1]
- Rooms for small groups [T1]
- Classroom or meeting room [T1]
- Good air-conditioning for IT equipment and computers [T3]
- Four bank gasses: medical air; oxygen; CO_2; Nitrous oxide [T2, T3] and get gasses built into the walls [T1,T3]
- Drainage in floors, helps with clean-up [T3]
- Counter spaces to work on that are not in the simulation room to do setups [T1]
- Computers and telephones in every room [T1].

Discussion: To plan the spaces in the centre well, was mentioned by five of the participants. The spaces that were mentioned the following four: spaces for students to practise unsupervised, group training spaces, one-on-one training spaces and a multiple training room.

The importance of a classroom or meeting room was stressed, because there is a need for areas to do briefing and debriefing and group discussions. The classroom can also be used for SPs training and reflection after an assessment opportunity. It can be useful to have a one-way glass window between the classroom and the simulation room so that the rest of the class can observe the simulation session. Another option is to make use of closed circuit television to broadcast the session. These sessions can be useful teaching and learning sessions and the whole group can benefit from it. The need for a classroom in the simulation centre is of major importance in the normal day-to-day running of such a centre.

The spaces for one-on–one training are especially useful for postgraduate training of special skills, e.g. laparoscopic surgery or bronchoscopy. These spaces can be used for self-directed learning and unsupervised sessions.

The multiple-training room can be an area where part-task trainers are used for training, resulting in an area where different skills can be trained on different simulators all in one room. This implies that only one or two instructors are needed and can attend to more students.

The group training spaces can be used for scenario training and group training sessions. These spaces can be used for different scenarios and should be organised so that it can be used for and changed easily to different scenarios. This can be done with the use of paintings on canvas of a theatre or ICU or accident scene. The equipment should be on wheels and portable for easy change of a scene. There should be the minimum fixed features in these rooms.

To have areas where students can train unsupervised is essential, because certain areas with expensive simulators and equipment that can easily be damaged or stolen should be stored securely. The areas for student access and unsupervised training should be available, but separate from certain areas in the simulation centre. The centre at Pennsylvania State University is available to students 24 hours a day for training and practise of skills, but there are also separate areas that are locked when the staff members are not there or available for supervision.

One of the participants mentioned the importance of a good air-conditioning system for the IT equipment and computers. The participant also mentioned that there should be computers and telephones in all the rooms. Because it is not always possible to run around to get equipment or consumables while a scenario is in progress, one has to have access to a telephone. The computers can be used to access X-rays or blood results and can be used for assessment purposes.

Technical staff participants mentioned the importance to have access to gasses. "*You need four bank gasses: medical air; oxygen; CO_2; Nitrous oxide".* It was also mentioned to have the gasses built into the walls, otherwise one has to store the gas cylinders in the centre, occupying too much space and making it more difficult to make areas realistic for certain scenarios. Some of the simulators cannot function without gasses (cf. Chapter 2 Point 2.5.1.5).

One of the technical staff participants mentioned that there should be areas with counters to do setups of task trainers and manikins. It was mentioned that these areas should be separate from the training rooms. The training rooms should have drainage areas in the floor for easy clean up after scenarios where fluids were used.

All these factors are important when planning a simulation centre.

<u>Offices</u>

Office space was raised by a technical staff member.

Data analysis and description: One of the technical staff members mentioned that office space and the location of the offices should be considered in the planning of a simulation centre.

Discussion: There should be a reception area in the centre so that there can be access control and somebody available to receive visitors and users to the centre and help with flow of people in the centre. The receptionist should be situated right in front of the simulation centre near the entrance. Simulator centre staff should have their offices adjacent to the simulation area, so that they can be readily available to help fix problems if something malfunctions during the scenario. Office space for the staff to have easy access to their work environment increases their satisfaction and effectiveness and decreases the daily stress of these key personnel in the centre (Brost *et al*. 2008a:186). One of the participants mentioned that the offices should be near the entrance, so that they can see the entrance when the receptionist is not available and also take turns. Office space for the director in the centre is good, but not essential. If the director is in or near the centre it may contribute to the morale and effectiveness of the staff and his/her availability to educators and students.

4.3.5.3 *Theme 3: Technology*

The third theme that evolved in the responses of the participants regarding the planning of a simulation centre was the technology involved in a simulation centre. The categories that emerged were access, audio-visual equipment and computers and IT. Each of the categories will be discussed separately.

<u>Access</u>

Access to the simulation centre is a factor that should be implemented into the planning of a simulation centre.

Data analysis and description: One of the clinical users mentioned the fact that there should be access control in the centre and that "...*swiping cards can be used to sign in and out"* [C4].

Discussion: This is an important factor to take into account, especially if students are going to use the centre for unsupervised sessions. With the expensive equipment, simulators, consumables, IT and audio-visual equipment, access control is essential. This is a factor that should be incorporated into the planning of a simulation centre.

<u>Audio-visual equipment</u>

The audio-visual component in the planning of a centre is of cardinal and extreme importance.

Data analysis and description: The audio-visual component was mentioned by three of the participants in the semi-structured interviews. The following aspects emerged: review later by faculty leader (= lecturer or staff member), playback for debriefing, importance of audio-visual equipment, evaluation of the equipment one really needs and portable cameras more cost effective. The audio-visual component was mentioned by three clinical users of different simulation centres.

Discussion: The application of the audio-visual aspects in the training and education of students is to videotape the scenarios and for use in debriefing sessions or for reviews by the faculty leaders of the scenarios. The review of what actually happened is the foundation of experiential learning and not the recollections of what the student or the lecturer thought or perceived and here the audio-visual component plays a vital role (Brost *et al.* 2008a:195). The ethical aspects involve the consent of all the participants involved in the scenario to use the videos in debriefing sessions and sometimes even for training sessions. In some simulation centres, the videos are destroyed after the debriefing session so that it cannot be used against the involved persons. This is to create a safe and friendly simulation environment.

One of the participants mentioned an aspect that is easy and very useful for playback. It was mentioned that the monitors should be visible on the video so that it can be used for playback purposes. During the visit at Pennsylvania State University, the researcher observed that they use analogue clocks in the simulation rooms and it is recorded onto the video. This makes it easier to search for an exact incident during the scenario when playing the videos back.

One of the clinical users mentioned that one should decide what one actually needs and to plan ahead for one's needs. It was mentioned that the relevant companies should demonstrate their systems so that those can then be evaluated in terms of compliance with the requirements. If you buy what you actually need and what requirements there are for your needs, one can save money on these systems. During the visits it was also mentioned that the audio part is important, because one should be able to hear the responses of all the members of the team and the sound should be clear. This can be achieved in different ways, namely wall-, ceiling- or manikin-mounted microphones and speakers or individual headset microphones.

One of the clinical users also mentioned that, *"Portable cameras save money and can be used in different locations".* This is a factor that can be considered, especially if there is going to be much simulation away from the simulation centre (off-site simulation). During the observations and discussions with staff members of the simulation centres, most participants mentioned that it is essential to have a fixed system in the centre. It is of great help to have a system that can be used at any time and does not need to be set up before use. It is an essential part of the equipment that is needed for the use of simulation as teaching tool. Visual collection of the simulations can include wall-, ceiling-, or manikin-mounted cameras.

In the planning of a simulation centre, the audio-visual component is vitally important. Even if one cannot afford the placement of cameras and microphones in every room, one should consider installing data and power cables and brackets during the construction phase, because it is easier and cheaper to add audio and video equipment to rooms already prewired.

Computers and IT

The next category that emerged was computers and IT.

Data analysis and description: This was mentioned by eight of the participants as an important part of the planning of a simulation centre. The aspects that emerged were: laptop security, upgrading, flexibility of technology, computer lab, wireless equipment, backups and computers and telephones in all rooms. It was mentioned by four clinical users, one director and three technical staff members.

Discussion: The fact that the computer system should be versatile and the simulation centre should keep up with the changes in technology was mentioned by five of the participants. The technology, especially the simulator technology, should be upgraded on a continuous basis and the computer systems should be upgraded with changes in technology. One of the technical users mentioned that there should be flexibility in the technology and that it should be used for multiple purposes. In the planning it should be investigated whether the systems are upgradable and the possibility for leasing contracts should also be investigated, so that the companies can keep the systems up to date and in line with the most recent developments. Two of the participants mentioned the following: *"Technology and engineering...designed that it can be upgraded with change and development in technology"* [C1, T2]. One of the technical staff members mentioned that there should be computers and telephones in every room, to improve the functioning of the simulation centre.

When using flat-screen simulation, every student should have access to computers. This problem can be overcome by the developments in the School of Medicine, UFS, namely to supply every medical student with a laptop. This will allow students to do flat-screen simulation on their own laptops. One of the participants mentioned the problem with security of laptops, especially when using it for assessment. The participant said the following: *"Laptop problems: security,...Google information, internet security on every laptop, ...different brands,... crash of systems"* [C2]. This can really cause problems and should be taken into account when planning the simulation centre. Another option is to have a computer laboratory with fixed computers and security systems in place.

One of the directors mentioned the fact that one should keep up with devices used in education. Computers and computer programming is an essential part of simulation and with the rapid changes in technology, it can be a challenge to keep up to date with the technology, and financially it can place a burden on the budget of a simulation centre.

Three of the participants mentioned that wireless manikins are more versatile and they can be moved around in the hospital. With fixed manikins, this is not possible and one is bound to the simulation centre for all simulations. Wireless makes the simulators more versatile. One of the participants warned that there can be problems with the wireless systems, because some of the addresses can be blocked or there can be interference with the signals. It was mentioned that it can be sorted out easily by the IT department.

One of the technical staff interviewees mentioned that there should be backups made of all computer programmes. This is indispensible and it should never be neglected.

4.3.5.4 *Theme 4: Equipment and supplies*

The last theme that emerged in the answers of the participants regarding the planning of a simulation centre was equipment and supplies.

<u>Equipment</u>

When planning a simulation centre, two participants referred to equipment. They mentioned the stretchers, beds, monitors and portability of the equipment.

Discussion: The use of the same beds, stretchers and monitors as in the hospital is an important factor to take into consideration and must be part of the planning. Students should be able to practise and familiarise themselves with conditions in the simulation centre that are the same as in the real hospital. In South Africa, this is an key factor to keep in mind when planning a simulation centre. Students should not be trained in a high-tech facility and then be placed in below-basic facilities in real hospitals. In the planning of a simulation centre one should be realistic and try to incorporate high-tech to very basic conditions in the scenarios and in the training programme. Students should have the opportunity to be exposed to all situations to prepare them for the not-so-ideal, real world. One of the participants summarised it as follows: "*Use the same monitors, syringes etc. as in hospital - make it as realistic as possible*" [C4]. Brost *et al*. (2008a:198) mentioned that by having the simulation spaces looking familiar, looking like the hospital or clinic, with the equipment and supplies that one would find in your hospital, one creates a non-threatening environment, reducing the anxiety of students (and educators).

The financial impact of the equipment in a simulation centre can be a burden on the budget. The one participant proposed the following, "*Hospital spends millions of dollars on equipment, so the company can donate at least one piece of equipment for training purposes*"[T1]. This can help to keep the simulation centre and the hospital on par and can relieve the financial impact on the simulation centre. To convince the companies, however, can still be a challenge.

Another factor to keep in mind in the planning of a simulation centre and acquiring of equipment is that the equipment, beds, drip stands etc. must be on wheels, so that it can be moved easily when scenarios are changed or stored.

<u>Supplies</u>

The management and acquisition of supplies is an important aspect to take into account when planning a simulation centre.

Data analysis and description: When the supplies were mentioned, the following aspects emerged: supplies that you would use in real situation; salvage from expired supplies, or donations from companies; counter space, zincs, cabinet space, to keep supplies and setup of scenarios and storage. These aspects were mentioned by three interviewees, one clinical user and two technical staff members.

Discussion: What was mentioned in the previous discussion, it was mentioned here as well - to use the same equipment as in the hospital. One should use the same supplies as in the real situation. One of the participants mentioned that they use supplies that have expired to save on the costs. Some of the companies can donate supplies to the simulation centre to expose students to their products.

The next issue that was mentioned was storage space, because some of the supplies take up too much space and this factor should be taken into account when the centre is planned. The centre at Pennsylvania State University uses areas in the simulation rooms that are being screened off with curtains. One of the participants mentioned that counter space is important to have space to set up the equipment for scenarios. The participant said the following: *"Counter space, zincs, cabinet space, to keep supplies and setup of scenarios" [T1].* This factor should be taken into account when planning a centre.

The next issue that was mentioned by one of the participants was the fact that students use the centre for practising and training. Acquiring the consumables and supplies for this can be expensive plus students can waste the consumables. The participant recommended that there should not be more than two needles available per student. Consumables are reserved for students that need to use it. Supplies and consumables are expensive and there should be systems and measures in place to control the use of the consumables. This aspect should form part of the planning from the start.

4.3.6 Recommendations regarding simulators

Semi-structured interview question number six dealt with the recommendations to take into account when acquiring simulators. The following question was asked to all participants: "What recommendations can you make to take into account when acquiring simulators?" All the participants answered the question. Answers were divided into themes and categories, as summarised in Table 4.6. The themes that emerged were:

- Theme 1: Curriculum and simulators
- Theme2: Manufacturers of simulators
- Theme 3: Simulators.

Each theme, with the categories, is summarised in Table 4.5 and will be discussed separately. Direct quotes of the interviewees are given in the text to enhance the trustworthiness of the study.

TABLE 4.6 RECOMMENDATIONS REGARDING SIMULATORS

THEMES	CATEGORIES
1. Curriculum and simulators	**Needs and uses** • Broad view of the kinds of things you need [C2, T1] • Hi-fi vs. simulate the core of the message [C1] • What part of the curriculum do you want to cover? Purchase simulators around the curriculum and not changing the curriculum around the simulators [D3, D2] • Do not purchase something you are not going to use [D3, T3] • Avoid the glitzy and glamorous [C5] • Planning scenarios ahead, the easier it gets [T1] • Know your objectives, get the cheapest solution to get what you want [C5, D1] • Triangle: a lot of low fidelity, few medium fidelity and if you can afford high fidelity [D2]
2. Manufacturers of simulators	**Communication** • Find out what the simulator can do and how it can be modified [C3, D1] • Communication with producers [C3] • Producers are receptive to small changes [C3] • It's programming [C3] • Certain specific things that I want in my teaching, can you make changes?[C3]
	Service • Borrow simulator from company and use it, before you buy it [C6] • Investigate features of simulator, e.g. intubation, cannulation, chest x-ray [C6] • Cost of replacement of wearing parts [C6] • After sales and support [T3, C6]

TABLE 4.6 RECOMMENDATIONS REGARDING SIMULATORS (CONT.)

3. Simulators	**Part-task trainers** • Great variety, a lot of part-task trainers, some homemade simulators do the job and bring the message as clearly as some commercial simulators [C2, C4, C5, D1, D2, D3] • Task trainers are great for doing the tasks [C4, C5] • For the lower level of students, we use task trainers [C4, C5] • Start with simple task trainers [D1, D2] • Medium fidelity is more robust [D2] • We found that a lot of programmes require very low fidelity [T2]
	High-fidelity simulators • You need a 'wow factor' to tell people to come and see what the simulator can do [C1] • A METI simulator to simulate high–fidelity [C1, C4] • METI simulators are very cumbersome and then they are not going to be used [C4] • Laerdal manikins are programmable and can function with remote control without cables [C1] • Laerdal manikins are simple to use [C4] • Transportable/wireless [C1, T2, T3] • Big budget if you need full-body manikins [C2, T1, D1] • Computer technology is going to make it easier[C1] • The more sophisticated, the more difficult they are to run [T1] • Team training is the most complex; scenarios start simple and work it up to team training [D1] • "I don't think you gain much with high-fidelity especially with undergraduate training" [D2]
	Flat-screen simulation • Virtual scenarios to make it cheaper [C1] • Flat-screen simulation makes it more affordable – 150 cases for 1/5 the price of whole-body simulator [C2, C5] • For $1000 per case you can buy flat-screen cases that are already developed [C2] • Flat-screen simulation can be developed from scratch, it will cost you a couple of thousand Rand [C5]

4.3.6.1 *Theme 1: Curriculum and simulators*

The theme that emerged was the needs and uses of simulators in the curriculum.

Needs and uses

The needs and uses of simulators in the curriculum was raised by seven of the twelve interviewees.

Data analysis and description: The aspects around simulators and the curriculum was raised by seven of the interviewees. All the directors/managers mentioned simulators in the curriculum and one summarised this aspect as follows: *"Triangle: a lot of low-fidelity, few medium-fidelity and if you can afford high-fidelity"* [D2]. Two of the participant warned against purchasing simulators that are not going to be used. A very important point made by two of the directors was the following: *"What part of the curriculum do you want to cover? Purchase simulators around the curriculum and not changing the curriculum around the simulators"* [D3, D2]. The needs and uses of simulators in the curriculum emerged as a category and included the following aspects: assessing needs, planning and purchasing simulators around the curriculum, more low-fidelity simulators than high fidelity simulators.

Discussion: A key point was made by two directors, namely that the module leaders and lecturers should determine what part of the curriculum should be covered by simulation and that the simulators should be bought around the curriculum and not the other way round. The lecturers should have a broad view of the kinds of simulators they need. It helps to plan ahead and decide on the core message you want to bring to the students with simulation. Two of the participants said one needs to know what one's objectives are and then get the cheapest solution for that. One participant warned that one should avoid the glitzy and glamorous and two other participants mentioned that it is important not to purchase something that is never going to be used. Planning ahead is important and this actually makes the decisions easier on what simulators or part-task trainers are needed. One of the directors referred to a ratio between simulators acquired: several low-fidelity simulators, a few medium-fidelity simulators and if affordable, some high-fidelity simulators in the simulation centre.

Brost *et al.* (2008b:204) advised that there should be careful evaluation and review of simulators and manufacturers and a review by an informed and interested Simulation Equipment Committee to minimise the financial burden and maximise utilisation of equipment.

4.3.6.2 *Theme 2: Manufacturers of simulators*

The second theme that surfaced was the manufacturers of simulators. The categories that emerged were communication and service. Each category will be discussed individually.

<u>Communication</u>

Communication regarding the improvement and changes that can be made to simulators and the functioning of the simulators are important to use simulators fully and to improve them.

Data analysis and description: Two of the participants in the semi-structured interviews mentioned communication with the manufacturers of simulators as an important aspect of acquiring simulators. One of the clinical users said the following, *"Certain specific things that I want in my teaching, can you make changes*?" [C3]. The aspects of getting information on the functioning and pre and post-purchasing modifications on simulators were raised by two of the interviewees.

Discussion: Communication with the manufacturers of simulators is important to improve the simulators. Producers are willing and receptive to make small changes. By giving feedback to manufacturers, the users of the simulators have the opportunity to contribute to the upgrading and improvement of simulators. The educators have to work in collaboration with simulation engineers throughout the design process to ensure the development of successful simulators with valid and reliable assessment instruments. (Scerbo *et al*. 2011:S22). The one clinical user mentioned that it has to do with programming of the simulators and this can easily change and improve the simulators, and if needs are communicated to the manufacturers both parties can benefit. Upgrading of simulators is an important aspect to take into account when acquiring simulators. If users are not fully acquainted with the simulators, it cannot be used to capacity and, therefore, communication between manufacturer and end user should be part of the agreement. Manufacturers are often receptive to input from the users of their products.

Service

Services rendered by the companies and manufacturers were the next categories that emerged.

Data analysis and description: Two of the interviewees mentioned the importance of after-sales support. One of the clinical users raised the issue of the cost of replacement parts. The same interviewee suggested that a simulator can be borrowed from the company and can be "test-driven" before buying it. The different features of the simulator was another factor that should form part of the service deal with the manufacturer. Two interviewees had opinions on the service companies can render to a simulation centre.

Discussion: One of the clinical users advised that the centre can borrow a simulator from the company before buying it. This helps to make informed decisions before buying simulators. The participant mentioned that it is important to investigate the features of simulators and its training scope. This investigation will prevent one from buying an expensive simulator with features that can be trained on a part-task trainer that may be much cheaper. The cost of the replacement of wearing parts is another important feature that should be investigated before-hand. A cheaper simulator may have very expensive wearing parts that must be replaced on a regular basis, making the running costs much higher.

Two of the participants mentioned the importance of after-sales support. Most manufacturers of simulators are based in the United States of America, Asia or Europe. The support is crucial especially in South Africa and Africa. The kind of support that the companies render is of vital importance. Technical staff has to do with the delivery and installation (logistics) and then after-sales support. Before acquiring simulators, service contracts should be signed

4.3.6.3 ***Theme 3: Simulators***

The next theme that emerged was the simulators as such. The participants mentioned the different kinds of simulators during the semi-structured interviews and the categories that emerged were: part-task trainers, high-fidelity simulators and flat-screen simulation. The different categories and aspects will be discussed next.

<u>Part-task trainers</u>

Part-task trainers was mentioned repeatedly by the interviewees.

Data analysis and description: Seven of the twelve participants mentioned the use of part-task trainers. Six of the interviewees were of the opinion that there should be a great variety and several part-task trainers. The same people said that some homemade simulators do the job and bring the message as clearly as some commercial simulators [C2, C4, C5, D1, D2, D3]. Two of the interviewees said that part-task trainers are good for teaching tasks and skills. The same interviewees said that task-trainers are good for training junior students. The fact that medium-fidelity simulators are more robust was voiced by one of the directors.

Discussion: Low-tech simulators are models or manikins used to practise simple physical manoeuvres or procedures. Complex task trainers feature high-fidelity visual, audio, touch cues and actual tools that are integrated with computers, virtual reality devices and simulators that replicate a clinical setting, e.g. ultrasound, bronchoscopy and cardiology (Ziv *et al*. 2003:784).

Six of the participants mentioned that there is a variety of simulators in the market and that there should be more part-task trainers in the simulation centre than high-fidelity simulators. They mentioned that even homemade simulators can be as effective or suitable for the task as the commercial simulators. At the IMSH 2011 congress in New Orleans, workshops were presented where attendees were trained to make part-task trainers from different materials at a relatively low cost, which would be as effective to train tasks as expensive simulators. Two of the clinical users mentioned that part-task trainers are suitable for training certain tasks. They also mentioned that they use task trainers in their centres for the junior students. It was mentioned that most programmes require only low-fidelity trainers. The task trainers and the medium-fidelity simulators are more robust and attain the objectives just as effectively as high-fidelity simulators. Two of the directors mentioned that one should start with simple task trainers. These statements can be summarised in the words of one of the directors [D2], "*to have a lot of low-fidelity, few medium-fidelity and, if you can afford, high-fidelity*."

<u>High-fidelity simulators</u>

In the literature, high psychological fidelity is described as follows: "Where simulation requires the user to perform or cognitively progress through a real-world task" (Salas & Wilson 2005:363). An example of high-fidelity simulation is a manikin-based or robotic trainer that responds to intravenous medication, talks, has a pulse and produces the appropriate physiological reactions on actions of students (Pugh 2008:657).

Data analysis and description: Two directors; two clinical users and three of the technical staff members mentioned certain aspects regarding the high-fidelity simulators and the aspects regarding the different brands of high-fidelity simulators, wireless simulators and expenses were mentioned.

Discussion: One of the clinical users mentioned that it is important to have a "wow-factor" in the simulation centre. This helps to promote the centre and especially to help with the adoption rate of simulation as a teaching tool by the teachers and the students. High-fidelity simulators are expensive, but provides this "wow-factor". High-fidelity simulators can be used for emergency training and crisis management that cannot be practised on real patients. The main applications for high-fidelity simulators are in the field of anaesthesia, intensive care and emergency medicine. Team training and interdisciplinary training is another important application for high-fidelity simulation. High-fidelity simulators can be used as the "flagship" for the simulation centre to attract attention to the centre. This factor can play an important role in getting sponsors for the centre.

Two of the clinical users specifically mentioned the METI simulators and mentioned that they are cumbersome and, for that reason, often not used optimally. The same two users mentioned the following regarding the Laerdal simulators: "*Laerdal manikins are programmable and can function with remote control without cables"* [C1] and "*Laerdal manikins are simple to use*" [C4].

Three of the participants stated that wireless simulators are transportable and can therefore be utilised easier in the centre and for on-site simulations. Computer technology makes it easier to produce wireless simulators that are portable.

A few negative aspects regarding the high-fidelity simulators were also mentioned. The fact that these simulators are extremely expensive can be a limiting factor. One of the technical users mentioned that the more sophisticated the simulator, the more difficult it is to run. The service and upgrading of these simulators are therefore more expensive and one needs specially trained technical staff to service these simulators. Often there are no support staff in South Africa, and if these technicians need to be flown in from overseas, it will be even more expensive. One of the participants had misgivings on the applications for high-fidelity simulators in undergraduate training. The person said: *"I don't think you gain much with high-fidelity especially with undergraduate training"* [D2].

<u>Flat-screen simulation</u>

Screen-based computer simulators are programmes used to train and assess clinical knowledge and decision-making, e.g. problem-based learning or acute cardiac life support (Ziv *et al.* 2003:784).

Data analysis and description: Three of the participants mentioned flat screen simulation. All of them mentioned the financial advantage of flat screen simulation.

Discussion: Flat-screen simulation can be utilised to help students develop reasoning skills and to work on their own in their own time. The financial advantage was mentioned by three of the participants, whether the simulations are being bought or developed from scratch, it is much cheaper than a manikin. One of the participants mentioned virtual scenarios as a cheaper addition to the simulation centre.

4.3.7 Financial considerations for a simulation centre

Semi-structured interview question number seven dealt with the advice regarding the financial considerations for a simulation centre. The question in the semi-structured interview guide was: "What is your advice on the financial considerations for a simulation centre?" All the participants answered the question and the answers were divided into themes and categories. The themes that emerged were:

- Theme 1: Financial income
- Theme 2: Expenditure.

Each theme, with the categories, is summarised in Table 4.7 and each theme will be discussed in turn. Direct quotes of the interviewees are given in the text to enhance the trustworthiness of the study.

TABLE 4.7 FINANCIAL CONSIDERATIONS FOR A SIMULATION CENTRE

THEMES	CATEGORIES
1. Financial income	**Sources of income** • Paintings in simulation lab – gallery pays to hang the artwork there [C1] • MOCA-people from outside have to pay to do their recertification [C1] • In future simulation can be used to obtain CPD points and you can ask money to use the facility [C1] • Research in the simulation centre can earn money [C1, D3] • "I asked the Dean" [C3] • Messiah College got grants to get some major remodelling done [C4] • To stay competitive in recruiting students you have to have a sim centre [C4] • Government grants [D3] • University has some internal grants [T1] • Internally find pockets of money e.g. from certain Departments to share in the expenses [T1] • The department buys the manikin and we keep it in the centre, maintain it and have it ready for use by students [T1] • The College of Medicine and the Hospital should contribute financially – for the use by students (numbers and lots of hours) and the hospital for safety and medico-legal aspects [D1] • The hospital contributes 2/3 [D1] • Fairly complex financial structure; funds from university, from postgrad deanery, hospital itself [D2]

TABLE 4.7 FINANCIAL CONSIDERATIONS FOR A SIMULATION CENTRE (CONT.)

1. Financial income (cont.)	**Financial challenges** • Director of simulation lab involved with money [C1, T1] • Simulation centre runs at loss, because it is an in-house training and the sort of budget is small [D2] • Evaluation tool from the beginning and keep your statistics, because in terms of funding it is a useful tool to motivate for funding [C6] • It is like a library, nobody tells the library they should fund themselves with photocopies [D1]
2. Expenditure	**Savings** • Flat-screen simulation cheaper and you achieve a lot of goals with that [C2] • "I don't know if full-body manikins, certainly in anaesthesia, teach you enough to warrant the exuberantly high price that manikins have got" [C5] • Flat-screen simulation can be developed from scratch, it will cost you a couple of thousand Rand [C5] • Look at curricula, plan around the curriculum, spend more money on lower-fidelity and task trainers and a smaller percentage on high-fidelity simulators [T2] • You can probably get ten of the cheaper simulators for one of those expensive ones [T2] • Consider the fidelity you actually need [C6] • Don't fall into the fidelity trap, because you may save some money [C6] • You shouldn't fall in the trap of sort of spending lots of money on things that you are never going to use [C6]
	Hidden costs • Fixed things like simulators are costly, AV system, hidden costs are consumables [D2] • Cost for replacement of wearing parts [C6]

4.3.7.1 *Theme 1: Financial income*

The first theme that emerged was the sources of financial income of a simulation centre. Eight of the participants in the semi-structured interviews had an opinion on the financial income for the simulation centre. The categories that emerged were sources of income and financial challenges. The categories will be discussed separately.

Sources of income

The financial aspects of a simulation centre and specifically the sources of income are major issues to take into account when planning and running a simulation centre.

Data analysis and description: Seven of the participants mentioned sources of income for a simulation centre. The aspects that emerged during the semi-structured interviews can be grouped into grants from the university and the government, departmental contributions, hospital contributions, research grants and other outside funding.

Discussion: The grants from the university were mentioned by five of the participants. The university has to contribute to the role the simulation centre plays in the training of students. The number of the students and the hours spent on training should be taken into account when the financial contributions of the University and Department of Higher Education are estimated. Both the centre visited in the United States of America, and the centre in the United Kingdom, both receive grants from the universities. One of the participants mentioned that to stay competitive in recruiting students one has to have a simulation centre. This is an aspect to take into account when applying for grants from the university and the government. Simulation can play an important role in the recruitment of undergraduate medical students at the University of the Free State. Because of the larger numbers for intake required by the Government, better quality students can be approved to apply at the University of the Free State, resulting in a better through-put rate and training better trained and better prepared doctors for the workforce.

Another way to obtain some financial contributions is from the departments within the School of Medicine. A department can buy a simulator or contribute for the consumables and then it can be used in the simulation centre for the training of students of that specific department. The simulation centre keeps, looks after and maintains the simulator for the department and the students can use it in the simulation centre. This has mutual advantages for the department and for the simulation centre.

One of the directors mentioned the following: *"The College of Medicine and the Hospital should contribute financially – for the use by students (numbers and lots of hours) and the hospital for safety and medico-legal aspects"* [D1]. The hospital contributes financially to the simulation centre because simulation helps improving the patient safety and limits the medico-legal expenditure of the hospital. One of the participants mentioned that the hospital's financial contribution is about two thirds. Both centres visited receive financial contributions from the hospital. The simulation centre can be used by the hospital for training and improvement of the clinical skills of the hospital staff, patient safety, general teamwork and interdisciplinary teamwork. These advantages for the hospital can convince the management to contribute financially. The centre can render training facilities for private hospitals' staff training and certification and this can contribute to the financial income of a simulation centre.

Two of the participants mentioned research as a way to generate money for the simulation centre. Some aspects of research that can be investigated are in the fields of medical education and simulation, patient safety, assessment and simulators, and this can develop into an important financial contribution to the simulation centre.

Other ways to generate financial contributions to the simulation centre were mentioned by one of the participants. The person mentioned the following:

- *"Paintings in simulation lab – gallery pays to hang the artwork there"* [C1]
- *"MOCA-people from outside have to pay to do their recertification"* [C1]
- *"In future simulation can be used to obtain CPD points and you can ask money to use the facility"* [C1].

There are different ways to earn extra income for a simulation centre and it should also be promoted for refresher courses, CPD activities, staff training of private and public hospitals and courses like ATLS and ACLS. Collaboration between different role players, e.g. government, university, private hospitals and private hospital groups, pharmaceutical companies and medical equipment companies, can play a vital role in the financial support of a simulation centre. A business plan is essential to sustain such a centre (Denning *et al.* 2008:337-8). Networking, negotiation and collaboration can be useful means to help raise funds for a simulation centre (Alinier 2008a:491).

<u>Financial challenges</u>

There are certain financial challenges mentioned by some of the participants.

Data analysis and description: Three of the interviewees expressed opinions about the financial challenges of a simulation centre. They were two directors and one clinical user. The one director said, *"Simulation centre runs at loss, because it is an in-house training and the sort of budget is small"* [D2] and the other director said*: "It is like a library, nobody tells the library they should fund themselves with photocopies"* [D1].

Discussion: The fact that simulation centres struggle to survive financially was mentioned by two of the directors. The directors of two simulation centres confirmed that it is difficult to make a simulation centre profitable and therefore there should be additional ways of funding of a simulation centre. One of the clinical users advised that there should be an evaluation tool from the beginning and statistics should be kept, this can help to motivate calls for funding.

4.3.7.2 *Theme 2: Expenditure*

The second theme was the expenditure of the simulation centre. The categories that emerged were savings and hidden costs.

<u>Savings</u>

The ways to save on expenditure were raised by three clinical users and one technical staff member.

Data analysis and description: The participants mentioned the following ways to save money: flat-screen simulation and lower fidelity simulators. Two of the interviewees mentioned the savings with flat-screen simulation and three interviewees mentioned that a substantial amount of money can be saved by using more low- and medium-fidelity simulators and that more or the same can be achieved as with one very expensive high-fidelity simulator.

Discussion: Flat-screen simulation can save money and at the same time several teaching goals can be achieved. Flat-screen simulation can be developed from scratch, which can save money. It was pointed out that a several teaching goals for less money can be achieved with flat-screen simulation.

One of the technical users said the following: *"Look at curriculums, plan around the curriculum, spend more money on lower-fidelity and task trainers and a smaller percentage on high-fidelity simulators"* [T2]. He added that one can get ten of the cheaper simulators for one of the expensive simulators. One of the clinical users confirmed that one should consider the fidelity and warned that one should not fall into the fidelity trap to spend money on simulators that are not going to be used. Planning ahead, decide on the teaching points and outcomes to be achieved and then decide what is really needed. In this way, a substantial sum of money can be saved by buying useful equipment and not spending money on simulators that are not going to be utilised fully. One of the clinical users said the following: *"I don't know if full-body manikins, certainly in anaesthesia, teach you enough to warrant the exuberantly high price that manikins have got"* [C5].

<u>Hidden costs</u>

An aspect of simulation is the hidden costs like wearing parts, consumables, day-to-day running costs and repair and maintenance of IT, audio-visual equipment and simulators.

Data analysis and description: This aspect of hidden costs was mentioned by a director and a clinical user.

Discussion: One of the directors mentioned that the fixtures like the audio-visual systems, monitors, electronic equipment, computers and the simulators are expensive, but the hidden costs are the consumables. The consumables form an essential part of simulation, because one will need needles, tubes, intravenous fluids etc. to run realistic and effective scenarios. As mentioned previously by some of the participants (cf. 4.3.2.2), the same consumables that are used in the hospitals should be used in the simulation centre. This means that high quality, expensive consumables should be used in the scenarios and that can be costly. The fact that expired consumables or donations from manufacturers and pharmaceutical companies, can be used, can save money.

The next aspect mentioned was the cost of replacing the wearing parts. These are important questions to consider when buying simulators, namely, are parts available (in South Africa) and what is the cost of the replacement parts?

4.3.8 The staff requirements for a simulation centre

Semi-structured interview question number eight dealt with the staff requirements for a simulation centre. The question asked during the semi-structured interview was the following: "Can you describe the staff requirements for a simulation centre?" All the participants answered the question and the answers were divided into themes and categories. The themes that emerged were:

Theme 1: General
Theme 2: Head of centre
Theme 3: Facility manager
Theme 4: Coordinator
Theme 5: Technical staff
Theme 6: Facilitator.

Each theme, with its categories, is summarised in Table 4.8 and will be discussed. Direct quotes of the interviewees are given in the text to enhance the trustworthiness of the study.

TABLE 4.8 STAFF REQUIREMENTS FOR A SIMULATION CENTRE

THEMES	CATEGORIES
1. General	**Multidisciplinary** • Group of people who can work together and are enthusiastic about developing the centre and that have to come from multiple disciplines [D2] • Simulation committee: Anaesthesia, Surgery, Acute and Emergency, Paediatrics, representative from Medical school to discuss curriculum activities [D2]
	Core group of people running it • Start small and add people as the centre grows [D3] • Core group of people driving it [D2] • Enthusiasm [D1] • You need a champion, without a champion the centre is not going to survive [D1]
2. Head of Centre	**Requirements** • Somebody ideally with a Ph.D. in Health Education [C4] • Real appreciation for adult learning [C4] • Educational background [D3] • Committed to improving education [D3] • Rest of the centre suffers if not a good educational background [D3] • Physician who needs to be involved and understand the curriculum [T1, T2] • Physician can spend percentage of time here [T1] • Medical director is our overall boss and administrative director and operational manager reports to MD [T2] • Somebody to manage course development [C6]
3. Facility Manager	**Requirements** • The facility manager must be able to think out of the box [C1] • Facility manager not necessary to be a doctor [C1] • Administrative director handles the administrative side, budgets and he is our goodwill ambassador [T2]
4. Coordinator	**Duties** • Coordinate all equipment, consumables [C4] • Scheduling which is huge just keeping organised [C4, T1] • Standardised patients and back-ups for them [C1] • Staff assistant doing the scheduling [T1] • Operational manager to oversee operational aspects [T2, T3, C6]

TABLE 4.8 STAFF REQUIREMENTS FOR A SIMULATION CENTRE (CONT.)

5. Technical staff	**Simulators**	• Three to four technical staff to manage the simulators [C1, T1, T2, C6] • Supervisor for the task trainer [C1] • Back-up staff if something goes wrong [C1, T1, C6] • "It would be nice if I had people in the simulation centre who were more knowledgeable with Harvey, forbid it doesn't need a lot of maintenance, but if something goes down I have to ask them to have a look" [C3] • The most important person in your simulation is your simulation technical specialist [C6]
	Computers	• One technical person to check computers that are going to be used for flat-screen simulation [C2] • IT person; use the recourses you have [T1]
6. Facilitator	**Instruction**	• It would be very helpful if you have someone in your centre that could instruct [T1] • Resuscitation training officers (Registered Nurses); one for Paediatrics, one for medical students and one for junior doctors [T3] • Somebody senior in the field [T3] • Teaching fellows for medical students [T3] • Consultant for mid-grade doctors [T3] • For flat screen simulation you need a teacher, that's all [C5] • Instructor needed in room when students do the simulation [C2, T1] • Instructors to show students how to use part-task trainers [C2] • Instructor to do testing and observe the students [C3]
	Fears	• People are afraid to act as facilitators, you are only facilitating, not running the simulation [D1] • "The most off-putting thing to your faculty, say for example, if you are asking consultants to come and debrief candidates, the most off-putting thing to them is the thought that they may have to run it, because technically it's quite complicated. So if you can guarantee that you've got one or two people that can always run the simulator in a technical point of view" [C6]

4.3.8.1 *Theme 1: General*

The first theme that emerged dealt with general issues. The categories were: multidisciplinary and a core group of people running it. They were mentioned by the three directors/managers who participated in the semi-structured interviews.

Multidisciplinary

The fact that the simulation centre should have a multidisciplinary approach was mentioned by one of the directors of one of the simulation centres visited in 2010.

Data analysis and description: The fact that there should be a multidisciplinary approach in the simulation centre was raised by one of the directors. The interviewee said the following, "...*group of people who can work together and are enthusiastic about developing the centre and that have to come from multiple disciplines"* [D2], and he added the following remark regarding the simulation committee: "*Simulation committee: Anaesthesia, Surgery, Acute and Emergency, Paediatrics, representative from Medical School to discuss curriculum activities"* [D2].

Discussion: People from different disciplines that are enthusiastic about simulation, should come together and plan together. It was suggested that a simulation committee or group from various disciplines should come together and plan together. One of the members should be from the Medical Programme to help coordinate the curriculum activities. In the literature it is also recommended that there should be a Simulation Equipment Committee to maximise the purchase of equipment, simulators and consumables with the best value for money and less likelihood that equipment would not be fully utilised (Brost *et al*. 2008b:204). This echoes the observations that there should be a multidisciplinary approach at all levels in the simulation centre and the members using it should take ownership of the activities in the centre to make a success of the simulation centre.

<u>Core group of people running it</u>

This category links with the previous category, because there should be a core group running the centre and to coordinate the facilitators from the different disciplines.

Data analysis and description: That there should be a core group of people running the simulation centre was mentioned by all the directors/managers that participated in the semi-structured interviews. Four aspects were mentioned.

Discussion: The first important factor that was mentioned was the enthusiasm of the people involved in the simulation centre. One of the directors said, "*You need a champion, without a champion the centre is not going to survive".* Enthusiasm is contagious and it can help change the attitudes of colleagues and students to accept simulation as an essential addition to the undergraduate medical programme. Another participant added that one should start small with a core group and add people as the centre grows. It was also mentioned by another participant that there should be a core group of people driving the simulation centre.

4.3.8.2 *Theme 2: Head of the centre*

The second theme dealt with the head of the centre.

Data analysis and description: Five of the participants expressed opinions regarding the requirements for the head of the simulation centre. The category that emerged was requirements.

<u>Requirements</u>

The participants named a few requirements for the head of the centre. The first aspect dealt with educational background and was mentioned by four different interviewees. The other sub-category that emerged was that the head of the centre should be a physician and this was raised by two of the interviewees. Some of the phrases used by the interviewees were: "...*Ph.D. in health education"* [C4]; "...*appreciation for adult learning"* [C4]; "...*educational background"* [D3]; "...*improving education"* [D3]; "...*understand the curriculum"* [T1, T2]; "...*manage* *course development"* [C6]; and "*Physician" and "...medical director is our overall boss and admin director and operational manager reports to MD"* [T2].

Discussion: The participants mentioned that the Head should have an educational background. This person should have a real appreciation for adult learning and be committed to improve education. One of the participants was of the opinion that the rest of the centre suffers if the head does not have a good educational background. The head of the centre should manage course development. Another clinical user was of the opinion that the head should have a Ph.D. in health education. Two of the technical staff members said that the person should be a physician who needs to be involved in and understands the curriculum. The head or medical director should be the overall head and the administrative director and operational manager should report to the Head of the centre. It was also mentioned that the head of the centre can be a physician spending a percentage of the time doing clinical work.

4.3.8.3 *Theme 3: Facility Manager*

The next theme that evolved was about the requirements for the facility manager. The category that emerged was the requirements for the facility manager.

<u>Requirements</u>

The interviewees who mentioned the facility manager during the semi-structured interview was one clinical user and one technical staff member. They had specific ideas and mentioned certain requirements that are needed for the facility manager.

Discussion: One of the clinical users was of the opinion that the facility manager should be able to think out of the box that and the person does not have to be a medical doctor. The manager should be responsible for the administrative aspects of the simulation centre, be involved in the financial aspects and be the goodwill ambassador of the centre.

4.3.8.4 *Theme 4: Coordinator*

The next theme dealt with the duties of the coordinator.

Duties

Some of the duties of the coordinator were raised during the semi-structured interviews.

Data analysis and description: Six of the participants in the semi-structured interviews expressed opinions about the duties of the coordinator. The aspects were raised by three technical staff members and by three of the six clinical users. They mentioned the following: *"Coordinate all equipment, consumables"* [C4]; scheduling [C4, T1]; standardised patients [C1] and oversee operational aspects [T2, T3, C6].

Discussion: The coordinator is the person responsible for the operational aspects. It was mentioned that this person must coordinate all equipment and consumables. The scheduling of activities in the simulation centre is a very important aspect and helps to keep the activities organised. The scheduling can be part of the secretary or receptionist's duties, but the coordinator must be actively involved in the scheduling, especially in managing the equipment and consumables, for instance, to ensure that there are no conflicting activities booked.

Another important and essential duty of the coordinator is to schedule, train and arrange backups for standardised patients. Standardised patients form an essential component of a simulation centre and can even render the need for the appointment of a full-time staff member that can be involved in the recruitment, education and feedback of standardised patients.

4.3.8.5 *Theme 5: Technical staff*

The next theme that emerged dealt with technical staff. The categories that emerged dealt with the simulators and computers (IT). The categories that emerged, will be discussed.

<u>Simulators</u>

The first category that emerged dealt with care of the simulators.

Data analysis and description: Five of the participants mentioned the technical staff members concerned with the simulators. Three clinical users and two technical users raised the point that there should be technical staff specifically looking after the simulators and one of the clinical users even said the following, *"The most important person in your simulation is your simulation technical specialist"* [C6]. Three of the interviewees mentioned specifically that backup staff is essential when running a scenario.

Discussion: One of the clinical users reasoned that the most important person during the simulation is the simulation technical specialist. One of the interviewees mentioned that there should be a supervisor present for the task trainers. Three to four technical staff members are needed to help with the management of the simulators. It is essential to have backup staff if something goes wrong and this was emphasised by three different interviewees. During the visits to the simulation centres, the importance of the technical support staff was observed and they are the essential, irreplaceable members of the whole simulation team. High-fidelity simulation cannot happen without these staff members.

<u>Computers</u>

The other category that emerged was the IT support staff.

Data analysis and description: Two of the participants mentioned this aspect of the staff in the simulation centre. The one participant in the interview said that it would be useful to have an IT specialist to help with the flat-screen simulation and to assist when something goes wrong during the simulation.

Discussion: Flat-screen simulation, are software solutions developed by IT specialists with specific instructional design skills. IT specialists will not be able to deal with the software problems, but they can assist with systems integration. It was mentioned that one can use the resources that are available; for instance, consult the IT staff of the University or the Hospital.

The simulators use sophisticated computerised technology. When buying simulators the IT staff should also be involved when training is provided by the suppliers. It is useful to have staff members in the simulation centre who understand and are able to assist with IT systems problems experienced with the simulators.

4.3.8.6 *Theme 6: Facilitator*

The last theme that emerged dealt with the facilitator. Facilitators are usually part of the teaching staff and are not permanently affiliated to the simulation centre, but lecturers from different departments and disciplines that are involved on an *ad hoc* basis for teaching of undergraduate classes in their specific field of expertise. The categories that emerged dealt with *instruction* and *fears*. The categories will be discussed one by one.

<u>Instruction</u>

Five of the participants in the semi-structured interviews expressed opinions regarding the facilitators and instruction. That there should be a facilitator in the centre during a simulation session was mentioned by two of the interviewees. The interviewees mentioned nine different aspects regarding the facilitator. The one technical staff interviewee said, "*It would be very helpful if you have someone in your centre that could instruct"* [T1]. The skills should be introduced, learning facilitated, wrong behaviour corrected, observed, assessed, debriefed and wrapped up.

Discussion: A participant said that there should be somebody senior in the specific field when doing simulation. The instructor should be the students' senior, e.g. consultants for registrars and registrars or consultants for the undergraduate students. This was confirmed by two other participants who said that there should be an instructor in the room when students do simulation. There should be an instructor available to show students how to use the part-task trainers. The instructors should also be involved in the assessment and observation of students.

For flat-screen simulation only one instructor is needed. This implies that flat-screen simulation is more economic regarding staff requirements.

Fears

The next category that emerged dealt with the fears of teachers to act as facilitators.

Data analysis and description: The aspect of fear was mentioned by two participants. One of the directors said, "*People are afraid to act as facilitators; you are only facilitating not running the simulation"* [D1]. The fear factor was mentioned at the simulation centre in the USA as well as at the centre in the UK.

Discussion: The one director said that people are afraid to act as facilitators, but they can be assured that they are only facilitating and not running the technical setup of the scenario. One of the clinical users said that the aspect that put the facilitators off helping with simulation sessions is the fear that they have to run the simulation scenario and therefore one should try to guarantee that there are technical staff available to support the running of the scenario. The facilitator only has to facilitate the session and help with the debriefing afterwards. When teachers see that they do not have to run the scenarios, they will be willing to help and it will help to curb the fear of the facilitators. Another factor to help curb the fears is to expose the facilitators to "train the trainer" sessions. If facilitators are more acquainted with simulation and the process of running a scenario, they will relax and they will be willing to help with facilitation of simulation sessions. Communication and training can play an important role to get the teachers to help with facilitation of simulation sessions (cf. Chapter 2 Point2.5.2.2).

4.3.9 The planning and implementation of a simulation centre

Semi-structured interview question number nine dealt with advice regarding the lessons the participants learnt regarding the planning and implementation of a simulation centre. The question asked in the semi-structured interview guide was, "What lessons did you learn regarding the planning and implementation of a simulation centre?" All the participants answered the question and the answers were divided into themes and categories. The themes that emerged were:

Theme 1: Planning

Theme 2: Implementation.

Each theme, with the categories, is summarised in Table 4.9 and each theme will be discussed. Direct quotes of the interviewees are given in the text to enhance the trustworthiness of the study.

TABLE 4.9 PLANNING AND IMPLEMENTATION OF A SIMULATION CENTRE

THEMES	**CATEGORIES**
1. Planning	**Centre** • Audio-visual component very important [C1] • Get people who are involved in the testing, involved in the planning of the centre [C3] • Quiet areas for students to write up the findings [C3] • Find unique niche to make you different from other centres [D3] • New devices to improve education [D3] • Always ask to see it first before buying something [T2] • Everything is portable and interchangeable and flexible with our equipment [T1] • People don't want to travel and if it's in the hospital or close by, it's much more usable [T1] • "...getting obsessed with technology is a mistake" [T3]
	Involved persons • Ask the lecturer: "What must the students be able to do differently when they are finished here?"[D1] • Be selective about getting people (faculty) involved, investing in people you're actually going to get a return on [T3] • Start small and add people, equipment, simulators as you grow [D3] • People who want to drive simulation need to be involved in the planning of the rooms [D2] • You need the core start, it's important for the implementation[D2] • You need to have ideas how you are going to integrate it into your curriculum from the word go [D2] • It has to be directed and start small with things you are teaching [D2] • It takes hard work to get it to work [D2] • Very clear plan whoever is involved in the development of the centre [C6] • Need to brainstorm [C6] • You need a committee of people [C6]

TABLE 4.9 PLANNING AND IMPLEMENTATION OF A SIMULATION CENTRE (CONT.)

2. Implementation	**Day–to-day running of centre** • Good scheduling system [C2] • Good record system to record how groups are doing [C2] • Records used for feedback [C2] • Planning important otherwise the simulation centre will be over occupied [C2]
	Scenario planning • System must be fully tested before exam [C2] • Packing lists helpful when deploying in another place [T2] • Everybody weighs 70kg or 100kg, keep as simple as possible [D1] • Lecturers must come a week in advance and tell the technical staff what they want [D1] • Preparation, communication with technical staff, there are certain requirements, otherwise it can look very disorganised [D1] • The fidelity trap, people get obsessed with everything being as realistic as possible - you really only need a really well planned scenario, as long as the monitor looks right and everybody beliefs/ is playing their part – that's the important thing [T3] • Rehearse scenarios [T3] • Video is immensely useful because people's perception of how they work and reality is different [T3] • Do an introduction before start with session, listen to the chest, feel the pulse, monitoring equipment, familiarise with the room - make them feel more confident [T3] • Different approaches for different groups [T3] • "Pressurise the students to do simulation" "You've got to do simulation and I want to see the results". "They'll do the simulation again and again to get it better in their own time, not your time" [C5]

4.3.9.1 *Theme 1: Planning*

The first theme that emerged on the question regarding the planning and implementation of a simulation centre, dealt with the planning. The categories that emerged were the centre and the involved persons.

<u>Centre</u>

The first category that emerged regarding the planning of a simulation centre dealt with the physical planning of the simulation centre.

Data analysis and description: Six of the participants mentioned aspects dealing with the physical centre. The responses varied from the planning of the buildings, audio-visual, the simulators and equipment and educational devices. Ten aspects were mentioned by the interviewees.

Discussion: The one aspect that was mentioned was that people who are going to use the simulation centre for teaching should get involved in the planning of the centre (Seropian & Lavey 2010:Online). One of the directors/managers mentioned that a niche for the centre should be found, so that it can make the centre unique. One of the participants mentioned that the location of the simulation centre is important, because people do not want to travel and if the centre is in the hospital or close by, it is going to be used more regularly and make access more user-friendly. Another important lesson mentioned by one of the clinical users is to have quiet areas where students can sit and write their findings (cf. Chapter 2 Point 2.5.1.2). One of the interviewees mentioned that it is essential to keep up to date with new technology and educational devices to improve education in the simulation centre (cf. Chapter 2 Point 2.5.4.2).

Some of the comments dealt with the importance of the audio-visual aspects of the simulation centre. An important lesson one of the technical staff members mentioned was to ask to see equipment, simulators or audio-visual systems first, before buying it. This will ensure that it is the correct device for the right purpose. Another lesson mentioned was to make sure that everything is portable, flexible and interchangeable. One of the participants said that it is a mistake to get obsessed with technology.

<u>Involved persons</u>

The next category, when planning a simulation centre, that was identified, dealt with the persons involved in a simulation centre.

Data analysis and description: The interviewees who mentioned the persons involved in the simulation centre were the three directors/managers, one clinical user and one technical staff member. Ten aspects were mentioned and included: lecturers who are involved, core staff members and add people as you grow, integration in curriculum, hard work, committee involved and brainstorming.

Discussion: One of the directors/managers mentioned that a core start is needed to get the implementation up and running. This was confirmed by another director/manager who said that one should start small and add people and equipment and simulators as you grow. The teaching should be directed and the participant added that one should start small with things you are teaching. One of the clinical users added that there should be a committee of people involved in the planning ("brainstorming"). One of the directors/managers said that it is hard work to get a centre up and running. A cardinal statement made by one of the interviewees was, "*Ask the lecturer: 'What must the students be able to do differently when they are finished here?'"* [D1]; and another participant added, "*You need to have ideas how you are going to integrate it into your curriculum from the word go"* [D2].

Two of the participants warned against the wrong selection of people who are not really passionate about simulation. The one participant said that there should be a clear plan when developing a centre. The second participant used the following phrase: "*Be selective about getting people (faculty) involved, investing in people you're actually going to get a return on"* [T3]. The people involved in the simulation centre should form an integral part of the planning of a simulation centre and was mentioned in an article by Seropian and Lavey (2010:Online).

4.3.9.2 ***Theme 2: Implementation***

The second theme that evolved during the semi-structured interviews dealt with the implementation of the simulation centre. The categories that evolved were the day–to-day running of the centre and scenario planning. The categories will be discussed below.

<u>Day–to-day running of the Centre</u>

The day-to-day running of a simulation centre is an aspect that should not be neglected. This aspect was mentioned by only one interviewee.

Data analysis and description: One of the clinical users mentioned the aspects of day–to-day running of the centre and especially a scheduling system and a recordkeeping system.

Discussion: The participant advised that there should be a good scheduling system and that there should be good planning to prevent over occupation of the simulation centre. Scheduling forms part of the implementation and planning ahead is of utmost importance to prevent double bookings, over occupancy of specific simulators and shortages of consumables, amongst other things.

The second aspect mentioned was record keeping and records on what and how the various groups are doing. The records also contain vital information for feedback, research and as previously mentioned, to apply for grants (cf. Chapter 2 Point 2.5.2.2).

<u>Scenario planning</u>

The second category that evolved dealt with the planning of scenarios.

Data analysis and description: The participants who mentioned the scenario planning were one director, two clinical users and two technical staff members. Eleven factors were mentioned and will be discussed below.

Discussion: The planning and preparation of scenarios are important. An interviewee mentioned that there should be communication with the technical staff at least a week in advance to comply with certain requirements to prevent chaos. It was mentioned that scenarios should be rehearsed and the systems should be fully tested before the exams. Another aspect mentioned was packing lists if scenarios are going to be in locations other than the simulation centre. It was also mentioned that there are different approaches for different groups, which implies that there should be room for change and adaptability in scenario planning.

A participant said that there should be an introduction before the start of the session and students should be allowed to familiarise themselves with the room, equipment and simulators. This will give them more confidence and create an environment that is conducive to learning. All patients must have a mass of 70kg or 100kg to standardise cases and make it simple and easier to work out dosages of medications. This makes it easier in planning of scenarios. Audio-visual feedback to students is important, because sometimes students do not recognise or accept their limitations. This adds to the value of feedback. A technical staff participant added the following regarding scenario planning and preparation: "*The fidelity trap, people get obsessed with everything being as realistic as possible - you really only need a really well-planned scenario, as long as the monitor looks right and everybody beliefs/plays their part – that's the important thing*" [T3].

One of the clinical users mentioned the following regarding the simulation and students: "*Pressurise the students to do simulation, you've got to do simulation and I want to see the results. They'll do the simulation again and again to get it better in their own time, not your time*" [C5].

4.4 SUMMATIVE DISCUSSION

The results from the semi-structured interviews supplied answers to the research questions presented in Chapter 1 (cf. 1.3).

The role of clinical simulation as an addition to the current undergraduate medical curricula was addressed with semi-structured interview question number one. The recommendations were that simulation should provide a non-threatening environment where students can improve their clinical skills and competence, receive additional training on diseases and the application of theory in clinical practice. The use of standardised patients is especially useful in the training of communication skills, teamwork skills and interdisciplinary teamwork skills. The improvement of patient safety is another advantage of incorporating simulation in curricula. The non-threatening environment where students can assess and practise acute or unusual situations will improve patient safety and equip students for the real-life conditions when they qualify.

The integration of simulation as an undergraduate training tool by means of integrating simulation in the current undergraduate medical curriculums was addressed with semi-structured interview questions two and four. Simulation should be integrated into the curriculums as a required component and not only as an optional extra. Simulation can be used to teach the following components of the curricula: problem-based learning, decision-making and reasoning skills. The use of realistic scenarios prepares students for emergency situations and equips them to perform in the real situations without hesitation. Simulation objectives must be aligned with the curriculum to make the integration successful. Train the trainer programmes are essential to make a success of the integration of simulation, and the simulation centre in the long run. The process of incorporating and aligning simulation with the curriculum will not be without problems and a few were mentioned, for instance contact hours, funding, and getting lecturers to write simulation into their curricula.

Semi-structured interview question four dealt with simulation as training tool. Simulation can be used as a training tool for team work training, patient safety, psychological competence and reasoning skills training, amongst others. Debriefing is a crucial component of simulation training and the process of debriefing, the use of debriefing in assessment and the training of the trainers were discussed.

Semi-structured interview question three dealt with assessment tools and criteria for assessment of clinical competence of undergraduate medical students in a simulation centre. General aspects like the assessment of higher levels of Bloom's taxonomy, Miller's model of competence and the problems of implementation of assessment modules were discussed. Formative assessment of reasoning skills, debriefing and interpersonal skills testing were discussed. The use of simulation for qualification and recertification purposes were evaluated and considered.

The factors to consider in the development and implementation of a new simulation centre for the School of Medicine, Faculty of Health Sciences, UFS, were evaluated and semi-structured interview questions five to nine dealt with these issues. The planning of a simulation centre dealt with the teaching programmes, the physical spaces, the technology and equipment and supplies required for the establishment of a simulation centre. Semi-structured interview six evaluated all the aspects regarding the simulators and the manufacturers of the simulators. The financial aspects involving the simulation centre were analysed with semi-structured interview question number seven. The staff requirements of a simulation centre were examined with semi-structured interview number eight. The last question dealt with aspects regarding planning and implementation of a simulation centre. The data gathered from the semi-structured interviews were very useful and contributed to the research questions.

4.5 CONCLUSION

Chapter 4 provided an overview of the results of the data analysis, description and a discussion of the findings of the semi-structured interviews.

In the next chapter, Chapter 5, ***Results of focus group interviews: analysis and discussion***, the results of the focus group interviews as data collection method will be reported and discussed.

CHAPTER 5

RESULTS OF FOCUS GROUP INTERVIEWS: ANALYSIS AND DISCUSSION

5.1 INTRODUCTION

The purpose of the chapter is to present the results of the focus group interviews, conducted for this study. Two focus group interviews were conducted, in order to develop a broad understanding rather than a quantitative summary of the attitudes, opinions and feelings of the participants. The emphasis was to determine the ideas and feelings of individuals on certain issues regarding simulation as enhancement of medical education and training at the University of the Free State (Burns & Grove 2001:425; Rabiee 2004:656). As described in Chapter 3 (cf. Point 3.3.3.7) the main aim of the data analysis and interpretation was to look for trends and patterns that reappear within a single focus group and among the two focus groups (Lewis 2000:Online).

Data for this study were collected at two focus group interviews. The focus groups were constituted as follows: heads of departments in one group and session presenters (lecturers) in a second group. The focus fell on the opinions and attitudes of the participants concerning the value that a simulation centre can play in the enhancement of education and training of undergraduate medical students in the different modules and the integration in the curricula for the School of Medicine, UFS. The process of data collection and analysis was described in Chapter 3 (cf. Point 3.3.3.7).

The trustworthiness of content analysis of the focus group interviews were determined by the researcher's ability to categorise, to define the categories and to show the connection with the focus group interview question. The data analysis was controlled by an independent researcher, appointed by the supervisors.

The reliability of the focus group interviews was ensured by the consistent method used during the interviewing procedure, by using the same facility and the same facilitator for the different focus group interviews. Transcriptions of the focus group interviews were typed by the researcher and the transcriptions and audio tapes were checked and controlled by the researcher and an independent person, who is a Lecturer at the Division of Health Sciences Education, Faculty of Health Sciences, UFS. These measures ensured the reliability of the gathered data.

Tong, Sainsbury and Craig (2007:349-357) suggested a 32-item checklist to be used as a tool for reporting focus group interviews and in-depth interviews. The consolidated criteria for reporting qualitative research (COREQ) include three domains, namely: research team and reflexivity, study design and analysis and findings. The COREQ criteria checklist for reporting focus group interviews is summarised in Figure 5.1 and will be used for the reporting of the two focus group interviews of this study.

DOMAIN 1
RESEARCH TEAM AND REFLEXIVITY

- **Personal characteristics**
  - COREQ 1-5
  - interviewer, credentials, occupation, gender, experience and training
- **Relationship with participants**
  - COREQ 6-8
  - relationship, participant knowledge of interviewer, characteristics of interviewer

DOMAIN 2
STUDY DESIGN

- **Theoretical framework**
  - COREQ 9
  - methodology, orientation and theory
- **Participant selection**
  - COREQ 10-13
  - sampling, method of approach, sample size, non-participation
- **Setting**
  - COREQ 14-16
  - setting of data collection, description of sample, presence of non-participation
- **Data collection**
  - COREQ 17-23
  - interview guide, repeat interviews, audio recording, field notes, duration, transcripts returned

DOMAIN 3
ANALYSIS AND FINDINGS

- **Data analysis**
  - COREQ 24-28
  - number of data coders, description of data tree, derivation of themes, participant checking,
- **Reporting**
  - COREQ 29-32
  - quotations presented, data and findings consistent, clarity of major themes, clarity of minor themes

Figure 5.1 COREQ* CRITERIA CHECKLIST FOR REPORTING OF FOCUS GROUP INTERVIEW
(*COREQ = CONSOLIDATED CRITERIA FOR REPORTING QUALITATIVE RESEARCH)
[Compiled by the Researcher, Labuschagne 2011 with data from Tong *et al.*, 2007:352]

5.2 RESEARCH TEAM AND REFLEXIVITY

The personal characteristics of the facilitator and the researcher and their relationship with the participants of the focus group interviews will be discussed in the next section.

5.2.1 Personal characteristics

The focus group interviews were conducted by the same facilitator, an academic staff member of the UFS, registered as a medical specialist with the Health Professions Council of South Africa (HPCSA) and involved in undergraduate and postgraduate training. The facilitator was appointed by the supervisors for this study, because he is an independent and competent person and he possesses the social competency and self knowledge to encourage participants' participation, so that contributions can be made by the participants that have not participated in the discussion before, as suggested by Maynard-Tucker (2000:399) and Rabiee (2004:656). The facilitator is skilful in group discussions, used a pre-determined question and established a tolerant environment, as suggested by Krueger (2002:Online) and Lewis (2000:Online), who also stated that facilitators need to deal with constantly evolving dynamics, have to handle problems by checking behaviour against attitudes, draw responses from participants with opposing views and look for emotional components of the responses. The facilitator in this study is friendly, has a sense of humour, has an interest in people and possesses good listening skills. He had previous experience in facilitating focus group interviews because he acted as a facilitator for focus group interviews in another Ph.D. study and he was also completing his own Ph.D. study where he made use of focus group interviews in his own research.

The researcher is an academic staff member of the UFS, registered as an ophthalmologist, with the Health Professions Council of South Africa (HPCSA) and is involved in undergraduate and the postgraduate training. The researcher is actively involved in the training of undergraduate medical students, optometry students and occupational therapy students and postgraduate training of registrars in ophthalmology. He is therefore well acquainted with the undergraduate programmes of the School of Medicine and School for Allied Health Professions (SAHP). The researcher acted as observer during the focus group interviews and made field notes on verbal and non-verbal aspects of the participants' reactions during the focus group interviews, but did not participate in the discussions or any activities. These aspects contributed to the ability of the researcher to identify with the ideas and feelings of individuals on certain issues regarding simulation as enhancement of medical education and training at the UFS.

A lecturer at the Division of Health Sciences Education, Faculty of Health Sciences, UFS, acted as an observer and made field notes for comparison and controlled the transcriptions to ensure the reliability of the gathered data. Rabiee (2004:656) recommends that one should have a note keeper present to observe non-verbal interactions, indicate the impact of the group dynamics , document exchanges of views to supplement the oral text to enable a fuller analysis of the data. This independent observer is known to all the participants of the two focus group interviews.

The credentials of the facilitator and the observers contributed to the credibility of the findings of the focus group interviews.

5.2.2 Relationship with the participants

The facilitator, researcher and independent observer were familiar with the participants as colleagues. They shared working and teaching environments. All the participants knew that the researcher was going to use the generated data for the completion of a Ph.D. study. This was stated in the consent forms (cf. Appendix B1) and again by the facilitator at the onset of the focus group interviews. This was confirmed by participant number 4 of the Phase III focus group when he mentioned the following: "...*is this going to stick only with the purpose of the Ph.D. that we are discussing now, or will this go out*..." [L16].

The facilitator and the independent observer were not personally involved in the research so they vested interest without bias or any personal gain from the focus group interviews. The researcher acted as observer and did not participate in the focus group interviews, so there could not have been any influence on the discussions or responses by participants. These factors contributed to the transparency, validity and trustworthiness of the focus group interview process.

5.3 STUDY DESIGN

The theoretical framework, selection of participants, focus group setting and data collection will be discussed in the next section.

5.3.1 Theoretical framework

Focus group interviews are semi-structured discussions with groups of people that aim to explore a certain set of issues (Tong *et al.* 2007:351). Focus groups generate qualitative data on the basis of the synergy of group interactions (Rabiee 2004:656). The data is organised in a structured and systematic way and analysis done to reveal themes emerging during the interviews. The use of multiple groups are recommended by Rabiee (2004:656), to the point that a clear pattern emerges and theoretical saturation is reached. Lewis (2000:Online) describes some of the uses of focus group interviews as diagnosing the potential for problems with a new programme, service or product, simulating new ideas and creative concepts and obtaining general background information about a topic of interest. The focus groups usually include six to ten participants.

5.3.2 Participant selection

The selection of the participants of focus group interviews should be selected with care and caution, because members of a focus group should feel comfortable with each other, so that every member will partake in the discussion (Rabiee 2004:656).

For the first focus group, the selection of participants was the various module leaders and lecturers (session presenters) in the clinical phase (Phase III) of the undergraduate medical programme. All module leaders and lecturers involved in the Phase III were invited via e-mail or personally by the researcher. The persons who were invited and did not participate, did so because the time or the date did not suit them. Nine participants participated in the focus group interviews and represented the following clinical departments: Anaesthesia, Family Medicine, Internal Medicine, Otorhinolaryngology, Paediatrics, and Surgery. In the first focus group interview, five of the participants were female and four male. One of the participants was English speaking, so the focus group interview was conducted in English. A specific number was allocated to a certain person and this number was used throughout the report. The paragraphs were numbered and a letter "L" preceded the paragraph number to make it easier to interpret the data and so that the reader can see which remarks and opinions came from which group.

For the second focus group, participants comprised heads of departments of the School of Medicine, UFS. All heads of departments of the School of Medicine were invited via e-mail or personally by the researcher. The persons who were invited and did not participate, did so because the time or the date did not suit them. Seven heads of departments participated and included the following departments: Anaesthesia, Critical Care, Dermatology, Family Medicine, Internal Medicine, Oncology and Ophthalmology. In this focus group interview, two of the participants were female and five male. A specific number was allocated to a certain person and this number was used throughout the report. The paragraphs were numbered and a letter "H" preceded the paragraph number to make it easier to interpret the data and so that the reader can see which remarks and opinions came from which group. This focus group interview was conducted in Afrikaans, because all the participants were Afrikaans speaking. The transcriptions were made by the researcher and controlled by the independent observer by listening to the audio recordings and reading word by word for correctness through the transcriptions where after, the transcriptions were translated into English by an independent translator.

No participants refused to participate or dropped out during either focus group interviews.

5.3.3 Setting

The focus group interviews were both conducted in a seminar room, Room A126, in the Division of Health Sciences Education, Faculty of Health Sciences, UFS. The environment where the focus group interviews took place, was comfortable, had circular seating around a table and the interviews were audio recorded as suggested by Krueger (2002:Online). The setting was familiar, but neutral to all the participants, contributing to a non-threatening environment as suggested by Katzenellenbogen *et al*. (1999:178). Water, snacks, coffee and tea were available during the focus group interviews to ensure the comfort of the participants.

The participants were seated around a table with the facilitator. The researcher and independent observer sat in a corner, taking field notes and were not involved in the discussion at all. The researcher thanked the participants and facilitator at the end of the focus group interview. A specific number was allocated to a certain person and this number was used throughout the interview in view of reporting and ensuring the anonymity of participants. This also contributed to the safe environment, where participants could voice their opinions in a non-threatening setting.

The first focus group interview with module leaders and lecturers (session presenters) in the clinical phase (Phase III) of the undergraduate medical programme took place on 7 April 2011. The first focus group interview was conducted in English as mentioned in (cf. Point 5.3.2), as all the Afrikaans speaking participants have an efficient command of English to enable effective discussion. The facilitator made it clear that participants were welcome to express themselves in Afrikaans to ensure clarity and that these comments would be translated into English. The second focus group interview with the heads of departments took place on the 10 May 2011 and was conducted in Afrikaans. Focus group interviews were audio recorded for reference and for transcription later and the Afrikaans version was translated into English by a recognised translator.

The letter of request to participate in the focus group interviews was used (cf. Appendix B1 and Appendix B2) and informed consent was obtained from each participant by means of consent forms in English (cf. Appendix B3) and Afrikaans (cf. Appendix B4).

5.3.4 Data collection

The data collection method was discussed in Chapter 3 (cf. Point 3.3.3.7). The reliability, validity and trustworthiness were discussed in Chapter 3 (cf. Point 3.4) while the ethical considerations were also discussed in the same chapter (cf. Point 3.5).

The facilitator made use of an interview guide, compiled by the researcher (cf. Appendix B5). This guide was developed to facilitate the discussion, encourage participation and allow for a dynamic flow of the discussion. For that reason one open-ended question was used. The following question was presented to the two focus groups:

- *"What are your personal opinion and attitude concerning the value that a simulation centre can play in the training of undergraduate medical students in the School of Medicine, University of the Free State?"*

- *"Wat is u persoonlike mening en houding ten opsigte van die waarde wat 'n simulasiesentrum kan speel in die opleiding van voorgraadse mediese studente binne die Skool vir Geneeskunde, Universiteit van die Vrystaat?"* [Afrikaans version]

The facilitator welcomed the participants, gave a brief discussion of the topic, setting them at ease and stating the process and ground rules. The confidentiality and anonymity was confirmed again as described in Chapter 3 (cf. Point 5.3.3), regarding the numbers and that no names would be used. At the end of the interview the facilitator reviewed the purpose and asked if anything had been missed and then he expressed his thanks and dismissed the group.

The duration of the focus group interview with the session presenters and module leaders was 96 minutes which was in line with the indication on the interview guide. The duration of the second focus group interview with the heads of departments was 53 minutes. The reason for the shorter duration was that saturation of data was reached after 53 minutes and there were no more new opinions or issues raised. The times specified is in accordance with the time of the audio recordings.

The data were gathered with the help of the audio recordings made during the focus group interviews and contextual field notes regarding the participants' non-verbal responses. Transcriptions of the interviews were made by the researcher after the focus group interview, using Microsoft Word. The facilitator read through the transcriptions and it was controlled by the independent observer, by listening to the recordings and comparing it word for word with the transcriptions. The transcriptions were sent to all the participants to read through and confirm via e-mail that they were satisfied that it was a correct version of the focus group interview. A period of three weeks was provided to review the transcript for accuracy. All the participants answered the researcher via e-mail and stated that they were satisfied with the transcription and that it reflected what was said during the focus group interview. This ensured the trustworthiness of the focus group interviews.

The final transcript of the two focus group interviews, together with the contextual observations of the researcher and independent observer were used as data base for the analysis and interpretation of the focus group interviews (cf. Appendix C1 and C2).

The researcher read through the transcriptions a few times and with different types of underlining and notes; repeating opinions and attitudes were thematically grouped (Polit & Hungler 1999:580). The data were analysed by the researcher according to the grounded theory analytic process.

5.4 DATA ANALYSIS AND FINDINGS

In this section, the data analysis and the reporting of the findings will be discussed. The analysis process is described in Chapter 3 (cf. Point 3.3.3.7).

5.4.1 Data analysis

The researcher was the only person responsible for the coding of the data from the focus group transcript, audio recordings and field notes of the researcher and independent observer.

The data were analysed by the researcher according to the grounded theory analytic process as described in Chapter 3 (cf. Point 3.3.3.7) and included: open coding, axial coding and selective coding (Mertens 2005:424).

Rabiee (2004:657) describes a continuum of analysis: raw data collection, descriptive statements, and interpretation of data. The focus group data analysis process was summarised by the researcher in Figure 5.2.

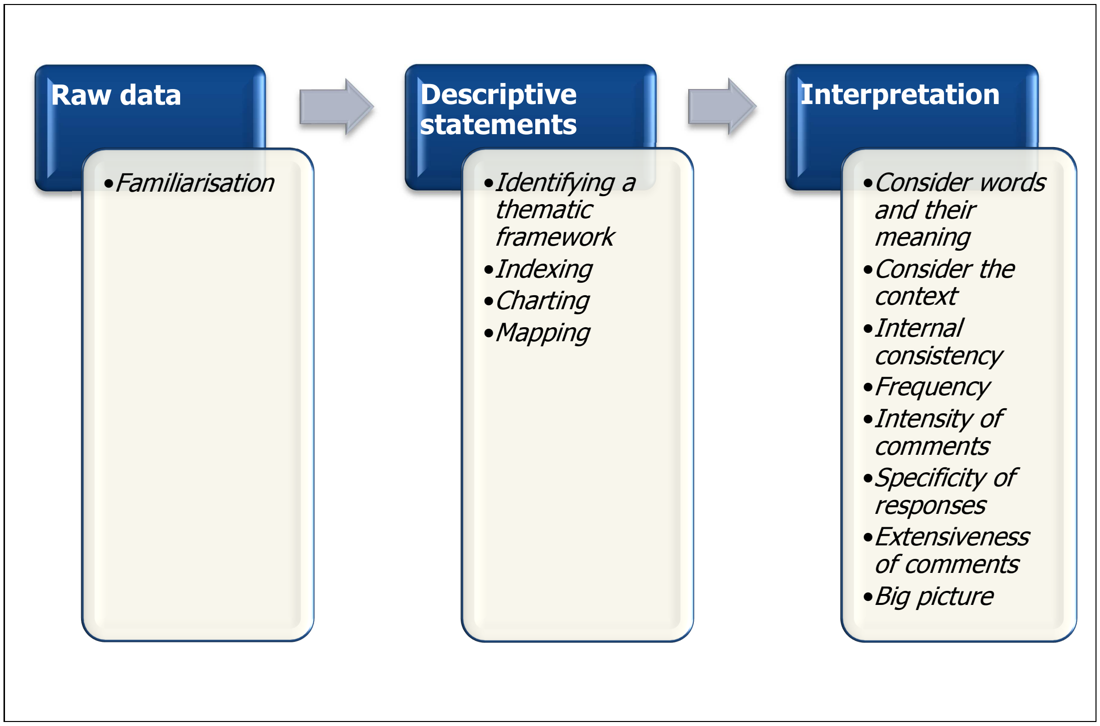


FIGURE 5.2 FOCUS GROUP INTERVIEW DATA ANALYSIS PROCESS
[Compiled by the Researcher, Labuschagne 2011]

Each one of the processes can be explained as follows:

- *Familiarisation* (listening to tapes; reading transcripts; reading observational notes; summary notes - immerse in details and get sense of interview)
- *Identifying a thematic framework* (writing memos in margin; short phrases; ideas; concepts to develop categories; analysis carried out on data under questioning route)
- *Indexing* (sifting data; highlighting and sorting out quotes; making comparisons within and between cases)
- *Charting* (lifting the quotes from original context and rearranging it under new themes) indexing and charting can be considered as management of data (data reduction by comparing and contrasting data and cutting and pasting similar quotes together)
- *Mapping* weighs up individual quotes to see the relationship between quotes and links between data as a whole (Rabiee 2004:657-660).

The researcher listened to the tapes, did the transcriptions himself in Microsoft Word format, read through the transcriptions and observational notes and looked at the details to get a sense of the interviews during the familiarisation process. The Afrikaans transcription was translated into English by a recognised translator. By writing memos in the margins, highlighting phrases and ideas, the researcher identified the thematic framework. By the sifting of data, sorting quotes and making comparisons within and between the interviews the researcher indexed the data. The next step was charting of the data, by lifting the quotes from the original context and rearranging the data under new themes. The individual quotes were linked to the data as a whole during the mapping process. Themes were allowed to develop from the *research question* and *narratives of research participants* resulting in a thematic approach. The interpretation of the data was the next step in the process and will be discussed in the reporting of the data.

5.4.2 Reporting

In analysing and reporting the data, it was important to contextualise the remarks and responses against the background and position in which the person is employed. The interaction between participants was used to highlight the participants' attitudes, priorities and framework of understanding regarding the use of simulation as addition to the education and training of undergraduate medical students at the UFS. Tong *et al*. (2007:356) advises that for the reporting of the data, quotes from all the participants should be included to contribute to the transparency and trustworthiness of the data. The data will be reported in themes and categories, supported by quotes from the participants. The Afrikaans quotes from the HOD focus group, were translated into English. The quotes from the PIII focus groups will be used in the original words as they were transcribed.

One open ended question was asked to initiate the focus group process. The single question encouraged the participants to give their opinions and attitudes, without any guidance from pre-set questions. The question was: *"What are your personal opinion and attitude concerning the value that a simulation centre can play in the training of undergraduate medical students in the School of Medicine, University of the Free State?"*

With this question, the focus fell on four major areas namely:

- personal opinion (of participants)

- personal attitude (of participants)
- value of simulation centre
- training of undergraduate medical students.

The findings will be reported under the focus group areas and will include themes and categories, supported by quotes, given in italics and the numbered paragraph in brackets to give a reference for the quote. Table 5.1 gives a schematic summary of the focus areas, themes and categories.

TABLE 5.1 SUMMARY OF FOCUS AREAS, THEMES AND CATEGORIES OF THE FOCUS GROUP INTERVIEWS CONDUCTED FOR THIS STUDY

FOCUS AREAS	THEMES (BOLD) AND CATEGORIES
1. Personal opinions	• **Essentiality** • **Knowledge and familiarity with simulation** • Unfamiliarity with simulation • Information seminar
2. Personal attitudes	• **Attitude in favour of simulation** • **Negative attitudes** • Exclusion from process • Resistance to change • Financial challenges
3. Value of simulation	• **Safety** • Safe environment • Patient safety • **Ethical aspects** • Ethical advantages • Ethical dilemmas • **Human resources** • **Added assets**
4.Training of under-graduate medical students	• **Curriculum** • **Skills development** • Development of clinical skills • Practise of clinical skills • Application in context • Integration of skills, knowledge and the clinical setting • Development of attitude and behaviour • **Multidisciplinary training** • **Training platform** • **Simulators** • High-fidelity simulators • Part-task trainers • Virtual reality simulators • Flat-screen simulators • Standardised/ simulated patients (SPs) • **Assessment**

5.4.2.1 *Focus group area 1: Personal opinions*

Two major themes regarding the participants' personal opinions were identified and included namely, essentiality and the participants' knowledge and familiarity with simulation.

Theme 1: Essentiality

One of the participants mentioned that the establishment of a simulation centre for the School of Medicine, UFS is essential and it was voiced as follows: *"...it is essential...think it is essential and I am very glad..."* [L1]. The participant was very positive and comfortable and sat back on the chair. This fact was only mentioned once in both focus groups. This remark was accepted by all the participants and there was consensus in the group that the simulation centre is an essential development for the training of medical students.

Theme 2: Knowledge and familiarity of the participants with simulation

The second theme in the focus group area concerning the opinions of the participants was the fact that there was a lack of knowledge and two categories were identified namely, unfamiliarity with simulation and the second category that developed was the suggestion of an information seminar or Summit.

Category: Unfamiliarity with simulation

The participants of Phase III focus group interview indicated that they did not know enough about simulation and made the following remarks:

- *"I am not personally familiar what you are going to teach the medical students at this basic level. So how are the people organising this course, going to explain to us, the specialists, what is going to go on in a simulation labs?"* [L6]
- *"...absolutely agree that you must get some insight and why it is necessary and why they want to do it. How far are they developing the student before we catch them along the line?"* [L7]
- *"...will make a lasting impression along the line and that will reduce the resistance extremely* ..." [L12]

In the HOD focus group interview, there was only one participant who was not fully acquainted with the development of the simulation centre. The participant and the facilitator had the following discussion:

- *"What is the simulation centre going to involve?* [H4] *"So at this stage you are...how can I say...not clued-up about simulation?"* [facilitator] *"What is it going to entail?"* [H5]

Discussion: The fact that the HOD focus group was more knowledgeable about simulation can be explained by the fact that simulation as a training tool and the establishment of a simulation centre for the School of Medicine was discussed and explained at several opportunities, where only the heads of departments were present. The lecturers and session presenters did not have opportunity to get acquainted with the idea of simulation, which can explain their reaction and opinions.

Category: Information seminar

The participants reached consensus about a solution for the problem that they did not have enough knowledge about simulation and the establishment of a simulation centre. They suggested that a information seminar or summit can be arranged to inform all the persons who are involved in the training of medical students. This aspect formed a category. The participants had the following suggestions:

- *"...to initiating a large scale new project or initiative in terms of throwing open the doors inviting anybody who has got an opinion and interest, who wants to be involved, not just in the School of Medicine, but in all other Schools to be involved..."* [L24]
- *"...we should have a large information session first. To see what is there, then ask people for their contribution..."* [L26]
- *"I think that the problem that I can see now that people are so resistant and afraid of simulation, because they don't have a slightest idea of what simulation can give us. Simulation is so wide, and I think that is where we need all the specialities to come in, because that speciality needs to see what they need and then it can grow from there..."* [L26]
- *"So yah, I think we need to present to the rest of the Prof's and educators here, what simulation is about and then we can get them involved to build things or*

maybe give a part of their budget to it and they will be more positive about it" [L26]

- *"I agree, maybe we should have another meeting, another two day meeting or a symposium out on two different days where the departments can come and let be explained exactly what the idea of the unit is.... what the facilities are at stake and what they plan to do and then also ask departments to put insight in. Ideas forward on what they would like to have as part of simulation in their department."* [L31]
- *"I support your idea of a one or two day session, like a Bosberaad* (= information seminar) *on simulation, because I think then a lot of people with no idea what simulation is about, can also come on board."* [L31]
- *"...in England is, we got all the Reps in, we invited every Rep in that simulates anything, because they want to sell their products. We invited them to a symposium, we had them all there to have a massive exhibition of everything that go up and down, the lights going on, the whole Faculty was invited, because they had fears and were uncertain, to have a look at things and AFTER that, make recommendations on what could be useful into the curriculum..."* [L32]
- *"I think that the Bosberaad would help arrange those liaisons."* [L33]

Discussion: The group identified a problem that they did not have enough knowledge about simulation, but with the discussion, they formulated a solution for the problem. The participants suggested that an information seminar with appropriate exposure to the manufacturers and the ways one can use simulation as a training tool should be arranged. During the discussion most of the participants were relaxed and some of the participants used their hands to emphasise certain aspects. The HOD focus group did not mention these aspects, because they were exposed to simulators earlier and did not see the need for an information seminar.

5.4.2.2 *Focus group area 2: Personal attitudes*

The next focus area focused on the personal attitude of the participants. Two themes regarding the participants' personal attitudes were identified, namely attitudes in favour of simulation and negative attitudes.

Theme 1: Attitude in favour of simulation

Both focus group participants had a very positive attitude towards simulation and the establishment of a simulation centre. To support this observation, some of the phrases the participants of Phase III focus group used, will be emphasised.

- *"I feel it is a fantastic development...very much in favour... so yes, I am extremely in favour of..."* [L1]
- *"So I completely support the idea"* [L2]
- *"I am sure once they see the necessity of it, the whole attitude will change"* [L3]
- *"If we get the simulation lab, it would be the very FIRST in South Africa. That will be a MAJOR breakthrough for our Faculty. It really will be to the advantage."* [L42]
- *"Personally I think, and this is my last comment, using a skills lab, using a simulation unit is fantastic."* [L61]

The HOD focus group was also supportive and had a positive attitude towards simulation as a training tool. Some of the phrases used will be presented to illustrate this. The phrases were translated from Afrikaans into English.

- *"... I am very positive towards, if you want my attitude..."* [H6]
- *"...add a lot of value to existing training methods..."* [H9]
- *"...so it was a positive experience...so yes my attitude is positive...and would like to support it and would like to see that it can be expanded..."* [H9]
- *"This is a wonderful opportunity that simulation will created for us."* [H27]
- *"...it is an excellent idea..."* [H69]

Discussion: The overall attitudes of both groups were positive towards the use of simulation as a training tool and the establishment of a simulation centre. One of the participants even mentioned that it will be the first for South Africa and he emphasised that it will be a major breakthrough for the Faculty of Health Sciences while using his right hand to emphasise the fact. In the HOD focus group one of the participants referred to his previous negative attitude against simulation but, this attitude changed after a visit to a simulation centre in Europe where discussions with staff and students made the participant realise the advantages of simulation training. This response highlights the phenomenon that when people are exposed to something they do not know, their whole attitude can change. The lack of knowledge is often the driver for resistance, but can be changed by empowering them with knowledge. The addition of simulation to the curriculums adds value and another dimension to the education and training of students.

Theme 2: Negative attitudes

The focus group discussions elicited some negative attitudes against simulation and this can be linked to the fact that some of the participants did not have previous knowledge of simulation. Three categories emerged as drivers for the negative attitudes; exclusion from the process, resistance to change and financial challenges.

Category: Exclusion from process

In the Phase III focus group discussion there was a few negative attitudes that could be attributed to the fact that some of the participants felt left out of the process and unfamiliarity with simulation. Some of the remarks of the participants will be presented.

- *"...that if somebody is left out of the process, very often you will get resistance you will find that it seems that there is a problem with the attitude..."* [L4]
- *"...people organising the course and the people in the clinical field might have some suggestions, I think they still feel a little bit left out."* [L11]
- *"...anybody who has an opinion to be involved will reduce apprehension of people because they feel they can contribute. Many times when there is a new thing started and actually hear about it and now it is happening and there is millions of Rands being spend and they were not involved in the planning necessarily, that creates resistance and I think that one of the ways to counteract resistance in a new high stakes in terms of money, is to be very conscious about inclusiveness."* [L14]
- *"...non-inclusiveness which unfortunately causes problems..."* [L14]
- *"...the process .....gives us the idea that it is not transparent. I think something of this major importance in the Faculty should be transparent..."* [L14]

Discussion: The issue of inclusiveness in planning of the simulation centre raised much negative reaction and negative attitudes against simulation. These negative attitudes were only encountered in focus group Phase III and this can be linked to focus group area 1 on personal opinions, (cf. Point 5.4.2.1, Theme 2 Category: Knowledge and familiarity). The fact that the people from focus group HOD attended previous information sessions, changed their attitude for the better and the issue was not even raised. The fact that the participants of Phase III focus group got the impression that they were not informed raised various negative attitudes. The solution to this problem can be to arrange information seminars, as was mentioned in focus group Area 1 (cf. Point 5.4.2.1, Theme 2 Category: Information seminar).

Category: Resistance to change

The next category that emerged was resistance to change. Some of the issues that were raised will be presented now.

- *"...once we started to establish the skills lab, there were quite an attitude of our consultants, our lecturers, against the skills lab..."* [L3]
- *"...in terms of attitude, like anything in life if somebody is unfamiliar with a new concept, very often you get resistance."* [L4]
- *"...the older guys, they are always resistant to change and if you don't know what is the issue and why it is you must change, then there will be resistance..."* [L7]
- *"...there is a large number of patients out there, you get the most fantastic heart murmurs out there, but we are not getting to the patients, we have all these heart murmurs, you don't get all these heart murmurs necessarily in the UK or American environment, because they were treated, they are different. So what is going on as regards stopping this dwindling lack of clinical exposure, replacing it with a simulation environment. People are concerned about that and would like some answers."* [L33]

Discussion: Participants raised the issue of resistance of the lecturers against change and the fact that unfamiliarity feeds resistance. One of the participants raised the issue that sometimes older lecturers are resistant to change, because they do not know what is it all about and they are often afraid to try new technology and unfamiliar teaching tools. This can be linked to the fear facilitators experience when they have to facilitate a scenario in the simulation centre. In Chapter 4, this aspect of fear was raised in the semi-structured interviews conducted in the USA as well as in the UK, making it a universal hurdle to overcome (cf. Point 4.3.8.6). Some of the solutions suggested during the semi-structured interviews were to empower the lecturers with knowledge and support and to expose them to train the trainer sessions.

One of the participants raised the issue of the teaching platform and the fact that good clinical cases are not reaching the teaching hospitals. The participant was negative towards replacing good clinical cases with simulation. The aim of simulation, however, is not to replace clinical cases, as it should be an addition to students' skills that cannot be trained on real patients, e.g. emergency medicine or paediatric procedures, where it is unethical to train students on real patients.

Category: Financial challenges

Another category that emerged was the financial aspects of simulation and this raised negative attitudes, especially the costs and the lack of money. The following was mentioned:

- *"I will be, if I knew there was money, but I know the financial situation. In the end of the day somebody is going to say, no we are not going to do that. You can have this one, but you cannot have the better model, because it is too expensive, this is what happens!"* [L37]
- *"Many times when there is a new thing started and actually hear about it and now it is happening and there is millions of Rand being spend and they were not involved in the planning necessarily, that creates resistance..."* [L11]
- *"...and yet we are spending a large amount of money on clinical simulation models. And I feel that is what some people would like to know more about."* [L35]
- *"I actually just want to know, does the Faculty have money for this? Because this is not going to be cheap. If you want to do it properly, it is going to cost a hell of a lot of money. So it is one thing talking about it even seeing lovely models and stuff, but can they actually afford it? Is it actually implementable or what?"* [L37]

Discussion: The participants are confronted with financial constraints on the hospitals and the shortages of equipment and supplies in the working environment, so they are aware of the financial limitations. This contributes to the negative attitudes towards the establishment of a simulation centre and the resistance towards it. The financial aspects must be handled with care and it was mentioned by Denning *et al.* (2008:337) that a business plan is essential to sustain a simulation centre. Another factor to help prevent the problems raised by the participant was to establish a Simulation Equipment Committee to minimise the financial burden and maximise the utilisation of equipment as mentioned by Brost *et al*. (2008b:204).

5.4.2.3 *Focus group area 3: Value of a simulation centre*

The next focus area focused on the value a simulation centre can add to the School of Medicine, UFS. The themes regarding the value of a simulation centre that emerged were safety, ethical aspects, human resources and added assets to the Faculty of Health Sciences, UFS.

Theme1: Safety
The issues regarding the creation of a safe non-threatening environment and the patient safety were raised in both focus group interviews. The two categories that will be discussed are: safe environment and patient safety.

Category: Safe environment

To create a good learning environment, it is essential to develop a safe environment that is not threatening and good for student learning. It was mentioned in the focus group Phase III interview. The participants mentioned the following: *"...essential to develop in a safe environment..."* [L2] and also *"...where people can really ventilate what they feel about in a SAFE environment...it will be fantastic in the planning..."* [L32].

Discussion: The fact that skills can be practised and mastered on simulators and not on real patients create a safe, non-threatening environment. By using simulation as a training tool, students can develop skills and acute illness management capabilities in a safe environment, which should improve the confidence of students and, in the end, patient safety. This secure environment creates a situation where students can be challenged to push the limits and learn from their experiences, without harm to students. This can be linked to the findings of the semi-structured interviews, as discussed in Chapter 4 (cf. Point 4.2.1.4). The one participant mentioned *"...to ventilate... in a safe environment..."* meaning the debriefing process in a non-threatening environment will create the ideal milieu for the education and training of medical students. Debriefing is an essential and integral part of simulation training and the non-threatening environment will be conducive to learning.

Category: Patient safety

Patient safety was a factor that was mentioned by participants of both focus groups and is an added value of simulation training. The facilitator prompted the participants *"...if I understand you correctly, about 'patient safety' that simulation can address the issue..."* [facilitator] and the reply was, *"...they should not exercise on patients...not from the beginning, totally inexperienced..."* [H29].

One of the participants in the Phase III focus group had the following opinion regarding patient safety: *"...unethical and UNSAFE and it will obviously be traumatic to the student if it goes wrong..."* [L2]. The participant sat with arms crossed, but during the discussion the participant was sitting more relaxed and with arms relaxing on the table.

Discussion: Patient safety is an important aspect of simulation training. This aspect improves patients outcomes and in the NESC (2011:Online) document confirm that patients are more satisfied. Simulation training also improved communication skills, and delivered fewer repeat procedures and calmer doctors who get things right the first time. The doctors were more confident and in the end the overall safety of patients improved. This safety aspect adds value to student training and the qualities of doctors that are produced are of a higher standard. Medico-legal risk is also excluded by the use of SBME (Ziv *et al*. 2006:1091).

In the Institute of Medicine report in the USA, more people die in a given year as a result of medical errors than from motor vehicle accidents, breast cancer or AIDS (Kohn, Corrigan & Donaldson 2000:1). In recommendation 8.1 of the executive summary of the same Institute of Medicine report, *To Err is Human: Building a safer health system,* the following was recommended for health care organisations:

- Provide strong, clear and visible attention to safety
- Implement non-punitive systems for reporting and analysis of errors in organisations

- Incorporate well-understood safety principles (standardising and simplifying of equipment, supplies and processes)
- Establish interdisciplinary team training programmes for providers that incorporate proven methods of team training, *such as simulation* (Kohn *et al.* 2000:14).

This is a landmark report that should be taken notice of, because this new culture of patient safety is a worldwide trend and here interdisciplinary team training with simulation training, as recommended in the report, can play a very important role in crisis resource management. In South Africa a simulation centre for the School of Medicine can make a major contribution in this regard, not only in the Free State Province but nationally.

Theme 2: Ethical aspects

The ethical aspects regarding simulation was mentioned by both focus groups and the ethical aspects that emerged can be divided into ethical advantages and ethical dilemmas.

Category: Ethical advantages

The ethical aspects that can be advantageous for students' education and training were mentioned by both focus groups. The positive aspects regarding the ethical aspects of simulation will be discussed subsequently. The Afrikaans quotes were translated into English.

Discussion: In the discussion in the Phase III focus group, one of the participants summarised the ethical aspects of simulation training as follows: *"...but the simulation unit is fantastic to develop particular skills in resuscitation where we cannot just expect from them to resuscitate a patient without prior training and say well this is your experience training, now resuscitate the patient have a go. It is unethical and unsafe and it will obviously be traumatic to the student if it goes wrong and it will probably go wrong if it is the first case....**unethical** and unsafe and it will obviously traumatic to the student if it goes wrong..."* [L2]. This ethical aspect of acute emergency medicine training, or the lack thereof, expose junior doctors to these situations for the first time in real situations with real patients. With simulation, these aspects can be addressed and students can be trained on simulators, without risk to patients or risk for litigation.

The ethical considerations regarding the emotional stresses of students caring for critically ill patients were raised by participants in focus group HOD. It was voiced in the following way: *"...at oncology...the emotional aspects are overwhelming for students..."* [H60] *"...the emotional aspects for them, as relatively young people,...problematic."* [H61]. With simulation, students can be prepared to deal with critically ill patients, by means of high-fidelity simulation and simulated patients. If a student had previously been exposed to a dying simulator or breaking bad news to a simulated patient, the emotional stresses of dealing with this in real life situations cannot make it easier, but may help to deal with it better at a personal level. *"...because the patient is still the priority of the whole being as a doctor, as a medical professional..."* [L61]

The issue around ethnical differences was raised in the HOD focus group. *"...one should be ethnic sensitive, and it depends on the environment where you grew up..."* [H66]. The value of teaching students to deal with patients from different backgrounds, ethnicity and religious convictions can add value to the medical programme by means of simulated patients. These aspects can be taught to students during simulation and this can be a useful application in a simulation centre. The other aspect regarding ethnicity is the fact that students from different educational and social backgrounds are trained in the same institution, making it difficult to deal with these challenges. A simulation centre can help in this regard, for instance, students can practise skills in their own time at their own pace, till they master the skills. With flat-screen simulators, they can develop reasoning skills without input directly from the lecturers. The students can work at their own pace till they achieve their goals. Students from previously disadvantaged schools, who need more attention, can be trained with simulation at their own pace and in their own time, without more effort from the lecturer.

Mentorship was raised in the HOD focus group. The ethical aspects of mentorship and the training of mentorship were discussed. The one participant said that mentorship cannot be trained with simulation, but another participant summarised this aspect of simulation and mentorship in the following way: *"simulation can help with the thought* *processes, especially with flat screen simulation, where you can help to develop this thought processes, but in the end, to apply this thought processes, is where you stand next to a patient with a mentor..."* [H46]. This connects to the previously mentioned aspects that simulation is an addition to medical training and that one should always move on from simulation to real patients.

Category: Ethical dilemmas

Some of the participants in the focus group interviews mentioned some ethical aspects regarding simulation and some ethical dilemmas regarding simulation were also raised.

- *"...the ethical considerations of teaching a student in a high tech environment and then have to go back to a non high tech hospital. I think that is actually one of the ethical dilemmas that I am sitting with..."* [L58]
- *"...we should really see how we can get our training facility, where our patients are, up to a better standard, because, having a R5 million simulation unit, and then having to take the students back to a hospital that is falling apart,.... I am wondering about the ethical issues... I don't have a solution..."* [L58]

Discussion: The fact that students are trained in a high tech environment e.g. tertiary hospital or high tech simulation environment and then have to go out to work in a district hospital or a primary care clinic, creates an ethical dilemma. Simulation can be used to prepare them for certain situations, by creating realistic scenarios and this aspect can be linked with Chapter 4 (cf. Point 4.3.2.2) regarding the clinical scenarios and the development of realistic scenarios, where a primary health care clinic can be simulated to prepare students for these conditions. Students can be prepared for different scenarios, from high tech tertiary hospital setting to the delivery of a baby in a township house.

It was mentioned that a huge amount of money will be spent on a simulation centre, while the hospital facilities are not sufficient to provide appropriate care to patients. This is a remark that should be ignored, because the funding for the simulation centre is a university matter and the funding for hospitals and supplies is a provincial problem. The ethical aspects can be debated, but within the scope of this study, this matter is irrelevant.

Theme 3: Human resources

The next theme that developed from the focus groups were the factors concerning the staff and the facilitators that are involved in a simulation centre and the value they can add to the training of medical students. Both focus groups raised issues regarding the staff and the staff requirements. The Afrikaans quotes from the HOD focus group, were translated into English. The quotes from the Phase III focus group were used in the original words as they were transcribed.

The aspects regarding the management of the simulation centre was raised and it was voiced as follows: *"I must mention that the unit must be run by a proper person that is qualified to run and allocate times and things like that and that the unit will be available, I would almost say, 24 hours a day (a little difficult for us at this stage) but overseas in Pittsburgh for instance it is available 24 hours a day for people who get lectures or whatever. And then the students can go in there at their own time and go and practice..."* [L13].

The way clinicians should be involved in a simulation centre was discussed as well as respective roles of clinicians and nurses and the interactions between clinicians and nurses. *"...if the clinician developed the simulation scenario appropriately, the technical staff can run the scenarios ...the hard work lies in the creation of good scenarios..."* [H32]. One of the other participants mentioned that *"...clinicians should be present during the scenario, but the technical staff can be trained to do the debriefing..."* [H35] while another said, *"...a nurse can do the formative assessment ..."* [H37] and another participant added, "...*the nurses are constantly in contact with the clinicians..."* [H38] *"... it is not necessary for a specialist to do the assessments, a medical officer, that is appropriately trained, can do the assessments and the debriefing..."* [H39].

Some of the aspects of mentorship and professionalism was raised again and it was said that these aspects cannot be taught by a nurse; it must be taught by a professional, *"...the interaction with a colleague, with a patient, and to observe that, can teach me a lot, can teach me good aspects, bad things ...professionalism..."* [H39] Evaluation of clinical skills can be monitored by staff members who know the students and can identify problems and encourage them to practise some more before they go for assessment opportunities. *"I think the staff that will be involved with the simulation centre, will understand that this student...practical skills, applied skills and thought processes...try to assess effectively."* [H71]. A very important remark from the one participant raised this important issue: *"...you need to be trained to do that, because it is not just doing a scenario on the manikin, telling you are doing it wrong, you actually have to do debriefing. The learning objectives, it's quite time invasive and we need to know how to do it effectively. We need training to do that..."* [L54].

Discussion: It follows from the abovementioned phrases and discussions, that the participants are not acquainted with the different roles and functions of the different staff members of a simulation centre. They are not consistent during the discussions and they are suggesting certain aspects e.g. some feel the technical staff should do debriefing, other mentioned that nurses should do the debriefing, which is not consistent and not always desirable. The clinician can play a very important role in this regard because the role of the clinician in debriefing can be to address the issues around the mentorship and the professionalism. In some cases the technical staff or nursing staff will not be able to do the debriefing of specialised scenarios or speciality-specific context. The training of the trainers to do debriefing is an important part of the success of simulation training. Alinier (2008b:748) proposes that debriefing should be treated with confidentiality and with caution, therefore only well trained individuals who are familiar with simulation debriefing should be employed to do the debriefing. The different roles of staff members are discussed in Chapter 2 (cf. Point 2.5.2) and in Chapter 4 (cf. Point 4.3.8).

<u>Theme 4: Added assets to the Faculty of Health Sciences</u>

The next theme that developed in regard to the added value of a simulation centre for the School of Medicine, UFS, was the addition of assets to the Faculty of Health Sciences and the University. During the focus group Phase III, there were discussions regarding the finances and where the money for a simulation centre is going to come from. Some of the participants had the following opinions:

- *"Obviously money is a problem, yes of course it is, it is going to be an EXPENSIVE situation, but I think that with the insight of, and I must mention our Dean here, with the insight and ideas of what the simulation unit must be, we will not be* *disappointed in the facilities that will be made available for everybody that is there..."* [L27]

- *"...it is a GREAT thing that the indaba was held where all the schools were involved, because it is much easier to ask for funds when there is a collaborative, inter-professional approach, and thinking and strategy to the setting up of a simulation unit. So I think there will be substantial amounts of money available for setting up of this lab..."* [L40] [Non-verbal: participant sat with hands on table, using some hand gestures, while speaking]
- *"...it is a major outlay, but on the other hand very EXCITING."* [L42] [Non-verbal: participant emphasised with right hand]

There were also concerns uttered:

- *"...and yet we are spending a large amount of money on clinical simulation models. And I feel that is what some people would like to know more about..."* [L33] [Non-verbal: sits with left hand on lap and right hand on the table]
- *"I actually just want to know, does the Faculty have money for this? Because this is not going to be cheap. If you want to do it properly, it is going to cost a hell of a lot of money. So it is one thing talking about it even seeing lovely models and stuff, but can they actually afford it? Is it actually implementable or what?"* [L35].

Discussion: During the discussion, the participants were discussing the pros and the cons of the financial impact on the Faculty and some were concerned about where the money is going to come from for the implementation, and there was also concern expressed that there is not going to be enough money to acquire appropriate simulators. There was a discussion on the possible sources of income and in the end the value a centre can add to the Faculty, was the positive conclusion that was reached and can be summarised in the words of one of the participants, "...*we will not be disappointed in the facilities that will be made available for everybody that is there..."* [L27]. Everybody reached consensus that this is a great asset and will add tremendous value to the faculty.

5.4.2.4 *Focus group area 4: Training of undergraduate medical students*

The fourth focus group area that will be analysed and discussed is the training of undergraduate medical students. The themes that emerged during the focus group interviews were: curriculum, skills development, multi-disciplinary training, training platform, simulators and assessment.

Theme 1: Curriculum

The participants of both focus group interviews mentioned the curriculum and how simulation can be integrated in the curriculum. *"Departments will have to discuss this among your people and they will have to set a curriculum for their undergraduate students in the unit..."* [L13] [Non-verbal: sitting bent forward and open to the group].

The integration process of simulation into a curriculum was mentioned in the HOD focus group too. " *I think this involves the broader development of a curriculum, what you should do early and what later..."* [H44] and another participant added that one should identify a problem and then try to find a solution to the problem. The participant used the following words: *"... you do not create simulation, because there is a good simulation, but you take a problem and evaluate if you can solve the problem with simulation. I think if you use this approach, it is going to be easy to integrate with the clinical work."* [H62] "...but it is additional, as we have mentioned before..." [H63]. The consensus in both focus groups was that the integration into the curriculum should be well planned. *"But I agree it must be well integrated and well planned into the curriculum..."* [L54].

The fact that simulation is inclusive to everybody was also mentioned. *"This is not purely a course, this is an open simulation unit to be used totally for everybody, every discipline undergraduate, and then the very step next, shortly after that will be postgraduate..."* [L13]. This can also be linked to a remark by a participant in Phase III focus group: *"I would advocate that it is important that we start planning ahead and see the major potential in simulation, outside of resuscitation is actually in postgraduate training. And I think that is something we should consider..."* [L22].

By integrating simulation in the curricula, students can be taught so much, including certain skills that are required by the HPCSA. *"The HPCSA asked that Interns should be able to perform a certain list of skills, before they can become Interns. So we shall* *have to ensure that everybody is able to perform these procedures in a structured manner. A great part of this can be done with simulation."* [H71].

Discussion: The use of the simulation centre as a multi-disciplinary unit was advocated and it should be implemented as such. The different departments should evaluate how they can make use of simulation in the different disciplines and how simulation can be integrated into their curricula. This links with a remark from one of the semi-structured interviewees: *"Group of people who can work together and are enthusiastic about developing the centre and that has to come from multiple disciplines"* [D2] as mentioned in Chapter 4 (cf. Point 4.3.8.1).

Simulation has another very important application, that was not really stressed so far, namely, the use of simulation in interdisciplinary training, e.g. medical students, nursing students and students from allied health disciplines. Collaborative work is an important starting point for inter-professional learning opportunities (Bradley & Postlethwaite 2003:7). The interdisciplinary aspect was mentioned by two of the interviewees in the focus group interviews. *"... collaboration between nursing and medical students, because they recognise the expertise each has..."* [C4. T3] it was discussed briefly in Chapter 4 (cf. Point 4.3.4.1 under the category Teamwork).

When integrating simulation into the curriculum, one should identify a problem and then try to find a solution to the problem with simulation, which was mentioned by one of the participants in the focus group interviews, but also by participants in the semi-structured interviews, *"...purchase simulators around the curriculum and not changing the curriculum around the simulators..."* [D2, D3] as discussed in Chapter 4 (cf. Point 4.3.6.1).

The use of simulation to teach students certain skills was mentioned and was repeatedly mentioned by the semi-structured interviewees. The fact that it can be used for all levels of students and different disciplines was discussed by Ziv *et al.* (2006:1094) who mentioned the following groups: medical school candidates, medical students, postgraduate training, residents, fellows, attending physicians and military physicians.

Theme 2: Skills development

The second theme that emerged from the training focus area was skills development and integration. The categories that were brought out were development of clinical skills, practise of clinical skills, application in context, integration and development of attitude and behaviour. The categories will be discussed and supported by direct quotes from participants. Direct quotes from the transcriptions of Phase III focus group and translated quotes from the HOD focus group will be used.

Category: Development of clinical skills

During both focus group interviews, the development of clinical skills was emphasised. Some of the remarks were: *"Simulation is there to develop skills, that we cannot trust students to develop thoroughly on patients before actually having the skills to treat the patients...development of particular skills...fantastic to develop particular skills in resuscitation where we cannot just expect from them to resuscitate a patient without prior training"* [L2] and the development of skills before they are exposed to real patients in the clinical setup was also mentioned. The participant said the following: *"And I think also with development of skills, somebody previously said drawing blood, putting up drips, I am sure there are manikins where students can experience doing an LP. There are a lot of procedures where it will be much easier for a student to learn and when they get to the wards, they will have a much more comprehensive knowledge of certain skills, and then we will not have to teach them everything, that takes up a lot of time..."* [L25].

An important remark from the HOD focus group emphasised that the simulation centre prepares students for the clinical setup and especially in terms of the preparation of students to perform certain clinical procedures. *"...this does not replace what we have, I think it is excellent to prepare students even better, it is especially to prepare them for procedures, where a certain routine has to be followed and to get your orientation ready to perform the procedure..."* [H23] And another mentioned: *"...we want to teach them initially the psychomotor skill of how to hold the nose speculum or how to handle the ophthalmoscope. The next step is to try and do it on one another now that we had a bit of practice on how to hold it or how to approach it and now we* *do it on patients. Sometimes the intermediate step can be replaced by a high-fidelity model, which will give you a lifelike feel* [L32].

The fact that it will be the different departments' responsibility to teach the skills was mentioned: *"Simulation is more advanced and it will be the responsibility of the department to teach certain skills* [L43] and another mentioned: *"In paediatrics it is good for skills, learning skills, put up drips, doing LP's"* [L53].

Discussion: The development of clinical skills is a major use and application for a simulation centre. The fact was repeatedly mentioned in the focus group interviews and in the semi-structured interviews in Chapter 4 (cf. Point 4.3.1.2). Simulation can be used to train students in basic to intermediate and advanced skills and procedures. Students practice with increasing levels of difficulty and simulation allows for individual learning, e.g. a student can practise a part of a procedure or skill he or she finds difficult to perform till they master the skill. Simulation provides a safe environment where students can practice clinical skills repeatedly. High-fidelity simulators can be considered a valid representation of clinical practise.

Category: Practise of clinical skills

During the focus group interview, both groups mentioned the fact that one can use simulation for repetitive practise of skills. The participants mentioned the following:

- *"...facility where anybody can come and practise again, come with another tutor, come with a senior student, and practise again.... students have a self-directed area to come back and practise in their own time..."* [L32]
- *"... apart from practising of techniques, is the repetition of techniques. We know knowledge is captured with intensive repetition and then on the longer term, what is repeated over longer periods...knowledge on long term capture."* [H15]
- *"... overcome the learning curve, especially with procedures where damage or complications can occur. You can practise on simulators, but you still have to do it on real patients in the end..."* [H22].

Discussion: The development and practise of skills are advantageous and was described in the literature in a study where repetitive practice with high-fidelity simulation was used resulted in improved outcomes. This was applicable to all levels of learners (students, residents, fellows and senior doctors) over a wide variety of specialisations and other professionals, e.g. pilots (Mc Gaghie *et al.* 2006:795).

Category: Application in context

The fact that simulation can be used for training of skills and procedures must be applied in context in the clinical situation. The participants mentioned the following:

- *"So I think when we use the skills lab, we need to do it in a context of a patient."* [L28]
- *"They can do the skill, but not in the context of a patient. They don't know when to do it and when not to do it."* [L29]
- *"So once again, we should actually be careful, if we have the simulation unit, that we do it in context with the patient."* [L32]
- *"...the surgeon must take the responsibility to take his own group there, but it must not be first or second year students. As they come to surgery, the whole idea is to first take them to the skill lab, I'll take them there myself, I'll show them what the SURGEON want them to do and see and then I take them back to Pelonomi and we go and search for that specific patient, so that they can repeat that skill, then it is not knowledge, then it becomes a skill as well. So yah it must be fourth years or fifth years. Where the basic skills lab is there for the more junior people."* [L43]
- *"...this is one of the nice things of simulation, it is the development of reasoning skills, especially if you use flat-screen simulation, then you can help to develop these thought processes..."* [H46]

Discussion: The fact that students have problems applying the theoretical knowledge in practise is a problem that was mentioned by participants. The one participant suggested that the lecturer take the students to the simulation lab, teach certain aspects and then take them to the hospital for clinical application in context immediately. The use of flat-screen simulation, however, can teach students reasoning skills and teach students how to make decisions and can be linked with the category on flat screen simulation as described in Chapter 4 (cf. Point 4.3.2.1). It is important to teach students to contextualise and integrate knowledge into clinical practice and here flat-screen simulation can play an important role in the whole process.

Category: Integration of skills, knowledge and the clinical setting

This category is very closely linked with the previous category. The fact that integration of knowledge and clinical practice should take place was mentioned in both focus group interviews. The participants mentioned a few aspects:

- *"I think they've got skills and they have patients and it is two different things, they cannot connect it."* [L30]
- *"...when it comes to the clinical years, they can't put the skill they learned together with the patient, because of lack of integration in their minds. And I think when we plan a simulation lab we should really think what we can do so that the students don't tell us that they never experienced this."* [L32]
- *"...the complexity and challenge of transfer from the simulated, safe clean environment, to the ward, where it is busy, it's a mess in it's running..."* [L32]
- *"... there is certain aspects that students are never exposed to and if you can simulate these aspects, then you can practise this with students, then they get exposure to this. Simulation creates wonderful opportunities."* [H27]
- *"I think if you can learn or teach somebody to do a thing properly, then when he land up there somewhere where there is nothing, at least he knows what he is supposed to do. There is usually a lot of improvising; I sometimes help there in Lesotho, if you think Pelonomi is falling apart...there is nothing. At least you know or supposed to know how to do it, then you see what is available and then you make the best of the thing. Because we're in Africa."* [L59]
- *"...clinical skills and the sooner we integrate these aspects, I think the better it is, then you do not lose the endpoint, that it should not be two separate things..." [H63]*
- *"...so there should be a movement between the clinical setting and the simulation centre..."* [H55]
- *"But as I say you MUST get back to the patient in the context, otherwise it is this 'pocket thing' again. You know the skill, but if it is real life, you can't handle it..."* [L60].

Discussion: These aspects of integration of knowledge and simulation into clinical practise was also mentioned by Issenberg *et al*. (2003:45), who suggested the following: lectures and symposia, small group problem-based learning, independent study by using computer-based learning, clinical skills of history taking and physical examination in a skills laboratory, hospital ward-based teaching, community-based teaching in primary care and tutoring by senior students. This is in line with the objectives of the undergraduate medical programme at the UFS.

The importance of integration of skills and knowledge acquired in the simulation centre and the application in the clinical setup was summarised by one of the participants in the focus group interview in the following words: *"for me, simulation is the bridge from where a student has no clinical skills to where it is expected from the student to function in the clinical setup, and function fully, there..."* [H67]. This remark forms the basis of simulation training, the additional opportunity to acquire and practise skills before the students are exposed to the clinical setup. This is a process of continuous movement, where students move from simulation to the clinical setup and back.

Category: Development of attitude and behaviour

The use of simulation to develop attitudes and behaviours was mentioned in both focus group interviews. The one participant said the following: *"...develop skills and attitudes and behaviours that we would feel is essential to develop in a safe environment before we let them loose on the patients..."* [L2]. In the HOD focus group the participant said the following: *"...certain aspects, which are difficult to teach on patients e.g. the emotional interaction between the person taking the history, the doctor and the patient, e.g. to inform a patient about death can be simulated very well..."* [H10].

Discussion: The important aspects of behaviour and attitude were mentioned and are closely linked to the aspects previously mentioned regarding the mentorship and professionalism (cf. Point 5.4.2.3 in the category: Ethical advantages). In the words of a participant "...*to apply this thought processes, is where you stand next to a patient with a mentor..."* [H46]. The aspects of medical education and training are not merely the training of knowledge and clinical skills and competence, but also to teach the students attitudes and behavioural skills, to behave like professionals. These aspects of professionalism are difficult to teach and here simulation with standardised and simulated patients can play a role (cf. Point 4.2.1.3). Attitudes and behaviours must be developed through the five years of training and here simulation can add value to the training programme to address these issues.

Theme 3: Multidisciplinary training

The aspects of multidisciplinary training were raised in both focus group interviews. The following phrases were used by some of the participants of the focus group interviews: *"...not just in the School of Medicine, but in all other Schools to be involved, particularly because we know simulation is excellent for developing inter professional teamwork and interdisciplinary skills later on and that is where one needs input."* [L12] and it was also raised in the HOD focus group: *"...the other aspect that is very positive is group work, and students are not exposed enough to work in groups. With simulation, one can create opportunities."* [H10]. One of the participants mentioned that simulation can be used to teach students aspects of working in groups or teams as colleagues and also inter-disciplinary, e.g. doctors, specialists, nurses and emergency room personnel. It was voiced as follows: *"I talk about the inter-disciplinary setup, but also doctors. I have seen examples of simulation, where emergency vehicle personnel, nurses, doctors, specialists are simulated around a patient...there are lots of opportunities...we have to think laterally and we should not only think about our own subject, but we should use the opportunity to do more than that."* [H47]. Another remark that summarise the interdisciplinary aspects of simulation perfectly was: *"This is what we want to teach them, is that the day they qualify, they are not going to work in silos, but that they are going to work with the people around them..."* [H50] One of the participants mentioned that lecturers should lead by example, so that students see their lecturers work in an interdisciplinary team, *"...but in the simulation unit we might work together, the students will see a coordinated effort and we will start understanding each other better. That will be good for the Medical School. And I'm not even talking about resuscitation, where the nurses are involved*...[L54]. *Now with my experience, I train multidisciplinary people. I train social workers, everybody together in a group..."* [H56].

Discussion: In simulation training, there are several human factors involved. The individual factors include: decision making, situation awareness, anticipation and planning ahead, and fixing errors. The team factors include: leadership/ followership, effective communication and distribution of the workload (Krage 2011:Presentation). The fact that students are trained in silos was mentioned by one of the participants and is an important factor, because students tend to think in compartments, but when they qualify they have to work as a team with colleagues and other disciplines, e.g. nurses. With simulation students can learn to work in teams and specific scenarios can be created with interdisciplinary outcomes. This aspect can be linked with the category: Teamwork as discussed in Chapter 4 (cf. Point 4.3.4.1). Team work in emergency situations where each member of the team has a specific task to perform and leadership properties can be taught and practised with simulation. This application of simulation is an invaluable training tool that should definitely be exploited. In the recommendations of the Institute of Medicine report, "To Err Is Human: Building a Safer Health System", the authors recommend periodic re-examinations and re-licensing of doctors, nurses and other key providers, based on knowledge of safety practices. In the same summary it is recommended that health care organisations should establish interdisciplinary team training programmes for providers that incorporate proven methods of team training, such as simulation training (Kohn *et al*. 2000:15-16).

<u>Theme 4: Training platform</u>

The changing teaching platform was mentioned in both focus groups and this can be linked with Chapter 1 (cf. Point 1.2). The smaller teaching platform (patients used for training of medical students and postgraduate specialist training) and a change in the case mix admitted to the academic hospitals can be attributed to the burden of HIV and related diseases and the financial constraints in public hospitals in South Africa. These factors have a significant effect on the number of patients available for training purposes and these factors in turn have an impact on the quality and competence of health care professionals leaving medical schools (CMSA 2009:3,10). The participants in the focus group interviews mentioned the following aspects:

- *"One should be an adjunct to the other in an environment where you got lack of clinical exposure, you need more clinical simulation, however we are in an environment where there is the potential for more clinical exposure, but due to the changes of the curriculum..., lack of specialists, lack of rotations to peripheral hospitals,..."* [L34]

- *"I think that is a major problem that everybody seems to ignore, the fact that facilities that we have are becoming unacceptable for student training..."* [L38]
- *"...if the Department of Education is really serious about improving the conditions that are set for the education of medical students, maybe they should not only supply money for a simulation unit, but we should consider getting them involved in helping us to improve the overall teaching platform."* [L38]
- *"...we can expose them, we have MANY patients, but we don't have supervision or the time when we expose them. So there is somebody out there, who is a doctor, but that doctor is not necessarily the one that tell them the correct things."* [L39]
- *"...even if we have enough patients, we need to have somebody to supervise them to do the correct thing..."* [L39]
- *"...I think we have a unique situation here, where we have a lot of patients with pathology, but they do not come to the correct places,..."* [H17]
- *"European students come here, because their clinical skills are built on simulation, with very little real patient contact...we have more clinical material, our pathology is more advanced..."* [H73].

Discussion: During the focus group discussion a few aspects regarding the teaching platform was raised. The fact that there is a lot of clinical cases, but they are not admitted to teaching hospitals and the change in case mix, for instance, the problems with HIV patients and related conditions, resulting in fewer beds for admission of patients with other conditions.

The poor health care facilities, lack of supplies and the lack of supervision by senior doctors in the peripheral hospitals and clinics pose another challenges and that should be looked at intensively by the Provinces and the National Department of Health. Some of the facilities are just not good enough to use for the training of students and the lack of supervision makes it unsuitable to train students there. The emphasis to move to community based medical education is good, but then the platform should be appropriate and there should be supervision. Students will learn much in community based medical education, because they will get exposure to a different case mix and difficult working conditions. Here simulation can play a role in preparing students for difficult circumstances, by using realistic scenarios and simulating conditions they are going to see in the community.

Theme 5: Simulators

One of the participants in the HOD focus group made a statement that is important and should not be forgotten: *"I disagree, you can simulate EVERYTHING"* [H25]. [Non-verbal: smiled, sitting back in chair and used hands while making the statement]. The aspects of simulators were discussed during both focus group interviews. Some of the participants had concerns regarding the realism and was voiced as follows: *"I just want to know if we are going to use models, how realistic are they?"* [L23] and another said: *"simulation must be almost real..."* [L62], but it was answered by another participant: *"Because the rubber models of twenty years ago that most of us know, is of nothing that the stuff that is out there today. It is completely different. When I visited The SPACE Lab, I was surprised at the realism of those manikins..."* [L24]. The participants mentioned the different kinds of simulators and will be discussed under the categories.

Category: High-fidelity simulators

The use of high-fidelity simulators were discussed by some of the participants. Participants of both focus groups mentioned the high-fidelity simulators.

- *"...the way that they can be programmed to be almost lifelike. It was a bit, almost scary that the manikins, with pupils that can react to light..."* [L24]
- *"...I heard about a anaesthesia manikin ...everything that can happen to you during anaesthesia, can be simulated..."* [H27].

Discussion: The use of high-fidelity simulators is important in teaching students the higher physiological and pharmacological aspects that are difficult to teach on real patients. The fact that these aspects can be simulated is an advantage of simulation and can be applied especially in emergency medicine and in anaesthesia intensive care and obstetric emergencies. During the semi-structured interview one of the interviewees mentioned that high-fidelity simulators add the "wow-factor" to simulation and it can be the "flagship" of the simulation centre. This links with the aspects mentioned in Chapter 4 (cf. Point 4.3.6.3).

Category: Part-task trainers

The next category that emerged dealt with the issues concerning the part-task trainers. Some of the remarks from the participants are listed.

- *"...you can have recordings of for instance heart sounds, of murmurs in this that can be very life like. That the students can have access to that, they don't have twenty patients in the ward with different heart murmurs."* [L25]
- *" Heart murmurs can be simulated very well, in the actual situation, it is often not so easy to hear those murmurs, because the patients have co morbidities, then it will be very good if the students can go back and familiarise them with the principles on the simulator..."* [H55]
- "...*with what basic equipment and tools you can build your own colon for colonoscopy. And that is where ENT can come in, if they think that models are not optimal, we have the tools to build and manufacture our own things. But yes, there is a place for cheaper models, so that a person at least teaches how to manoeuvre a scope or whatever. You don't need brilliant 100% perfect models for that. And then as a department you can say OK we have a problem with that, maybe we can make it nicer or we can look out for a little bit more expensive one..."* [L26]
- *"Unfortunately there is no dark skin manikins and that is a bit of a negative, because our patients are dark skinned, so you cannot see the veins, you have to feel..."* [L53].

Discussion: Part task trainers are low-tech simulators that can be models or manikins that are used for practising physical manoeuvres or procedures. These trainers are especially useful to teach students to perform procedures e.g. intubation, listening to heart murmurs or doing a pelvic examination. The interviewees in the semi-structured interviews mentioned a few important facts to consider when acquiring simulators. Further points about part-task trainers were described in Chapter 4 (cf. Point 4.3.6.3) of which some were reiterated during the interviews. The shortcomings in some of these simulators were also mentioned, e.g. the skin colour and the difficulty to simulate mucous membranes or the tactile properties of some structures. An aspect mentioned in the semi-structured interviews was that one should have many low-fidelity simulators, fewer medium-fidelity and only a few high-fidelity simulators. In the planning of a simulation centre the different departments should consider acquiring more low and medium fidelity simulators, because most aspects that one want to teach students can be done on these simulators.

Category: Virtual reality simulators

Another type of simulator that was discussed was the virtual reality simulators. The one participant mentioned that virtual reality simulators are better for specific specialisation fields and for post graduate training of surgical skills. Some of the remarks by the participants were:

- *"That is what I say virtual reality in our field is the better way to go than models"* [L20]
- *"...there is large development in especially postgraduate training especially surgical training, with **laparoscopic devices** and also using of **3D laparoscopic and microsurgery** can actually be simulated quite nicely with devices and on a **flat screen** so that you actually operate on a flat screen, but it is a model you use."* [L22]
- *"...is it virtual, is it a model, I think laparoscopic is the best example, there is a combination on, if I operate laparoscopically in theatre, all I see is a flat screen, it is not 3D it is a flat screen and my hands are down here, so I feel."* [L41]
- *"You get fantastic simulated virtual patients, which is more scenario-based, like in many of the resuscitation- courses, where scenarios and moulages help you to clinically reason what the next step must be..."* [L54].

Discussion: The aspects around virtual simulation was mentioned by some of the participants and they confirmed the fact that there are a lot of uses especially in surgery training, e.g. arthroscopic surgery, retinal surgery and endoscopic surgery. Many of these simulators are computer based, resulting in cheaper devices. The other use for virtual reality is flat screen based, helping students to develop reasoning skills.

Category: Flat-screen simulators

Flat screen simulation is an important part of the training of students in the art of clinical reasoning and decision making. These aspects were raised by a participant in the focus group interviews. The participant said the following: *"...this is one of the* *nice things...with flat-screen simulation; you can help to develop these thought processes..."* [H46].

Discussion: Flat-screen simulation is a computer based program that can be used to teach students reasoning skills and decision making skills. This can be linked to the discussion in Chapter 4 (cf. Point 4.3.6.3) and the fact that flat-screen simulation is a cheaper option to teach students a lot. Much of this can be done in the students' own time, saving a lot of time for lecturers and students can do it when it suits them.

Category: Standardised / simulated patients (SPs)

SPs are a integral part of simulation based training and most simulation centres make use of SPs in their programmes - especially to teach students communication skills, team work skills, taking a history and handling of difficult patients or breaking bad news. The participants mentioned the following regarding SPs: *"...the Rheumatology Society helps to train patients or the family of patients, to simulate symptoms..."* [H31] and the participant continued: *"... the patient does not have to have the condition, if the patient is trained well, he can simulate the symptoms of classic rheumatologic conditions well...on the condition that it is done correctly and that quality insurance is built in..."* [H31]. *"...with simulated patients. This is how we can simulate different types of difficult histories, breaking bad news, with people who can immediately start crying when it is not done appropriately. This is on a higher level; this is another higher order skill..."* [L54].

Discussion: Some confusion around standardised and simulated patients may arise. To recap, standardised patients can be defined as people with or without actual disease who have been trained to portray a medical condition in a consistent fashion. These people may portray their own problems or ones based on those of other patients (RCSA 1993:475-7). Simulated patients are normal persons who have been coached to present symptoms and signs of actual patients. At IMHS-2011, the recruitment, training, pre-assessment and post-assessment feedback sessions were emphasised. Some centres use SPs as assessors, but good training and quality control is essential. The use of SPs should be an integral part of any simulation centre and they should be utilised fully.

Theme 6: Assessment

During the focus group interviews, the next theme that emerged was simulation as tool for assessment. The participants were positive about the use of simulation for assessment. One of the participants said the following: *"... the use of this facility for assessment of students, which is a great add on...we can also use it as an assessment area, bringing in patients for college exam, it is close to the facility to set up speakers for quiet, proper, good assessment..."* [L51]. In the HOD focus group it was also mentioned that: *"...simulation is used for assessment in the cases where large groups of students have to be assessed, without inconvenience to patients in the process..."* [H14]. [Non-verbal: sat with arms crossed, touching chin with left hand at times, while talking in a relaxed tone]. Assessment can be used for the assessment of certain aspects, but it cannot replace clinical assessment on real patients as mentioned by a participant: *"...you cannot replace assessment on real patients, but certain aspects of assessment can be done on simulators as long as one puts a limitation on it..."* [H20]. One of the participants mentioned that simulation and debriefing is a form of formative assessment, but that one should use simulation for summative assessment with caution. *"...I think simulation and formative assessment can work, but when using simulation for summative assessment...if I listen to what the people say, is that the area where most of the problems arise..."* [H44].

One of the participants warned against the use of simulation for assessment. The person voiced the following concern: *"I think there are certain aspects that can be assessed with simulation, but if I listen to the people with experience that is the area where lots of problems can arise. I think opportunities that were not available previously, for training, should be created with simulation...I think yes, BUT one should think about assessment and consider it very carefully..."* [H20].

Discussion: During the discussion, a few factors were mentioned, namely: the simulation centre can be used as an area where assessment can take place, simulation can be used for assessment of large groups of students, simulation for formative assessment and debriefing as part of formative assessment is better and can be utilised, but one should be cautious if you want to use simulation for summative assessment.

These factors link to the discussion in Chapter 4 (cf. Point 4.3.3). Aspects that were not mentioned by the focus group participants include the assessment of group interactions, interpersonal skills, setup of equipment and the use of SPs in assessment. Two of the interviewees in the focus group interviews mentioned: *"Integral part of assessment of behavioural skills, interpersonal skills and attitude."* [D3, T1].

The risks involved in training and assessment on real patients can be defeated by the use of simulation-based assessment. Boulet and Murray (2010:1049) caution that with simulation-based assessments, the instructor must know that the scores are reasonably accurate reflections of the skills that are being evaluated. The unpredictability and complexity of the human body, the lack of physiological data and the limitations of simulators contribute to the limitations in the assessment with current high-fidelity simulators (Maran & Glavin 2003:27). The implementation of periodic re-examination and re-licensing of doctors, nurses, and other health care professionals based on competence and knowledge can add another dimension to simulation based assessment (Kohn *et al*. 1999:14).

5.5 SUMMATIVE DISCUSSION

The results of the focus group interviews supplied answers to the research questions presented in Chapter 1 (cf. Point 1.3). The focus areas and the themes that emerged from the discussions are summarised in Figure 5.3. The focus areas and the themes that emerged were discussed and supported by quotes from the participants. During the focus group interviews, answers to the research questions were provided.

The focus area regarding *personal opinions* contributed to research question 4 on the topic of the development and the implementation of a simulation centre. Consensus was reached immediately that it is essential to develop a simulation centre for the School of Medicine, UFS. The need for information seminars to familiarise the lecturers with simulation as training tool, because of a general lack of knowledge, was identified and should be incorporated in the development process of the simulation centre.

The focus area on the topic of the *personal attitudes* of participants, contributed to research question 4 regarding the development and the implementation of a simulation centre. The attitudes were mainly positive towards the establishment of a simulation centre, but a few negative attitudes were identified and that can be linked to the lack of knowledge identified in the focus area about the opinions of the participants.

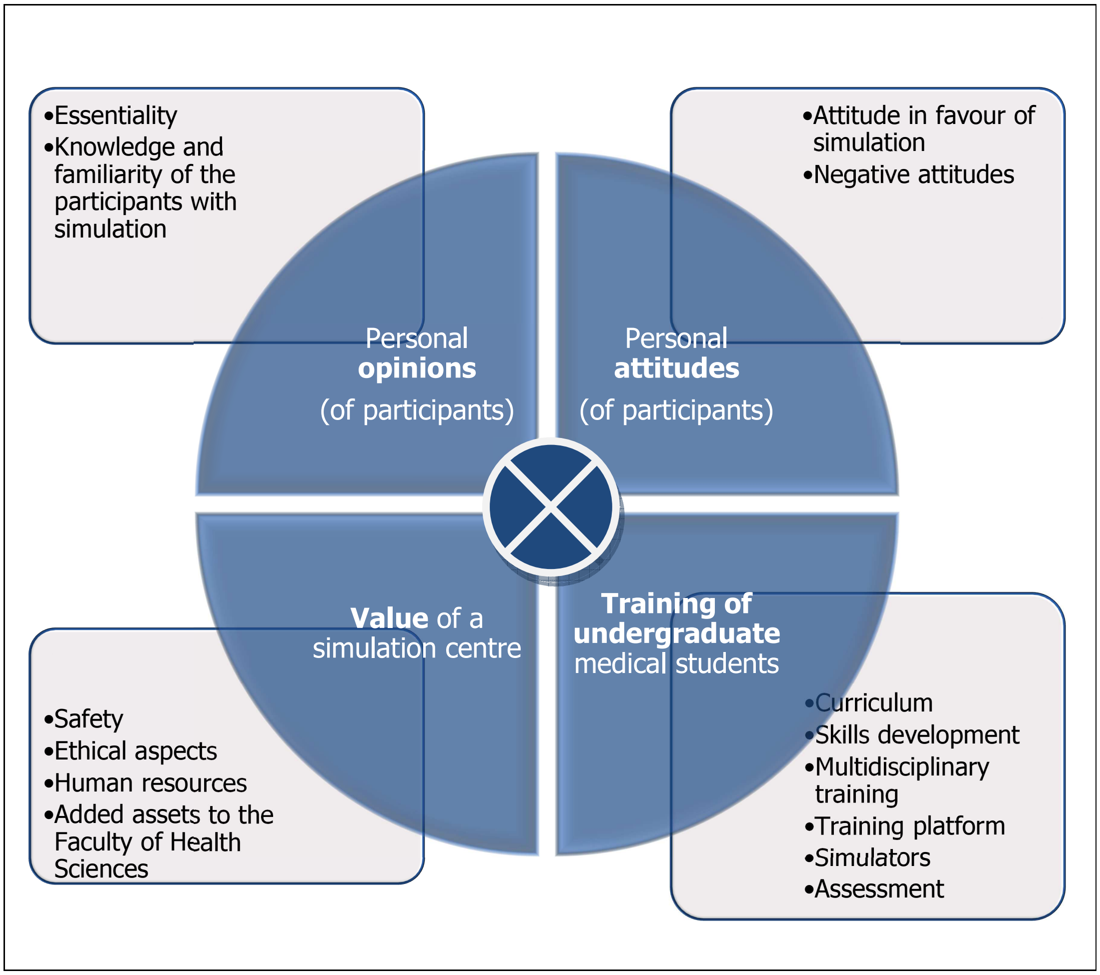


FIGURE 5.3 SUMMARY OF FOCUS GROUP INTERVIEWS: FOCUS AREAS AND THEMES
[Compiled by the Researcher, Labuschagne 2011]

The focus area concerning the *value that a simulation centre can add* to the School of Medicine, contributed to research question one. The additional benefits of patient safety and training in a non-threatening environment to the current curriculum were highlighted. The ethical aspects of training with simulators were considered. The added value of the assets for the Faculty of Health Sciences and human resources contributed to research question four.

The focus area concerning the *training* of medical students, addressed different research questions with the themes that developed from this focus area. The themes about the curriculum added to research questions one and two. The theme about the teaching platform contributed to research question one. The themes on the subjects of skills development and teamwork contributed to research question two about skills and competence development. Theme 5 regarding simulators contributed to research question number three about skills and development. Theme 6 on aspects of assessment contributed to the answering of research question three on the assessment tools.

The focus group interviews added another dimension to the research in the sense that the emphasis was on determining the ideas and feelings of individuals on certain issues regarding simulation as enhancement of medical education and training at the University of the Free State.

5.6 CONCLUSION

Chapter 5 provided an overview of the results of the data analysis, description and a discussion of the findings of the focus group interviews. The focus group interviews were used to diagnose the potential for problems with a new programme, suggested new ideas and creative concepts and obtained general background information about clinical simulation in the context of a medical school in South Africa.

In the next chapter, Chapter 6, ***Clinical simulation to enhance undergraduate medical education and training at the UFS*** will be discussed.

CHAPTER 6

CLINICAL SIMULATION TO ENHANCE UNDERGRADUATE MEDICAL EDUCATION AND TRAINING AT THE UFS

6.1 INTRODUCTION

An in-depth study was done with a view to make recommendations for the use of clinical simulation to enhance medical education and training at the University of the Free State.

In the South African and African context, with the burden of disease and the change in the case mix (type or mix of patients treated by a hospital or unit), changes in the instructional environment, also referred to as the teaching platform, are observed. The need for the training of health care professionals and especially the need for more medical doctors and specialists requires medical schools and faculties to train more students to supply in this need.

In addition to the problem of training more students given the changing training platform, important factors regarding patient safety should be addressed. In truth patient safety is becoming more and more important globally and should be addressed in the education and training of medical students worldwide. The improvement of competence and skills training, interdisciplinary and team training as well as the improvement of clinical reasoning skills, should have a favourable influence on the prevention of both execution and planning errors. Ethical aspects of training inexperienced students on real patients and exposing patients to multiple examinations by several students can be debated. Students are often not exposed to training in acute emergency medicine, paediatric emergencies and other conditions that require immediate, prompt action, with the consequence that there can be a high margin of error with disastrous outcomes to patients when students are exposed to these situations in the real clinical setup. With simulation training, students can be trained in these aspects - resulting in better equipped, better prepared more competent students leaving medical school as a result. This study investigated the integration of simulation as a required component of the undergraduate medical programme, the improvement of clinical skills and competence, the role of simulation in the assessment of students and the factors playing a role in the development of a simulation centre.

The methods used to investigate the aspects of simulation training, assessment and the implementation of a simulation centre for the School of Medicine included a literature review, semi-structured interviews with international experts and focus group interviews, with heads of departments and lecturers in the School of Medicine, UFS. The undertaking was to provide the foundations and criteria for the development and implementation of simulation as an additional, but required, component of the undergraduate medical programme of the UFS in a structured and systematically researched manner (cf. Chapter 1-5).

In this chapter, Chapter 6, the foundations and criteria to develop and implement simulation, will be discussed and recommendations will be made regarding the role and position of clinical simulation as additional component to the current undergraduate medical curriculum of the UFS, the improvement of clinical skills and competence by means of integration and implementation of clinical simulation and the assessment tools and criteria for assessment of clinical competence of undergraduate medical students in a simulation centre. The development and implementation of a new simulation centre for the School of Medicine, Faculty of Health Sciences, UFS, will be discussed. Recommendations will be made regarding simulation as enhancement of undergraduate medical education and training at the UFS. Finally a conclusion will be given.

The discussion in the following section, the role and position of clinical simulation as additional component to the current curriculum, aims to provide answers to the first research question: "*What role can be formulated for clinical simulation as an addition to the current undergraduate medical curricula?"*

6.2 THE ROLE AND POSITION OF CLINICAL SIMULATION AS ADDITIONAL COMPONENT TO THE CURRENT UNDERGRADUATE MEDICAL CURRICULUM

The position of clinical simulation in the undergraduate medical programme will fit into Phase III of the curriculum. The structure of the undergraduate medical programme was discussed in Chapter 2 (cf. Point 2.2.1).

The introduction of simulation as instructional medium to form part of the curriculum, can be considered in a *vertical* way, from Phase I of the curriculum, starting with general skills in the skills lab, to Phase II, with the training of clinical skills in the skills lab and then to Phase III, where simulation as instructional medium will form an integral part of each clinical subject or module. This correlates with the craft orientated approach described in Chapter 2 (cf. Point 2.2.3).

The *horizontal* component of the integration process should include the following components. Firstly, the learning objectives need to be evaluated and decisions made on where the simulated component fits in. Secondly, simulation cannot be a separate island, it should rather be fully integrated into the programme e.g. programme schedules, time-tables and instructions to students, assignments and formative assessments. Thirdly, the simulated part of the curriculum should be aligned with the components that are being discussed during lectures and the clinical components of the curriculum.

The role of simulation is a dynamic process of continuous movement between theory, simulation and clinical exposure. There should be a free flow between the different components, though. This flow can be instructor-based training, where lecturers are involved in aspects of the simulation training, or it can be self-directed learning where students practice certain skills in the simulation centre in their own time. For instance, students can identify a problem with a certain skill while working in a clinical rotation. The student can then go to the simulation centre and practice that skill until it is mastered and before he or she returns to the clinical aspects with real patients.

Lecturers should identify teaching and learning needs that exist in the current curriculum. These needs e.g. rare diseases training, communication skills or acute medicine training can use simulation as instructional medium. Currently, it is essential to include the training of patient safety, leadership, group training and interdisciplinary training in the curricula and simulation can play an important role in the training of these aspects.

Lecturers are often hesitant to become involved in simulation training. This aspect was mentioned a few times during the semi-structured interviews as discussed in Chapter 4 (cf. Point 4.2.3.3). The fact that lecturers at the School of Medicine, UFS, are unfamiliar with using simulation in training was discussed in Chapter 5 (cf. Point 5.4.2.1 under the Category*: Unfamiliarity with simulation*). The establishment of train the trainer courses to help with the integration and implementation of simulation in the curriculum is an essential component of the process. The fears of lecturers to do simulation and the unfamiliarity of lecturers with simulation can be addressed with train the trainer courses. The role of train the trainer courses is illustrated in Figure 6.1.

It is essential that simulation integration into the curriculum is planned well. The integration of simulation in the current undergraduate curriculum is also represented schematically in Figure 6.1 which shows the vertical movement from Phase I to Phase III and where skills training and simulation fits in.

The horizontal integration of theoretical training, skills training and clinical training in clinical immersion is shown by means of the funnel in Figure 6.1, where gaps can be filled with simulation. There will be a continuous movement between the different components of theory, simulation and clinical practice with the aim to enhance undergraduate medical education and training. Simulation training has to form a spiral with various opportunities to develop skills and integrate theory and practice. It should be an open process in a continuous, stepwise and dynamic course of action where students as well as lecturers can move up and down the spiral to achieve excellence in teaching and learning. This correlates with the spiral curriculum model described in Chapter 2 (cf. Point 2.2.3)

The role and position of clinical simulation as additional component to the undergraduate medical curriculum at the UFS, by means of vertical integration from the first phase to the third phase of the undergraduate medical programme and the dynamic horizontal continuous movement between theory, simulation and clinical exposure was discussed and can form part of the implementation process of clinical simulation as enhancement of medical education and training at the UFS.

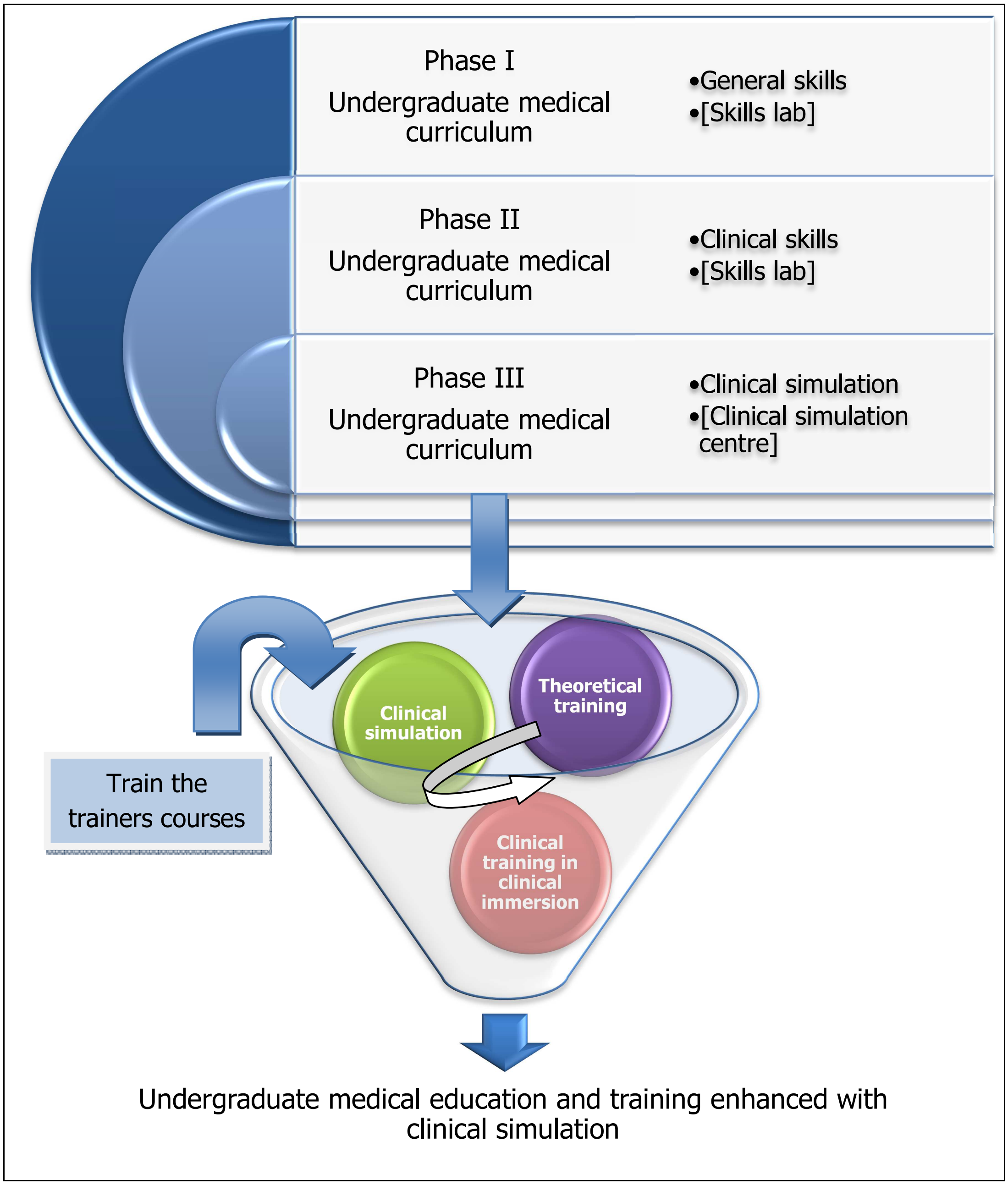


FIGURE 6.1 SCHEMATIC MODEL OF VERTICAL AND HORIZONTAL INTEGRATION OF SIMULATION IN THE CURRENT UNDERGRADUATE MEDICAL CURRICULUM, UFS [Compiled by the Researcher, Labuschagne 2011]

6.3 THE IMPROVEMENT OF CLINICAL SKILLS AND COMPETENCE BY MEANS OF THE INTEGRATION AND IMPLEMENTATION OF CLINICAL SIMULATION INTO THE CURRENT UNDERGRADUATE MEDICAL CURRICULA AS A REQUIRED COMPONENT

The improvement of clinical skills and competence with the aid of simulation are major advantages of simulation as an instructional medium and add an additional dimension to the curriculum. The discussions that are going to follow, will provide answers to the second research question: *"How can clinical skills and competence development be improved by the integration and implementation of clinical simulation into the current undergraduate medical curricula as a required component and not only as an optional activity?"*

The taxonomy as proposed by CNSH (2011:Presentation) and as described in Chapter 2 (cf. Point 2.2.4 and Figure 2.3), will be used for description purposes. This will be done with the view to emphasise how clinical skills and competence can be improved by the integration and implementation of clinical simulation into the undergraduate medical programme at the UFS.

Simulation as an *instructional medium*, in the undergraduate medical programme will help improve clinical skills and competence of the students. The first step is to create a non-threatening and friendly environment that contributes to learning. The non-threatening environment establishes and maintains an appealing learning environment, promotes discussions, identifies performance gaps and helps students improve performance and establish the skills they have acquired. A non-judgemental environment contributes to an overall non-threatening environment.

In the next section, the aspects of simulation modality, instructional methods and presentation of simulation will be discussed.

6.3.1 Simulation modality

A modality can be defined as a particular mode in which something exists or is experienced or expressed. Simulation modalities include procedural simulation, simulated patients, computer based simulation and simulation clinical immersion.

6.3.1.1 *Procedural simulation*

The basis for procedural simulation is simulators that allow for the training of psychomotor skills. Students are allowed to practise and master the skill of performing certain procedures before exposure to real patients in the clinical setting. Skills competence can be practised in a safe, non-threatening environment to improve the confidence of the students, before moving on to the clinical setting. Part-task trainers and medium fidelity simulators are especially useful for procedural simulation. Procedural simulation as essential part of a simulation centre for the School of Medicine, UFS, can play an important role in the practicing of procedures before students move to the clinical setting. Together with the use of virtual reality simulators, procedural simulation is a useful tool for the training of more advanced procedures like bronchoscopy or gastroscopy.

6.3.1.2 *Simulated patients (SPs)*

Simulated patients can be actors, patients or patient simulators (high-fidelity simulator) who play the role of a patient. This simulation modality is especially helpful in the training of communication skills, team work skills, suicidal and psychotic behaviours and the development of certain attitudes and mentorship. The recruitment, training and management of SPs are an important and essential aspect of simulation training with SPs. These aspects will be addressed in this chapter under the Point: ***Team composition*** (cf. Point 6.3.3.5).

6.3.1.3 C*omputer-based simulation (Flat-screen simulation)*

This modality makes use of a screen as interface through which students interact in a virtual, simulated environment. It is also known as flat-screen simulation. It is especially useful for the training of reasoning skills and clinical thinking. Computer-based simulation helps students work out management plans, problem lists and helps them justify their diagnosis. The integration and contextualisation of knowledge in clinical practise is a useful application for computer-based simulation. In the South African context, computer-based simulation can be a useful tool to address the needs of medical students from different cultures, educational backgrounds and educational needs, because they can work at their own pace and own time on cases, till they mastered the skills needed. With the multi-cultural composition of students at the UFS, computer-based simulation will provide an educational tool that will enhance the education and training of undergraduate medical students.

6.3.1.4 *Simulation in clinical immersion*

With simulation in clinical immersion, the clinical environment or work environment is reproduced. It could be simulated or real environments. This experience may involve actors, patients or patient simulators and is ideal for the training of clinical diagnosis, patient management and patient safety competencies (CNSH 2011:Presentation). In this case, students can practise before exposure to the real situation or real patients. In the South African context, where students have to function in primary care environments with limited resources, simulation of these settings can prepare them for these conditions. Here patient safety plays an important role, because students are exposed to high stress situations and learn how to manage these situations in the simulated environment, before going out into the clinical setting. Interdisciplinary team training programmes can be simulated with simulation in clinical immersion by creating realistic scenarios either in the simulation centre or even in the hospital setting, e.g. an intensive care unit, trauma unit or primary health care clinic. The implementation of simulation in clinical immersion will enhance education and training of undergraduate medical students at the UFS.

6.3.2 Instructional methods

The relevant instructional methods include self-directed learning and instructor-based learning and will be discussed in the following paragraphs.

6.3.2.1 *Self-directed learning*

Self-directed learning is an important aspect of simulation training. There are two aspects, namely computer-based learning and practising of clinical skills in own time. When self-directed learning is more centred on problem-solving, students find it more applicable and it also excites their curiosity in a subject. The more self-directed the experience, the higher the comfort level and the better the learning outcomes of students. Stillsmoking (2008:768) mention four types of adult learners:

- Kinetic (hands-on, have to touch and manipulate)
- Audio (hear, listen to stories and read out)
- Visual (movies, PowerPoint, creator of drawings and maps)
- Intellectual (reflecting and making connections, think trough problems).

It is important to remember that students receive clear guidelines on what is expected of them during self-directed episodes, as well as indications on whether they succeeded.

The use of simulation addresses all four these aspects and it is therefore a very useful and important tool that can be applied in self-directed learning. By addressing the needs of all student types, simulation gives a sense of satisfaction to students, because they learned to analyse and solve a problem in the medium they feel most comfortable in.

6.3.2.2 *Instructor-based learning*

Instructor-based learning with simulation represents a cycle between simulation and feedback and can be summarised in terms of Kolb's four stage model of experiential learning, as quoted by Glavin (2008b:755). Concrete experience (scenario that encourages the student to focus on a particular concept that is related to the outcomes) → Observations and reflections (during debriefing) → Formulation of abstract concepts (during the debriefing or feedback stage) → Testing implications of concepts in new situations (active experimentation can be difficult on real patients, but is allowed in simulation). The reflective simulation framework as discussed in Chapter 4 (cf. Point 4.3.4.3 and Figure 4.3) can be applied here.

Instructor–based learning is an essential instructional learning method in simulation training. Debriefing forms an essential part of the cycle, with active involvement from the instructors or lecturers. The lecturers at the School of Medicine, UFS will have to be trained in the methodology of running scenarios, simulation and the art and science of debriefing, when clinical simulation is implemented as medium of instruction.

Debriefing

Debriefing was defined as a facilitated reflection. Practically it is a conversation to review the clinical experience, and to evaluate the actions, thought processes and emotional experiences of the participants to improve future performances.

Debriefing is an integral part of the feedback process. It is essential for the smooth and effective functioning of a simulation centre, that lecturers master the art of debriefing. The use of effective feedback and debriefing, will promote learning and reflection after simulation-based training. The DASH© elements that are conductive to debriefing were mentioned in Chapter 2 (cf. Point 2.4.1.1). To recap:

- Establishing an engaging learning environment
- Maintaining an engaging learning environment
- Structuring the debriefing in an organised way
- Provoking engaging discussions
- Identifying and exploring performance gaps
- Helping students to achieve and sustain good future performance.

In order to *establish and maintain an engaging learning environment*, students need to experience the psychological safety that they will not be punished or humiliated for voicing their opinions, and ideas, or ask questions or when looking at their mistakes.

The debriefing *structure and function* can be summarised in Figure 6.2 as adapted from Eppich (2011:Presentation). The process can be explained as follows: Description of the reactions, succeeded by an analysis of the reaction and then the application via integration. Examples of phrases that can be used are included in the summary to explain the concepts.

The *discussion and reflection* can be encouraged by using open-ended questions; rephrasing questions, rather than answering them yourself; being curious and using silence to make students think about a matter. The use of video recordings can help to demonstrate good practise. The video should, however, not be used as evidence against the participants.

The *performance gaps* should be identified by the lecturers or the persons responsible for the debriefing and they should help to fill the gap as explained in Figure 2.3 in Chapter 2. The end result is that students are helped to *achieve and sustain good future performance.*

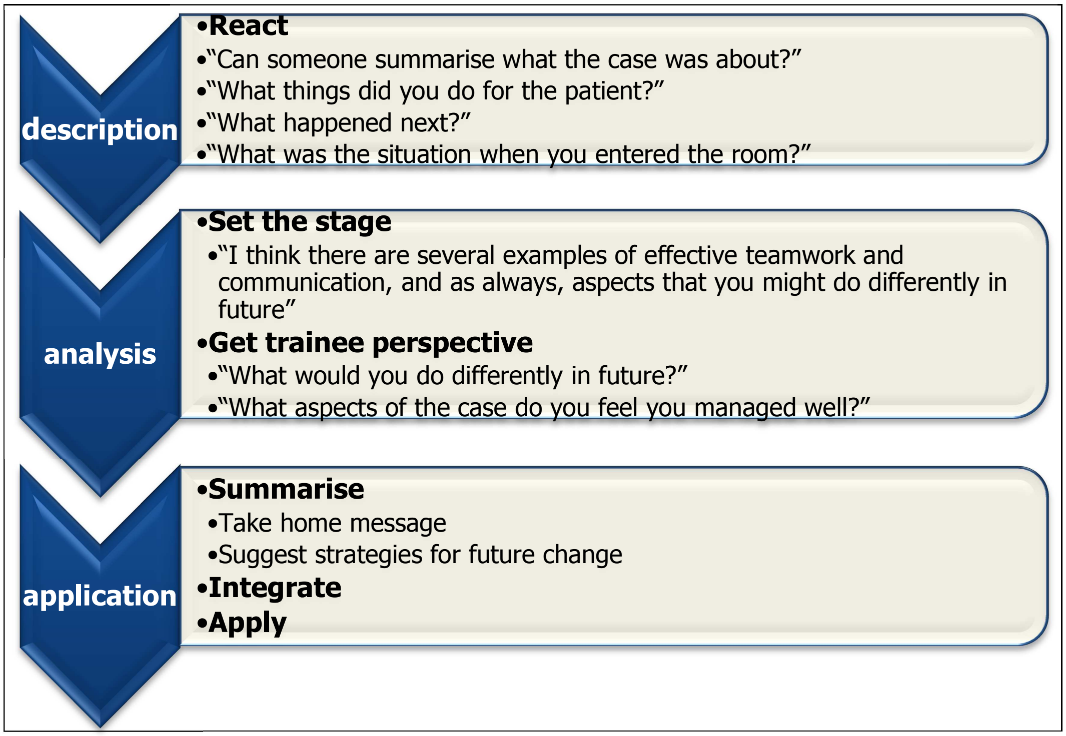


FIGURE 6.2 DEBRIEFING STRUCTURE AND FUNCTION WITH EXPLANATORY PHRASES (ADAPTED FROM EPPICH 2011:PRESENTATION)
[Compiled by the Researcher, Labuschagne 2011]

6.3.3 Presentation

Presentation of simulation include feedback, fidelity, simulator type, scenarios and team composition.

6.3.3.1 *Feedback*

Feedback is an integral part of simulation training and comprises communication to review an experience, or analyse actions, thought processes and emotional states to improve future performances. It helps students increase their knowledge about a performance and help them set goals for future performances. Feedback can be given by the individual himself/herself, the lecturer, the other students or in a structured group (debriefing). The feedback process can be scheduled during the simulation, directly after the scenario or be delayed.

6.3.3.2 *Fidelity*

Fidelity or trustworthiness of simulation can be defined by the degree to which simulation replicates reality. Fidelity in simulation is multidimensional and is determined by the appearance and feel of the equipment used, environmental aspects and psychological fidelity.

The learning objectives and the student's level of expertise establish the minimal characteristics of real world features needed for an educational experience. Three kinds of fidelity is described in the literature and include physical (patient) fidelity, environmental fidelity and temporal fidelity (CNSH 2011:Presentation).

Physical fidelity can be defined as the realism of the patient that is simulated. Environmental fidelity refers to the realism of the elements not directly connected to patient, e.g. setting, staff, equipment and supplies. Temporal fidelity in turn refers to the way time flows during the simulation (CNSH 2011:Presentation). The aspects of fidelity in simulation can be summarised in Figure 6.3 as adapted from CNSH (2011:Presentation).

Fidelity features can be determined by the accuracy and choice of simulation for a specific outcome. In planning a scenario, fidelity plays a vital role and it is determined by the specific outcome of a session.

Physical fidelity is determined by the simulators or patients. In planning a scenario, the outcomes will determine the fidelity. A part-task trainer can be used if a clinical skill is being taught, but if a multidisciplinary emergency room situation is simulated, one would need a patient simulator in an emergency environment with emergency room equipment and supplies (environmental fidelity) and in real time (temporal fidelity). Actors and real patients contribute to the physical fidelity of scenarios and should be utilised fully.

Environmental fidelity as variable should not be neglected, because it contributes to the overall fidelity of a scenario. Clothes, leaves, smoke, darkness and smells play a role in environmental fidelity of scenarios (Gisin 2011:Presentation), specifically in the connection a student should make between simulation and real situations. Students can learn that it is not always easy or ideal circumstances; they should learn to adapt to the conditions.

In the South African context, environmental fidelity plays a cardinal role in scenario planning and execution of scenarios, because students should be exposed to the conditions in the primary health care clinic in the rural countryside with limited recourses. Students can be exposed to a traditional house doing a home delivery, under very difficult conditions. Environmental fidelity thus plays a decisive role in the training of medical students, because they need exposure to conditions that are not always perfect. Students are trained in tertiary hospitals, but it is expected from them to work in rural areas with limited resources. Clinical simulation can enhance education and training of undergraduate medical students at the UFS because simulation can bridge the gap between the training institution and the real health care world out there.

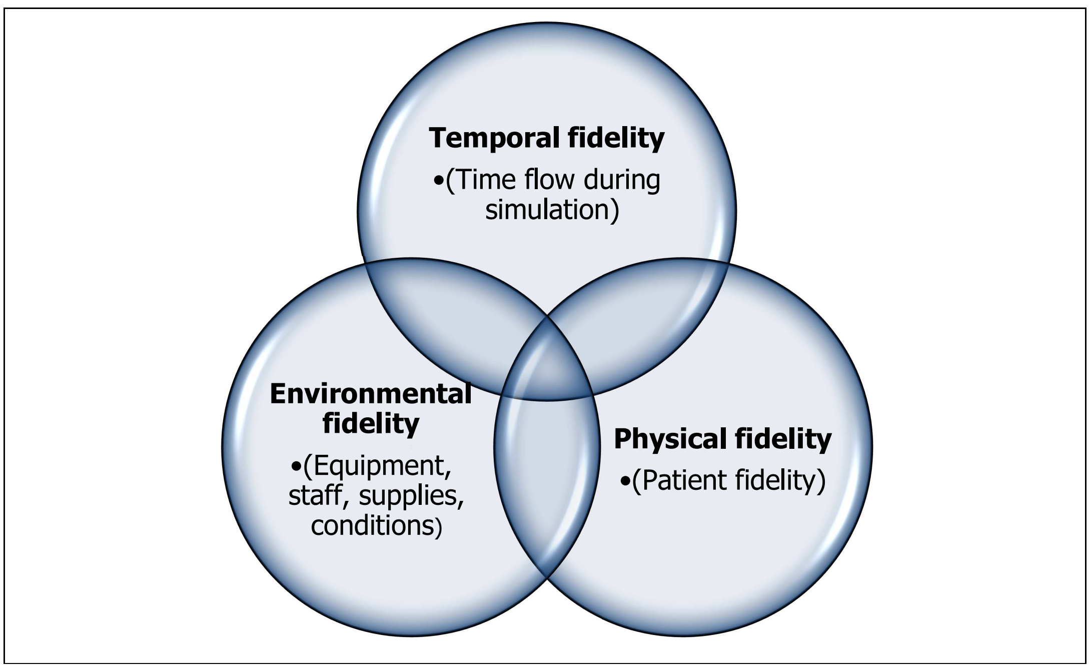


FIGURE 6.3 FIDELITY ASPECTS IN SIMULATION (CNSH 2011:PRESENTATION)

Temporal fidelity refers to the time flow during a session. What is important in this regard and was also mentioned during the semi-structured interviews, is that with simulation it is possible to stop a scenario, discuss teaching points and then continue. If the students are inexperienced and new to the training, the whole process of the simulation can be slowed down till they master basic skills where-after the scenario can be run in real time. This point is key to creating a non-threatening environment that contributes to learning.

6.3.3.3 *Simulator type*

The different kinds of simulators can be classified as discussed in Chapter 2 (cf. Point 2.5.4.1) and can be summarised as in Figure 6.4 for descriptive purposes; it is linked to simulation modality (cf. Point 6.3.1).

The different simulator types will be discussed under the following points in the subsequent section namely, description, examples, uses, advantages and disadvantages and the way in which they can be utilised for assessment.

Procedural simulation includes the use of the following simulators: part-task trainers, virtual reality simulators, patient simulators and organic cadaver or animal material. Each one of the entities will be discussed.

<u>Part-task trainers</u>

Part-task trainers are synthetic simulators that replicate a human system or a part of a system. *Examples* of part-task trainers are: oro-pharynx, trachea and lungs for the training of intubation; or a pelvis for training of a gynaecological examination. There are a great variety of part-task trainers available on the market.

The main *use and aim* of part-task trainers are to help with the practice of physical manoeuvres or procedures. They are mainly used for skills training. In a simulation centre, the largest component of simulators should be part-task trainers.

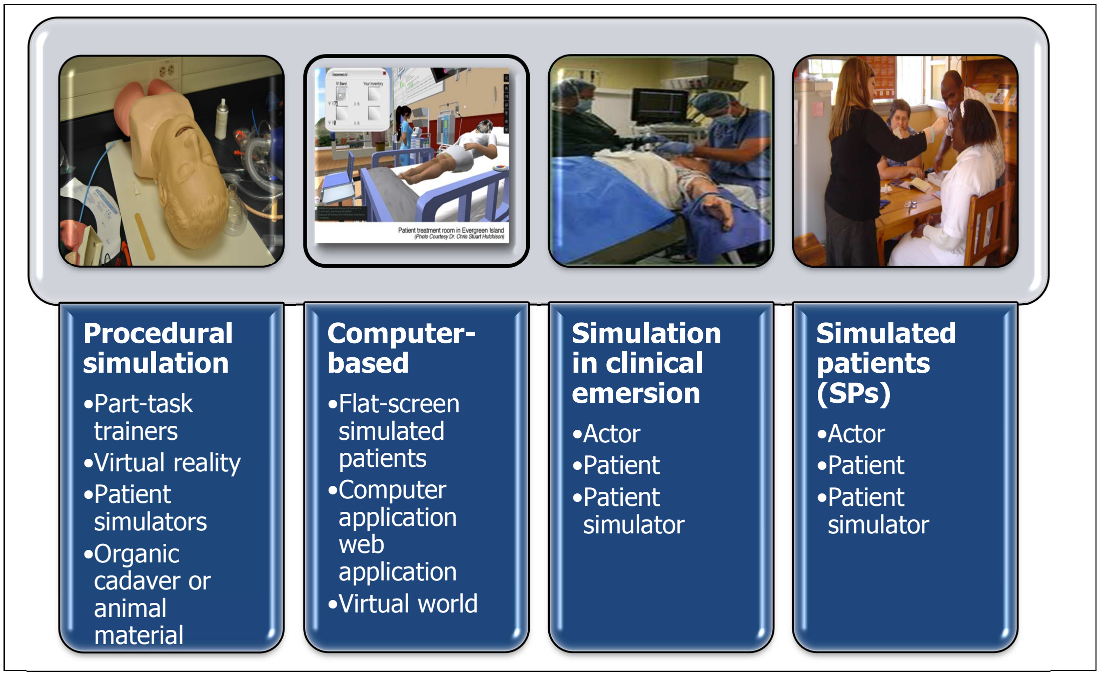


FIGURE 6.4 CLASSIFICATION OF SIMULATORS USED FOR THE SIMULATION MODALITIES
[Compiled by the Researcher, Labuschagne 2011]

There are *advantages* to using part-task trainers, because they are relatively cheap in comparison to high-fidelity simulators. Groups of students can use a part-task trainer at the same time and they are excellent for self-directed learning and mastering skills or aspects of a procedure. At the skills laboratory of the School of Medicine, part–task trainers are already utilised for education and training and the use can be expanded to the simulation centre. Homemade simulators can be very useful and relatively cheap to make and in several of cases facilitate mastery and goal attainment just as well. These simulators fall in the category of part-task trainers.

The *disadvantages* of part-task trainers are that they are sometimes not that realistic specifically the tactile components, and especially mucous membranes are not that realistic. Also some parts need to be replaced on a regular basis, because of wear and tear. The fact that most of the simulators are not available with a dark skin puts limitations on the training of students in South Africa, especially for the practising of setting up of intravenous infusions. Manufactures can be requested to darken the skin shading.

Part task-trainers can be used for the *assessment* of clinical skills and especially for the assessment of specific skills where it can be difficult to use, for instance, for urinary catheterisation or gynaecological examinations. Some of the part-task trainers are equipped with pressure sensors to assess the internal examination and pressure exerted by the student on certain parts. The future use of part-task trainers in assessment will definitely improve and they will be used more and more, as technology advances.

Virtual reality simulators

Virtual reality simulators are synthetic simulators that are used for skills training, which provides students with a realistic interface and outputs through a computer. *Examples* of virtual reality simulators are bronchoscopy simulators, laparoscopic surgery or microsurgery.

These simulators are specially *used* for the training of specialised skills and their use in undergraduate training is therefore limited, but for postgraduate registrar training, these simulators have useful and multiple applications.

The *advantages* are that registrars can train and practice a procedure on the simulator before operating on a real patient. The realism of these simulators are good and the perceptible qualities and the visual properties can be compared to the real life surgery. With the endoscopy simulators, the realism is excellent and the simulator can bleed or mucous can even be a hindrance. The main aim is to practice specialised skills so that the trainee can become acquainted with the equipment and the procedure. This has a huge impact on patient safety and can prevent medico-legal risks for hospitals and doctors.

The *disadvantages* of virtual reality simulators are that they are task specific, and their use is highly specialised and not ideal for use at undergraduate level. The use of these virtual reality simulators has an initial financial impact on a simulation centre, but they are still cheaper than high-fidelity simulators. furthermore, they are not as robust as part-task trainers, and IT problems can occur.

Another use of these virtual reality simulators is for *assessment* and because it is computer generated, it is non-biased and objective. It is also very useful for self-directed learning and self-assessment.

Patient simulators

Patient simulators are life-size mannequins that can simulate several behaviours and characteristics of real patients and can respond to intravenous medication, talk, have pulses and produce the appropriate physiological reactions to actions of students. These *high-fidelity simulators* can be *used* for the training of physiological scenarios e.g. emergency room situations, anaesthesia or medical emergencies like ketoacidosis.

The *advantages* are numerous, especially in the training of emergency conditions that students are not exposed to during undergraduate training. These simulators teach students physiological and pharmacological aspects that are not easy to teach on real patients. Students can practice rare diseases, emergency situations, team training and inter-disciplinary training scenarios without harm to patients, ensuring patient safety. These simulators add a "wow-factor" to the simulation centre. Some of the patient simulators are wireless, transportable, programmable and can be controlled with remote control.

The *disadvantages* are that these patient simulators are very expensive. The maintenance of the high-fidelity simulators can be complicated. Often a special technical staff member is needed to work the simulator, because it can be challenging to run them. For South Africa, the servicing and maintenance of the simulators is a major consideration, because it can be very expensive to fly in a technician. Therefore, a service plan with the manufacturers or companies selling the simulators should be a consideration and the detail of who is going to pay for service or repairs should be stipulated in a contract. There are some patient simulators that are not wireless, meaning that cable links need to be maintained in the simulation room rendering the simulator to be static. These are important factors to take into account, especially if the simulators are to be used in clinical immersion.

The high-fidelity or patient simulator can be used for *assessment* opportunities like team work, leadership, interdisciplinary assessment and recertification assessments.

These simulators can provide a minute to minute report on the actions of the students and this can give an objective assessment of the scenario and the factors involved. It can be used during the debriefing session. The acquisition of high-fidelity simulators for the simulation centre of the SoM, UFS, must be explored because it is an essential component needed to enhance undergraduate medical education and training at the UFS.

Organic cadaver or animal simulators

Organic simulators involve the use of organic material for skills training. *Examples* that can be used include pigs eyes for training of ophthalmic surgery, or cadaver tissue for dissection and training of skills in preparation of new surgical procedures.

The *advantages* of animal material is that it is readily available, affordable and easy to use.

Cadaveric material is not so readily available if one is not near an anatomy department. Another problem is the ethical and legal issues regarding the use of human tissue, which can be *disadvantageous*.

These tissues can be used for *assessment* in the same way as part-task trainers.

Computer-based simulators include virtual patients, computer (Web) application and virtual world.

Virtual patient

A virtual patient is a computer-based programme that allows the student to interact with a pre-programmed patient through a screen-based interface i.e. a computer screen. This is also known as *flat-screen simulation* and is usually *used* to train students clinical reasoning skills and decision making. There are possibilities that flat-screen simulation can be operated through the BlackBoard® learning management system currently in use by the UFS.

The *advantages* of a virtual patient are numerous and will be discussed next. Firstly, it is computer-based, with the result that it is cheaper to start up and to maintain. Maintenance can be done by using local IT staff or repairs and upgrades can be via the Internet. Secondly, a virtual patient have great practical value, because students learn how to apply prior theoretical knowledge, it also helps them with reasoning skills, compiling a problem list and motivating their diagnosis. Furthermore, students can do their cases in their own time so lecturers save time. Flat-screen simulation is especially beneficial in disciplines like psychiatry, psychology and conditions where students have to make a diagnosis through reasoning and critical thinking, but it can be applied to any condition or any speciality.

Flat-screen simulation is different from book learning and the students usually enjoy it, because it is outcomes driven. Students are usually in favour of this kind of learning, because it is fits in with the adult learning principles mentioned in the section on self-directed learning (cf. Point 6.3.2.1). The more self-directed the learning, the more comfortable students are and the better the outcomes. Students usually like flat-screen simulation (virtual patients), because they learn how to analyse problems, learn to reason about problems and it gives them a great sense of gratification when they solved a problem.

Lastly, this tool can be developed for different levels of students, making it very versatile. It can be used for first-year through fifth-year students and even at postgraduate level, applying the same programmes and the same equipment. Flat-screen simulation can be used to identify teaching and learning needs in the curricula, resulting in better teaching and learning of medical students at the UFS.

There are not many *disadvantages* that can be attributed to this kind of simulation, but the fact that one uses technology can cause problems in terms of accessibility to computers and the Internet, and the programming and cost to acquire the programmes. The fact that the School of Medicine, UFS is starting the laptop initiative to supply first year medical students with laptops can be advantageous in this regard. The fact that many programmes are developed in first world countries for first world circumstances, limits the applications for the use in South Africa and developing countries. This can be a point for development in future, namely to develop virtual patients for developing countries and South African conditions and patient profiles.

Flat-screen simulation can be used for *assessment*, because these programmes can generate a minute-to-minute analysis of what students did. Students can hand in their best effort for assessment, resulting in better outcomes and learning more, because they do the case over and over, in their own time. Reasoning skills, attitudes and clinical thinking can be assessed, but practical skills and competence cannot be evaluated with virtual patients (flat-screen simulation).

Computer (Web) application

Computer application is computer-based programmes, delivered locally or through the Internet and reproduces actual systems or equipment entirely or in part (CNSH 2011:Presentation). A Web application makes use of a Web browser to run the programme or application. The programmes can be run through intranet or Internet. The developer of a programme uses a client-server environment in which multiple computers share information through an Internet server.

The *advantages* are that the developer of the programme do not have to write programmes that are compatible with different computers or programmes, because it runs through the Internet server.

The *disadvantages* of web applications are that they depend entirely on the availability of the server delivering the application. If there is interruption of the Internet connection, sessions can be terminated without warning and work can be lost. Total security can also not be guaranteed.

There are possibilities for *assessment*, but at the moment, they are very limited and not recommended. Web application can be used for self-directed learning, and can be put to good use by the SoM, UFS. Assessment may be an option for the future, but at the moment it is not recommended to be used by the SoM, UFS.

Virtual world/ Virtual reality

Virtual world is a computer-based programme that allows the student to be immersed, through a screen-based interface in the digital recreation of an environment or setting.

The student often interacts with the simulation through a digital persona or "avatar" (CNSH 2011:Presentation). The uses of the virtual world is to recreate a virtual world (i.e. virtual hospital or virtual clinic). The student does a simulation in a virtual world and the student can be like a virtual immersion.

The *advantages* are that students can be "transposed" to any setting, and any condition can be created. The opportunities are almost unlimited. The fact that it is computer-based makes it relatively cheap and students with Internet can use it anywhere. If students are on community rotation, they can still do simulation - all they need is a computer and Internet connection. In most rural settings this is possible. With the laptop initiative of the UFS, more students are enabled to use virtual simulation as additional educational tool.

The *disadvantages* are that it is Internet and computer dependent and it can therefore be a problem to access in very remote areas. The fact that students interact with a computer can have a limiting effect on the interpersonal skills development and communication. Virtual reality programming and software are very expensive. High levels of in programming skills is required if such programmes are to be developed in-house.

There are possibilities for *assessment* with a virtual world simulation, but it can only test reasoning skills and attitudes. There is no practical skills testing or evaluation. The opportunities for assessment is limited, but must be evaluated as option to be used at the SoM, UFS.

<u>Actor</u>

This is a person that takes up a specific role during a simulation session. Actors can be real actors that are trained to act out a specific scenario or it may be another student doing role play or an accomplice. Actors can be *used* to play a specific role in a scenario, for instance a difficult family member, breaking bad news to a patient or psychotic or suicidal behaviours.

The *advantages* of using actors are that they can be trained to act very realistically and they can actually cry or distract a student during a scenario. Because they are trained, they can be taught to interact and adapt to different directions a scenario may take. They are usually students from local drama departments and are usually readily available. Professional or amateur actors can be employed.

The *disadvantages* are that they can sometimes be unrealistic, for instance a young twenty-year old acting as a sixty year old patient, or specific clinical signs can be difficult to replicate. These actors are usually paid per hour, which can become costly. Because students are often used, it may be possible that the medical students know them, because they may share hostels, and that may have an effect on the realism of a scenario. If the actors are not trained well, they may put students on the wrong track, increasing the chance that a scenario may fail.

Actors are excellent to employ in *assessment* opportunities, because they are trained and they can even be trained to do the assessment of students. They can be trained to act out certain behaviours or reactions to certain actions of students, increasing the realism and making it possible to assess students better on behaviours and attitudes. The actors are excellent to use for the assessment of history taking or psychiatric conditions. In team training sessions or interdisciplinary sessions, actors can be asked to distract students during a scenario for instance the hysteric family member or the "helpful" onlooker. Actors can play valuable roles in the assessment of students and can be employed for formative and summative assessment opportunities.

<u>Patient</u>

A patient can be requested to take on his or her own role as a patient during a simulation session.

The *advantages* are that they are real, they have the condition with actual symptoms and signs and they experienced the condition themselves, all adding to the credibility of the scenario. Patients play a valuable role in the education and training of undergraduate medical students at the SoM, UFS and should *never* be replaced by simulators, because there are not many simulators that can improve on real patients.

The *disadvantages* are that the patient often experience fatigue or symptomatic discomfort, resulting in a patient that cannot be used in more than one simulation session. The symptoms and signs may change, which may influence scenarios and assessment opportunities. Another disadvantage is that there are not always a patient with a certain condition available for a scenario on a specific day. Patient safety can also be a problem, especially with patients with life threatening conditions. One should also take into account the ethical considerations involved in exposing a real patient to repeated examinations by inexperienced students.

Patients have been used for *assessment* of medical students for many decades and it is still the best option to assess students on real patients. They have actual symptoms and signs and they are the real connection between the medical school and the real health care world outside.

The simulators used for the ***simulated clinical immersion*** as well as for ***simulated patients*** are actors, patients and patient simulators as explained in Figure 6.3.

6.3.3.4 *Scenarios*

Scenarios are used to demonstrate different clinical situations and outcomes. Scenario planning is determined by the curriculum and should be aligned with the undergraduate medical programme at the UFS. Scenarios help students to integrate and contextualise the theoretical knowledge and the skills developed for application in the clinical situation. The vehicle to reach this goal is the establishment of scenarios as basis of a simulation. The scenario forms the setting within which the simulation can take place.

The planning and preparation of scenarios are important; for instance, the technical preparation should be done well in advance and the rehearsal of scenarios are essential for the success of a scenario. A margin for adaptability and change in a scenario must be built in so that changes can be made during a simulation session for example if the context changes or a technical problem arises during the session. Realism plays a role in scenario planning and should be taken into account when planning a scenario. Simulation staff needs to be pre-briefed by the lecturer on the specific session, on what the objectives are and if there are specific needs for a specific scenario. These factors contribute to the success of a simulation session.

The setting for the scenarios can be in a dedicated simulation centre, clinical site, simulation in motion and simulation in outreach. The different settings will be discussed with their advantages and disadvantages.

Dedicated simulation centre

The *advantages* of dedicated simulation centres are that the equipment is permanently installed and some of the high-fidelity patient simulators are not wireless and permanently installed, making it impossible to transport these simulators. The staff are dedicated to simulation training, with the result that everything is running more smoothly during a scenario. Scheduling can be done, contributing to an organised setup without disruptions or conflicting appointments. Many of the facilities are multifunctional and can be changed for different scenarios, making the simulation centre more versatile. The simulation centres are usually equipped with audio-visual equipment for recordings and use in debriefing sessions.

There are also *disadvantages* to a dedicated simulation centre. The realistic working environment can be difficult to recreate; for instance, a primary health care facility in rural South Africa. To recreate a scenario with the supplies and equipment from different institutions can be expensive or impossible. Students perform better in a familiar environment, and often the simulation centre can be unfamiliar, especially with recertification or refresher courses. Sometimes it can be difficult for clinicians to get free time to attend the training sessions in a simulation centre. In South Africa, the distances to travel to a simulation centre for training can be a challenge and it can become expensive if a few students or staff members have to travel to the centre.

Simulation in clinical site

Simulation scenarios can be developed in a clinical setting for instance a hospital ward, clinic or intensive care unit. The simulation can be temporary or permanent. The simulation is also described in the literature as "*in-situ*" simulation. With the proposed simulation centre close to Universitas Hospital and on the same level, simulation in clinical site can easily be employed in the scenario planning of the undergraduate medical programme of the UFS.

The *advantages* of clinical site simulation is that the simulation is run in the actual workplace, with real equipment and supplies from that specific clinical site. The clinicians are usually close by and can easily attend the sessions. The advantages of having clinical site simulation is that the staff will start to experience simulation training as "normal" and promoting patient safety. If there were adverse events in the ward or clinic, it can be recreated with simulation, and the students or staff can learn through this simulation and the debriefing, which can double as debriefing for the adverse event.

The *disadvantages* of clinical site simulation is that it can be problematic because the clinical site may be needed for real patients; it can be upsetting to bystanders in a busy ward setting where staff can be called away for normal clinical work in the ward. It can be difficult to do the setup in a remote place with challenges like power supply and audio-visual equipment.

Simulation in motion

Transport of patients, especially critically ill patients, is difficult and challenging. The *advantage* of simulation in motion scenarios prepares students for these difficult circumstances. It helps to replicate patient handover between health care teams e.g. from theatre to the ward or from the ambulance to the emergency room staff. These simulations can help to evaluate the normal flow of patients and the normal functioning of a unit.

Some of the *disadvantages* can be that there should be multiple simulation sites. Some of the patient simulators are not wireless or the wireless systems can cause problems in some of the simulation sites.

Simulation in outreach

Simulation in outreach is where simulation experts are taken to the peripheral health care facilities to help with the training of staff in their own setting. The *advantages* are that the staff can be trained in their own clinical setup, with their own equipment and supplies. This can be an important part of simulation training for refresher courses, especially in the South African setup. Health care facilities with a poor track record for patient safety can be identified and staff training sessions can be organised with simulation in their own facility Permanent truck-based simulation teams can go on permanent outreach, moving from health care facility to health care facility. These aspects can contribute to the improvement of patient safety. Collaboration of a simulation centre at the School of Medicine, UFS and for instance the Department of Health (DoH) can play an important role in training, recertification of staff members and interdisciplinary training. This can be a form of income for the simulation centre.

The *disadvantages* are mainly costs, difficulty in setting up and uncertainty regarding the circumstances and standards in the local health care centre. The fact that expensive simulators and equipment are transported on a regular basis, can be high on the wear and tear and maintenance. Internet and IT can be problematic in rural areas.

6.3.3.5 ***Team composition***

The importance of teamwork is to improve patient safety. Simulation can play a very important role in the training of teamwork, and interdisciplinary collaboration. These simulation opportunities help students recognise the interdependency and the expertise of each profession. Teamwork helps students see the holistic approach to patient care. Simulation can play a very important role in the training of these skills. At the Faculty of Health Sciences, UFS, there is a simulation centre for the School of Nursing, a skills development centre for the School for Allied Health Sciences and a skills lab at the School of Medicine while a new clinical simulation centre will be developed and implemented in future. Interdisciplinary teamwork can play a very important role in training of the undergraduate and postgraduate students of the three schools. For the assessment of groups, a group of assessors is needed and if possible, at least one from each discipline in the team to be evaluated.

Team training sessions are important aspects of simulation and simulation training. Teams can be comprised of different groups. The groups can be members of the same profession, inter-professional teams, work units, actors or confederates.

Groups with members from the same profession group

The training of skills among members of the same discipline is important and by arranging teamwork sessions, these skills can be developed and improved. The aim of simulation sessions for groups from the same group or discipline is the development of inter-collegial communication skills, attitudes, leadership, situation monitoring and task assistance. It is important for students to see that colleagues for example, from surgery, anaesthesia or family medicine, are working in a team to promote patient care and patient safety.

Interdisciplinary teams

Interdisciplinary teams usually comprise members from two or more different professions. The development of inter-disciplinary teamwork training will improve collaboration and recognition of interdependency. The skills that are trained include: leadership, communication, situation monitoring and task assistance. The training of students from different professions are usually in isolation, resulting in students that are unfamiliar with the training, capabilities, functions and demarcation of duties of the other profession. The students are often exposed to the other professions for the first time in the clinical situation. The integration of interdisciplinary simulation scenarios in the curriculums of all three schools will prepare students from all professions for future clinical collaboration. Interdisciplinary team training will break down the training that often happens in silos.

Work units

Teamwork can also comprise teams from work units. An emergency room team or operating theatre team can use simulation to improve teamwork. Simulation can play an important role in the establishment of team cohesion and enhance team performance and patient safety, especially in emergency medicine. Students can also be incorporated in the work unit groups; for instance, if they rotate in the trauma unit, they can be included in these training sessions. The timing of simulation sessions for work units can be at a regular interval, randomly or after an adverse event in the unit.

Actors and confederates

Actors and confederates, acting as SPs constitute another group with special needs and training methods and styles, which need to be trained in a simulation centre. The SPs are often student actors, professional actors or members of the public that are recruited. They have special and different needs and capabilities. The methods of learning differ from generation to generation. Pensioners have more time at hand and can attend longer training sessions. Educational, social and cultural background all have an influence on the training of SPs and should be taken into account.

Actors and confederates need intensive training to be utilised to full capacity. When training SPs a core group of persons, regularly used for training and assessment sessions, is needed. This helps to orientate and put newcomers at ease. The core group usually comprises 10% of the group needed for a session.

Aspects in the training of SPs include:

- Didactic training, where a case is read out aloud, with discussion of the case and reading through the checklist.
- Independent training at home where SPs are allowed to read through the material at home and prepare themselves.
- Interactive training where SPs can be trained with role play or watching a video with discussion of the case, clarification of the checklist, checking the scoring and instructions concerning the body language.

The trainer of the SPs should make sure the SPs understand the cases, know what the students are going to do, what level of knowledge and skills to expect of the students and where and when the session will take place. SPs are usually paid for the sessions. In the USA the payment is approximately $16 per hour (IMSH 2011).

The actors and confederates are a special group with special training needs. The training of SPs can be a fulltime job and a dedicated person is needed for the recruitment, training and feedback to the SPs (IMSH 2011).

6.3.4 Summative discussion

The improvement of clinical skills and competence by means of the integration and implementation of clinical simulation into the current undergraduate medical curricula as a required component was discussed by means of the CNSH guidelines working group's taxonomy and conceptual framework for instructional design and media selection. The application of aspects for the South African situation was discussed and suggestions for a simulation centre for the UFS curriculum were made.

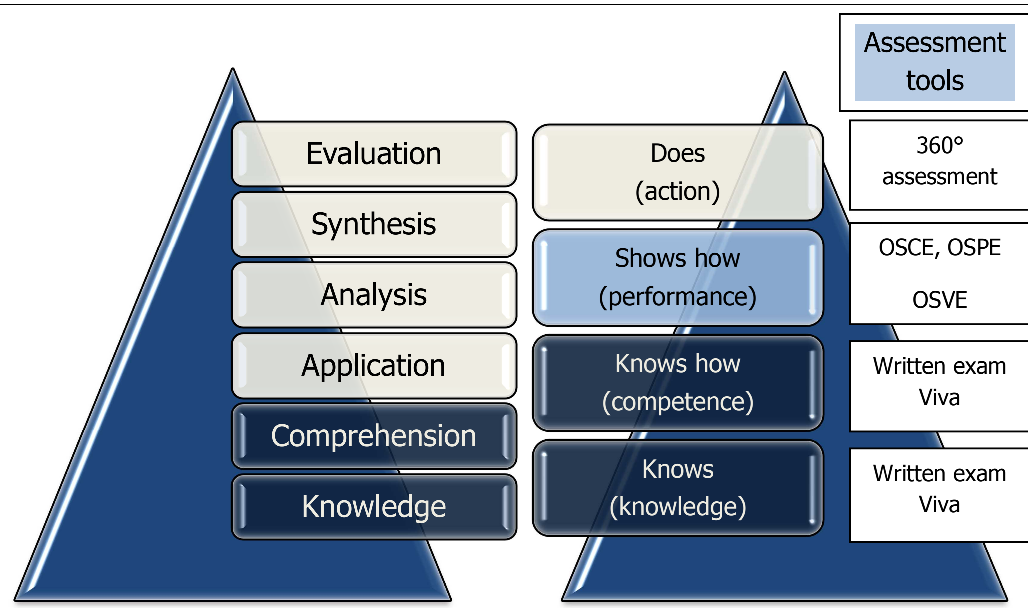
6.4 THE ASSESSMENT TOOLS AND CRITERIA FOR ASSESSMENT OF CLINICAL COMPETENCE OF UNDERGRADUATE MEDICAL STUDENTS, IN A SIMULATION CENTRE

For a student to learn, assessment is required. Assessment has the function of testing the knowledge, skills and attitudes of students, it also helps teachers measure the effectiveness of their teaching; and it ensures patient safety. Patients are the end clients of medical schools and to satisfy them, medical schools should train students to be competent doctors. Without assessment, students would not know what they know and what their competencies are, lecturers would not know how effective the training is and the patients could as a result lose confidence in the training ability of medical schools. This section will provide some answers to the third research question: "*What are the assessment tools and criteria for assessment of clinical competence of undergraduate medical students, in a simulation centre?*"

6.4.1 Background

When using simulation as assessment tool, students interact with the simulators and they are judged on the quality of their performance. Standardised patients (SPs) are one of the most popular simulation modalities used for assessment. SPs can be actors, real patients or patient simulators (high-fidelity manikins). Scores are based on checklists completed by SPs or by a lecturer. According to Pugh (2008:658), high-fidelity simulation has many features that make it attractive for use in higher order thinking skills testing as described in Chapter 2 (cf. Point 2.4.1).

In Figure 6.5, a comparison is given between Bloom's Taxonomy and the assessment of clinical skills of Miller (Miller 1990:S63), to explain the higher order thinking skills. According to Bloom, the higher order thinking skills are application, analysis, synthesis and evaluation and the lower order skills are knowledge and comprehension. Knowledge and competence are the lower levels on Miller's pyramid. Methods to test skills and performance generally falls in the performance ("Shows how") category. Assessment tools to assess the levels of the pyramid includes: written exams, viva, OSCE and 360° assessment. These aspects are summarised in Figure 6.5.



Bloom's Taxonomy **Assessment of clinical skills of Miller**

- Knowledge and comprehension: Lower order thinking skills
- Knows and knows how: Lower order clinical skills
- Methods aimed at skills and performance testing falls into the "shows how" level

FIGURE 6.5 COMPARISON BETWEEN BLOOM'S TAXONOMY AND MILLER'S PYRAMID FOR METHODS OF ASSESSMENT IN MEDICAL EDUCATION AND ASSESSMENT TOOLS

[Compiled by the Researcher, Labuschagne 2011]

Simulation devices can be used to support the different assessment tools. The simulation devices used for written examinations and viva (oral questioning) include computer based assessment. OSCE (objective structured clinical examination) OSPE (objective structured practical examination) and OSVE (objective structured virtual examination) assessment can make use of the following simulation devices: part-task trainers, virtual reality part-task trainers, SPs (actors, patients or patient simulators), simulated environments and fully integrated scenarios. Currently the forms of assessment that are already in use for assessment of undergraduate medical students at the School of Medicine, UFS include: written examinations, oral questioning, OSCE, OSPE and SPs. To incorporate simulation into these forms of assessment should be investigated and implemented where possible. The 360° assessment, is a fully clinical assessment of a candidate when functioning independently in a clinical practice. This *action* component of professional behaviour is clearly the most difficult to measure accurately and reliably (Miller 1990:S63).

There should be a clear distinction between training and assessment, students should feel safe in the simulation environment. Simulation is an effective tool for assessment, but not for the first time students are exposed to simulation, because people do not behave naturally in that environment and it would not be an accurate expression of their ability.

Another aspect of simulation training and assessment is debriefing. Debriefing is considered the "heart and soul of simulator training" (Dieckmann *et al.* 2008:667). Debriefing forms part of the feedback process and can be applied to formative and summative assessment. The features of debriefing was described earlier in this chapter (cf. Point 6.3.2.2). Assessment with simulation cannot be done without debriefing. At the Center for Medical Simulation in Cambridge, a system for "Debriefing Assessment for Simulation in Healthcare" (DASH©), was designed to allow debriefings from a variety of disciplines and courses, varying numbers of participants, a wide range of educational objectives, and various physical and time constraints. The DASH© rates six key elements of debriefing was mentioned in Chapter 2 (cf. Point 2.4.1.1). The DASH© system has three versions, one for trained evaluators and two for students to rate their instructors. This is a useful instrument in the debriefing process(DASH, 2010). To implement effective debriefing the lecturers at the SoM, UFS will have to be trained adequately.

Currently there are several challenges involved in assessment with simulation. Participants in the semi-structured interviews, from three different simulation centres, stated that they do not have assessment modules in their simulation centres, because current assessment criteria in simulation is limited and assessment with simulation is wide-ranged. A few key issues are needed for effective simulation-based assessment. Boulet and Murray (2010:1043-1048) summarised them as follows:

- Defining the skills and choosing the appropriate simulation tasks
- Developing the appropriate measurement tools
- Assessing the reliability of test scores
- Providing evidence to support the validity of the test score interferences.

There is scope for research in this area, especially in simulator-based assessment. In the planning and implementation of clinical simulation in the curricula at the UFS, simulator-based assessment should be investigated and should form part of the planning.

6.4.2 Formative assessment

Formative assessment refers to a process by which students can be made aware of the performance gaps and how they can make progress in closing the gap. Elements in the learning experience of formative assessment activities include, task setting, questioning, observation, feedback, self-assessment and peer assessment (Nicol & Macfarlane-Dick 2006:203). An application in the simulation environment can be:

- Task setting: make sure students understand the task. In a simulation assessment, a pre-brief session will make the task clear so that students will know exactly what is expected of them.
- Questioning: ensuring that the students answer the questions effectively. With simulation, the objectives should be clear to the students, resulting in the achievement of the goals of a simulation session. They should be allowed to ask questions if there are any uncertainties.
- Observation: in the simulation environment, audio-visual equipment aid with observation and with the target setting. With simulation the scenarios, cases and objectives should be developed for the level of the students e.g. simpler scenarios for junior medical students than for the seniors. Observation helps to assess the different steps in a procedure and check whether a certain number of steps were met. Observation helps to evaluate problem solving skills in content and time (cf. Point 6.3.2.2). Computer-based assessment can give a minute to minute evaluation of the students actions, giving an objective report.

- Feedback: the most important aspect of the oral feedback, is the debriefing process in simulation environment. Computer-based assessment gives excellent feedback of actions and thought processes.
- Self-assessment: the students' understanding of their performance and personal skills. This can form part of the debriefing session. With computer-based assessment, the student can get immediate feedback for self-evaluation.
- Peer assessment: students judge the performance of fellow students; this aspect forms part of the debriefing process.

Observation, self-assessment and peer assessment help to identify and close the performance gap (cf. Chapter 2 Figure 2.3).

Formative assessment is an excellent tool to evaluate how much students have learned and retained, what their thought processes are and how much they understand. Formative assessment in simulation is not only for ordinary physical skills, but also assesses group interactions, interdisciplinary skills, interpersonal skills and attitude. By implementing clinical simulation as medium of instruction and assessment at the SoM, UFS, formative assessment can contribute to the on-going learning experience by enhancing knowledge as well as intellectual skills and communication skills.

6.4.3 Summative assessment

Summative assessment is usually undertaken at the end of a module or period of learning in order to generate grades that reflect the performance of students. Currently there are limitations on the use of simulation, and especially patient simulators (high-fidelity simulators) in summative assessment opportunities, because of physiological and technical limitations on the simulators and the appropriateness of measurement tools, reliability and validity of test scores.

Summative assessment can have negative effects on the motivation of students, because of anxiety. By using simulation in the preparation for summative assessment, students can be better prepared, and anxiety restrained, which could contribute to better performance. Summative assessment should be aligned with the curriculum and outcomes. With simulation integration into the curriculum, students will be comfortable if simulators are included in summative assessment opportunities. By adding different simulators in the final OSCE examinations, communication skills, attitude and team work skills can be assessed, making the summative assessment more comprehensive. The use of summative assessment in simulation centre should be subjected to further research as to the validity and reliability.

6.4.3.1 *Qualifying assessment*

Qualification examination is a form of summative assessment (Boulet & Murray 2010:1041). Simulation can be an important part of the qualification examinations, for instance, the Part II examinations of The Colleges of Medicine of South Africa (CMSA), final M. Med. examinations or board examinations for the Allied Health Professions. In these cases simulation can be applied to postgraduate medical education and training. At the moment there is no or very limited use of simulation in these examinations due to a lack of suitable simulation centres throughout the country.

6.4.3.2 *Recertification assessment*

The implementation of periodic re-examination and re-licensing of health care professionals based on knowledge and competence can add another dimension to simulation-based assessment. These examinations will improve patient safety and is one of the recommendations in the safety report *To Err is Human* (Kohn *et al*. 1999:14). Currently high-stakes assessment is the United States Medical Licensing Examination (USMLE), and the Educational Commission for Foreign Medical Graduates (ECFMG) (Pugh 2008:655-656). Simulation-based assessments are being implemented in the Maintenance of Certification Assessment (MOCA) process in the USA. In future the recertification process of health care professionals in South Africa can play an important role and can form part of CPD programmes. Clinical simulation can play an important role in this regard and should be investigated.

6.4.4 Summative discussion

This section dealt with the tools and criteria needed for assessment with simulators. The background for assessment with simulation, and the aspects of formative and summative assessment were discussed. The role simulation-based assessment can play in the education and training of undergraduate medical students at the School of Medicine, UFS was discussed and the scope for further research was mentioned.

6.5 THE DEVELOPMENT AND IMPLEMENTATION OF A NEW SIMULATION CENTRE FOR THE SCHOOL OF MEDICINE, FACULTY OF HEALTH SCIENCES, UFS.

In the previous sections of this chapter, the integration of simulation into the undergraduate medical programme of the School of Medicine, UFS, the development of clinical skills and competencies and the tools for assessment with simulation were discussed. The next section will consider recommendations for the development and implementation of a simulation centre for the School of Medicine, UFS. They will provide answers to research question number four: *What are the factors that should be considered in the development and implementation of a new simulation centre for the School of Medicine, Faculty of Health Sciences, UFS?*

6.5.1 Background

The Faculty of Health Sciences started with simulation training in 2009 with the opening of the simulation centre for the School of Nursing, the SPACE, in November 2009. The Faculty of Health Sciences comprises three Schools, namely, the School for Allied Health Professions, the School of Medicine and the School of Nursing. The School for Allied Health Professions opened a Clinical Skills Centre in October 2011, the first of its kind in South Africa. The School of Medicine is currently making use of skills training in the skills lab, but is planning to open a simulation centre in the near future for the training of medical students and postgraduate students from different specialities in the near future.

It is crucial for the development and implementation of a simulation centre for the School of Medicine, to get staff members of the School of Medicine on board. The personal opinions and attitudes of the staff members, lecturers and heads of departments are very important for the success of the simulation centre. To get the personal opinions and attitudes of the staff members, two focus group interviews were conducted to diagnose the potential for problems with a new programme, acquired new ideas and creative concepts and obtained general background information about clinical simulation in the context of a medical school for the UFS. A literature review as well as information from the semi-structured interviews with international experts provided expert opinions as well as personal experiences with simulation centres, that can be contextualised for use in the establishment of a simulation centre for the School of Medicine, UFS.

The foundation for the establishment of a simulation centre for the School of Medicine (SoM) for the UFS is summarised in Figure 6.6. This suggests the basis for the planning for the development and implementation of a simulation centre in the South African context.

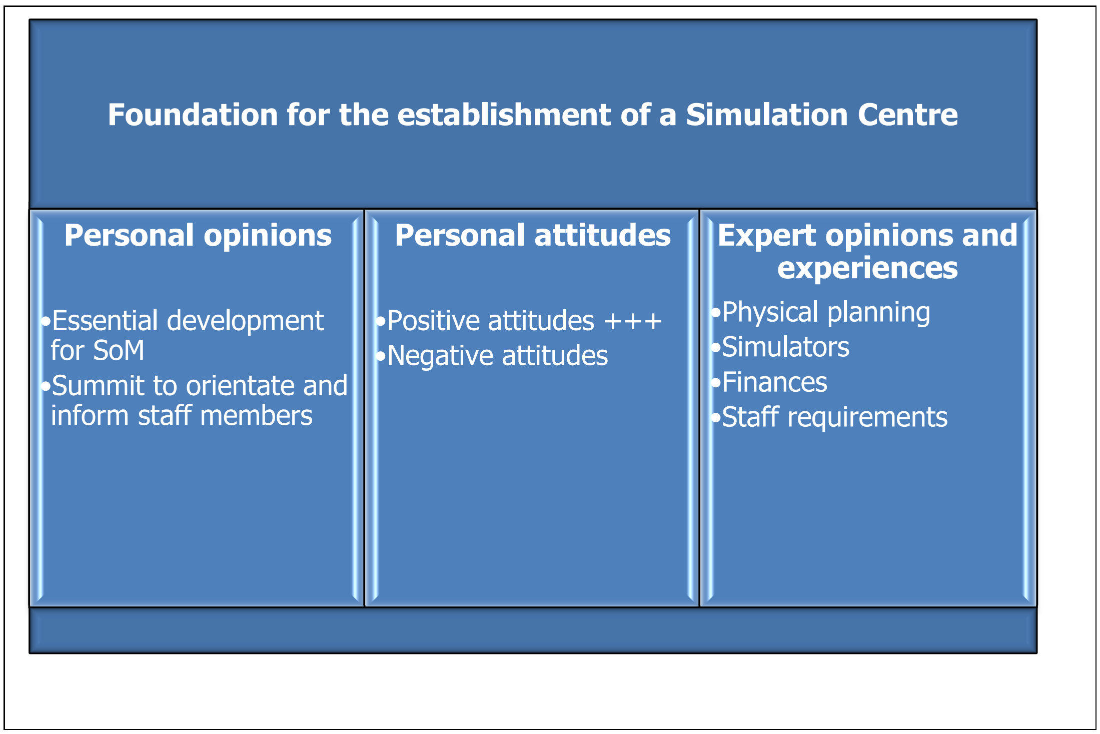


FIGURE 6.6 FOUNDATION FOR THE DEVELOPMENT AND IMPLEMENTATION OF A SIMULATION CENTRE
[Compiled by the Researcher, Labuschagne 2011]

6.5.1.1 *Personal opinions*

The personal opinions of the staff members of the School of Medicine were obtained from the focus group interviews conducted for the study. All the participants agreed, without any disagreement that the development of a simulation centre is *essential*.

Saturation was reached immediately without further discussion. This strengthens the basis for the simulation centre considerably.

There was unfamiliarity regarding simulation among the lecturers of Phase III of the medical programme. The participants suggested a *summit* and informative training sessions to familiarise the staff members with simulation.

During such a summit, the following aspects need to be addressed:

- Background information regarding simulation as an instructional medium
- Training sessions (Train the Trainers), especially in debriefing as instructional method
- Introduction to the simulation modality of procedural simulation, SPs, computer-based simulation and simulated clinical immersion by means of an exhibition of simulators by different manufacturers so that the lecturers can assess what is needed and available for each discipline
- Utilisation of standardised patients for training and assessment of students and the recruitment and training of SPs
- Incorporation of simulation in each of the disciplines as instructional medium. The "how, where and when"
- Scenario planning sessions (simulated clinical immersion)
- Identification of gaps in the curriculums' training needs and filling gaps with simulation
- Tools for simulation-based assessment
- Promotion of patient safety through simulation
- Promotion of teamwork and interdisciplinary teamwork by means of simulation
- Evaluation on how the three simulation centres of the different schools can share facilities, simulators and work in collaboration with the aim of improving student skills and competencies training.

By familiarising lecturers during a summit where abovementioned aspects can be addressed, the personal opinions in favour of and the negative attitudes against simulation training will be addressed.

6.5.1.2 *Personal attitudes*

Personal attitudes in favour of simulation education and training as instructional method, of both focus groups, were *positive*. One of the participants highlighted the fact that he had negative attitudes towards simulation, but after exposure to simulation training in Europe, his attitude changed in favour of simulation. This links to the added value of an information summit mentioned under the previous point. The overwhelmingly positive attitudes were discussed in Chapter 5 (cf. Point 5.4.2.2).

The *negative attitudes* can be ascribed to the following factors: resistance to change, financial challenges and exclusion from the planning process. These aspects were discussed in Chapter 5 (cf. Point 5.4.2.2) and can be addressed by an information summit.

6.5.1.3 *Expert opinions and experiences*

The expert opinions and experiences were reported and discussed in depth in Chapter 4 (cf. Points 4.3.5; 4.3.6; 4.3.7; 4.3.8 and 4.3.9) and will form the pillars that will be discussed in the next section of this thesis

6.5.2 Physical planning

The first pillar in the development of a simulation centre, is the physical planning of the simulation centre. During the semi-structured interviews a few aspects regarding the physical planning of a simulation centre came forward.

<u>General</u>

A major factor that was mentioned repeatedly was the fact that the spaces should be flexible usage, so that it can be used for multiple purposes. In the structural planning, it is important to plan five to ten years ahead. With the expansion in the student numbers and the fact that more students should be trained, it is important to plan ahead to accommodate larger numbers of students in the simulation centre.

The flow of people and equipment was also mentioned. There should be enough space for the large hospital equipment and hospital beds and trolleys, to be moved around in the simulation centre, especially when changing scenarios or when doing simulation in motion scenarios. The flow of people must also be taken into account. There should be enough room for the flow of students, staff members and SPs in the simulation centre, without interruption during simulation sessions and scenarios, or overcrowding of the spaces in the simulation centre.

The SPs are a special group of people, with special needs. Consideration should be given to older people, mothers with children or student actors. They can be in the simulation centre for long times, and therefore they need special resting places that are easily accessible and comfortable with ablution facilities and eating and resting facilities and even areas with computers or internet access for the students. The flow of the SPs and the students should also be separate, because in assessment opportunities there should be no contact between students and SPs.

When doing simulation in clinical site or simulation in motion, it is better if the simulation centre can be situated near the hospital for easy access and it is easier for the lecturers if they do not have to travel to the simulation centre. Easy access for all users make it much more user friendly. The perfect position for the simulation centre is between the Universitas Academic Hospital and the Francois Retief Building of the Faculty of Health Sciences. In Figure 6.7 an **example** of a conceptual design proposal for a simulation centre for the School of Medicine in Block A next to the hospital in the faculty building, was proposed by a workgroup on simulation in the School of Medicine, UFS.

Storage is another factor to take into account, because there should be enough secure storage for the simulators, equipment and the supplies as well as props for scenario setting.

Access to the simulation centre should be secure and be monitored for instance with swiping of student cards and 24 hour surveillance with closed circuit television or similar systems.

Simulation spaces

With the literature review and during the semi-structured interviews the experts made recommendations regarding the simulation spaces (cf. Chapter 2 Point 2.5.1 and Chapter 4 Point 4.3.5.2).

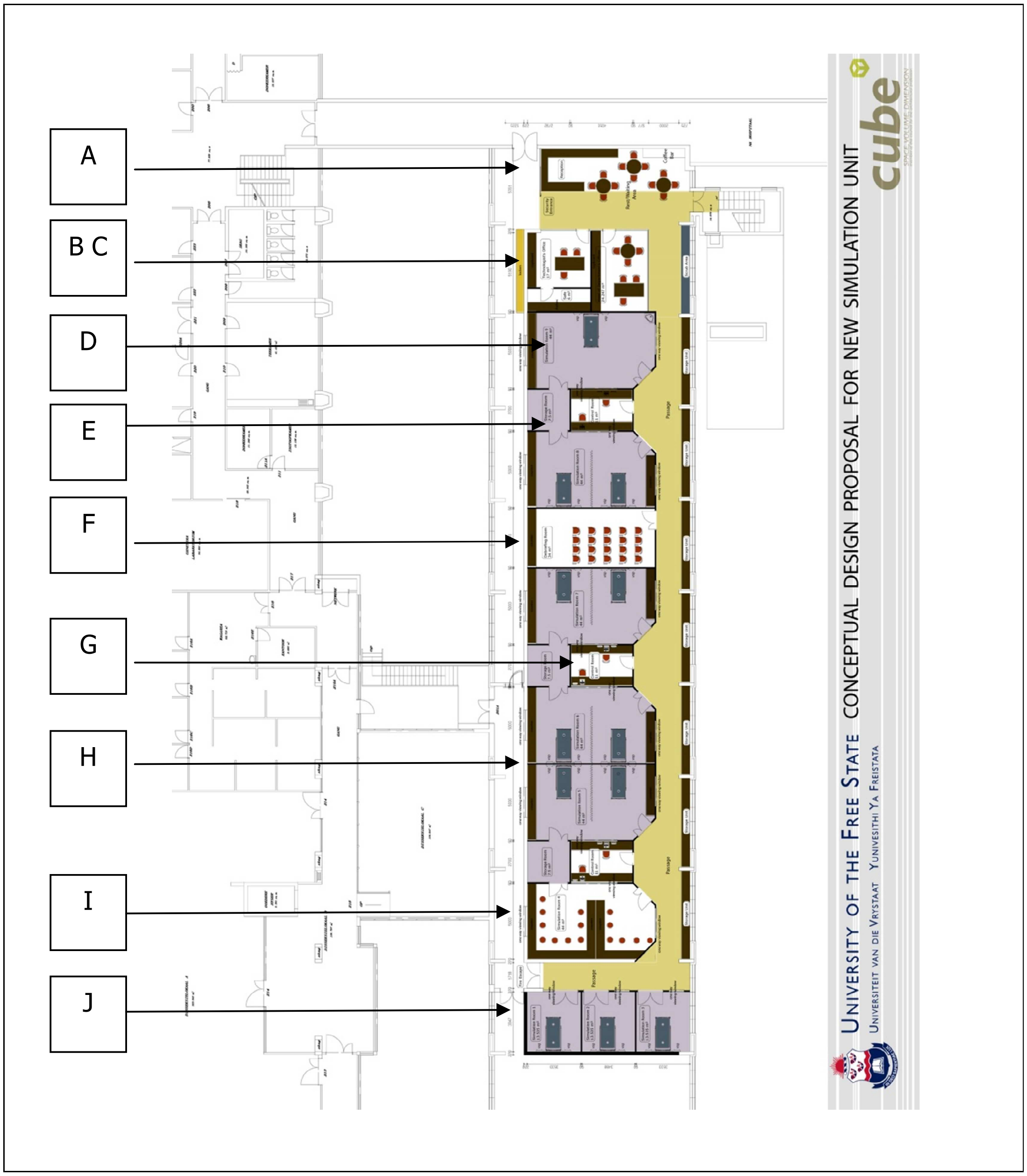


FIGURE 6.7 CONCEPTUAL PROPOSAL FOR NEW SIMULATION CENTRE, SCHOOL OF MEDICINE UFS [CUBE ARCHITECTS]

In the conceptual planning of a simulation centre the following simulation spaces were proposed, with some alterations after discussions with an international expert on clinical simulation that is not reflected in this example:

- Three one-on-one simulation rooms that can be used to train students with SPs or real patients [Refer to J on plan]
- Eight multi-purpose simulation rooms for group training are rooms that can be changed for different needs and for small groups or larger groups, with partitions between rooms that can be removed for larger groups or for different scenarios. [Refer to H on plan]
- A high-fidelity simulation room is a simulation room with a patient simulator (high-fidelity simulator) for high-fidelity simulations that can be equipped for instance for an operating theatre or an intensive care unit. [Refer to D on plan]
- Two rooms for procedural simulation with part-task trainers with counters and enough room for the part-task trainers and can be used by several students on different simulators. [Refer to I on plan]
- A room for flat-screen simulation can be made available in one of the other simulation rooms or the computer lab in the Faculty can be utilised for flat-screen simulation or with expansion in future, a area dedicated to flat-screen simulation can be utilised. Another option for computer-based simulation is to create an area where students of the three schools in the Faculty can share the facility.

Three control rooms that are linked to all the multi-purpose simulation rooms for the running of simulation sessions and to observe the students during simulation sessions. [Refer to G on plan] All the simulation rooms are equipped with one way viewing windows so that students can be observed without distraction or interference during a simulation session.

There are three large storage rooms [Refer to E on the plan] with access to the high-fidelity simulation room and to the multi-purpose rooms and in the southern corridor, there are multiple storage units. There will be a scrub area where students can scrub for certain simulation scenarios.

Classrooms

A classroom is available for formal lectures in current lecture room eight. The lecture room can be used for the simulation centre or for other lecture purposes. Audio-visual linkage to the simulation rooms can make observation for large classes possible, without interference to the students doing the simulation. A small classroom that can be used for small groups and for debriefing will be situated in the simulation centre [Refer to F on the plan].

Reception and office space

The reception area where the office of the secretary with a resting/ waiting area will be situated at the entrance of the simulation centre [Refer to A on the plan]. From that open plan area there will be access to the office of the technical and multi-media technicians and to the office of the Head of the centre [Refer to B and C on the plan]. Additional office space for the simulation coordinator can be supplied in one of the one-on-one simulation rooms [Refer to J on plan].

Future prospects

In future, the simulation centre can be expanded to supply more office space and waiting and resting areas for the SPs and for post graduate simulation training that are more specific for certain specialities. This expansion can be accommodated in a new building on the eastern side of the proposed simulation centre or by adding a next storey to the existing building.

6.5.3 Technology

Simulation technology is the next pillar for the development of a simulation centre. The technology can be divided into audio-visual equipment and computers and IT requirements.

Audio-visual equipment

The best way to review the learning event or simulation is the making of audio-visual recordings as opposed to the recollections of what the student or lecturer can remember. The assistance of audio-visual recordings in the process of debriefing and of formative and summative assessment in a simulation centre, is of vital importance. The fact that the recorded material should not be used as 'evidence' and that consent should be obtained before using recordings are aspects that should not be ignored. In the planning and building of a simulation centre, the audio-visual requirements and the planning and positioning of the equipment is very important. The building should be designed so that there is room for expansion and data and power cables should be installed even if they are not used immediately. The cameras and microphones can be wall mounted, ceiling mounted or mannequin mounted. Portable systems can be useful when simulation in clinical site or simulation in motion is being done.

It is important to ask different companies to demonstrate systems before buying a system. Everyone involved should evaluate if the system complies to the needs of the different users.

Computers and IT requirements

The computer systems should be versatile and compatible and adaptable to changes in the technology. The technology should be upgraded on a regular basis. Backup systems for the computers and IT is important and should never be neglected.

The computer technology for flat-screen simulation, web application and virtual world simulation must be compatible and the servers and Internet connections must be able to handle these aspects. It is important to keep up with the computers and programming used in education. The computer systems must be able to handle the data needed for the simulation systems needed.

Simulator technology changes and improves rapidly and the simulation centre should keep up with the changes and simulators should be upgraded on a regular basis. Simulators should be versatile and the use of wireless technology was mentioned a few times during the semi-structured interviews. Wireless simulators allow for simulation in clinical site, simulation in motion and simulation in outreach. However, simulators with wireless technology may generate technical problems of their own.

The communication with suppliers and after sales support are important factors to take into account and should not be neglected in service contracts.

6.5.4 Equipment and supplies

The equipment and supplies for a simulation centre forms an integral part of the centre and for the centre to run effectively, there should be ample supplies and the equipment should be the same or comparable with the equipment in the hospitals.

Equipment

The equipment for a simulation centre include the hospital beds, trolleys, IV poles and also the electronic equipment like ECG monitors, blood pressure monitors, ventilators and other hospital equipment. During the semi-structured interviews it was mentioned by interviewees that the equipment should be similar to the equipment in the hospitals and clinics. The environmental simulation should be as close as possible to the real environment. To make it easier for the staff, most of the equipment should be on wheels for easy storage and change of scenarios. Even a single person should be able to change scenarios without help.

Appeal to companies should be made to donate an item of equipment to the simulation centre when the hospital buys new equipment, so that students and hospital staff can be trained in an environment similar to the hospital or clinic environment, with the same equipment. This aspect was suggested by one of the semi-structured interviewees.

Supplies

Supplies include the syringes, needles, intravenous fluids, and other consumables to be used for simulation scenarios. The supplies must be as close as possible to the real supplies used in the hospital to support environmental fidelity.

A good source to acquire supplies is from the medical depots to acquire expired consumables. Donations from companies have the advantage of exposing students to their products.

Supplies are expensive and practicing students can waste a lot of consumables. Good control over usage and availability of supplies for students practicing on their own, should be monitored carefully. It is usually the simulation coordinator's duty to ensure a constant supply of stock.

The secure storage of supplies in the simulation centre is cardinal and this aspect must not be neglected in the planning of a simulation centre.

6.5.5 Simulators

The classification and the simulator types were discussed earlier in this chapter (cf. Point 6.3.3.3).

General aspects regarding the purchase of the simulators include the following:

- Purchase only simulators that are needed for the training purposes as identified in the teaching gaps in the curricula
- Take care in purchasing only simulators that will be useful
- Acquire simulators dictated by the curriculum needs and not the other way round
- Avoid the procurement of too many patient simulators (high-fidelity simulators)
- Homemade simulators can be as effective in demonstrating an aspect as the more expensive simulators
- Find out what the cost of replacing wearing parts is
- Borrow simulators on an experimental basis to determine if they fulfil the needs, before buying the simulator
- Investigate the features of simulators e.g. intubation, x-rays and inter costal drains before buying a simulator
- Obtain more part-task trainers, a few medium-fidelity simulators and only one or two patient simulators
- Feedback to developers of simulators
- Stipulate specifications and special needs to manufacturers.

The maintenance and service of simulators cannot be ignored, especially in South Africa, where the manufacturers are based in the USA or Europe. If there are operational problems with the simulators or if there are maintenance and upgrades needed; will the companies be willing to come and do it? The travel costs, maintenance, service, after sales and support details should be carefully considered before buying simulators.

6.5.6 Financial considerations

The financial aspects of a simulation centre is an aspect that must be approached with care, because it can be expensive and if it is not planned carefully and with caution, a lot of money can be wasted.

Sources of income

The funding for the establishment of a simulation centre for the School of Medicine, UFS should be by the University and the Department of Higher Education and the Department of Health. Funding from these departments are essential to establish the infrastructure and the equipment of the simulation centre.

During the research, a few innovative ways to increase the financial income of the simulation centre were identified and can be summarised as follows:

- Grants from the University for the training of students
- Grants and collaborative agreements with international universities
- Training of students from other universities; for instance, universities from other African countries
- Financial contributions from individual departments, contributing to the purchasing of simulators, equipment and supplies for the specific speciality's training
- CPD short training courses can generate money for the simulation centre
- Maintenance of certification or recertification courses for professional bodies for instance the CMSA or Professional Societies.
- Training of hospital staff e.g. patient safety, CPR refresher courses etc. can be funded by Department of Health
- Services for the staff of private hospital groups
- Research grants for research activities in the simulation centre

- Pharmaceutical companies and medical equipment companies can contribute to equipment and supplies and, in return, students get exposure to their equipment and supplies
- Pharmaceutical companies can pay to use the simulation centre facilities for the training of doctors on new equipment or instruments.

With the funding of the simulation centre, it is necessary to be innovative and creative in finding ways to generate income for the centre, because it can be difficult to make a simulation centre profitable as mentioned by semi-structured interviewees.

Expenditure of the simulation centre

There are many hidden costs in a simulation centre. The costs of the running and maintenance of the simulation centre include cost such as the simulators, audio-visual equipment, equipment and then the consumables for the day to day running of the simulation centre.

Actions to save money can be implemented, which can help to relieve the burden on the simulation centre. When establishing the centre, expenditure can be limited by acquiring simulators that are useful, have multiple functions; planning around the curriculums, and caution when acquiring patient simulators (high-fidelity simulators). Be cautious not to spend money on simulators with restricted application. There should be more part-task trainers, a few medium-fidelity and only one or two high fidelity simulators in the centre.

Computer-based simulators can save money, because it is cheaper and several outcomes can be achieved via computer-based simulation.

Much money can be saved in terms of the equipment and consumables by making use of donated and expired equipment and supplies.

The service contracts, leasing of equipment and service contracts with suppliers can save money for the simulation centre.

The salaries of staff can be considered as one of the major expenses of an organisation, and by utilising more *ad hoc* people in the simulation centre and appoint only the key staff members in the simulation centre can save money, relieving the financial burden on the simulation centre.

6.5.7 Staff requirements

The people working in a simulation centre can be divided into permanent staff and staff members working in the simulation centre on an *ad hoc* basis i.e. the lecturers from different departments that facilitate simulation sessions. The structure of the staff establishment of a simulation centre for the School of Medicine, UFS, is proposed in Figure 6.8.

The permanent staff members would be the Head of the clinical simulation centre, technical staff members, a multimedia technician, a simulation coordinator and a secretary.

The members working in a simulation centre on an *ad hoc* basis would be the lecturers from different departments, involved in simulation training. The lecturers help to define the skills and find the appropriate simulation tools for teaching, learning and assessment. The lecturers will be involved in the planning and running of scenarios and debriefing after the simulation sessions.

The Faculty of Health Sciences has already appointed a SPs coordinator who is recruiting, training and providing feedback to the SPs for the simulation centres for the three Schools within the Faculty.

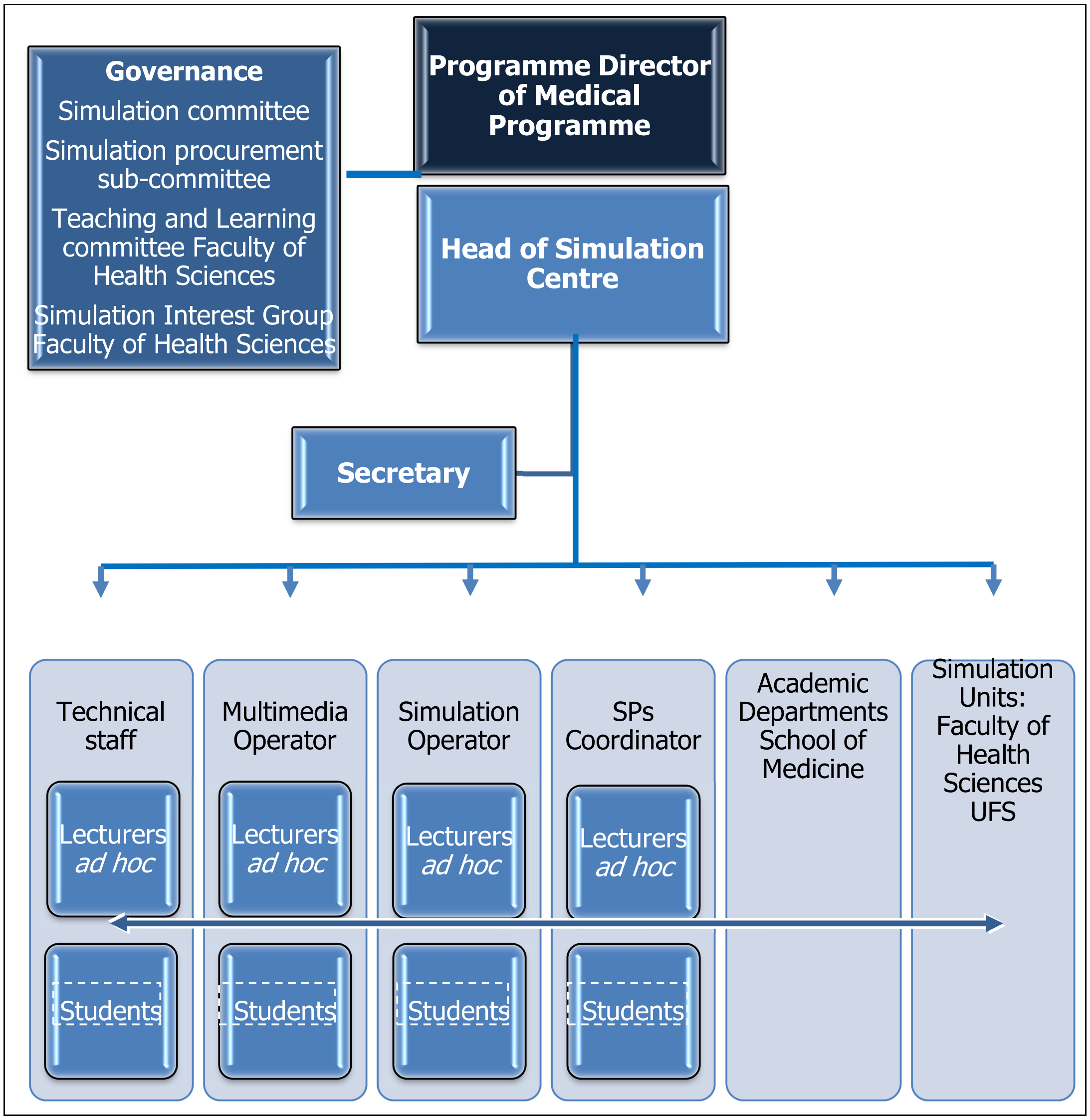


FIGURE 6.8 PROPOSED STRUCTURE FOR A STAFF ESTABLISHMENT OF A SIMULATION CENTRE

[Compiled by the Researcher, Labuschagne 2011]

<u>The Head of the Clinical Simulation Centre</u>

The job description of the Head of the simulation centre is the planning of simulation programmes for simulation training and to help with the implementation thereof. The Head will report to the Programme Director of the Undergraduate Medical Programme.

Responsibilities further include general supervision, administrative and business planning, promotion of the centre, development of business opportunities, and financial planning and funding opportunities for the simulation centre.

The person will be responsible for cooperation with the simulation units of the School for Allied Health Professions and the School of Nursing.

Liaison with clinical departments and users and health education training is another aspect where the Head should be involved. Train the trainers workshops and help with scenario planning and evaluation and implementation of simulation in the different modules and disciplines as a required component should also fall under the responsibilities.

Research and research projects in the simulation centre is another important function of the simulation centre and the Head must be involved in the planning, coordination, participation and promotion of research in the centre.

Technical staff members

The technical staff members are involved in the day to day operation of the simulation centre. The high fidelity simulation scenarios, support for the simulators and training of the use of simulators are responsibilities of the technical staff members. The technical support, maintenance and logistical aspects regarding the simulation and scenarios are part of the simulation technical staff members' duties. They should be involved in support to the lecturers and even help with the training of some of the technical aspects in the simulation centre.

The technical staff help to coordinate the day to day functioning and the planning and maintenance of equipment. The staff will monitor all aspects regarding the simulators e.g. safety, maintenance and care. Monitor and maintenance of the supplies and the purchase equipment in collaboration with the simulation coordinator.

In future, with the expansion and development of the simulation centre, the appointment of more technical staff members will be necessary. The technical staff members are important for the functioning and running of a simulation centre and as the centre develops, more people will be needed.

Multimedia operator

The simulation centre has many computer-based and Internet based equipment and some of the simulators can have IT requirements. The multimedia operator will be involved in the maintenance and upgrading of the IT equipment. The audio-visual equipment and uses are important aspects of the simulation centre and the multi-media operator should be involved here for the daily functioning of the centre and the recording during sessions. The person should be actively involved in the support to lecturers regarding simulation sessions and the storage of recordings. The multimedia operator can be involved with the production, lending out and storage of material for education and training purposes to lecturers and students.

The multimedia operator must be involved in the establishment and support of the computer-based (flat-screen) simulation. The person can assist lecturers in the running of computer-based simulation and help with assistance to students if they encounter problems with the IT systems.

It follows that a multimedia operator needs to be qualified in the field of IT and networking with an educational background.

Simulation coordinator

The simulation coordinator will be responsible for the coordination of the simulation sessions, and especially for the equipment and consumables. The coordinator manages all the operational aspects of the functioning and operation in the simulation centre. The person should be involved with the scheduling of simulation sessions especially to oversee and manage the consumables needed and the preparation for scenarios. The simulation coordinator will be involved in the writing and the planning of scenarios and also in some of the aspects of the SPs.

It is recommendation that the coordinator should be a medical officer or a registered nurse or an equally medically qualified person, because the coordinator manages the equipment and the consumables and monitors the supplies and the purchase of equipment and supplies with the aim of maintaining a functioning simulation centre and also need to keep record of supplies and usage of supplies to ensure that there is enough stock available to run scenarios. It will be an advantage if the person has a medical background and understands the functioning and acquisition of the consumables and equipment.

Simulation operators are involved in training of certain aspects in simulation, for instance CPR and interdisciplinary teamwork training and patient safety aspects. Simulation operators, who are trained in debriefing, can facilitate debriefing sessions and assist in debriefing and assessment. The coordinator can be actively involved in assessment opportunities in terms of the preparation and even assessment by means of OSCE, OSPE and OSVE.

In future, with the expansion and development of the simulation centre, the appointment of more simulation coordinators will be necessary. The coordinators form the backbone of the functioning and running of a simulation centre and as the centre develops, more coordinators will be needed. The coordinators are responsible for a lot of the behind the scenes functions that are essential for the running and functioning of a simulation centre.

SPs Coordinator

The simulation centres of the three schools in the Faculty of Health Sciences share a SPs coordinator. The person is responsible for the recruitment and training of SPs, and feedback to the SPs. The compensation of the persons acting as SPs is also the responsibility of the SPs coordinator. The training of the SPs and the aspects involving the SPs were discussed in this chapter (cf. Point 6.3.3.5).

The SPs coordinator should have excellent people skills, because he/she is involved with people of all age groups, be empathetic, and have patience and good communication skills to communicate with the SPs and the lecturers and simulation centre staff members to meet the needs of the different stake holders.

Secretary

The secretary is involved in the simulation centre with the general office and administrative duties such as, answering telephones, filing, managing messages, e-mails, organising the scheduling in the simulation centre, act as receptionist for the centre and liaises with students, lecturers and simulation staff and visitors. The person acts as personal assistant and performs general office duties for the Head of the simulation centre.

The secretary will be involved in student administration by updating student records, academic results, attendance, participation in activities, notification of student sessions, organising and scheduling of sessions and meetings and preparation of educational and training tools.

Financial aspects like requisitions and purchases, receiving and monitoring of stationary, and petty cash handling will be handled by the secretary.

Lecturers (*ad hoc*)

It is important for the lecturers from different departments involved in simulation training, to define the skills needed and to use simulation as an instructional medium. The needs that may exist, for instance patient safety, acute emergency training, paediatric emergencies and procedural training can be identified and then filled with simulation, either with part-task trainers or patient (high-fidelity) simulators. The lecturers should be somebody more senior in his or her field to guide students and to facilitate simulation sessions, and be involved in debriefing.

During the semi-structured interviews and focus group interviews it became clear that lecturers are hesitant to act as facilitators and factors that were identified as contributing to the fears were mainly that they think that they will have to run a scenario, because technically it is complicated. Lecturers are unfamiliar and uncertain about developing and running of scenarios and the technical aspects thereof. Debriefing is an art and lecturers are not acquainted with debriefing, and all of this contributes to their fears.

The fears can be addressed by the following actions:

- Lecturers must be guaranteed that the technical staff will be available and running the scenario
- Familiarise lecturers with the simulation modalities so that they can see that they can use procedural simulation, computer-based simulation, SPs or simulated clinical emersion and to create instructional methods that suits their requirements for their specific needs in their field
- Train the trainer sessions to familiarise lecturers with simulation as teaching tool and how to incorporate simulation in the curriculum must be scheduled
- Training in the art of debriefing
- Lecturers must know that the students will do the simulation and that the lecturers are not going to be put "on the spot"
- Getting enthusiastic lecturers involved in the simulation centre so that they can assist in the support of the lecturers that are hesitant in using simulation in their training ("help to spread the news")
- Active communication between the lecturers and the permanent simulation staff, to ensure that the scenario development and the actual simulation sessions meet the expectations of the lecturers and the students, so that the students should learn what they are supposed to learn
- Collaboration between lecturers from the different simulation centres of the schools in the Faculty can improve the team and interdisciplinary training of students, by writing scenarios and running scenarios and even doing assessment jointly with the other groups (cf. Figure 6.8).

The lecturers form the basis for simulation as instructional medium and they will use it optimally they are involved in the planning and incorporation of scenarios in their curriculums.

6.5.8 Summative discussion

The factors to be considered when developing and implementing a new simulation centre for the School of Medicine, UFS were discussed in the previous section.

The aspects that were dealt with include the following: foundation, physical planning, technology, equipment and supplies, simulators, financial considerations and the staff requirements. These aspects can be summarised in Figure 6.9, where the foundation comprises personal opinions, personal attitudes and expert opinions and experience; the pillars are formed by the physical planning, technology, equipment and supplies, simulators financial considerations and staff requirements which all contribute to the establishment of a clinical simulation centre.

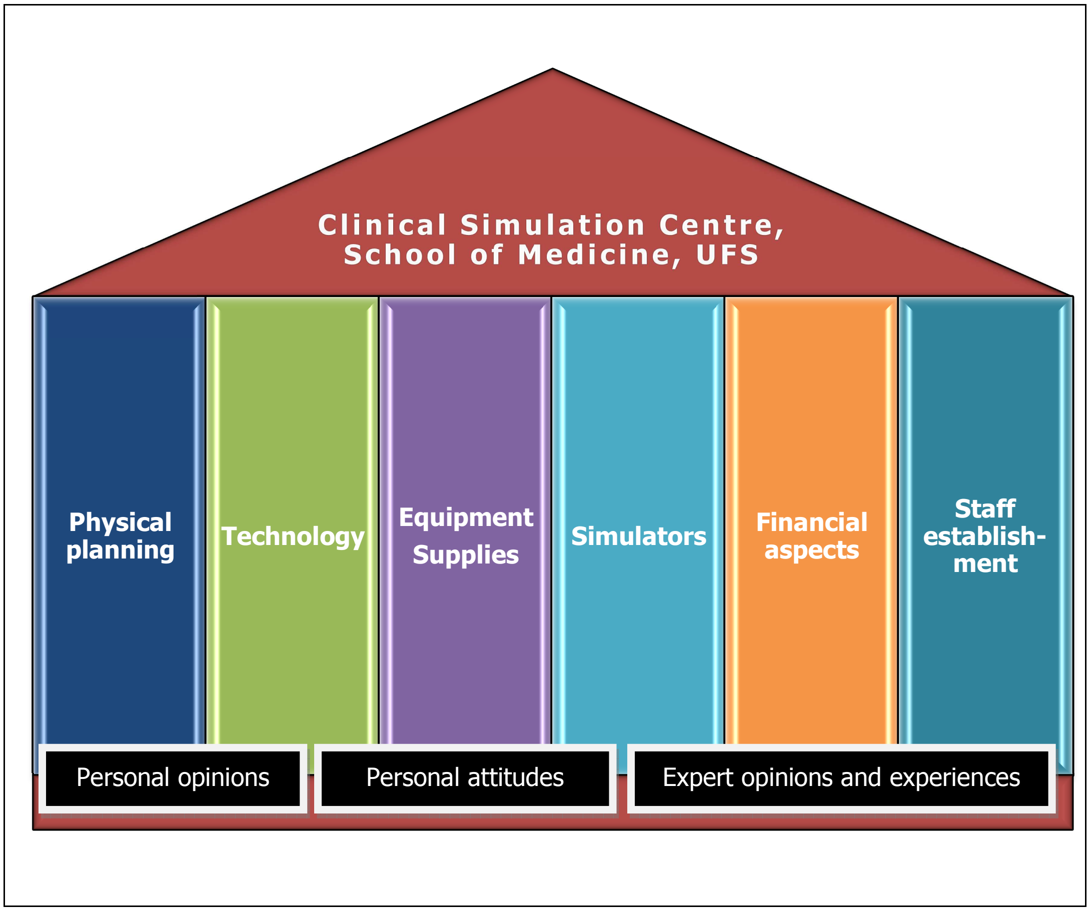


FIGURE 6.9 FACTORS AFFECTING THE DEVELOPMENT AND IMPLEMENTATION OF A CLINICAL SIMULATION CENTRE FOR THE SCHOOL OF MEDICINE, UFS
[Compiled by the Researcher, Labuschagne 2011]

6.6 RECOMMENDATIONS

This section deals with the recommendations the researcher wishes to make as far as ***simulation for undergraduate medical education and training for the UFS***, is concerned. The first aspect that will be discussed, is the premises of simulation as enhancement for undergraduate medical education and training. Subsequent to this, the points of departure, the role players and recommendations will be discussed.

6.6.1 Premises of simulation as enhancement of undergraduate medical education and training

From the perspective of the researcher, the following premises are essential for the establishment of clinical simulation for undergraduate medical education and training:

- the curriculum can be *enhanced* by clinical simulation, driven by clearly identified objectives and educational content
- simulation should be integrated as a *required component* of the curriculum
- *assessment* needs to be incorporated to determine whether the students have mastered the content and achieved the objectives.

The first premise, entails the enhancement of the curriculum by clinical simulation by means of clearly identified objectives and educational content. The teaching and learning needs identified in the curricula must be filled with simulation as instructional medium to achieve the objectives. The following examples can be offered, namely patient safety, creating a non-threatening environment, team training and inter-professional training.

The second premise, that emerged from the study, stipulates that simulation should be integrated into the curriculum as a required component of the curriculum and not only as an optional extra to improve clinical skills and competence. The integration should be vertical and horizontal as explained in (cf. Point 6.2).

The third premise, is the assessment of students to evaluate whether the students have mastered the skills, content and achieved the objectives. Assessment with simulation, can be utilised for formative assessment (cf. Point 6.4.2), summative assessment (cf. Point 6.4.3), qualifying assessment (cf. Point 6.4.4) and recertification assessment (cf. Point 6.4.5) if supported by examination authorities.

6.6.2 The points of departure

For the recommendations in this study to be effectively implemented, the following elements are assumed to be in place or they should be put in place: clinical simulation centre, the staff development and the information summit for the users. The points of departure can be summarised in Figure 6.10.

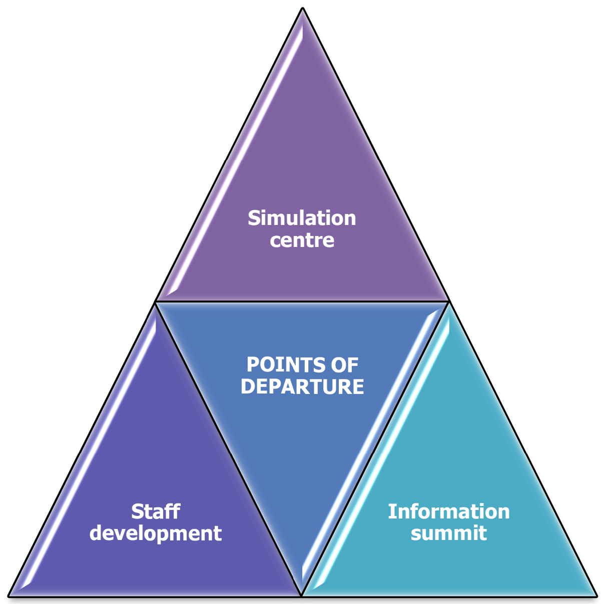


FIGURE 6.10 POINTS OF DEPARTURE FOR THE USE OF SIMULATION AS INSTRUCTIONAL MEDIUM TO ENHANCE UNDERGRADUATE MEDICAL EDUCATION AND TRAINING AT THE UFS
[Compiled by the Researcher, Labuschagne 2011]

6.6.2.1 *Establishment of clinical simulation centre*

In order to start with simulation as instructional medium, a simulation centre should be established for the School of Medicine, UFS, in terms of the following:

- A simulation centre must be built
- The simulation centre must be equipped with the appropriate technology, equipment and supplies
- The clinical simulation centre must acquire the correct simulators that are in line with the needs identified by the different module leaders and clinical lecturers to fulfil in the needs identified. The simulators must be appropriate for the needs of

undergraduate medical students and fill the gaps that exist in the current curriculum.

6.6.2.2 *Staff development programmes*

It is essential to implement appropriate *train the trainers programmes* to equip the lecturers and permanent staff members of the simulation centre, so that they will be able to facilitate simulation training sessions and debriefing sessions. This can be achieved, for instance, by implementing the following:

- The training of lecturers and simulation centre staff can be done locally, at national level or internationally by attending training sessions, seminars and congresses
- Training sessions can be arranged with manufacturers of simulators so that technical staff and lecturers can get simulator-specific training
- The implementation of the DASH© criteria for debriefing assessment in simulation to streamline debriefing in the simulation centre
- Assessment training for lecturers and the establishment of assessment tools for simulation-based assessment.

6.6.2.3 *Information summit for users*

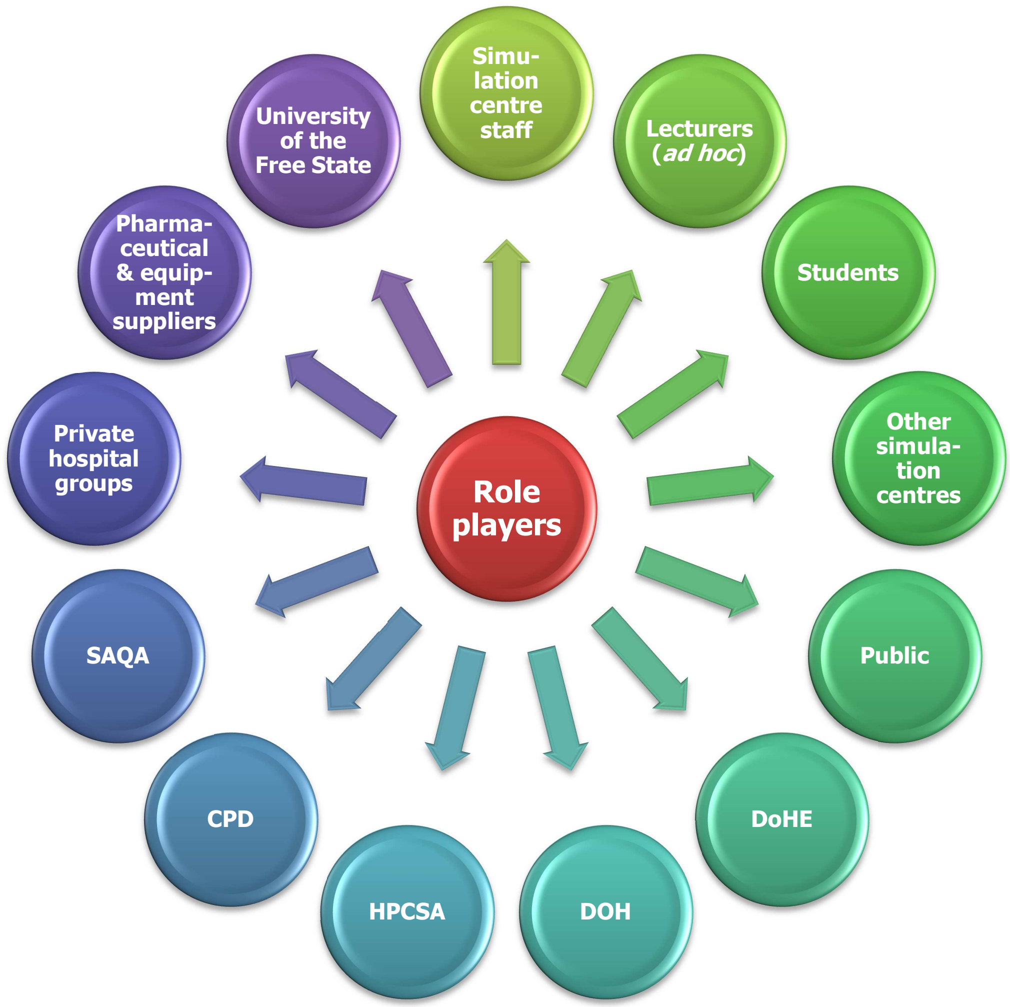
In order to curb the unfamiliarity and lack of knowledge of simulation as instructional medium and the improvement of attitudes in favour of simulation, an information summit should be arranged, with the following in mind:

- Information regarding simulation as an instructional medium for the undergraduate medical education and training of skills and competencies and the assessment thereof
- An exhibition of simulators by different manufacturers so that the lecturers can assess what is needed and available for each discipline
- Collaboration with other simulation centres to promote interdisciplinary and team training to promote patient safety.

These aspects were discussed earlier in this chapter (cf. Point 6.5.1.1)

6.6.3 Role players

The role players involved in the establishment of a simulation centre, for the UFS can be illustrated in Figure 6.11. All these role players will be discussed briefly.



CPD: Continuing Professional Development
DoH: Department of Health
DoHE: Department of Higher Education
HPCSA: Health Professions Council of South Africa
SAQA: South African Qualifications Authority

FIGURE 6.11 ROLE PLAYERS IN THE ESTABLISHMENT OF A SIMULATION CENTRE FOR THE SCHOOL OF MEDICINE, UFS
[Compiled by the Researcher, Labuschagne 2011]

Permanent staff of the simulation centre by:

- providing support for lecturers coming on an *ad hoc* basis to facilitate simulation sessions

- providing support for students coming in for self-directed and instructor-based learning
- providing preparation of scenarios, supplies and equipment
- preparing and maintaining simulators and
- developing research spheres.

Lecturers by:

- facilitating simulation sessions and skills training on an *ad hoc* basis
- debriefing students after simulation sessions
- helping with curriculum development
- assisting with research and
- assessing students.

Students by:

- using the simulation centre for self-directed and instructor-based learning
- improving skills and competence in a safe and non-threatening environment
- team training and multidisciplinary training sessions
- assessing competence through self evaluation and peer evaluation and
- getting involved in research activities.

Other simulation centres in the Faculty of Health Sciences, UFS; nationally and internationally by:

- collaborating and sharing of facilities, simulators, equipment and supplies
- collaborating by sharing of a SPs coordinator
- sharing of expertise between staff members and lecturers
- developing scenarios
- developing of assessment tools and
- collaborating in research projects.

The public by:

- willingness to participate as SPs for the centre
- willingness to be trained as SPs and
- supporting the simulation centre with positive attitudes and acceptance as instructional medium to improve patient safety.

The University of the Free State (UFS) by:

- creating a platform for the establishment of a simulation centre for the School of Medicine
- supplying infrastructure for the development of a simulation centre
- providing funding for salaries to appoint staff for the simulation centre and
- Contributing to the maintenance of the simulation centre.

Health Professions Council of South Africa (HPCSA) by:

- communicating effectively where regulatory changes are needed and recognising simulation as instructional medium to enhance medical education and training
- assisting in the development of quality assurance, and continuing accreditation of the undergraduate medical programme at the UFS and
- upholding the code of ethics and patient safety.

Department of Higher Education (DoHE) by:

- supporting the development and implementation of a simulation centre for the School of Medicine, UFS, financially and
- financially supporting the periodical upgrading and maintenance of the clinical simulation centre, UFS.

National and Provincial Departments of Health (DoH) by:

- financial support to establish a simulation centre for the School of Medicine, UFS to train more undergraduate medical students
- supporting simulation as instructional medium to improve patient safety in government hospitals and clinics
- recognising multidisciplinary and team training to improve patient safety in government health care facilities and
- recognising simulation as instructional medium for recertification and CPD activities for their staff.

Private hospital groups by:

- supporting simulation as instructional medium improve patient safety in private hospital facilities
- recognising multidisciplinary and team training to improve patient safety in private health care facilities

- recognising simulation as instructional medium for recertification and CPD activities for their staff and
- financially supporting the simulation centre to assist in the training of private health care providers.

Pharmaceutical companies and equipment suppliers by:

- donating equipment and supplies to the simulation centre
- supporting financial aspects of the simulation centre by sponsorships and
- getting involved with research projects.

South African Qualifications Authority (SAQA) by:

- upholding the principles of the NQF and
- seeking registration for simulation-based programmes, e. g. recertification and maintenance of registration programmes.

Continuing Professional Development (CPD) programmes by:

- CPD content and design of programmes
- logistics of CPD and
- marketing of CPD and recertification.

6.6.4 Recommendations with regard to the use of clinical simulation as enhancement of the undergraduate medical education and training at the UFS

Based on the previous discussions (cf. Points 6.6.1, 6.6.2, 6.6.3) the following recommendations are made with regard to the use of simulation as enhancement of undergraduate medical education and training at the UFS:

6.6.4.1 *The role and position of clinical simulation as additional component to enhance the education and training of the undergraduate medical students*

- Integration of simulation into the curriculum vertically, by introducing simulation in Phase I with basic skills, clinical skills training in Phase II of the curriculum in the skills lab and then in Phase III with clinical simulation in the clinical simulation centre.

- Integration of simulation horizontally in each of the modules as a required component and not only as additional extra. The learning objectives should be evaluated and then it should be decided on where to fit in the simulation component. Gaps in each module should be identified and the gaps should be filled with simulation training. Simulation training should be well planned and fully integrated in the curriculum.
- Simulation training is a dynamic process where students continuously moves back and forth between theoretical training, simulation training and clinical training.
- Create a safety culture by implementing well-understood safety principles, and interdisciplinary and team training programmes with the help of simulation training. Simulation training of medical students, CPD training and permanent staff of provincial and private hospitals will improve patient safety.
- Certain ethical aspects of training of students on real patients, can be addressed with simulation; for instance, the emotional stresses of students can be addressed because they train and practice in a safe, non-threatening environment.
- The ethical aspects regarding ethnical differences, religious convictions and mentorship can be addressed with simulation.
- Team training and interdisciplinary training can be addressed with simulation, because it is very difficult to train these groups on real patients.
- Computer-based simulation will improve reasoning skills and clinical thinking by contextualising theoretical knowledge in clinical practise.
- Training and education of simulation staff and lecturers regarding the aspects of simulation training and assessment by means of the attendance of training sessions, seminars and international congresses.
- Recruitment and training of SPs.

6.6.4.2 *The improvement of clinical skills and competence by integrating clinical simulation as instructional medium*

- Creation of a non-threatening and safe environment to promote student learning.
- Implement simulation modalities like procedural simulation, simulated patients, computer-based simulation and simulation in clinical immersion.
- Use instructional methods of self-directed and instructor-based learning.

- Presented by means of the following methods: feedback, fidelity, simulator types, scenarios and team compositions.
- Introduce training sessions for hospital staff, CPD programmes and recertification programmes with simulation as additional instructional medium.

6.6.4.3 *Assessment tools and criteria for assessment of clinical competence*

- Implementing the steps needed for simulation assessment, namely:
  - Define the skills and choose the appropriate simulation task
  - Select the correct simulation tool to assess this skill
  - Assess the reliability of the tools
  - Support the validity of the test scores.
- Implement the correct debriefing techniques as suggested by the DASH© principles.
- Implement simulation as tool for certain aspects of formative, summative, qualifying and recertification assessment.

6.6.4.4 Development and implementation of a simulation centre

- Creation of a simulation centre for the School of Medicine with at least the following simulation spaces: simulation rooms for one on one training, multi-purpose simulation rooms, high-fidelity simulation rooms, procedural simulation rooms and the accompanying control rooms.
- Classrooms for pre-brief and debriefing sessions, and formal lectures.
- Administrative areas for instance, reception, offices, storage and setting-up rooms.
- Audio-visual equipment, computers and telephones for each simulation area.
- Equipment and supplies equivalent to the equipment and supplies used in the hospitals.
- Simulators, many part-task trainers, and medium- and high-fidelity simulators to comply with the objectives and needs of the curriculum.
- Financial support from Government, University, commercial companies and suppliers, private and public hospitals and private donations.
- Staff establishment as described in this chapter (cf. Point 6.5.7).

6.7 CONCLUSION

Chapter 6 provided recommendations for using clinical simulation to enhance undergraduate medical education and training at the UFS, as a final outcome of the study through synthesising the literature review, the results from the semi-structured interviews and the results of the focus group interviews.

The aspects that were dealt with, were the role and position of clinical simulation as an additional component to the undergraduate medical curriculum; the improvement of clinical skills and competence by integration and implementation into the current curriculum; assessment tools and criteria for assessment of clinical competence of undergraduate medical students and the development and implementation of a new simulation centre for the School of Medicine, UFS.

In the next chapter, Chapter 7, ***Conclusion, recommendations and limitations of the study***, a summative discussion, limitations of the study, conclusion, and recommendations from the study will be provided.

CHAPTER 7

CONCLUSION, RECOMMENDATIONS AND LIMITATIONS OF THE STUDY

7.1 INTRODUCTION

An in-depth study was carried out by the researcher with a view to make recommendations for the use of clinical simulation as enhancement of medical education and training at the University of the Free State.

Education and training of undergraduate medical students, as well as postgraduate registrar training, can be enhanced by means of clinical simulation as an additional educational tool. Clinical simulation in medical education should include three essential components; namely, curricula must be developed with clearly identified outcomes and educational content; simulation must be integrated as a required component of the curriculum; and assessment must be done to determine whether students have mastered the content and achieved the objectives. In this study, these aspects as well as the factors influencing the establishment of a clinical simulation centre for the School of Medicine, UFS were investigated and evaluated.

The aim of this chapter is to provide a short overview of the study and to present comments and some concluding thoughts on the findings. The chapter commences with a overview of the study, followed by recommendations for the establishment of a simulation centre, conclusions drawn, a short discussion on the limitations of the study, the contribution to knowledge, the significance as well as recommendations from the study and conclusive remarks.

7.2 OVERVIEW OF THE STUDY

The research was carried out and completed based on four research questions. The findings of the research served as a foundation for making recommendations for the use of clinical simulation as enhancement of undergraduate medical education and training at the UFS.

In Chapter 1 (cf. Point 1.3) an outline of the various research questions was presented. The research questions guided the study and shaped the final outcome. From Point 7.2.1 onwards, the four research questions are reviewed together with the main findings and final outcomes of each research question.

7.2.1 Research question 1

The research question was stated as:

What role can be formulated for clinical simulation as an addition to the current undergraduate medical curricula?

The following objective was pursued:

To formulate the role and position of simulation as additional component to enhance the education and training of the undergraduate medical students.
This objective addressed research question 1.

The research question aimed to provide recommendations for using clinical simulation as an addition to the current undergraduate medical programme. A **conceptualisation** and **contextualisation** of the subject was provided in Chapter 2 (cf. Point 2.2.5) where **integration** of SBME in the current curriculum and the **alignment** with the current undergraduate programme of the School of Medicine, UFS as **required component** and not only as an optional activity, was emphasised.

During the data collection, **semi-structured interviews** with international experts were conducted to collect **expert opinions** on the integration of simulation into the current curriculums and the data was reported in Chapter 4 (cf. Point 4.3.1 and Point 4.3.2). The other method used for data collection was **focus group interviews** with lecturers and heads of departments at the UFS to evaluate the **personal opinions** and **attitudes** of the participants. The data of the focus group interviews were reported in Chapter 5 (cf. Point 5.4.2.4). The **reliability** and **validity** of the research methods were described in Chapter 4 (cf. Point 4.2) and in Chapter 5 (cf. Point 5.1).

Synergy between **theory** and **practical application** of knowledge, form the basis of the integration and contextualisation into the whole curriculum as a **dynamic process vertically** and **horizontally** which was described in Chapter 6 (cf. Point 6.2 and Point 6.6.4.1). An outline of the process, in the form of a **diagrammatic overview**, is included in Figure 6.1.

The researcher made a number of **recommendations** with regard to the role and position of simulation as enhancement of the current medical curriculum at the UFS in Chapter 6 (cf. Point 6.6.4.1)

7.2.2 Research question 2

The research question was stated as:

How can clinical skills and competence development be improved by the integration and implementation of clinical simulation into the current undergraduate medical curricula as a required component and not only as an optional activity?

The following objective was pursued:

To determine how clinical skills and competence can improve by means of integrating and implementing clinical simulation into the current undergraduate medical curricula as a required component.
This objective addressed research question 2.

In response to research question 2, the **conceptualisation** of the **improvement** of **clinical skills** and **competence**, was achieved with the aid of the **literature review** as described in Chapter 2 (cf. Point 2.3). The description and discussion of the **semi-structured interviews** regarding **simulation as undergraduate training tool** formed part of Chapter 4 (cf. Point 4.3.4) and the description of the results and discussion of the **focus group interviews** on the topic of the **skills development** and **practising skills** were presented in Chapter 5 (cf. Point 5.4.2.4) in the second and third themes.

The **taxonomy of simulation**, as suggested by Canadian Network for Simulation in Healthcare (CNSH 2011), was used to describe the **proposed recommendations** for the use of clinical simulation to **improve the clinical skills and competence** of medical students with the aid of clinical simulation as **instructional medium**. In Chapter 6 (cf. Point 6.3), a detailed discussion on the creation of a **non-threatening** and **safe environment** to promote student learning was provided. The implementation of **simulation modalities** such as **procedural simulation, simulated patients, computer-based simulation and simulation in clinical immersion**, was discussed in Chapter 6 (cf. Point 6.3.1).

The **instructional methods** of **self-directed** and **instructor-based learning** were discussed in detail in Chapter 6 (cf. Point 6.3.2). The **presentation methods** of **feedback, fidelity, simulator types, scenarios** and **team compositions** were discussed in Chapter 6 (cf. Point 6.3.3). **Debriefing** forms an integral and essential part of simulation training, and was discussed in detail in Chapter 2 (cf. 2.4.1.1), in Chapter 4 (cf. Point 4.3.4.3) as well as in Chapter 6 (cf. Point 6.3.2.2). A schematic overview of the **debriefing process** was given in figure 6.2.

Patient safety was described and discussed in detail in Chapter 2 (cf. Point 2.3) in Chapter 4 (cf. Point 4.2.1.4), Chapter 5 (cf. Point 5.4.2.3) as well as in Chapter 6 (cf. Point 6.2). The **ethics** of simulation training is closely linked to patient safety. The ethics regarding simulation training vs. training on real patients were also discussed in Chapter 2 (cf. Points 2.2 and 2.3), in Chapter 4 (cf. Point 4.3.4.1), Chapter 5 (cf. Point 5.4.2.3) as well as in Chapter 6 (cf. Point 6.1).

Team training and **interdisciplinary team training** are very difficult on real patients in real situations and the role of simulation in this regard was discussed in Chapter 2 (cf. Point 2.2.2) and in Chapter 4 (cf. Point 4.3.4.1), Chapter 5 (cf. Point 5.4.2.4) as well as in Chapter 6 (cf. Points 6.1, 6.2 and 6.6.4.1).

The researcher endeavoured to make a number of **recommendations** with regard to the role and position of simulation to improve clinical skills and competence development of medical students in Chapter 6 (cf. Point 6.6.4.2).

7.2.3 Research question 3

The research question was stated as:

What are the assessment tools and criteria for assessment of clinical competence of undergraduate medical students, in a simulation centre?

The following objective was pursued:

To specify the assessment tools and criteria for assessment of clinical competence of the undergraduate medical students in a simulation centre.
This objective addressed research question 3.

In response to research question 3, the **conceptualisation** of **tools** and **criteria** for **assessment of clinical competence**, was achieved with the aid of the **literature review** as described in Chapter 2 (cf. Point 2.4). The **semi-structured interviews** regarding simulation assessment were described in Chapter 4 (cf. Point 4.3.3) and the description of the results and discussion of **focus group interviews** regarding assessment of clinical skills were presented in Chapter 5 (cf. Point 5.4.2.4), in theme six.

Chapter 6 (cf. Point 6.4) presented an in-depth discussion of **assessment tools** and **criteria**. A **schematic comparison** between **Bloom's taxonomy** and **Miller's pyramid for assessment of clinical skills** with assessment tools for simulation was provided in Figure 6.5.

Steps needed for **simulation assessment** were provided in Chapter 6 (cf. Point 6.4.1). Simulation used for **formative, summative, qualification** and **recertification purposes** were provided in Chapter 2 (cf. Point 2.4), in Chapter 4 (cf. Points 4.3.3.2 and 4.3.3.3 as well as 4.3.3.4), Chapter 5 (cf. Point 5.4.2.4) as well as in Chapter 6 (cf. Points 6.4.2 and 6.4.3). DASH© principles for **debriefing assessment** for simulation in health care were discussed in Chapter 2 (cf. Point 2.4.1.1) and in Chapter 6 (cf. Point 6.4.1).

The researcher endeavoured to make a number of **recommendations** with regarding the tools and criteria for assessment of clinical competence in Chapter 6 (cf. Point 6.6.4.3).

7.2.4 Research question 4

The research question was stated as:

What are the factors that should be considered in the development and implementation of a new simulation centre for the School of Medicine, Faculty of Health Sciences, UFS?

The following objective was pursued:

To enumerate the factors that should be considered in developing and implementing a new simulation centre for the School of Medicine, Faculty of Health Sciences, UFS.
This objective addressed research question 4.

In response to research question 4, factors affecting the development of a simulation centre were **summarised schematically** in Figure 6.9. **Conceptualising** the **establishment and implementation** of a simulation centre was achieved in conjunction with the **literature review** as described in Chapter 2 (cf. Point 2.5). The description and discussion of **semi-structured interviews** regarding the different aspects of the development and establishment of a simulation centre were presented in Chapter 4 (cf. Points 4.3.5, 4.3.6, 4.3.7, 4.3.8 and 4.3.9) and the results and of the **focus group interviews** were described in Chapter 5 (cf. Point 5.4.2.3) in theme four.

The **foundation** for development was provided by the **expert opinions** and **experiences** as provided by **semi-structured interviews** and was reported in Chapter 4 (cf. Points 4.3.5, 4.3.6, 4.3.7, 4.3.8 and 4.3.9). Data was obtained from **focus group interviews** regarding **opinions** and **attitudes** of staff members were reported on in Chapter 5 (cf. Point 5.4.2.1).

Physical planning was discussed in depth in Chapter 6 (cf. Point 6.5.2) as it followed from data collected for the **literature review** in Chapter 2 (cf. Point 2.5.1), **semi-structured interviews** in Chapter 4 (cf. Point 4.3.5.2) and **focus group interviews** in Chapter 5 (cf. Point 5.4.2.3), theme four.

Simulation technology was discussed in Chapter 6 (cf. Point 6.5.3) in terms of the data collected for the **literature review** in Chapter 2 (cf. Point 2.5.1), and **semi-structured interviews** in Chapter 4 (cf. Point 4.3.5.3).

Simulators were discussed in Chapter 6 (cf. Point 6.5.5) based on the data collected for the **literature review** in Chapter 2 (cf. Point 2.5.4), **semi-structured interviews** in Chapter 4 (cf. Point 4.3.6) and **focus group interviews** in Chapter 5 (cf. Point 5.4.2.3), theme five.

Financial considerations were discussed in Chapter 6 (cf. Point 6.5.6) with regard to the data collected for the **literature review** in Chapter 2 (cf. Point 2.5.3), **semi-structured interviews** in Chapter 4 (cf. Point 4.3.7) and **focus group interviews** in Chapter 5 (cf. Point 5.4.2.3), theme four.

Staff requirements were discussed in Chapter 6 (cf. Point 6.5.7) as it followed from the data collected for the **literature review** in Chapter 2 (cf. Point 2.5.2), **semi-structured interviews** in Chapter 4 (cf. Point 4.3.8) and **focus group interviews** in Chapter 5 (cf. Point 5.4.2.3), theme three.

The researcher endeavoured to make a number of **recommendations** regarding the **development** and **implementation** of a simulation centre in Chapter 6 (cf. Point 6.6.4.4).

The aim of Chapter 6 was the compilation of recommendations for the use of clinical simulation to enhance undergraduate medical education and training at the UFS as well as for the planning and implementation of a simulation centre. The **premises** (cf. Point 6.6.1), **points of departure** (cf. Point 6.6.2) and **role players** (cf. Point 6.6.3) were examined in order to **make recommendations** with regard to the use of clinical simulation as enhancement of undergraduate medical education and training at the UFS (cf. Point 6.6.4).

7.3 CONCLUSION

Clinical simulation for education and training of health care professionals is a relatively new educational tool and which has over the recent years escalated to a level where medical training is not complete without simulation training. This study originated from the **recognition that a gap exists** as far as the use of clinical simulation as enhancement of undergraduate medical education and training at the UFS, but also in South Africa and the rest of Africa is concerned. To **bridge the gap**, the researcher compiled **educational recommendations** for the integration of clinical simulation as a required component of the current **curriculum**, the enhancement of training of **clinical skills and competence** of medical students with clinical simulation as well as **simulation assessment tools and criteria.** The **development and implementation** of a new simulation centre for the School of Medicine, UFS, was discussed in order to reach the goal of clinical simulation teaching and learning.

A combination of methods was used to generate data and these findings were interpreted to form the basis of the guidelines. ***Theoretical perspectives***, based on a literature review and linked to the contributions of various authors in the field of simulation teaching and learning, were used to develop a ***conceptual framework*** on which the research was based (Chapter 2).

A detailed description of the **factual aspects** was presented, as derived from semi-structured interviews with international experts and focus group interviews with faculty members of the School of Medicine (Chapters 4 and 5). The interpretations were discussed in detail as scientific evidence and congregated to compile the recommendations regarding the use of simulation as enhancement of undergraduate medical education and training were made by the researcher (Chapter 6).

At the ***conceptual level*** it became clear to the researcher that for the implementation of simulation, it is crucial to approach the process in an educational and scientific way. ***The researcher is of the opinion that*** simulation must be fully integrated into the curricula so that students can **move continuously** between theory, simulation and clinical training. Simulation training has to form a **spiral** with **various opportunities** to develop skills and **integrate** theory and practice. It should be an **open process** in a **continuous, stepwise** and **dynamic** course of action where students as well as lecturers can move up and down the spiral to achieve excellence in teaching and learning. Simulation must be used for **self-directed learning** as well as **instructor-based learning.**

To comply with the educational needs of simulation training, **assessment** must form an integral part of simulation training and especially **debriefing**, where students learn without fear for mistakes in a safe environment. The creation of a **safe environment** is conducive to learning and the simulation centre must therefore form the safety net where students can learn without harm to patients. Collaboration between the different teaching and training facilities and their role players may contribute to promote patient safety and **multidisciplinary** education.

Development and implementation of a simulation centre must be done in a scientific way, with meticulous **planning** and liaison with staff members from different clinical departments, permanent simulation staff members, hospital management and students. Therefore, a leader will be needed to drive the process, with **expert knowledge** of the educational aspects of simulation and excellent **interpersonal skills**. An **enthusiastic** individual with **authority** and adequate **medical clinical** background and who will be able to promote simulation training to lecturers and students, will play a vital role in the successful implementation of simulation education and training. Evaluation of simulation training must form an integral part of the process for **quality assurance**, and changes need to be made if necessary.

Implementation of simulation training is very expensive and, therefore, the establishment of a simulation centre for the School of Medicine, UFS must be **well-researched, well-planned** and all aspects of the management must be adequately addressed so that the simulation centre can add value to the education and training of undergraduate as well as postgraduate students.

The scope for **research** in the field of clinical simulation is almost unlimited. Persons adequately qualified are essential for conducting and mentoring quality research in clinical simulation.

7.4 LIMITATIONS OF THE STUDY

The researcher recognises some limitations in the study.

Although the study was clearly demarcated, it became a comprehensive study, generating a large amount of data. The study was conducted in the field of health professions education, but some aspects - for instance, the financial aspects, the buildings, the staff and technical aspects of simulation **broadened the scope** of the study. These aspects were discussed briefly, but could be addressed in more detail when publications are prepared or new research topics are pursued.

The study was conducted especially for **undergraduate medical students**, but it could also be relevant for **postgraduate registrar training** and **interdisciplinary training**. These aspects could be addressed in further research projects and studies.

The researcher recognises another limitation in this study, namely the fact that the lecturers in the Phase III focus group did not have enough background information and knowledge on simulation. In that specific focus group, data were generated that could not contribute to the research, because of **unfamiliarity** and **lack of knowledge** regarding simulation teaching and learning. The Heads of Departments focus group, however, provided valuable data that could be added to the first focus group, resulting in useful data for the study, that contributed to the study.

Semi-structured interviews were conducted with experts from three centres from first world countries. Experts from **developing countries,** for instance, South America, Africa, Asia or Eastern Europe could add another dimension to the data, - especially where medical educators from developing countries are confronted with financial challenges, students from different ethnical backgrounds and discrepancies between primary, secondary and tertiary health care provision and facilities. These aspects can be investigated in future and can form the basis for further research in this regard.

7.5 CONTRIBUTION AND SIGNIFICANCE OF THE RESEARCH

The research made a **valuable contribution** to new knowledge by providing recommendations for developing and implementing a simulation centre for the School of Medicine, UFS. By developing the recommendations, the identified gap was bridged. The research can assist in integrating clinical simulation into current curricula, so that the knowledge can improve the skills development and competence of medical students and provide recommendations for simulation-based assessment of medical students. The sound research approach and methodology ensured the **quality, reliability** and **validity** of the research. The completed research can form the basis for a **further research agenda**.

Recommendations made from the research will significantly improve **team training** and **interdisciplinary training**. **Patient safety** will be addressed and **ethics** regarding training on real patients will be attended to. Simulation training can minimise the **psychological stress** students experience when they have to train on real patients and can bridge the gap between tertiary health care training and rural primary health care circumstances where health care professionals will have to cope in difficult conditions.

The overall goal of this study was to investigate the role clinical simulation can play in the education and training of undergraduate medical students as an enhancement of current curricula and the implementation process of a simulation centre for the School of Medicine, UFS. The study provided clear **recommendations to reach the goal** that was set. The recommendations in achieving this goal were discussed in Chapter 6 (cf. Point 6.6.4).

7.6 RECOMMENDATIONS

In order for the study to yield **significant and valuable** results, the researcher takes the liberty of recommending the following:

- That the findings of this study be submitted to the Executive Management of the School of Medicine, UFS for consideration, implementation and further recommendations as a way forward in the education and training of medical students.
- That the recommendations be implemented in the undergraduate medical programme at the UFS by means of a structured implementation plan.
- The recommendations can be customised for medical programmes at other South African and African Universities.
- That the plan should play a pro-active role in the need for the use of modern educational methods such as high-fidelity simulation and appropriate use of e-learning activities with flat-screen simulation in training programmes of students.
- That the research results be presented at national and international congresses.
- Publishing the research results by means of articles in accredited higher education and clinical simulation journals.
- This study can make a valuable contribution in expanding the service training platform as recommended by the CMSA (2009:3)
- To do further research on the impact of simulation teaching and learning on students' outcomes.
- Further research on simulation-based assessment and assessment criteria.
- Further research on customising the guidelines for implementation in training programmes for specific institutions e.g. private hospital groups, government hospitals and pharmaceutical companies
- Research on implementing and adapting the educational recommendations on simulation for postgraduate registrar training, CPD programmes and exit examination assessments with the aim of improving patient safety.
- Further research on how the educational recommendations on simulation can be implemented for training, assessment and maintenance of registration programmes for other medical schools and examination bodies like the CMSA.

The researcher is of the opinion that the research made a significant contribution to the body of knowledge, in the field and that the recommendations will contribute to the development and implementation of a simulation centre for the School of Medicine, UFS.

7.6 CONCLUSIVE REMARKS

The introduction of clinical simulation as medium of instruction, as a required component in the current undergraduate medical programme at the UFS, will add a new dimension to teaching and learning of the medical students.

This study investigated and reported on the characteristics of simulation as defined by the Canadian Network for Simulation in Healthcare (CNSH 2011:Presentation): "*an instructional medium used for education, assessment and research, which includes several modalities that have in common the reproduction of certain characteristics of clinical reality. As a fundamental requirement, they must allow participants to affect, to different degrees, the course of the educational experience through verbal or physical interaction with the simulated components or patients.*"

The addition of clinical simulation as medium of instruction will enrich the undergraduate medical programme and also produce better-equipped medical practitioners and consequently render a better service to patients in need.

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APPENDIX A

(INCLUDING APPENDICES A1-A3)

Appendix A1

LETTER OF INVITATION TO PARTICIPATE IN A SEMI-STRUCTURED INTERVIEW

Dear Colleague

This is a letter to request you to participate in a Ph. D. study:

CLINICAL SIMULATION TO ENHANCE UNDERGRADUATE MEDICAL EDUCATION AND TRAINING AT THE UNIVERSITY OF THE FREE STATE

The **purpose** of the semi-structured interview is to investigate the role of a simulation centre in the education and training of undergraduate medical students as an enhancement to current curricula and the implementation and management of such a centre. The semi-structured interview will take approximately 45 to 60 minutes to complete.

I would like to **request you to take part** in the semi-structured interview. Please note that by taking part in the semi-structured interview you are voluntary agreeing to participate in the research study. You will remain anonymous and your data will be treated confidentially at all times. You may withdraw from this study at any given moment during the completion of the semi-structured interview. Should you be willing to participate, you will not be held responsible for any decisions or conclusions made from the study. Kindly note that the results of the study may be published. You will not receive any remuneration and there will be no costs payable by the participant.

Please fill in the accompanying consent form and return it to me electronically or by fax or hand it personally to me.

Thank you for your consideration of this initiative. I am looking forward to hearing from you and hope to meet you personally in future.

Yours sincerely

Dr M. J. Labuschagne
Senior Lecturer/Ophthalmologist
Department of Ophthalmology
University of the Free State
Bloemfontein, South Africa

Etovs number: 122/2010

Appendix A2

FORM OF CONSENT: SEMI-STRUCTURED INTERVIEWS

Date ____________________

Hereby I, the undersigned, consent to participate in a semi-structured interview, which is scheduled to take place on the scheduled visit to your simulation centre on _________________.

My full particulars are as follows:

Surname: ____

Full names: ____

Telephone number: ____

E-mail address: ____

____

Signature/Typed consent

I wish to assure that the information will be treated in highly confidential manner and that there will be no reference to any names. Please take note that the results coming from this research will be published, but you will not be held responsible for any decisions or conclusions made from the study.

Thank you in advance for your kind co-operation.

Yours faithfully

Dr M.J. Labuschagne
Senior Lecturer/Ophthalmologist
Department of Ophthalmology
University of the Free State
Bloemfontein, South Africa

Etovs number: 122/2010

Appendix A3

INTERVIEW GUIDE FOR SEMI-STRUCTURED INTERVIEWS

CLINICAL SIMULATION TO ENHANCE UNDERGRADUATE MEDICAL EDUCATION AND TRAINING AT THE UNIVERSITY OF THE FREE STATE

The **purpose** of the semi-structured interview is to investigate the role of a simulation centre in the education and training of undergraduate medical students as an addition to current curricula and the implementation of such a centre.

Semi-structured interview guide

1. What role can simulation play as an additional mode for undergraduate medical training?

2. How can simulation be integrated into current undergraduate medical curriculum?

3. What role can simulation play in assessment of undergraduate medical students?

4. What lessons did you learn by using simulation as undergraduate training tool?

5. In your opinion, what are the important factors to take into account in the planning of a simulation centre?

6. What recommendations can you make to take into account when acquiring simulators?

7. What is your advice on the financial considerations for a simulation centre?

8. Can you describe the staff requirements for a simulation centre?

9. What lessons did you learn regarding the planning and implementation of a simulation centre?

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APPENDIX B
(INCLUDING APPENDICES B1-B5)

APPENDIX B1:	**REQUEST TO PARTICIPATE IN A FOCUS GROUP INTERVIEW**
APPENDIX B2:	**VERSOEK OM DEEL TE NEEM AAN 'N FOKUSGROEP-ONDERHOUD**
APPENDIX B3:	**FORM OF CONSENT: FOCUS GROUP INTERVIEW**
APPENDIX B4:	**TOESTEMMINGSVORM: FOKUSGROEP-ONDERHOUD**
APPENDIX B5:	**INTERVIEW GUIDE FOR FOCUS GROUP INTERVIEW**

Appendix B1

REQUEST TO PARTICIPATE IN A FOCUS GROUP INTERVIEW

Date: __________________

Time: __________________

Venue: __________________

Dear Colleague

This is a letter to request you to participate in a Ph. D. study entitled:

CLINICAL SIMULATION TO ENHANCE UNDERGRADUATE MEDICAL EDUCATION AND TRAINING AT THE UNIVERSITY OF THE FREE STATE

The **purpose** of the focus group interview is to investigate the personal opinions and attitudes concerning the value that a simulation centre can play in the training of undergraduate medical students in the School of Medicine, UFS.

I would like to **request you to take part** in the **focus group interview**. The focus group interview will take a maximum of 120 minutes. Please note that by taking part in the focus group interview you are voluntary agreeing to participate in the research study. You will remain anonymous and your data will be treated confidentially at all times. You may withdraw from this study at any given moment during the completion of the semi-structured interview. Should you be willing to participate, you will not be held responsible for any decisions or conclusions made from the study. Kindly note that the results of the study may be published. You will not receive any remuneration and there will be no costs payable by the participant.

Should you be willing to participate, please fill in the accompanying consent form and return it to me electronically or by fax or hand it personally to me.

Thank you very much for your consideration of this initiative and I am looking forward to hearing from you.

Yours sincerely

Dr M. J. Labuschagne

Senior Lecturer/Ophthalmologist

Department of Ophthalmology

University of the Free State

Bloemfontein, South Africa.

Etovs number: 122/2010

Appendix B2

VERSOEK OM DEEL TE NEEM AAN 'N FOKUSGROEP-ONDERHOUD

Datum: _______________

Tyd: _______________

Plek: _______________

Geagte Kollega,

Hiermee word u versoek om deel te neem aan 'n Ph. D.-studie getiteld:

"CLINICAL SIMULATION TO ENHANCE UNDERGRADUATE MEDICAL EDUCATION AND TRAINING AT THE UNIVERSITY OF THE FREE STATE"

Die **doel** van die fokusgroep-onderhoud is om u persoonlike mening en houding ten opsigte van die waarde wat 'n simulasiesentrum kan speel in die opleiding van voorgraadse mediese studente binne die Skool vir Geneeskunde, Universiteit van die Vrystaat te ondersoek.

Ek **versoek u om deel te neem** aan die **fokusgroep-onderhoud**. Die fokusgroep-onderhoud sal maksimum van 120 minute neem. Neem asseblief kennis dat as u aan die fokusgroep-onderhoud deelneem, u vrywillig toestemming gee om deel te neem aan die navorsingstudie. U sal te alle tye anoniem bly en u data sal te alle tye vertroulik hanteer word. U mag op enige stadium tydens die fokusgroep-onderhoud aan die studie onttrek. Indien u instem om deel te neem, sal u nie verantwoordelik gehou word vir besluite of gevolgtrekkings wat gemaak word nie. Neem ook kennis dat resultate uit die studie gepubliseer kan word. U sal geen vergoeding ontvang nie en daar sal geen kostes vir u aan vebonde wees nie.

Indien u instem kan u asseblief die meegaande toestemmingsvorm invul en teken en so spoedig moontlik elektronies of per faks of persoonlik aan my terug besorg.

Baie dankie dat u dit oorweeg om deel te neem aan hierdie ondersoek en ek hoop om so spoedig moontlik van u te hoor.

Die uwe

Dr M. J. Labuschagne

Senior Lektor/Oftalmoloog

Department Oftalmologie

Universiteit van die Vrystaat

Bloemfontein

Etovs nommer: 122/2010

Appendix B3

FORM OF CONSENT: FOCUS GROUP INTERVIEW

Date ____________________

Hereby I, the undersigned, consent to participate in a focus group interview, which is scheduled to take place on __________________, time _________, venue ___________.

My full particulars are as follows:

Surname: ____

Full names: ____

Telephone number: ____

E-mail address: ____

____

Signature

I wish to assure that the information will be treated in highly confidential manner and that there will be no reference to any names. Thank you in advance for your kind co-operation. Please take note that the results coming from this research will be published.

Yours faithfully

Dr M.J. Labuschagne

Senior Lecturer/Ophthalmologist

Department of Ophthalmology

University of the Free State

Bloemfontein, South Africa

Etovs number: 122/2010

Appendix B4

TOESTEMMINGSVORM: FOKUSGROEP-ONDERHOUD

Datum ____________________

Hiermee gee ek, die ondergetekende, toestemming om deel te neem aan 'n fokusgroep-onderhoud, wat geskeduleer is om op ______________, om _____________ by ____________________ plaas te vind.

My volle besonderhede is:

Van: ____

Volle voorname: ____

Telefoonnommer: ____

E-posadres: ____

____

Handtekening

Ek wil u verseker dat die inligting as hoogs vertroulik hanteer sal word en dat daar geen verwysing na enige name sal wees nie. By voorbaat baie dankie vir u samewerking. Neem asseblief kennis dat resultate voortspruitend uit hiedie navorsing gepubliseer sal word.

Die uwe

Dr M.J. Labuschagne

Senior Lektor/Oftalmoloog

Department Oftalmologie

Universiteit van die Vrystaat

Bloemfontein

Etovs nommer:122/2010

Appendix B5

INTERVIEW GUIDE FOR FOCUS GROUP INTERVIEW

Appointed facilitator: ____

Independent observer: ____

Welcome: Introduce facilitator and assistant

The topic is: ***"Clinical simulation to enhance undergraduate medical education and training at the University of the Free State"***

You have been selected because you are a Head of Department/Module leader/session presenter in Phase III of the undergraduate medical programme.

Guidelines:

- No right or wrong answers, only different points of view.
- We are tape recording, so only one person can speak at a time.
- We are using the number in front of the person; mention your number when you are speaking for the sake of confidentiality and the recordings.
- You do not need to agree with others, but you must listen respectfully as others share their views.
- We ask that you turn off your cellular phone during the interview.
- My role as facilitator is to guide the discussion.
- Talk to each other.

Opening question:

"Wat is u persoonlike mening en houding ten opsigte van die waarde wat 'n simulasiesentrum kan speel in die opleiding van voorgraadse mediese studente binne die Skool vir Geneeskunde, Universiteit van die Vrystaat?"

"What are your personal opinion and attitude concerning the value that a simulation centre can play in the training of undergraduate medical students in the School of Medicine, University of the Free State?"

Conclusion:

- Summarise with confirmation,
- Review the purpose and ask if anything has been missed,
- Thanks and dismissal.

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APPENDIX C

(INCLUDING APPENDICES C1-C2)

APPENDIX C1: FOCUS GROUP INTERVIEW: PHASE III LECTURERS

APPENDIX C2: FOCUS GROUP INTERVIEW: HEADS OF DEPARTMENTS

Appendix C1

Focus Group Interview: Phase III Lecturers
Date: 07 April 2011. Room A126, Francois Retief Building, UFS, Bloemfontein.

Person speaking	Paragraph Number	Transcription of words	Non- verbal
4	L1	I am very much in favour of it. I have been using simulation now on slightly small scale for the past 25 years in training students CPR. It is essential and as a matter of fact that is the only way they can really be trained by simulation. I can tell of few cases where students were trained on the session and when they left Anaesthesia and went to the next discipline, that was Family Medicine, and working for instance in the casualty Department they came back and said they had two cases of cardiac arrest in the Casualty Department, and they knew what to do. So I think it is essential and I am very glad for the whole purpose of establishing the simulation unit here, because it can be expanded into a lot of things, I mean if we can think of the skills lab, which is nothing else but simulation, where they are taught the basics of certain procedures. So yes, I am extremely in favour of.	At ease sitting back on chair
Facilitator		Any comments on number 4's opinion?	
8	L2	I would like to support number 4 and I feel it is a fantastic development for the Medical School, however I just like to add my own personal view on it in the sense that there has been rumours here that the simulation unit and low or high fidelity simulation can in any way replace a changing or decreasing platform in the clinical fields in medicine and surgery. And I feel it is a major misconception. Simulation is there to develop skills, that we cannot trust students to develop thoroughly on patients before actually having the skills to treat the patients. And secondly to develop skills and attitudes and behaviours that we would feel is essential to develop in a safe environment before we let them loose on the patients, so I think if the simulation unit is the philosophy around simulation has been quite widely described in the literature regarding the development of particular skills, but the clinical training ground of feeling a lump in the neck of a patient that moves during swallowing or an abdomen that is hard, because it is an acute abdomen, those are things students need to learn in the field in clinical medicine, but the simulation unit is fantastic to develop particular skills in resuscitation where we cannot just expect from them to resuscitate a patient without prior training and say well this is your experience training, now resuscitate the	Arms crossed More relaxed sit back arms on table

		patient have a go. It is unethical and unsafe and it will obviously traumatic to the student if it goes wrong and it will probably go wrong if it is the first case. So I completely support the idea, but it is important to recognise what simulation is there for, and what it is used for. And my last view is that it should be a holistic approach to simulation, so we should start looking at the current skills lab and the one we are now proposing to develop and look at how we can integrate it, use the facilities most appropriately in development further. But I completely support the idea.	
Facilitator		Number 4 wants to make a comment on that	
4	L3	I just want to make a comment on attitude and I was involved in the establishing of the whole new curriculum that is going on now for many, many years since 1995 94 those years when the Kat was still here, any case, once we started to establish the skills lab, there were quite an attitude of our consultants, our lecturers, against the skills lab, because the arguments were taken that ah but you can't teach skills on a doll or a manikin or whatever, it must be taught on a real patient. I am still involved in the skills lab, up to today. And there is a major change in attitude from the higher perspective of our consultants and lecturers and things like that. So even if there might be a little something against the whole situation of skills or rather simulation unit. I am sure once they see the necessity of it, the whole attitude will change. And I got no doubt and I have spoken to quite a few of you who had been overseas trips of investigating into the skills unit. Basic skills can be taught in any of the scenarios in any of the disciplines, if it is taught correctly right from the start and I think obviously the purpose of this thing is teaching it correctly and making attitudes change towards this. Because we sit with a problem that patients are not so easily available for clinical work any more, than it used to be.	Comfortable and relaxed, open body to group
Facilitator		Number 9	
9	L4	I would just like to make a comment, I think in terms of attitude, like anything in life if somebody is unfamiliar with a new concept, very often you get resistance. I think what we should think of that once something like this has been established to try and involve as many people as possible, even if we distribute the positive effects that come from such a unit, widely. Because my experience is that if somebody is left out of the process, very often you will get resistance you will find that it seems that there is a	Sits back into chair and emphasise aspects with hands

		problem with the attitude. But lack of knowledge and understanding of exactly what was going on could be a driver of resistance and the idea that people don't like the whole concept.	
Facilitator		Number 3	
3	L5	I totally agree with that. I think most of the people are against it because they are not familiar with it. If we can familiarise them with the techniques and we can pull them in, maybe they will change their whole attitude. And I also want to agree with number 4 on the previous statement where he mentioned that if you get somebody and you familiarise him with a specific aspect, say for example a hernia or whatever, then if they go out to the patients, they will learn so much faster, because they are already familiarised with it. If you take for example in my years as a student I spent three years in the surgical wards, these days I only see the fourth and final year students, so they have one year less, so if we can train them on certain aspects, before they touch their first human patient, then I think two years will be more than enough. That two years plus simulation, beforehand will mean more than three years on the patients. If I take for example in my fourth year I have seen a couple of drips when they inserted the *Jelco's* but you cannot see exactly what they do the whole time. You have to see six seven patients before you feel you can do it now. But if they take you to a sim lab and they show you properly once then I am sure the first patient out there will be yours.	Relaxed with hands resting on table
Facilitator		Number 7	
7	L6	Previously we discussed that if people knew more about the clinical simulation labs they would not have such a resistance to it. When I personally I know about clinical simulation in relation to the manikins in the anaesthesia situation. But I am not personally familiar what you are going to teach the medical students at this basic level. So how are the people organising this course, going to explain to us, the specialists what is going to go on in a simulation labs? Will you going to ask for our inputs? Will you give us a chance to visit them and see what they are supposed to be learning?	Keep left arm folded on lap while using right hand to emphasise certain aspects

1	L7	I think that is important especially in our Department with the older guys, they are always resistant to change and if you don't know what is the issue and why it is you must change, then there will be resistance. Always. But then I absolutely agree that you must get some insight and why it is necessary and why they want to do it. How far are they developing the student before we catch them along the line. That will make a lasting impression along the line and that will reduce the resistance extremely better.	Sits back and takes sip of coffee
Facilitator		Number 4	
4	L8	In the discussions beforehand, I am also on the committee for simulation and we have been going on now for more than a year now. In our meetings there was no doubt about it that every discipline, every person who are interested will be given the opportunity and given the chance to go and visit the sim lab and visit and see what they are actually doing, even if you are not in that discipline, you will be able to experience what is going on and so forth. I want to quote our Programme Director here and he said he was absolutely amazed at the major congress that was held in St Louis.... New Orleans in the beginning of this year. He has spoken to one of the senior people of one of the universities in the States and he was absolutely amazed at the extent of surgical simulation that was done there, so yes it can be to the benefit of many people. And even us in Anaesthetics might be more interested in simulation, I am sure that the whole project will be open to everybody. I have no doubt that courses will be held to show them what exactly is going on, so I got no doubt about that.	Sits with hands folded in front of him on the table, slightly bent forward towards the group.
Facilitator		Number 7 do you want to respond to the comments? Your concern is more about the uncertainty in other disciplines.	
7	L9	I don't think that in the answer that was given that there was any mention of the specialists being asked for their input as to what should be on the curriculum in the simulation lab. I think we are still in a bit of a fog as regards to what they will be learning. They could give us a list of things that will be taught and ask us for our input on whether we think it is appropriate and if we wish to add other skills that could be added to this curriculum, I think that would be valuable.	Left hand folded over lap

Facilitator		So you are still uncertain about the type of input?	
7	L10	The interaction between the people organising the course and the people in the clinical field might have some suggestions, I think they still feel a little bit left out.	
Facilitator		Number 8 and then number 4	
8	L11	I just like to comment on what number 7 has said. The point that she is actually raising is the issue of inclusiveness in planning in the inclusion of the simulation lab into the curriculum and what happens in the simulation lab. My Department was also part of this simulation committee, which started about a year ago, but we've since not been actively engaged to participate any more. And I think the issue about inclusiveness is very important in driving a new initiative in a large Medical School, because of the way inclusiveness and asking people, anybody who is interested, anybody who has an opinion to be involved will reduce apprehension of people because they feel they can contribute. Many times when there is a new thing started and actually hear about it and now it is happening and there is millions of Rands being spend and they were not involved in the planning necessarily, that creates resistance and I think that one of the ways to counteract resistance in a new high stakes in terms of money, is to be very conscious about inclusiveness. I think that is something that I experienced overseas, is the level of the importance and the emphasis is placed on inclusiveness and involving anybody who is interested, not creating a hierarchyal committee from a selected few people who has been handpicked to drive the process. Anybody who is interested can contribute to that process so that it can be a truly inclusive process.	Starting with arms crossed, start to use hands during the conversation. Starting to relax and sitting back on chair
Facilitator		So you are talking about inclusiveness and the multidisciplinary approach to a specific area and not only Department, Department, Department.	
8	L12	I am talking about a culture and a nature that is embedded in the Faculty's approach to initiating a large scale new project or initiative in terms of throwing open the doors inviting anybody who has got an opinion and interest, who wants to be involved, not just in the School of Medicine, but in all other Schools to be involved, particularly because we know simulation is excellent for developing inter professional teamwork and interdisciplinary skills later on and that is where one needs input.	

Facilitator		Number 4	
4	L13	Number 7 I just want to clarify my point. You mentioned every time a course a course. This is not purely a course, this is an open simulation unit to be used totally for everybody, every discipline undergraduate, and then the very step next, shortly after that will be postgraduate. If we refer back to two weeks ago with that meeting with Prof van Zyl. This inclusiveness was absolutely stressed that other Faculties, other disciplines, like nursing, like Optometry, they must be inclusive. That was the decision taken there by those people present that inclusiveness. That we mustn't spend money on one thing that the School of Medicine can use and the others not. So whenever there is something the three Schools can use, it must be inclusive and so on forth. So the idea is that this message should be spread to Departments and the Departments will have to discuss this among your people and they will have to set a curriculum for their undergraduate students in the unit. I must mention that the unit must be run by a proper person that is qualified to run and allocate times and things like that and that the unit will be available, I would almost say, 24 hours a day. (a little difficult for us at this stage) but overseas in Pittsburgh for instance it is available 24 hours a day for people who get lectures or whatever. And then the students can go in there at their own time and go and practice. So every Department as I see it will have the facilities in the unit. The Eyes can go and see eye testing and practice eye testing, whatever Department there might be. So inclusiveness I think is there. I think the idea was first to get the situation going, and then get the other people in, of course this will be for the whole School, or rather the Faculty, all three Schools of the Faculty.	Sitting bent forward and open to group
Facilitator		Number 9	
9	L14	I would like to make two comments. First of all comment on number 4 in terms of inclusiveness; unfortunately the situation has developed that a major Department was left out. We were included initially in the planning and then suddenly it seemed as if nothing happened, I mean there was a person on the committee from our Department as part of the committee and then for a number of months we actually thought that the committee was not convening, until it was actually found that the committee has been very active and our Department was not been involved any further. And it is exactly this kind of non-inclusiveness which unfortunately causes problems. And I	Use hands during conversation

		would also disagree that to get the process going and then only start to be inclusive is in my opinion also not the right thing, because then there is already something there and then people start feeling they are just add-ons. It also causes problems. The fact that the process has gone on as it has been, also gives us the idea that it is not transparent. I think something of this major importance in the Faculty should be transparent. So certain things happened that gives a certain perception which might or might not be correct, but unfortunately it creates certain tensions as well. The second was, to include everybody in the Faculty, I mean there are three Schools involved and I really think that one should try and see how we can use the resources as best to our advantage as possible. There is already a unit going on in one of the other Schools, not the School of Medicine and there were at some stage we thought maybe we should get a large unit that would help the whole School. In my opinion, once again, in my opinion, is that we as a Medical School now want our own simulation unit, separately from that of the other School, which we should wonder are we using our resources to the best advantage? Is it now going to cause duplication? Is it not going to put extra stresses on certain resources we are going to get? So these are questions on my mind which I wonder about. And I agree that we should work as a Faculty. But putting everybody on a little island the different three Schools. I think it is not to our advantage.	
Facilitator		You mentioned the problem of transparency. Do you have any solutions? How they can address the issue of transparency?	
9	L15	Being much more inclusive. There should be a larger group with a person from every Department, not as a working committee, doing the things, but even if that Department doesn't have a specific opinion, they should be invited.	
Facilitator		Number 4	
4	L16	Right in the beginning an invitation at a meeting, was sent to all Departments to nominate persons for the committee and there was an OVERWELMING response of about six people. The second thing. May I ask a question? Out of this discussion that happened now, because now I can see that there are worries, they are VALID worries about that. Is this going to stick only with the purpose of the PhD that we are discussing now or will this go out to the people who are actually involved at the	Emphasise specific words with hand movements

		moment and the more superior people in this committee? Because what is said here are really worrying. And out of this must come then some action. So if that is the purpose of this meeting also, then it will be fine.	
Facilitator		Yes, that is also the purpose. Well, comment number 9?	
9	L17	It is actually the fact that there were only six Departments that wanted to be involved and one of that Departments came forward and with people who are very keen, are suddenly dropped and I understand that you were probably not being involved in the process of dropping this Department. But it is said.	
Facilitator		Right number 6	
6	L18	I just want to know what kinds of models we are looking at? Are we looking at plastic models or are we looking at virtual reality, which is a completely different thing and much more expensive? Because we work in a very specialised field and it doesn't lean itself to simulation, so that is why we didn't respond. But I did some research now and there are some few things we can do, but you need a very specific model for that. So I want to know how wide they are looking at the models?	Keeps hands in front of neck and face
Facilitator		Any comments on that? Number 3	
3	L19	On the Internet there is a lot of nice things for ENT as well. I gave a talk at the Surgery Department to give them a nice glance of what is available and there is a lot of nice things you can look at. I can give you that information. I've been to America as well, to New Orleans, and there are some virtual reality models as well.	Open up to group and looking number 6 in the eyes
6	L20	That is what I say virtual reality in our field is the better way to go than models.	
3	L21	And there are some other models on the body where you can change for instance the ear. There are 10 or 15 ears with different diseases that you can change on the model.	
8	L22	I just want to say in my experience in Scotland and England, there is large development in especially postgraduate training especially surgical training, with laparoscopic devices and also using of 3D laparoscopic and microsurgery can actually	

		be simulated quite nicely with devices and on a flat screen so that you actually operate on a flat screen, but it is a model you use. I think I am not personally quite sure yet if the Faculty is currently only looking at the undergraduate model, which I think it will be unfortunate if we do not start planning for the postgraduate rollout and the facilities and the rooms now and the facilities and rooms and also start putting some money away to get for instance a laparoscopic model for the first year surgical registrars, so that they can start learning that skills. I would advocate that it is important that we start planning ahead and see the major potential in simulation, outside of resuscitation is actually in postgraduate training. And I think that is something we should consider.	Arms crossed
Facilitator		Number 6 if I can come back to you, now that you are very uncertain about what is going to happen in the simulation unit, what is then your opinion, your feelings on the simulation at this stage?	
6	L23	I don't have a problem with it, I just want to know if we are going to use models, how realistic are they? Like as he said you can change the tympanic membrane, I suppose, does it really look like it looks? We have got one of the Rep companies that gave us heads, where you examine the nose, the stuff in there is rubber it is not realistic at all. You have to use your imagination to . i just want to know is it good quality stuff, does it looks like the cases in the clinic? Because then it is a great idea, because at the moment in the skills lab the students examine each other for lack of a model.	Hands in front of neck and mouth
Facilitator		Number 9, then we will come back to number 3	
9	L24	Just a comment on number 6, it is exactly the comment that she make, is exactly the reason that when there is an e-mail send out, to start a simulation unit, there is few that reply or are interested. If our colleagues do not know what is out there, how can they know that they can actually benefit from this? And shouldn't one ask if that is not the reason that there is no interest? Because the rubber models of twenty years ago that most of us know, is of nothing that the stuff that is out there today. It is completely different. When I visited The Space Lab I was surprised at the realism of those manikins. The way that they can be programmed to be almost lifelike. It was a bit, almost scary that the manikins, with pupils that can react to light. So my opinion is that if we want to do something about this, we should have a large information	Emphasise with hands sitting forward towards group

		session first. To see what is there, then ask people for their contribution. I think then we are going to see a lot more than six people coming forward.	
Facilitator		Number 3, before I come to you. Number 9 what do you think will be the value of this training of the pre graduate students on almost real manikins?	
9	L25	I think first of all as far as I know you can have recordings of for instance heart sounds, of murmurs in this that can be very life like. That the students can have access to that, they don't have twenty patients in the ward with different heart murmurs. Just last week the students told me that they feel that they don't have enough training. They don't even heard a heart murmur before and they are now at Cardiology, and if they don't recognise the murmur immediately, everybody is upset. I think if there is something like that, it can definitely help. And I think also with development of skills, somebody previously said drawing blood, putting up drips, I am sure there are manikins where students can experience doing an LP. There are a lot of procedures where it will be much easier for a student to learn and when they get to the wards, they will have a much more comprehensive knowledge of certain skills, then we will not have to teach them everything, that takes up a lot of time, very precious time of people doing a lot of clinical work, and we don't have that much of time to spend on students.	Open up to group, more relaxed
Facilitator		Number 3 and then number 4	
3	L26	I will try to answer number 6 and number 8. I think that the problem that I can see now that people are so resistant and afraid of simulation, because they don't have a slightest idea of what simulation can give us. Simulation is so wide, and I think that is where we need all the specialities to come in, because that speciality needs to see what they need and then it can grow from there, for example at the surgery department in New Orleans they taught us a couple of things. But before I get to that, as a Surgical Department I need to see where we have problems. Obviously it is important to see where we have problems. Pre-graduate a few things, but post graduate, with laparoscopic stuff, with colonoscopies. Because colonoscopies are quite invasive, you can damage a patient, the same is with colonoscopies, because we don't have enough theatre time and we keep on cancelling our patients. By the time you operate a patient for a cholecystectomy, he had cholecystitis about eight times before,	Relaxed open up to group

		by the time he gets operated it is a much more difficult procedure. Our equipment is terrible, so now you take a youngster, his first cholecystectomy is on a difficult patient with equipment that is not worth operating on a pig. All right, I will come back to that. But first the colonoscopy, what they taught us in New Orleans, with what basic equipment and tools you can build your own colon for colonoscopy. And that is where ENT can come in, if they think that models are not optimal, we have the tools now how to build and manufacture our own things. But yes, there is a place for cheaper models, so that a person at least teach how to manoeuvre a scope or whatever. You don't need brilliant 100% perfect models for that. And then as a department you can see OK we have a problem with that, maybe we can make it nicer or we can look out for a little bit more expensive one. And the previous question number 6, is it virtual, is it a model, I think laparoscopic is the best example, there is a combination on, if I operate laparoscopically in theatre, all I see is a flat screen, it is not 3D it is a flat screen and my hands are down here, so I feel. There is two laparoscopic models available on the market, and they are not that expensive. In South African Rand, the one is R600 000 and the other one is R750 000, and those things you can feel the material that you touching, if you cut something or pull on something, it feels exactly like the same thing. In New Orleans I did on that simulator, I have done about eight lap cole's and you can choose the grade of difficulty. It feels EXACTLY like the real McCoy. It is not that expensive any more. So yah, I think we need to present to the rest of the Prof's and educators here, what simulation is about and then we can get them involved to build things or maybe give a part of their budget to it and they will be more positive about it.	
Facilitator		Number 4	
4	L27	I am going to change my number to number 5 or something like that. I feel so guilty now because everything now is my fault! I just want to stress the fact that it was mentioned before I think by number 9. In saying that they never heard heart sounds, which is rubbish, they have been taught heart sounds in the skills lab already. The Anaesthetic Department actually gives them lectures on ECG, they get a lecture on ECG, they get taught in the skills lab by one of our consultants of the department on ECG's for a whole week. I got a running model of a running ECG they don't know what a PQRS complex is. You see it must come forward that they are never exposed to this. We sort of forget the role of the skills lab the basic principles, the basic things that are	Emphasise with right hand

		taught there. So the thing is obviously, obviously in a unit like this, a skills unit, we are not going to go for the 20 year old stuff, we are going virtual, yes, as a matter of fact we have spoken about quite a few of these virtual programmes that number 3 mentioned and even real cases, real situations where you can do it. Obviously money is a problem, yes of course it is, it is going to be an EXPENSIVE situation, but I think that with the insight of, and I must mention our Dean here, with the insight and ideas of what the simulation unit must be, we will not be disappointed in the facilities that will be made available for everybody that is there. And I agree, maybe we should have another meeting, another two day meeting or a symposium out on two different days where the departments can come and let be explained exactly what the idea of the unit is and what the facilities are at stake and what they plan to do and then also ask departments to put insight in. Ideas forward on what they would like to have as part of simulation in their department. But then I think basically the word must be spread by the people who are interested in simulation and then spread the word in the department. I think the symposium or Bosberaad maybe, two days on simulation is a very good idea that must come out of that.	Whole group laughing, everybody seems relaxed now
Facilitator		OK number 2	
2	L28	I just think in reaction to number 4. They were exposed to ECG's and to heart sounds, but not in the context of the patients. That is my problem. When we do the exams of the third years when they are there in the skills lab, they ask them a question, but the question is not how they would do it. Somebody taught it to them, if you show them an ECG, they say this is exactly the one we gave them previously and they know exactly this is the one, so if you give them another one, they score zero. For the ECG's their score is usually very low in the OSCE. Because it is not the same one, they just know this. They can test the urine, specifically on the test of the urine: They tested the urine of diabetic patients, that was what they were taught and they tested it and there was sugar in, now we give them something without sugar, they cannot read it, because they can do the skill, I see sugar, this is sugar, but if there is no sugar in they don't know what it is. So I think when we use the skills lab, we need to do it in a context of a patient. That must be part of now we are going to do urine testing, now we are going to read the ECG, now we are going to do this. Because this is how they experience it, and only if it is exactly the same thing they can recognise it, but if it is not the same they cannot recognise it.	Emphasises with hands, sits back in chair

Facilitator		Just to summarise: your problem is the link between the simulation unit and the patient out there. So how do you see, how would you link the lack of skills between the students and......	
2	L29	You cannot teach somebody just a skill, a skill, you need a skill, teach them this is the indications, this is the contraindications, this is the complications and then you can do it. But now they can do a specific skill, they can put up a drip, but if it is a patient with cardiac failure they don't know they must be careful. They can put up a drip. Every patient that needs a drip, will get a drip. When we tell them to take the blood, they take the blood, no matter if there is a contraindication for that. They can do the skill, but not in the context of a patient. They don't know when to do it and when not to do it.	
Facilitator		So what you are saying is that, they don't know patients.	
2	L30	Yes, I think they've got skills and they have patients and it is two different things, they cannot connect it. And I know they are second and third year students, but you need to start with a patient in context and not skills separate.	Interrupts the facilitator
Facilitator		Number 9 you want to comment on that. Then number 8.	
9	L31	First of all, I would completely agree with number 2. Just coming back to number 4, I've got a lot of experience with tales that students tell. I know we once had students that say they have no idea of sequence of blood travelling through the heart chambers which is absolute nonsense. But I think what it shows me is that there is a lack, it is true, they are exposed to it, but when it comes to the clinical years, they can't put the skill they learned together with the patient, because of lack of integration in their minds. And I think when we plan a simulation lab we should really think what we can do so that the students don't tell us that they never experienced this. So once again, we should actually be careful, if we have the simulation unit, that we do it in context with the patient. The second thing I support your idea of a one or two day session, like a Bosberaad on simulation, because I think then a lot of people with no idea what simulation is about, can also come onboard.	

Facilitator		Before we go to number 8, I want a solution. How would you address this link between .....? Number 8 you have the solution....	Group is laughing when number 4 was mentioned
8	L32	The solution is in education. What we all are talking about is what we taught the students, but do we recognise that they have not learned it? And that is what it's all about in education. It is not about the teaching. We can jump up and down, but it's about what they learn. The second thing is (and it is very well documented in the literature) the complexity and challenge of transfer from the simulated, safe clean environment, to the ward, where it is busy, it's a mess in it's running. Suddenly people looks different and they smell, it is an uncoordinated, unstructured environment out there, where we want them to practise, but we train them in a quite safe quiet .. no one collapses.. so the thing is, in planning it, what you need to do is plan for unconventional scenarios. And I think the important thing in learning is, we get it all the time, students say they have never seen that, but actually if we look at the curriculum, it is there. So what we need to ask ourselves is (and it is also very well documented in the simulation literature) that the power of the learning is directly linked to the skills of the facilitator, not the manikin, it's not in the manikin, it's in the skills of the facilitator. So if the students are in an environment where the facilitator is quite a fearful individual, then the students don't want to ask questions, they just want to get through it, they don't feel that they have the opportunity to practise and learn and actually gain more experience, the learning may not be quite extensive. So in a simulation unit, and I think that was part and parcel of many of the international units, is that they have this facility where anybody can come and practise again, come with another tutor, come with a senior student, and practise again, up to very recently in our own skills lab, there was not a facility where our students can come and practise in their own time, now there is, I think that is a fantastic development, where students have a self directed area to come back and practise in their own time. I just want to answer something about number 6 again, where she mentioned the complexity of the models and not being real about the nose. That comes back to what is simulation about, it's about understanding what we want to teach them initially the psychomotor skill of how to hold the nose speculum or how to handle the ophthalmoscope. The next step is to try and do it on one another now that we had a bit of practice on how to hold it or how to approach it and now we do it on patients. Sometimes the intermediate step can be replaced by a high fidelity model, which will give you a life like feel. But it seems in ENT there hasn't been a development up to	Number 8 indicates he wants to answer that Sits back in chair, using hands to emphasise certain aspects

		where there is nose hairs and lights go on when you touch sensitive areas or press too hard, or something like that. What we did in England is, we got all the Reps in, we invited every Rep in that simulates anything, because they want to sell their products. We invited them to a symposium, we had them all there to have a massive exhibition of everything that go up and down, the lights going on, the whole Faculty was invited, because they had fears and were uncertain, to have a look at things and AFTER that, make recommendations on what could be useful into the curriculum. Now that they have an exposure of what is latest the market has to offer. Because remember the Reps are very keen to come and sell it, so they are very keen to come to a symposium to expose loads of doctors who want to set up a unit with their product. So we had the opportunity to pick and choose the sort of things we could use and life like for that intermediate step between psychomotor skill and patient. To do the skill but get feedback on whether you doing it wrong or how the arm react. So there is complexities in simulation. This forum has been quite fantastic to highlight things and bring things out and I think number 4's suggestion of having a greater discussion, where people can really ventilate what they feel about in a SAFE environment, where we INVITE inclusiveness and ideas and then filter it down into what have come out of this. It will be fantastic in the planning.	
Facilitator		Number 7 and then number 6	
7	L33	If we got the integration of clinical simulation with clinical experience it comes more apparent as the discussion goes on that there is a problem with this at the moment. There should be more liaison between the clinical simulation educators and the clinicians. For example if somebody is being taught the clinical skill of listening to heart sounds, there should be liaised with the clinical scenario they are about to enter. Then they go straight from that to patients. Because there is no point in learning a skill, if you don't go and practise it, then it does not become a skill, it just become a bit of knowledge. There must be more liaison if a person learns to examine a nose then they must go straight to ENT, so there must be some sort of clinical link, otherwise it just becomes islands of knowledge which aren't put into clinical practice. I think that the Bosberaad would help arrange those liaisons. A second point is we are all aware that we need clinical simulation in the environment	

		where there is lack of clinical exposure, and we are aware of the problem that there is with the Programme, of less and less clinical exposure, but a lot of people would sort of feel, well aren't we addressing the problem of lack of clinical exposure with just clinical simulation. So i would like to know what has been done with lack of clinical exposure? They feel there is a bit of a whitewashing the problem, that problem is not addressed enough and yet we are spending a large amount of money on clinical simulation models. And I feel that is what some people would like to know more about. Because, I mean, we are in South Africa, we are not in United States, we're not in England, there is a large number of patients out there, you get the most fantastic heart murmurs out there, but we are not getting to the patients, we have all these heart murmurs, you don't get all these heart murmurs necessarily in the UK or American environment, because they were treated, they are different. So what is going on as regards stopping this dwindling lack of clinical exposure, replacing it with a simulation environment. People are concerned about that and would like some answers.	Emphasises with hands Sits with left hand on lap and right hand on the table
Facilitator		So what you are saying is that we must not just ignore the clinical setup, just because we have the simulation unit	
7	L34	Exactly! One should be an adjunct to the other in an environment where you got lack of clinical exposure, you need more clinical simulation, however we are in an environment where there is the potential for more clinical exposure, but due to the changes of the curriculum, the six years instead of five years, lack of specialists, lack of rotations to peripheral hospitals, for management reasons, for structural health care reasons we are not seeing the patients. Then we are substituting it with the second best which is clinical simulation.	
Facilitator		Number 6 and then number 9.	
6	L35	I actually just want to know, does the Faculty have money for this? Because this is not going to be cheap. If you want to do it properly, it is going to cost a hell of a lot of money. So it is one thing talking about it even seeing lovely models and stuff, but can they actually afford it? Is it actually implementable or what?	
Facilitator		So you are concerned about the financial aspects.	

6	L36	We are talking about it here and everybody gets excited and we get the Reps over here and come to show us stuff, but in the end they will just say there is no money. This is what always happens.	Emphasises with right hand
Facilitator		So you are not excited?	
6	L37	I will be if I knew there was money, but I know the financial situation. In the end of the day somebody is going to say, no we are not going to do that. You can have this one, but you cannot have the better model, because it is too expensive, this is what happens!	
Facilitator		So this is why you are almost withdrawn at this stage. Just realistic. Sorry, number 9	
9	L38	Just a comment on number 7. I think that is a major problem that everybody seems to ignore, the fact that facilities that we have are becoming unacceptable for student training. At some stage there was even the scare, we have to close down Pelonomi. The second thing was that we are not living in the United States, so we don't have loads of money thrown at us. At some stage I was quite surprised as to hear, I think it was the Department of Education who said they are going to give a large sum of money to the Faculty, to put this in place. And the question I ask myself was; here we are, our hospitals are falling apart, I mean they are not always proper to train students. I hear the surgeons have to operate on patients with outdated instruments that are not suitable to operate on pigs. So what are we teaching our students? So my idea is if the Department of Education is really serious about improving the conditions that are set for the education of medical students, maybe they should not only supply money for a simulation unit, but we should consider getting them involved in helping us to improve the overall teaching platform. I just wonder how on earth can they give R3 million and our patients don't even get proper medication?	Nods head in affirmative
Facilitator		Right number 2	
2	L39	I want to comment on number 7 and 9. The real patients. I think it is good to have real patients, but my only problem with that is, if we can expose them, we have MANY patients, but we don't have supervision or the time when we expose them. So there is	Number 5 and 6 sit with crossed arms. Number 5 did not say a word so far.

		somebody out there, who is a doctor, but that doctor is not necessarily the one that tell them the correct things. I mean i was in O&G examination the other day. One of the students who had to repeat, and he was listening to the foetal heart without the stethoscope touching the patient. And he was repeating! And I ask him what he is doing. He answered the doctor taught me to do it like that! So this is what... even if we have enough patients, we need to have somebody to supervise them to do the correct thing. And what number 9 said that we need to practise what we preach. It is very nice to tell them this is exactly what you need to do, this is what you need, this is the medication you have to prescribe, but when I need to prescribe it, that medication is not available – so I prescribe something else. So we don't practise what we preach. We know what is the correct thing to do, but unfortunately in the circumstances, we cannot do that. And the other thing is, when they practise in the skills lab now, is there somebody that will supervise them? Because what we do is we've got this small groups of 15 students and they are divided into 4 groups and I supervise them to do a specific skill, I cannot supervise 15 of them together, so they have 4 groups in the room, then I ask one of the others to supervise their group, because they need to practise a specific skill. And every time I turn my back somebody was doing something that was NOT correct. So you need somebody to specifically supervise them to do the correct thing. Otherwise they will tell them - I taught them to do it that way. I think that it is very important that whether it is on patients or in the simulation unit, we must supervise them, they must be taught the correct thing!	
Facilitator		Number 8 and then number 6 again	Emphasises with hands
8	L40	As far as I understand, there was a substantial amount of money, given by the Department of Education, given to the Faculty, to get this thing off the ground, it was in the order of R5 million, and then another couple of millions. I'm sure there will be a backup plan and I'm sure the Dean has great connections to continue that. That is why I think it is a GREAT thing that the indaba was held where all the schools were involved, because it is much easier to ask for funds when there is a collaborative, inter professional approach, and thinking and strategy to the setting up of a simulation unit. So I think there will be substantial amounts of money available for setting up of this lab. How much of this will be absorbed by the construction cost of converting three Kines, I don't know, what I'm saying is where number 9's comment is quite useful, we	

		need to look at what know what we need to build and thinking of the future, so that might not get that amount of capitol money again to build again, so we need to think ahead plan it very clearly before we can initiate the process.	
Facilitator		Number 6, you want to comment on that?	
6	L41	I just want to comment on number 2 where she said about supervision. If you have a proper simulation unit with good models, then they give you actually feedback. The model will flash a red light if you don't do it right. That actually helps with manpower problems that we do have.	Sits with both hands resting on the table, using hands during the conversation
Facilitator		Number 4	
4	L42	I don't know if I'm wrong, but I get the feeling that we blind ourselves with the idea of skills lab, which is basic primary procedures and things. A simulation unit is more advanced. So we often refer to skills lab, skills lab, skills lab, that is absolute the basic. Simulation is more advanced and it will be the responsibility of the department to teach certain skills. And yes I just wanted to confirm what number 8 said and the concerns of number 6, it is a major outlay, but on the other hand very EXCITING. If we get the simulation lab, it would be the very FIRST in South Africa. That will be a MAJOR breakthrough for our Faculty. It really will be to the advantage.	
Facilitator		Number 3 have a comment .	
3	L43	Yes two things. I want to agree, the Surgeon must take the responsibility to take his own group there, but it must not be first or second year students. As they come to surgery, the whole idea is to first take them to the skill lab, I'll take them there myself, I'll show them what the SURGEON want them to do and see and then I take them back to Pelonomi and we go and search for that specific patient, so that they can repeat that skill, then it is not knowledge, then it becomes a skill as well. So yah it must be fourth years or fifth years. Where the basic skills lab is there for the more junior people. The second thing is the money. There is a couple of millions that is backed up by a second budget. Then the other thing is the Sisters and other Schools plan now to do it together, because they do not have room for more dolls or whatever, they want to	

		use. But they have a couple of thousands or millions, so their money will also come here and then we will integrate with the Sisters.	Emphasises with right hand
9	L44	Just comment on number 4. I agree that what we are talking about, that is the simulation, is more advanced than what is going on in the skills lab. But it is exactly that... that is a basic skill that should be done in the skills lab, it shouldn't be done by anybody involved in clinical work. That is causing what we see, it is because there is NO integration. My idea is that if we do have the simulation unit, to put the skills lab IN there, would be much better, because then they can actually do the basic skills there. Get somebody from clinical, there is a more advanced model available, that is the in between step between the basic skills and the patient. So I think we should stop saying or thinking like these little pockets of people working separately, we should try and integrate it, because we are causing this divide, then we wonder why the students can't take the basic knowledge and bring it either to us or any of the other departments. So I think we should think a little bit broader. Just the basic, say for instance the basic skills, somebody shows them an ECG and they have to listen to heart sounds. The next thing there is an actual model with actual hear murmurs and the Cardiologist can come, the student just heard the basic, and immediately can transfer and use that on a simulator doll or some situation where there is simulation. So then, when they get to the clinical departments it's not just the basic skill that they got, and have no idea how this relates to real life environment.	Sits bending forward towards group
Facilitator		Number 4.	
4	L45	I DESPERATELY differ from you. The skills lab is not setting up little pockets, there is the facility to go and train, the invitation was to each and every department, to come and teach what you want them to be taught. We've had departments (I know it, because I was involved, for many years) specifically sent out invitations to departments, and there were departments who absolutely refused, I can give you names. So it is not to blame for those poor people up there, trying their best, to get the success out of the skills lab. Sorry...there is also now a second unit in which the students can now go and train. It is set up now lately, by money provided by... I cannot remember even... it is a separate unit in the skills lab, where the students can go and train as many times as they want to do. As a matter of fact it is even open to the post graduate people. So, you know, I don't think we set up little pockets.	

9	L46	Sorry, I think my words came out wrong. What I actually meant is to keep the skills lab a skills lab and then there is that simulation unit, this is what I mean with little pockets of people who are doing what they are doing. It is slightly different from what you heard. I just don't want the skills lab that is separate and then there is the simulation unit that is separate. To me it would make much more sense to integrate it.	
Facilitator		Number 8	
8	L47	Perhaps what colleague number 9 is referring is that is under one umbrella. But it is different sites, that is an integrated structure, strategy that is coordinated together and with different things happening at different sites at the appropriate levels, which is fine. I would like to ask number 4 for an example where the psychomotor skill, that is for instance a very basic skill, that is for instance a vena puncture, how the teaching of that differ from a more advanced skill? That is the first question. The second thing is, if we think of undergraduates, the amount of skills or simulation that we would like to do, that's applicable for a undergraduate level, is actually, after we've done the basic skills and they've done their clinical rotations and they've seen the patients, listen to hearts. The simulation will just add to support the skills they need, they can't get in the clinical environment, like resuscitation. Secondly to enhance learning, like in cardiac murmurs. So I'm not convinced that the higher level simulation, I'm not talking post graduate, that is a completely different ball game, I'm talking the higher learning simulation for fourth years, fifth years, maybe sixth years in future, what is the difference between the style of teaching in psychomotor function like vena puncture the amount of skills that we want to do that's applicable for undergraduate level is actually, after we've done the basic skills and had their clinical rotations where they have seen patients and listen to hearts. What is the basic skills that they now do in a higher order, not resuscitation, I completely understand that, but other undergraduate simulation and how that differs from your basic skills?	Number 4 is frowning Number 3 interrupts
Facilitator		Number 4	
4	L48	To answer your last question, obviously in the skills lab, as far as I know, they are taught basic cardiac sounds, lup dup, like that, in the advanced area, as you	

		mentioned, those highly sophisticated virtual, sounds that you now can listen to, murmurs that they can learn to distinguish to whatever the cause is. So yes, there is a facility to improve on your semester 6 and fourth and fifth year students, by going into the simulation room, where the more advanced cardiac sounds are played and they can actually listen on a manikin to the different sounds, and you can change it by heart anything. That is the idea of a simulation unit.	
8	L49	The challenge we have, let's talk about the heart murmurs, because that is a very common one. When we had that symposium in the UK, none of the Cardiologists, I'm not a Cardiologist, but when I listen to this, this does not sounds like a person's heart it sounds whishy like a dishwasher going. Yes there is pulses with it so you can do it systolic, diastolic, but the actual sounds doesn't sound life like,. That was a concern of number 6. Being taken to a manikin, listen to sounds, that does not sound like sounds in a patient's heart. So yes, the CD's that come out, and I have not listened to the latest CD's that came out, it is very difficult to figure out if this is life like type of murmurs, to transfer it back into the clinical environment. The pulses are different, a pulse is a pulse, that is not difficult to simulate, but the actual sounds.. .i was not convinced that it was actually helpful for the students to take back into the clinical environment.	Emphasises with hands
Facilitator		Number 4 you want to comment on that.	
4	L50	I want to comment on your statement. Do you then actually, according to what you've just said to me, oppose then to the whole setup of the simulation room? Where the more advanced, even if they are not absolutely life like, at least they will get the student to learn the sounds between two pulses, get the idea if that is a systolic murmur, a diastolic murmur or something like that? That at least you know they are listening to other things in between and so forth. Don't you agree that that is an advantage? Because I agree with you. I can't think that ever you could get a life like sound, because no one patient is exactly like the other one. And the sounds are not exactly. But at least now they will start listening to sounds between the pulses and things like that.	Uses hands to emphasise point
8	L51	I agree that the pulses, sounds between pulses is useful in distinguishing in at least distinguishing between at least systolic, diastolic murmurs and the clinical reasoning,	Sits back on chair, using hands during conversation

		that we can discuss subsequently to that, what could it be then? What is your differential if you hear a systolic murmur with these other signs to aid integration back into the clinical environment. Yes, what I actually say is quite basic, it is not very advanced, it is actually a very basic thing feeling the pulse, hearing the sound, one after the other, what does it mean? The actual cognitive learning is actually at a similar level as the psychomotor skill level. What I'm trying to say is that the word "advanced" is not correct. It is other things that we are simulating that aid learning in the clinical context. That is why it is important that we, off course, support the clinical areas development, upkeep and that sort of things that they will actually practise. The simulation area will be the exact area where we can fine-tune certain aspects and then go back to the cardiology ward and listen to the patients. What you can get a specific instrument which can be used on a patient and it transmits his heart sounds over a speaker and everybody can hear and listen. And that is actually quite nice, then you use a real simulator, you don't need a facility to teach that. Something we have not touched on yet, is the use of this facility for assessment of students, which is a great add on. Specifically in our resource stricken area where we have to try and combine uses for a new centre. We do simulation, but we also do assessment. We have great problems when doing our OSCE for the second year, we have to thinking about, not making this a white elephant, just sitting there as a simulation unit, people take time to buy in. We can also use it as an assessment area, bringing in patients for college exam, it is close to the facility to set up speakers for quiet, proper, good assessment.	Emphasises with hands
Facilitator		Number 2	
2	L52	Yes, I would like to agree with number 4 that it is very important that we have that. But my problem is still the context, if you listen to a heart, this is where you put your stethoscope, that is what we are trying to teach the students all the time, you don't put your stethoscope on the patient, before you know what you want to hear. So you need to see this patient, I need to know what the blood pressure is, I need to know the pulse is, then I look at the symptoms and then I listen, first take the history, ... but anyway... and this is what my problem still is, we need... there is a place for that, but we must just make sure that we use that.. we need basic skills, they can get that in the skills lab, it is not that you need...some of the things they need to print this and they need to know how I need to do that and in the simulation lab, for instance, I	

		need to follow the following steps before I listen to the patient's heart. If I am in Pelonomi hospital and there is one patient and six students, we cannot give everybody chance to ask what is the patient's pulse, what is the patient's blood pressure? You need to know that and when you come to the patient, you need to be able to do that. So I think the simulation will help us to prone the students so that they know exactly this is what I need to do and even if the sound is not exactly, that doesn't matter, because on the patient they will be able to hear that sound. But.. we need to make sure that we use that correctly and say "I'm going to use this to teach you the sounds, because this is not how the sounds are that you're going to hear" that is unfortunately...	
Facilitator		Number 5, you are so quiet.	
5	L53	Yah fortunately I was just told to come, I'm not part of the curriculum or the simulation committee. In Paediatrics we are already using simulation for neonatal resuscitation. But I think it is a good idea for undergraduates simulation lab. In paediatrics it is good for skills, learning skills, put up drips, doing LP's. Unfortunately there is no dark skin manikins and that is a bit of a negative..because our patients are dark skinned, so you cannot see the veins, you have to feel. The other thing is the scenarios, I think it is very good for the undergraduates to do resuscitation scenarios. A thing that bothers me and my colleagues, is you need to be trained to do that, because it is not just doing a scenario on the manikin, telling you are doing it wrong, you actually have to do debriefing. The learning objectives, it's quite time invasive and we need to know how to do it effectively. We need training to do that.	
Facilitator		There is just one aspect I want to highlight, what we hear over and over again, practice, practice, practise are the main concern and then going back to the real patient. And then what number 3 was saying, you have state of the art simulation equipment, and now you come to the real world, where you have equipment you don't want to use on pigs, so what will be the ethical aspect of that, you know, teaching the students in this environment and then going back to that environment. Number 2 you already touched on that? You think there are major ethical implications? Number 8.	
8	L54	I just want to comment on that and coming back to the question that is very valid. What do we see then as the advanced level of simulation when we do this? One of the	

		things is simulated patients. I've tried to engage with the Drama department to try and help us with simulated patients. This is how we can simulate different types of difficult histories, breaking bad news, with people who can immediately start crying when it is not done appropriately. This is on a higher level, this is another higher order skill. Also, the thing that will help a lot with transfer, that we struggle with our students. They can now from the skills we have taught him, hopefully they have learned it, gather the blood, take the blood pressure, but it is about the integration and higher order clinical reasoning of what is going on here? You get fantastic simulated virtual patients, which is more scenario-based, like in many of the resus- courses, where scenarios and moulages helps you to clinically reason what the next step must be. Many times the skills are there, but it is to know what to do and when to do it, what we can simulate in the higher years when they have a bit of clinical experience. They've got basic skills, but how they put it together in the appropriate scenario. So there is virtual patient scenarios, there is simulated patients where you can get into it and try to interact with difficult patients, somebody who is quite aggressive in a ward, how to deal with those situations as well. But I agree it must be well integrated, and planned into the curriculum. And I think one of the fantastic spin offs that will come out of setting up a unit like this. It will bring a lot of people out of the woods to think together for a joint up educational strategy. For instance getting Family Medicine and Internal Medicine together to work out a strategy about training for Cardiology, because we do some cardiology, but we do not speak to each other a lot but in the simulation unit we might work together, the students will see a coordinated effort and we will start understanding each other better. That will be good for the Medical School. And I'm not even talking about resuscitation, where the nurses are involved and the porter has to do crycoid pressure or whatever..and all these things we want to bring in to help the students cope in the real world out there, where there is a lot of team members.	Arms crossed Laughing
Facilitator		Number 4	
4		I DESPERATELY object to a porter doing crycoid pressure!!	
Facilitator	L55	That brings us back to another issue that I gathered from this discussion. Number 2 you also mentioned that. Now that they have the skill. So what do you think is the level of confidence now with the student? Having the skill taking it to the patient?	

2	L56	Now with my experience, I train multidisciplinary people. I train social workers, everybody together in a group. So I think if you've got the skill and they need to do it, it is different, but you need to prepare then first, that is different. Somebody spoke about the debriefing, we are not aware of how people feel if something goes wrong. We think that we know, the other day one of the Social Workers, and we just discussed a patient and we walked past a patient, she is just a Social Worker, she is not a doctor, but she is part of this multidisciplinary team. And she saw a patient there, and I just looked at her and saw that there was something wrong. Afterwards when I called her in she was so distressed that she could not do anything for the rest of the day, because of that patient that she saw there. And we're not... so if something goes wrong, we just say that is life, so it is in Pelonomi, so just go on. We need to make sure that we are for debriefing – this is something that we neglect a lot. Even if something isn't wrong, we should tell them, this is good, you should go on this way. But we are so.. just finish it and then we go on to the next thing. We are missing opportunities that we've got. How can we improve that?	
Facilitator	L57	Any other comments? Number 1.	
1		Just one comment on this to get simulation as part of the whole process. You must go back to a patient, definitely, you can't put it in place. For example the intubation, you can do it very nicely on a manikin and suddenly in the real life it looks completely different. You can teach somebody the basic things, what to look for. I'm talking about the old models, I do not know about this new fancy stuff.. maybe there is a bit of blood and phlem, coughing and gagging and everything with that as well? But as I say you MUST get back to the patient in the context, otherwise it is this 'pocket thing' again. You know the skill, but if it is real life, you can't handle it.	
Facilitator		Number 3 – no comment?....... Number 9.	
9	L58	I want to go back to a question you asked. You talked about the ethical considerations of teaching a student in a high tech environment and then have to go back to a non high tech hospital. I think that is actually one of the ethical dilemmas, that I am sitting with. That is why I previously made a comment, if we want to have high tech equipment, we should really see how we can get our training facility, where our patients are, up to a better standard, because, having a R5 million simulation unit, and	Everybody is laughing, number 8 mentioned a "trained" one

		then having to take the students back to a hospital that is falling apart,.... I am wondering about the ethical issues as well... I don't have a solution,	
Facilitator		Number one has a solution...	
1	L59	I haven't a solution, but unfortunately this is real life, and I think if you can learn or teach somebody to do a thing properly, then when he land up there somewhere where there is nothing, at least he knows what he is supposed to do. There is usually a lot of improvising, I sometimes help there in Lesotho, if you think Pelonomi is falling apart...there is nothing. At least you know or supposed to know how to do it, then you see what is available and then you make the best of the thing. Because we're in Africa.	
8	L60	I just want to say that I think the issue of high fidelity and these nice manikins, has all to do with how close they are to real people. Luckily the patients are still people, so they are actually the highest level, because they are the real thing. The equipment we use is just trying to get as near as possible to the patient. It has nothing to do with the environment. I think the skills we are trying to teach the students, psychomotor, clinical reasoning, attitudinal skills, multi professional skills, dealing with different professionals, different capabilities, hopefully make this step, this jump to the reality a bit smaller, that they don't fall into the gap, that they actually make it to the other side. Yes it is a different environment, at least I know A B C, it's been drilled into me so at least I know what has to happen first, then this, this...	
Facilitator		Number 4	
4	L61	Mentioning drilled into, yes, that is happening! Personally I think, and this is my last comment, using a skills lab, using a simulation unit is fantastic. But whatever is mentioned here, of teaching the student to handle patients, who has got minds, who's got life, who's got breathing who's got feelings. It is still the departments' responsibility where you take your student from the classroom to the patient. So this still remains the crux of the matter. That it is the responsibility of each and every single teacher in this Faculty, that we must never forget. Your responsibility, from the student conveyed over to the patient. Because the patient is still the priority of the whole being as a doctor, as a medical professional.	Asking everybody around the table for inputs.

Facilitator		Concluding number 2	
2	L62	I just want to say what they said, simulation must be almost real, because I did one of the courses, it is also an inter disciplinary course where you do neonatal resuscitation in the course and then the ambu-bag we have is a very grand ambu-bag, you can measure the pressure on it. The sister who was working with me in my unit was there in the course and she did it 100%, and that night we had a resuscitation, and they asked her to do that and she could not do that, and I asked her: "but you did it this morning, you practiced it this morning?" But she said: "the ambu-bag is different, I cannot see the pressure on this one" so we think it is logic. Most of the things we think is logic, is not logic for students or for junior people. So we must be very careful that we're in contact with what they think. Because that one thought to measure the pressure, she was just looking at the pressure there, and it was 24, 24, and she was very happy with that, and that evening she could not do it.	Number 2 confirms that
Facilitator		Number 3	
3	L63	I think to answer 7 and number 5, simulation, a big part of it is briefing and debriefing, and this is an excellent example, where you need to debrief to tell them exactly, this thing is just to show you how hard to push, but here is exactly the one you will see in Pelonomi, so they need to understand the whole thing. And I agree we need to go for training to help us with this.	
Facilitator		Number 5	
5	L64	I think scenarios is a good thing if you have a learning objective of what to do if something go wrong. You can give them a broken ambu-bag, what do you do now if it's not working? Or we can teach them how to continue even if you're in Lesotho. That is why it is a scenario, you can put things in and you can talk about it afterwards.	
Facilitator		Any other comments? I would just conclude and thank everybody for your inputs, for the arguments. All over I think it is very helpful.	

Appendix C2

Focus Group Interviews: Heads of Departments
Date: 10 May 2011. Room A126, Francois Retief Building, UFS, Bloemfontein.

Person speaking	Paragraph number	Transcription of words [Translated by professional translator]	Non- verbal
1	H1	I think it is a fantastic supplement to the clinical training one gives, in other words it actually prepares students for the situation they will find themselves in one day, e.g. to handle a heart arrest. If he has already done it on a monitor then he is confident to do it, the steps that he needs to take. I do not see it as replacing clinical training, rather as an addition to it and I think that is where the value is for me; that we are actually able to add something to the training in the end.	Sits comfortably forward, using hands
Facilitator		Specifically in your field or in general?	
1	H2	No, in general; it applies to every field I can think of.	
6	H3	May I also pose a question?	
Facilitator		Please, number 6.	
6	H4	What will the simulation centre entail?	
Facilitator		So at this stage you are not…how can I say… quite 'on the ball' with simulation?	
6	H5	What can it possibly entail?	
Facilitator		Good, let us listen to what the others say, then we will see if we can attend to your question. Number 3.	
3	H6	Simulation in our setup cannot replace our current programme, but it is supplementary. But it is, however, supplementary because it offers what we would not have been able to offer otherwise. So I think it very useful. I am very positive about it, if you want my attitude about it.	Sitting forward, hands on table
Facilitator		Good. Number 5.	

5	H7	The supplementary thing is correct, I agree with it. What I find important about simulation is that it is able to close important gaps that may perhaps be missed in clinical training elsewhere. In other words, there are perhaps guys…students that do not always get all the opportunities to see and treat the conditions in their clinical internship, and those gaps can then be bridged in simulation. So, supplement, but also to fill the gaps that…so that all the students get the same exposure to certain procedures.	Arms crossed and touching chin with right hand.
Facilitator		Good, number 5; number 1 agrees. Let us just change the discussion around number 6.	
6	H8	My Head of Department isn't here; I am standing in for her...	
Facilitator		Exactly, just to get her up to speed…What to you understand under the simulation unit? Number 4.	
4	H9	If I may start with your first question, my attitude toward simulation had been quite negative due to ignorance until I paid a visit to Maastricht School of Medicine. There I saw what they are achieving, what they are doing. And after I talked to the people there and observed the students, I realised that this is a method of training that can add a lot of value to existing training methods, and there are, for example, certain areas where simulation in Internal Medicine... and after all it is the basis of clinical teaching. It is in our department itself where most of the principles are laid down with contributions from other places, but I think the basic principles, many of them originate at Internal Medicine and the way in which we see and treat patients. And one of the big gaps that we have in our own setup here, and it remains to be a gap, is taking a patient's history. When a student arrives at the clinical years, they do not have that ease or the judgement to initiate the process of interaction with the patient. With the simulation I observed in Maastricht, for example, it is drilled into the students – over and over again – and they have volunteers that come in from the street. They sit in a consulting room situation, die whole interview is recorded on video, on CD. The student is very relaxed and I was truly surprised to see when it came to taking history what tremendous value it can add, where the lecturer is then able to have a look at the DVD afterwards and give feedback to the student and say, listen, this is what you did here..it's good, or, this isn't good, this we can do better. Because with our current manpower we simply do not have the time or patience to go and sit with every student and say, listen, this is what you did here…it's good, this isn't good, this we can maybe	Emphasise with hands Use hands while talking, with body forward to group

		do better. Because with the current manpower we do not have the time or patience to go and sit and take every condition and history; there are the general things and the more specific things. So, that is the one thing that really impressed me. Furthermore, it is possible to simulate almost anything. So for me it was a particularly positive experience; so, yes, my attitude has changed and I am positive about it and I would gladly support it and I would like to see it expanded.	
Facilitator		Good, thank you, number 4. Number 3.	
3	H10	May I just add, there are some aspects that are very difficult to learn from patients, e.g. the emotional interaction of patients and the person or doctor that takes the history, who examines the patient, e.g. to break the news of a death and the like, that people are able to do very well with simulation. The other aspect that is very positive that people struggle to learn in other places – group work – and students get relatively few opportunities to learn in group work. In simulation you are able to create the situation.	Bending forward towards group and use right hand to emphasise certain aspects
Facilitator		Good; anything else, number 1?	
1	H11	Just something which we haven't mentioned yet, say a student was taught long ago how to treat a heart attack, and three, four, five years go by. Suddenly he is confronted on a street corner and he now has to think a bit before he can act…they say those first three minutes are crucial. So, it is true; through simulation they can be trained to know precisely what to do. They do not wait for someone else to take the lead, because they say the faster you can do it the more lives are saved. So I think that is another point that makes simulation so important.	Use hands while talking
Facilitator		Good. Number 6, sorry, from the discussions that have emerged here you would have been able to pick up...	
6	H12	Yes, yes, clinical skills are basically what can be learned.	
Facilitator		Number 5.	
5	H13	I would just like to know if another question on assessment and simulation is coming...	Arms crossed on lap
Facilitator		You are welcome to address it.	

5	H14	I also see a valuable help there. With assessment of certain physical examinations and procedures on a patient, where students are assessed in a long line on sensitive examinations, without patients being inconvenienced in the process, this thing can possibly play an important role in assessment.	Arms crossed, touching chin with left hand at times, while talking, relaxed
Facilitator		Number 3.	
3	H15	Apart from practising of techniques, there is the repetition of techniques. We know knowledge is established by initial, intensive repetition and then long term which then repeats again over longer periods. This is something that we are able to schedule through simulation in order to preserve knowledge in the long term.	Body bend forward, towards group, relaxed
Facilitator		Number 4, would you like to say something?	
4	H16	No, I would just like to mention that what I saw in Maastricht was precisely this – students have the opportunity and are also encouraged to go back and schedule their own appointments. When they are busy preparing themselves and they find that they are uncomfortable with something they are not able to do well yet, they can simply make an appointment with the unit. And on a day and date, then, there will be…a system will be in place, whether you are doing a delivery or whatever. It will be available and they can do it. So, this serves as an icebreaker, students learn the routine, they learn good practice routine and to not take shortcuts and this can be repeated. And so, should they be confronted with a case involving a real-life patient, they are able to do so with confidence.	Sits back, relaxed.
Facilitator		Number 7.	
7	H17	I agree with the previous point that was mentioned, but I would like to remind everyone that most people responded by saying that it was supplementary, and I think one should be careful not to focus on simulation only. I think it is very good to learn on these skills, but then these have to be translated into the real-life practice. And I think we have a unique situation here, where we actually have an abundance of patients with pathology that do not always end up in the right places, but there is an abundance of patients with pathology for whom one is not able to prepare and I think it is also very important for the student to have an experience of the real situation.	Sits back, relaxed, used hands to emphasise certain aspects. Relaxed.

Facilitator		Number 3, and then number 4.	
3	H18	May I just ask a question – are we coming back to assessment?	
Facilitator		Yes, I have it here. But while you are there…	
3	H19	I just want to say that the experts on simulation warn against problems with assessment and simulation and I do not think that we should put too much emphasis on it. I think there are certain things one can assess with simulation, but it looks to me like the people with experience say there are many pitfalls, so I think it is more about creating opportunities that would not otherwise be possible for training.	Sits back with arms crossed. Relaxed.
Facilitator		So you are saying there are possibilities?	
4		I think there are, yes, but it is something one has to put a lot of thought into.	
Facilitator		Number 5, you brought it up; would you like to…	
5	H20	Yes, sure, there will be limitations; one cannot replace assessment on patients, but certain aspects can possibly easily take place on simulation, as long as one puts a limitation on it. For example, we use simulation massively with photos; it isn't quite the same value as live patients, but we often use it as a second best option.	
7	H21	Staying with that example, if you know and recognise the photos…then you miss the point with your training. That is the problem and I think I would also see simulation more as preparation for specific skills. If I am an F1 driver and I have to drive that car, I would maybe do things on a simulator in order to practise, and so that in case I make an accident it isn't so big, but you still need to drive and that's why I think simulation is good – that practise, the establishing of the routine and say that's how you get the routine. And that's why I think it is a very good practice.	
Facilitator		Number 2.	
2	H22	I think what you are saying, and something that goes with that is that one somewhat eliminates the learning curve, especially with procedures when there may be damage or complications, that you get in that practise, but you still need to do it on a real patient, some or other time.	Group laugh.

Facilitator		Number 4, did you want to say something?	
4	H23	No, I totally agree with that and I think it's exactly what we are saying; this isn't supplementary; it doesn't replace what we have. I think it is excellent and we can do even better to prepare this student even better. It is especially when it comes to procedures, where a certain routine has to be followed and that you have to get your orientation right to be able to do it. You will never be able to simulate a stroke correctly; it's impossible; you can't get a volunteer to simulate a stroke; it simply can't work...	Speaks for the first time, turns body towards group.
Facilitator		Do you get a mannequin that can simulate a stroke?	Use hands, while speaking.
4	H24	You can't do it; there are too many variations in the neurological examination and you need to…you need to get that feeling…your own sensory observation of the different degrees of resistance, so you can't…	
3	H25	I disagree – you can simulate everything. In my second year Professor Esterhuizen invited Professor Kleynhans to give a talk on heart physiology. Then Professor Kleynhans said, "One day we will have artificial hearts". But Professor Kleynhans replied that that would never happen...	Smiles, sits back in chair and uses hands
4	H26	We may differ, but I maintain that you cannot simulate a stroke. You cannot simulate physical signs that accompany a stroke.	Group laughing, especially number 7 enjoys the discussion
Facilitator		Number 1.	
1	H27	I heard about a anaesthetics mannequin, the one that costs R1,5, that can simulate all diseases, everything that can possibly happen to you, during an aesthesis. It's wonderful, because our students can do perhaps 80% of cases in their training, but there are things that will simply never get to them and if you could simulate something like that and you can practise it, then they at least get exposed to it. It creates wonderful opportunities for us. We are all in agreement, I think, when we say that we aren't going to now show patients the door and only do this – it is actually supplemental, and that's important.	With passion
Facilitator		So you are in agreement about assessment; we can move off that point, because I'm	

		hearing you are talking about supplementary, so it must now shift to the patient.	
1	H28	But there is one more point, with simulation; as I understand it, everything that is done is debriefed. You get the student to come in and you give him feedback and that is actually more than we have been able to do up until now because every time after the student has gone through the process someone sits him down and says this and this was done correctly and next time you must do this; so many things will be added, which is another valuable point of simulation for me: we are going to be able to give more feedback than the case is at present.	
Facilitator		Good. Number 5, I just heard you talk about, if I understood correctly, patient safety – that simulation would sort of be able to address it.	
2	H29	Do not practise on patients…not initially, being totally inexperienced...	
4	H30	What number 1 said there is totally true; it is also a form of assessment; it is formative assessment, not summative but formative. The feedback you give is still a form of assessment of what has taken place. What is important to me is, where do you set the standard? It is very difficult and I have the problem myself with patients of where to set the standard. We have used the example before: when a pilot is trained on his simulator he has to get 100% on his instruments….50% is not enough; 60% is not enough – the standard there is 100%. Now, that is the extreme, so the 50% that we are talking about is actually a thumb suck that is actually a historical value; there is no scientific basis.	Emphasises with left hand and then crosses arms
Facilitator		Any more comments? I would like to return to number 4 now; you made mention of time. Shortcomings will be addressed, but you do not always have the time to… could you please expand a bit on that? How do you see it…how shall one guide the student at the simulation unit?	
4	H31	There are many examples of this, e.g. in rheumatology there is the Rheumatology Association that helps train patients and their family to simulate symptoms. So taking the history of a patient with a rheumatologic condition is an art: you need to have certain facts; there is a certain order and based on the history you already decide in which category a patient's joint disease would fall. So the patient doesn't necessarily have to have the disease – if the patient has been trained well, he is able to simulate the classical examples of rheumatologic conditions well and the patient can already be	With arms crossed and use hand movements to emphasise certain

		trained before the time. A doctor doesn't first have to see him. You know, the first time he sees us the basis could already have been laid, given that it has been correctly laid and the necessary quality controls have been built in.	aspects.
Facilitator		Number 3, would you like to comment?	
3	H32	I would just like to add to that; when it comes to the more technical simulations, the situation is the same. If the clinician designs the simulation situation well, then technical personnel can basically continue with the simulations and the big job with that is in creating good scenarios.	
Facilitator		So what you are actually saying is that you, the clinicians, are going to be responsible for designing the initial simulation and if you have designed it well, you are able to say the simulation unit is running and then, as you have said, the student is able to go back without supervision, if I understand you correctly. Number 3.	Bends towards group.
3	H33	I must say, my feeling is that it will always benefit the student more if an expert is with him, especially with the initial exposure, but as you are saying, with repetitions it isn't necessary that people sit there and watch them.	
Facilitator		Number 4.	
4	H34	No, that is totally correct, I think the expert will initially explain what the process is about and will definitely be instrumental or make a contribution to the system that is to be adopted for the simulation process, but it has to eventually be evaluated and then, of course, it has to go over into the real clinic setup where the students will do it under supervision. So, it is just the time factor; you can teach the student a lot, something that is terribly neglected in my field, about taking history.	
Facilitator		That's why I want to get back to what number 1 said in terms of debriefing; there must be debriefing. How do you see it; who must do the debriefing with the repeats when the students go back?	Bends forward and hand movements.
3	H35	I think there will be many individual variations. Again, I think the ideal – especially until the system is up and running – is probably that the clinician will have to be there, when we speak of clinical scenarios, but technical people can be trained to perform the debriefing. But it is very important; I think the biggest value of simulation…maybe I	Sits back on chair, relaxed.

		should correct myself, maybe not the biggest value but a very big value of simulation lies in the discussion of what is happening, and that is why everything is video recorded...	Number 4 agrees and shakes his head.
Facilitator		Number 4 agrees. Number 5.	
5	H36	The man from America who came here to give a talk about a month or two ago…Murray; he said they are using nurses extensively for this and he mentioned that a nurse works better than a clinician, than a doctor, to give feedback to students. Many of these procedures they do…one can appoint one or two nurses that can work on all these simulations and give feedback about most of them.	Number 1 informs him that it was Murray
Facilitator		You don't see your role in it?	
5	H37	Initially, like you said, but especially for repetition of exercises and over and over and then giving feedback in formative assessment – nurses can be used for this.	
Facilitator		Number 3.	
3	H38	I am sure that is the direction we should take, but we have to remember that if we refer to Dr Murray's unit…those nurses are constantly in contact with the clinicians; they do not work in isolation. But granted, I think we do want to create a system that is not labour intensive, and we will appoint people who will handle all those simulations.	
Facilitator		Number 4.	
4	H39	What is more and is linked with this and I totally agree with it, is that it doesn't have to be a specialist that supervises the assessment or who does the debriefing. Certainly experts that have been trained can also do it; a medical officer can do it if he has been properly trained and schooled in the process. But this is an initial process; of course there will be a transitional area between pre-clinical and clinical, but what one cannot simulate is mentorship. I think a nurse can definitely serve as a mentor in many things, but you get mentorship in the real situation. In other words, the interaction of my colleague with a patient and me being able to observe that can teach me a lot of things – also wrong things. So it is also something conscious. And, for example, you can probably simulate professionalism and the nurses can also help in this, but our role	

		models have been developed in such a way that it is very difficult for a nurse to play the role of a surgeon. I think that role could be played, but it will not be very real.	Number 7 nods his head in agreement.
Facilitator		Good. Number 7, I see you strongly agree with number 4.	
7	H40	Well [laughter] yes, I agree with many of the principles. I think there are many pitfalls, especially in terms of assessment, which I have experienced myself. I was an external examiner. They had a simulation, the situation for taking a history during a consultation. The students knew that they were going to be assessed on how they communicated with the patient and they told the patient a whole lot of nonsense just because they wanted to be polite to the patient. So they were not listening to what the patient wanted. The patients were doctors, so the doctors gave the right answers and most of the students didn't realise that this patient was, for example, having a heart attack. Now…there was a problem, because they knew that they were only being assessed on the interaction and not in the quality of their listening to the patient. I think this is one of the biggest pitfalls and for me that is one of the problems. When you walk into a simulation lab you do it right because you know you are being recorded on video; you are being watched, you are being criticised, but then when you come to the ward you do not have to do it anymore, because there isn't a video camera. And I think that is a tension that I would like to…that I am still experiencing with simulation and I think I would like to…get that into practice.	Laughing. Sits forward, using hands wile talking. Relaxed.
Facilitator		Number 3.	
3	H41	It connects to what you have said: mentorship. The example of how people function.	
6	H42	And debriefing.	
Facilitator		And what I am hearing here now, is what number 7 is saying about different standards. And that is also what number 4 said – there are going to be standards in the laboratory and where do you set that standard and where do you set the patient's standard? Number 4…number 3…I beg your pardon, number 6.	Number 7 agrees.
6	H43	Can one not say that one first has to reach a standard before you can proceed to the next level? So you have to first be trained to, say, take a good history and ask the most important things before being allowed to start with the examination. Almost like a computer game – you can't go to the next level before you have a certain number of	Number 7 agrees and nods his head. Number 3 indicates he forgot

		points and the game has been made more challenging to you. You need to first complete something basic before you can go on to something higher, more difficult, more skilful.	what he wanted to say.
Facilitator		Number 1 agrees. Number 3 would like to make a comment.	
3	H44	I think this is about a broader development of a curriculum; what you do earlier and later isn't the point. I remember what I wanted to say…Number 4 talked earlier on about formative assessment; I think simulation and formative assessment can work reasonably, but when summative assessment…when I listen to what people are saying, it is the biggest area where problems occur.	Folds arms while talking. Number 1 agrees, nodding his head.
Facilitator		Number 4, any comment?	
4	H45	I think something we haven't addressed yet is how a doctor thinks. It is about problem solving, e.g. you have 40 causes, for instance, of breast cancer – the dangerous one currently is acute myocardial infarction. This is the hypothesis you work from and first eliminate it; then you ask the questions that go with that and integrate and interpret and then you process that hypothesis and say, improbably, then you need to proceed to my next differential diagnosis, which is the subconscious thought processes that are developed. We are never consciously taught to do it, but by observing the person, the experts that do it, that the patient responds to, or the way a number of patients respond, you eventually get…the pattern is formed. E.g. you referred to Prof Kleynhans, and I am sure we would be permitted to quote our former teacher here: we often saw the situation in cardiology where patients had chest pain and a normal angiogram. But now there is something that is not quite normal. The clinician is just not totally sure – it isn't ischaemic pain, what has the mentor done? After ward rounds, after all the examinations were done, he sat comfortably on a chair next to the patient, created a relaxed atmosphere, no hurry, and said, "Tell me about your pain", and then the thought processes started again. On the one hand, then, it leads to a different diagnosis and on the other, to wonderful peace of mind for the patient. It is that professionalism that a trained simulator person will never be able to give you, so…	Crosses arms while talking.
Facilitator		That was my next comment. Number 3, would you like to comment?	
3	H46	I agree with what was said and it goes with mentorship, but many of these thought patterns…it is one of the nice things about simulation – you are able to get	

		acquainted, especially when you do computer, flat screen simulation, you are able to help develop these thought processes, but to eventually apply those thought processes, stand next to the patient with a mentor.	
Facilitator		Good, any more comments? I would like to get back to what I think number 4 said about the groups, or was it number 3, who said you learn more in groups, by working in groups? Are you talking about doctors only or about the interdisciplinary?	
3	H47	I am talking especially about the interdisciplinary setup, but doctors also. I often see doctors who work in isolation and I think that is where we are poor mentors, I think. But I regularly saw examples where they used ambulance men, nurses, doctors, specialists, to simulate patients. And what was outstanding, or what really impresses me, is that they learned to do things right which they would not have learned otherwise. There are great possibilities. It means that we will have to think laterally; we will not only think that we are about to simulate our subject; we must do more than that.	Sits back on chair, relaxed.
Facilitator		Number 7.	
7	H48	I would also say students amongst one another. I do not think our students are using the opportunity to peer review one another. I think it could help.	
Facilitator		So, you are saying that they can rather start there, on student level?	
7	H49	Yes, they need to present as patients to one another, they need to practise, with one another and critique one another. That will help them a great deal, because they actually possess the knowledge; they learned the knowledge; they just do not practise it.	
Facilitator		Good, but, number 3; you made mention of doctors, nurses and ambulance men. Do you see it happening on graduate level; that it can happen on graduate level, for example medical students, physiotherapists?	
3	H50	That is exactly what we want to teach them, that the day they finish their studies they aren't going to work in silos, but that they are going to work with people around them.	
Facilitator		Good. How do you foresee that those simulation programmes will be developed?	

3	H51	What I said is that we need to keep our vision broad. And we need to work with nurses on our scenarios; we need to work with auxiliary health professions on scenarios. And I mentioned ambulance men, but they are sitting in a different institution; I think we must involve them too.	
Facilitator		Number 7.	
7	H52	I say institutions.	Group laughing.
4	H53	I am reminded of my ancient past, the days when we still made house calls with midwives. We would stand there waiting for labour to start, right there in the home. That was quite good experience. It was very pleasant to have a conversation with the young nurse who had also accompanied me.	Group enjoying remarks.
Facilitator		I would like to get back to simulation and go over to real patients. How do you see that transition process? Do you think the simulation can play a role and how can the simulation unit play a role to achieve that, almost, bridging? Or do you think a bridging will be needed? Number 3.	
3	H54	I have two comments. I know of a piece of research that was done of students in Canada, where they learned to do urine catheterisation and when their training had come to an end and they now had to become interns, a survey was done. They all said that they felt comfortable doing catheterisations on mannequins, but they didn't want to do it on patients; they didn't have the confidence to do it on a patient. Now, this is a terribly simple procedure, so this is one experience. The other side of the matter - something different we saw in America. The nurses at the hospital that we visited received resuscitation training, it is compulsory; everyone undergoes it and it is repeated, yet they found that patients simply died when they got a heart arrest in the hospital. That is because the people had not developed the confidence to do what they had learned – they were in a state when it happened. Then the simulation centre developed a programme they call 'the first three minutes'. Then they bring in the nurses and they teach them what happens during those first three minutes. And suddenly they got successful simulations in the hospital and apparently the nurses were greatly activated and became very involved and eager to do things. So there, I think, simulation helped to bring something abstract into the practice.	Sits back on chair.

Facilitator		Number 4.	
4	H55	The question was, how can we integrate it and what needs to happen? I think the ideal would be if you begin with your elementary basic training until those patients get exposure to the real clinical environment orientation and are able to see what really happens. On the one hand it could inspire somewhat and on the other it could remove the monotony or the artificiality from the situation to see what we are working toward. In other words, this thing is going to come to an end and this is how it works in the real situation. So I think ideally speaking a bit of overlapping may take place and then of course students who are already fully in clinical environments, there are certain clinical observations what we are sitting with and neurological examination is one of them, the evaluation of the cardiovascular system and especially heart murmurs. Heart murmurs can be simulated very well, in the real situation it is not always as simple to hear those murmurs, because the patient has many comorbidities; it can be very good if the student goes back and familiarise themselves again with the principles and the simulated person. So there should be movement to and fro, but also a looking forward, but at some or other stage it needs to end.	Sits forward, towards group. Serious.
Facilitator		Number 3.	
4	H56	I actually wanted to say the same thing. I think when you simulated something today you shouldn't say the students have to go to the ward in two years' time. At the same time, during this period, say taking of history, in the situation to be able to understand real history, we do learn some skills, but they are, in fact, skills that we are going to use.	
Facilitator		Number 2, I think especially in your unit it is quite scary and threatening for the students to walk in there for the first time, where they've just come from the simulation unit; now they suddenly come into contact with all these monitors.	Use hands while talking
2	H57	The thing is, you may know about something, but not until you have…I think that is where the...if you haven't seen it yet, then it is…if you see what your mentor does or what others are doing, then it is real. If you have read or heard about it somewhere then it is something you have read or heard about; it isn't something that has happened.	
Facilitator		So you would say that he has to see it in the simulation unit, but then he first has to	

		look.	Bending forward towards group.
2	H58	He also has to see it happen in the clinical situation and then become part of it.	
Facilitator		How does the mentor do this…and he can…number 6.	
6	H59	I think at oncology the emotional aspect is often overwhelming to students. And when they arrive there they only think about, you know, the agony and the suffering and the cancer and everything that goes with that and when they see that the same history and where the same clinical examination is used that they are used to, then it will help them a lot. The rest of the things will…because we often take them in with us when we…they are rotating two weeks with us and they see that we are talking to normal people, we deal with normal problems, and I think they are amazed to see that it is an ordinary hospital. So it they have already simulated it and see that it work the same as at other places, it will be much easier for them.	Sits with arms crossed.
Facilitator		They actually have a different idea of you when they arrive?	Relaxing, sitting back.
6	H60	Yes, I think for them as relatively young people the emotional thing is still to a greater extent the problem.	
Facilitator		The simulation....	
6	H61	...will help them a great deal there.	
Facilitator		Number 3.	
3	H62	I am thinking of something else to bring into connection with simulation in practice. Again, professor Nel repeatedly emphasised that you do not create simulation because there is a nice simulation – you take a problem and you try and see whether you can solve it in simulation. I think of one uses that approach it can integrate easily with the clinical work as well.	
Facilitator		Number 1, please.	
1	H63	I would like to add to that. Our point of departure is to, for instance, train a good clinician. So say someone is doing their internship with maternity, they see what	Sits with arms on table, making movements with hands while

		happens there, but then they can supplement it and practise certain things in the simulation unit to improve themselves, but the focus for me is still almost on the clinical skills and the sooner we integrate it the better, I think, because then you don't lose the end goal, that it shouldn't be separate things. But the one is very supplemental, as we have already mentioned many times, but that one approach it from that vantage point.	talking.
Facilitator		Number 7.	
7	H64	I am just thinking, sometimes I do this in the ward, when I don't quite know how the baby is coming out: I stand in front of the mother like this and I look at the head and move it myself. Then the student thinks…I am busy....hehehe...working out a mechanism for myself, how to deliver the baby and I think we should not forget that it is important in practice. But I agree, simulation is good for practising and learning the basic techniques, but it has to be applied and I think it should be applied again for the students in practice.	Left arm on back of chair, using other hand while talking. Relaxed.
Facilitator		Any comments? I want to come back to what number 6 said, of only getting to a certain level and that you first need to succeed on that level before being able to move to the next level. Is that basically what you suggested?	
6	H65	It is just a computer programme, if one had wanted to achieve something specific with a computer programme, wanted to teach the student something through it. In the end he has to, say, have achieved a certain number of marks to see if he has passed; is it just a computer thing; how will he handle it? If he clearly doesn't pass or doesn't learn it from the computer programme, if he doesn't get it out of that, he can't move on.	Laughing.
Facilitator		I wanted to say there are ethical aspects: now I'm getting back to what number 4 said, where do you set the standards? So are there ethical aspects that come into play in the transition from simulation to real patients? How do you feel about it, number 4?	
4	H66	I can mention a practical example, e.g. one has to be ethnically sensitive; it depends on the environment one grew up in. For example, the examination of the breast: in Maastricht the female students make themselves available for the procedure, while that will definitely not happen in our environment. And they were surprised that I was uncomfortable with that. In the Netherlands it isn't a problem at all!	

Facilitator		Good, anything else? Any comments on the personal opinion, attitude, value that it can add to students, graduate student training? Number 5, you have been quiet since the assessment.	
5	H67	No, no, it wasn't totally shot down, we foresaw limitations for it. I would just like to say something about the bridging thing. I don't know; for me, simulation is the bridge between a student that knows nothing and a student that has to get in, that has to get in at the deep end. In terms of what number 3 said about catheters in Canada, if that student has never even held a catheter in his hand and is now suddenly confronted with a live patient, he would have been much worse off than the one who has already done it a thousand times on a mannequin, not so? Although he was still a bit apprehensive with the patient, the simulation has already been a bridge between knowing nothing and being clinically skilled. But I think what number 4 said is at a stage they 'dovetail', which of course is also naturally essential. But for me as far as simulation is concerned it has always been a bridge between no clinical and full clinical.	Group laughing, and enjoying remarks.
Facilitator		Number 3 and then number 4. You want to comment?	
4	H68	I would like to add to number 5. I think the classical example is the use of an Arrow, when inserting deep lines. You cannot be standing next to a real patient and try to figure out how this system works. It doesn't work like that; you need to at least be familiar with the instrument you are using – how to quickly assemble it and see how you will be able to utilise it. It has to happen automatically when you are standing next to a patient. I think that is the difference. It's the bridge that is built.	
Facilitator		Any more comments? On your personal opinions? You may voice them.	Uses fingers to explain 'dovetail'
6	H69	I think the value will be very high; it would truly be wonderful. Sometimes it feel to be like the student lands up with us, and it's forth years and they tell us that they have never taken a history in their lives. I find it hard to believe, thinking back to when I was a student, that you have not taken a history before your fourth year. Therefore I think it is a marvellous idea.	Number 3 indicates he does not want to say something.
5	H70	Yes indeed, students can get away in the current system; they can see gaps and get away and not do certain things well, and still advance. But when you follow a structured simulation programme you will force everyone to do it. Then you won't be	

		able to say that you have never taken a history because you will be scheduled to do a simulation on a specified date. So students will not get away with murder by taking shortcuts and arriving in their fourth year without ever having taken a history, despite us presuming that they have already practised it. Yes, they had the chance, but they didn't take it.	Crossed arms.
Facilitator		Number 3.	
3	H71	The Medical Council have requested that interns should be able to perform a certain list of procedures when becoming interns. Therefore we have to see to it that each one of those things are done in a structured fashion and probably a large portion of it will have to be done in simulation. I would also like to say something about the issue of standards. That is why assessment is such a sensitive matter; 100% is actually what we should get, but it is sort of an unattainable goal. And I think the personnel who will conduct the simulation will understand in the end that this student is actually able to do this and it is in fact mainly about practical skills and applied skills, thinking skills; it is not about accumulating knowledge. And I think the experienced personnel will be able to know whether this person will get it right if given one more chance. It isn't that difficult to see. And one can try to assess effectively. But it is a nightmare to tick every single little point and then we come with the thing that they do every little point at the simulator, but when they get to the patient, then they forget it.	Number 7 mentions that they were exposed.
Facilitator		Good, any more personal opinions? Fine, can we conclude, summarise? There is a place for a simulation unit. Anyone against it? Good, would you agree? How do you feel about the statement, number 4, that any situation can be simulated?	
4	H72	I think the principles can be simulated, but the finer nuances of specific clinical signs cannot possible be simulated, but it can if one establishes the principles, and establish an approach to the establishment of behavioural patterns.	
Facilitator		Let me return to that first comment that you made; it's supplementary; so you still need to go back to the patients. Number 4.	
4	H73	That's why I say that's why it's so popular; that's why our environment is so popular with the European students: clinical skills are built on simulation with very little actual patient contact. So when they arrive here the situation is different; we simply have a lot more clinical material; often out diseases are much more advanced as what they	Elbows on table, uses hands to emphasise aspects.

		have there. For example, rheumatologic valve disease in Britain or the USA today is so rare, they send the Cardio Thorax Surgeons in America to Europe, East Europe, to go and perform valve replacements, because they are simply not getting the training, so it is a sign of the environment in which the students are trained.	
Facilitator		So you have had experience of students coming out of a simulation unit, e.g. from Europe, and our students. How do you see the difference? How is it a different doctor coming out on the other side?	
4	H74	I cannot report on the end product; all I can say is that the interaction between the European students and our students is very positive and our experience of the bunch we had here (when we were still checking them out) was usually as individual mature people. They were much more independent in their thoughts, reasoning skills, discipline to e.g. make sure that there weren't any gaps in their training; that sense of responsibility of European students came through very strong, but of course it is quite a selected group.	
Facilitator		Good, final concluding comments? Number 7, looks like you have a burning issue.	Relaxed.
7		No, I think I've said what I wanted to say.	
Facilitator		Good, then I think we can end this session. Then I would just like to thank you very much.	