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RESEARCH ASSIGNMENT FOR MPhil in HEALTH PROFESSIONS EDUCATION

Medical students' perceptions about a newly implemented
Clinical Skills module



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Submitted in fulfilment towards the degree MPhil in Health Professions Education at
Stellenbosch University

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Date submitted:

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1 INTRODUCTION

For this MPhil research assignment, I have chosen to *write an article* based on a small scale research project conducted in the Clinical Skills Centre (CSC) at Stellenbosch University. Medical students' perceptions were gathered in order to evaluate the usefulness and relevance of the Clinical Skills module and the different components thereof as experienced by the students themselves. This in the end led to valuable feedback that were given to the course coordinators which in turn may lead to curricula changes being made to improve the overall teaching and learning experience for future medical students rotating through the CSC.

2 BACKGROUND TO THE STUDY

A worldwide shift to simulation-based medical education (SBME) was mainly influenced by the changes in healthcare delivery through which reduced patient availability and reliability, as learning opportunities, became a reality. This led to specific SBME programmes where independent learning could take place in a safe, structured environment. With such a programme, a wide variety of clinical conditions and situations can be reproduced on demand and therefore allows a standardized experience for all students ^[7].

This was also the case in South Africa and Stellenbosch University implemented such a structured Clinical Skills module for the MBChB degree in 2010. This module runs longitudinally with the clinical placements of students in the hospitals and they rotate through the Clinical Skills Centre (CSC) throughout the year. The Clinical Skills module, consist of five broad components. These include structured teaching and learning sessions in the CSC, presented by trained health care facilitators; structured rotation though different areas and disciplines in the clinical environment; the completion of a logbook which acts as proof that the students did get exposure to certain important procedures or cases; an interactive online learning site (Web-CT) where additional information regarding cases or procedures are shared, and lastly the Objective Structured Clinical Examination (OSCE) that acts as the summative assessment for each year.

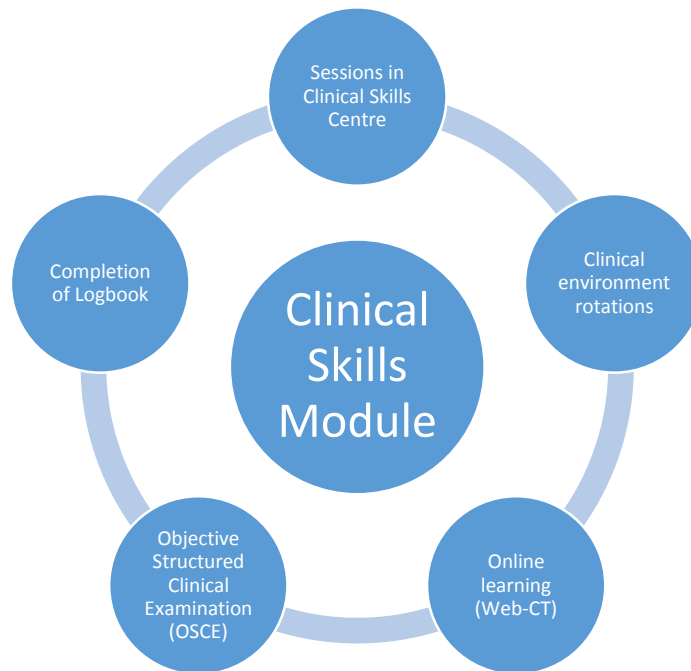


Figure 2.1 Components of the Clinical Skills Module

Since the implementation of the Clinical Skills module at Stellenbosch University, no formal feedback or evaluation of the module has been done. This research project was thus initiated by the CSC and course coordinators to assess the perceptions of the students rotating through the module. The feedback received from these students would then be used to inform changes in the curricula if deemed necessary.

3 PROBLEM STATEMENT

Evaluation and feedback form an integral part of any newly implemented module or programme ^[44] and the reason for conducting this research was to gain insight into how medical students perceive and experience the different components of the Clinical Skills module presented to them in the CSC. No other South African research could be found that used focus group discussions to gather students' perceptions to assess and evaluate a clinical skills programme or module. The intended aim of conducting this research project was thus to give feedback to course coordinators to guide curricula reform, if needed, by using the feedback received from the students.

4 SIGNIFICANCE OF THE STUDY

The *primary contribution and social value of this study* is that it discusses the perception of medical students regarding the Clinical Skills module and relates this back to *application of programme evaluation* within the unique South African context. Through the research a general impression of the current *experience of students* was established. Although these results are not representative, due to the small sample size, it aims to present certain general themes and insights for other institution presenting simulation or skills training in South Africa. In this way it hopes to *addresses the gap in academic literature on the perception students have regarding a structured skills training programme, specifically within a South African context. As well as making use of feedback from students to inform module evaluation.*

5 RESEARCH ARTICLE

5.1 Journal requirements

The African Journal of Health Professions Education (AJHPE) was chosen to submit the research article to. Their requirements are the following:

- Research articles must not exceed 3000 words, with up to 6 tables and illustrations. These articles are usually observations or research of relevance to education in the health professions.
- References should be limited to no more than 15.
- A structured abstract should be provided, not exceeding 250 words, with the following recommended headings: *Background, Objectives, Methods, Results, and Conclusion.*
- All references should be listed at the end of the article in numerical order of appearance in the Vancouver style.

For more detail the complete Author Guidelines can be found in **Addendum A**.

5.2 Article

Medical students' perceptions about a newly implemented Clinical Skills module.

ABSTRACT

Background

A Clinical Skills module was implemented by the Faculty of Health Sciences, Stellenbosch University, in the undergraduate medical curriculum since 2010. This module runs longitudinally with other clinical rotations and the main aim is to facilitate learning of procedural skills in a safe, non-threatening and low-anxiety environment in order to prepare students for the clinical environment.

Objectives

The objective of this study was to explore medical students' perceptions of the different components of the module in order to evaluate the module and recommend changes.

Methods

A qualitative study was done to determine the perceptions of the students. Semi-structured focus group discussions were conducted with 24 (n = 598) medical students in their fourth, fifth and sixth year by making use of convenience sampling. Ethical approval was granted by the Health Research Ethics Committee. Participation was voluntary and anonymity was guaranteed. The audio-recorded data was transcribed and coded by making use of inductive data analysis to identify themes.

Results

Students reported that they mostly found the module relevant and valuable. They gave feedback with regard to potential improvements to the module. These included suggestions regarding the logbook, sessions on the interactive website (Web-CT) as well as the summative examination.

Conclusion

The newly implemented Clinical Skills module was evaluated by asking students what their perceptions were. On the basis of their suggestions, important changes can be made to the curriculum to improve the teaching and learning experience for other students who will rotate through the Clinical Skills Centre at Stellenbosch University.

Introduction/ background

Simulation is an instructional process that substitutes real patient encounters with artificial models, live actors or virtual-reality patients^[1]. The goal of simulation is to replicate patient

care scenarios in a realistic environment for the purpose of feedback and assessment ^[2]. If it is properly conducted, simulation creates an ideal educational environment, as learning activities can be made to be predictable, consistent, standardised, safe and reproducible ^[1, 3]. With simulation training students can develop their knowledge, skills and attitudes while protecting patients from unnecessary risks ^[3].

Simulation-based medical education or skills training in a Clinical Skills Centre (CSC) offers a wide variety of teaching and learning opportunities. One of the most important and frequently cited aspects is the ability to provide formative feedback to students in order for them to shape and refine their performance ^[4, 5]. This is done through direct supervision and guidance from lecturers.

Researchers identified that clinical skills training in a simulated environment reduces student anxiety and allows for a uniform, predictable and consistent clinical experience for all students ^[4]. In the healthcare environment, such training is necessary, as the clinical area can be very opportunistic and unpredictable and all students are not necessarily exposed to the same learning opportunities and patient cases ^[6].

Stellenbosch University aims to deliver clinically competent graduates at the end of their medical training and in order to achieve this goal, students rotate through a structured Clinical Skills module facilitated in the Clinical Skills Centre. This module is complementary to the clinical rotations and focuses on teaching procedural skills in simulation.

The Clinical Skills module consists of different components with the aim of integrating theory, practice and the clinical experience regarding procedural skills ^[1, 4, 5]. These components include scheduled teaching and learning sessions in the CSC, presented by trained healthcare providers, during which the skills are demonstrated to the students. During these sessions students get hands-on experience, using life-like manikins and models, while receiving formative feedback from the supervising lecturers.

During the sessions a behaviouristic orientation to learning is followed whereby the lecturer demonstrates the specific desired behaviour, the students observe the technique or exact manner in which the skill should be performed, and some sort of scoring rubric (checklist, rating forms) is used to assess performance and provide reinforcement ^[13]. In the CSC the social learning orientation also plays a role. Within this learning framework interactions with, and observations of, other students in the group enhance learning ^[7].

Another component of the Clinical Skills module involves an interactive, online learning site (Web-CT), which is used to provide additional information regarding specific skills and procedures.

For the third component of the Clinical Skills module, students have to complete a logbook as proof that various procedural skills have been acquired in an attempt to ensure that they make use of the clinical learning opportunities in the clinical environment. This logbook needs to be signed off by clinicians in the clinical environment. It needs to be completed in order to be admitted to the summative examination. The logbook is an extension of the behaviouristic approach, as the students are encouraged to get the relevant exposure and practical experience in the different areas, as identified by the specific objectives, and thus improve their competence by applying the skills demonstrated and learnt in the CSC ^[11].

The final component of the Clinical Skills module, which was evaluated in this research, is the summative examination. This takes place at the end of the module and assesses procedural skills and integrated theoretical understanding [6]. An objective structured clinical examination (OSCE) is used to assess the students' ability to perform the clinical skills [9]. Their theoretical knowledge is assessed by using a multiple-choice questionnaire on the online Web-CT learning site.

Much research has been done on the effectiveness of an OSCE as an assessment method [2, 4, 6, 9]. An OSCE has multiple short stations where students need to perform specific tasks. The OSCE allows standardisation and reduces the number of variables that could impact on the assessment of performance [9]. In a well-designed OSCE, the grades of the students should predominantly be affected by their performance alone, with minimal effect from other sources of variance such as patient availability and cooperation that come into play when examinations are conducted in the clinical environment [9].

One should note that simulation training cannot be the only available learning opportunity and students need to be exposed to real patients in the 'real world' [2, 3]. It is implicit that learning in Clinical Skill Centres cannot replace the experience that is gained from placements in the clinical area, but exposure to learning opportunities in the clinical area cannot be guaranteed and planned. Therefore, while 'real' clinical experiences have always been at the heart of healthcare education and should remain there; teaching in a CSC is appropriate to supplement and enhance it. A Clinical Skills module should therefore aim to assist students to bridge the theory-to-practice gap and to prepare the students to apply the skills learned in simulation in the clinical environment [1, 4, 8].

From the students' feedback, recommendations were made that may assist in curricula reform. This was based on Kirkpatrick's Four Levels of Evaluation [15] where students' perceptions and experiences are used to evaluate a learning and/ or training event. The feedback received may assist in analysing the effectiveness and value of the module so that improvements might be made if deemed necessary. The students' feedback with regards to the module related to the first three levels of evaluation, which is focussed on Reaction to the module; Learning of the content and changes in Behaviour. The fourth level of evaluation is more difficult to assess as it relates to final Results of the programme. See below for a summary of the Four Levels of Evaluation as applied in this research.

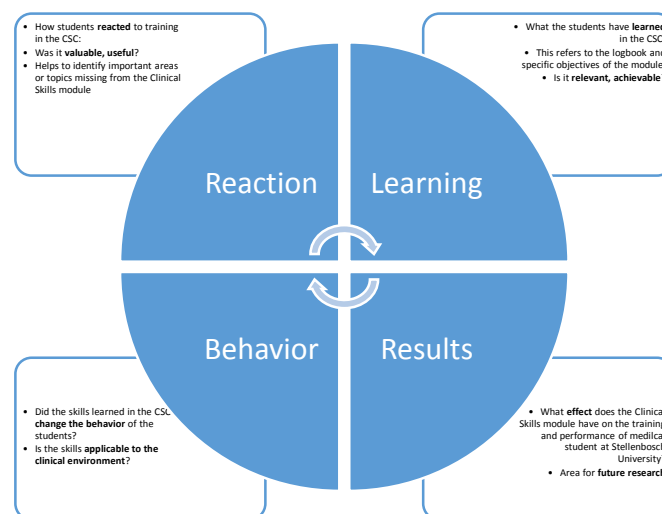


Figure 1 Kirkpatrick's Four Levels of Evaluation

The perceptions of the students regarding their experiences of this Clinical Skills module were explored and described in this study, since no formal feedback had been received from students since implementation of the module about three years ago.

Objectives

Primary research objective

To determine what components of the Clinical Skills module students would like to see improved to enhance the teaching and learning experience for future students rotating through the CSC.

Secondary research objectives

- To determine the relevance of the Clinical Skills module outcomes with regards to the clinical environment.
- To determine whether the medical students perceive the skills learned as valuable and useful to prepare them for the clinical environment.

Methods

Research design

A qualitative research approach ^[14] was used in this study to assess the perceptions of the medical students in order to give feedback to the course coordinators with regards to possible module changes needed.

Population and sample

The study population was the fourth-, fifth- and sixth-year medical students enrolled at Stellenbosch University during 2013. These students had either completed their early rotation (during their third year) or early and middle Clinical Skills rotation (during their fourth and fifth year).

Participants were conveniently selected from students who were available and willing to attend the focus group discussions. The class representatives assisted with the recruitment of participants by informing students of the research during specific theoretical blocks. Word of mouth by already participating students helped to recruit more participants.

Data collection

Data collection was done by means of discussions in six semi-structured focus group interviews ^[14] comprising a total of 24 students. The sessions were facilitated by the researcher herself. An advantage of this was that students could answer more openly, as they knew that the researcher was independent from the University and not part of the module being evaluated. Audio recordings were made during these hour-long discussions and were transcribed verbatim by an outside source.

Data analysis

Qualitative content analysis formed the basis of the analysis by means of which the whole data set was coded into themes through inductive processes ^[14]. Similar data (codes) were then grouped together and categorised into specific themes that emerged from the data and were linked to the different components of the Clinical Skills module. Data analysis was

done by the researcher and member-checking was done by another member of the research team to improve the credibility of the findings.

Results

Experiences of the CSC teaching sessions

Students reported that they enjoyed the sessions in the CSC and that they were proud to be part of a University with such a well-equipped facility for the acquisition of skills. They perceived the opportunity to receive training and guidance from well-trained clinical facilitators, and to use ‘*amazing resources*’ in a non-threatening environment as very positive. Interactive discussions and the formative feedback that form part of these sessions were also assessed by them:

‘I enjoyed coming to the Skills Centre where we get proper training. It’s not unsupervised, like go and do this thing as in the hospital setting.’

‘They assist us ‘... with interactive discussions where we can be taught and where bad habits can be corrected.’

According to the students, the sessions in the CSC improved their confidence and empowered them to perform the procedures in the clinical environment, even though the same techniques were not always followed there:

‘We can see what is right and how you are supposed to work.’

Feedback received from them on how to improve the Clinical Skills module revealed the overwhelming feeling that exposure to the CSC should be even earlier. Furthermore, students would have preferred to have more sessions:

‘It actually needs to expand. I think one would benefit more from another hour or two being taken out of every single clinical block to do skills training.’

Lastly, with regard to the teaching of the procedural skills, some students suggested that the information available on the online site (Web-CT) could be better utilised by making it compulsory for students to prepare the theoretical information so that the teaching sessions in the CSC could then focus only on demonstrating and practising of the procedures:

‘... time can be utilised better. One could do the theory before the session and then practise only.’

Experiences with the logbook

Students felt that the purpose of the logbook was to ‘*check on them*’ and to force them to get exposure to certain skills and procedures:

‘... it is to check on students that can’t take responsibility themselves...’

‘... forces students otherwise they do nothing.’

They also described it as a ‘*massive nightmare*’ and a ‘*very stressful endeavour*’ to find specific cases and to ask for signatures all the time. Some did, however, report that without the pressure to get all the objectives done, they would not have made the effort or felt as motivated to acquire the skills in the clinical environment. With regards to the relevance of the objectives, they said the skills and procedures should be revised and standardised, as not all students would be able to see everything or get exposure to the same cases:

‘... there are discrepancies between what are expected from us by the module and what is allowed in the clinical environment.’

The students expressed the need for better communication between the CSC and the clinical environment with regard to the objectives that needed to be achieved. One of the biggest complaints was that the doctors and nurses working in the clinical areas were not very accommodating in allowing them opportunities to perform the required procedures. Some of the doctors in the clinical areas were not informed about the logbook objectives and were not doing the procedures according to the guidelines being taught in the CSC:

'Doctors are not informed about what should be done, signed off and the right way of doing things.'

'We get confused between what is taught in the CSC and what we see in practice.'

'... we learn the hospital habits...'

Experiences of the summative examination

The first response from the respondents when asked to reflect on the OSCE component was overwhelmingly positive:

'After the OSCE I felt empowered. Feels like "wow" I can do something.'

'It's a good learning experience as you learn something new when you walk away afterwards.'

Some transparency issues emerged from the discussions, as students felt that they should know exactly what they were scored on in the OSCE. They would have wanted the instructions to be much clearer, for example when they had to use a skill during the OSCE. They felt that they should not be scored on any verbal aspects:

'Standardise the assessment as it is a "doing station" ...'

'They should make the criteria available as we will do better if you have the outcomes' and 'know what the critical points are.'

Students requested that the Web-CT examination component, which assessed the theoretical aspect, should be revised. They were of the opinion that the content of the Web-CT multiple-choice questions were not always relevant, correct or clear:

'During the Web-CT test the answers were not correlated, as nothing fit.'

Discussion and recommendations

Literature supports the responses of the students made in this study with regard to the relevance and value of having a CSC for simulation activities as well as a formalised Clinical Skills module. Scalese et al. [3] reiterate that simulation-based medical education allows the students to hone their skills in a risk-free and safe environment. Simulation training also provides better instruction for certain tasks such as technical skills [3, 11], and in many studies conducted, students emphasised that the skills learned in the CSCs provided them with a pathway to the clinical environment [2].

Simulation also offers a unique opportunity to learn through experience, aided by reflection and feedback and the opportunity to practise [8], which was also evident in the responses of the students in this study. Weller's [8] study also support the idea that simulation training should be used more in medical education, just as the students in this study requested. When using a behaviouristic approach to learning, the new behaviour or skill should be acquired first before the student is expected to perform it on their own in the clinical field [7]. This again links to the request by the students to have the sessions before their rotation in the clinical field.

With regard to the relevance of the skills taught in the CSC, students said that it acts as a good foundation to know what is expected of them, but that the lack of resources in the clinical environment makes it difficult for them to replicate the learned behaviour. Another aspect discussed by the students was the fact that the techniques they were taught in the CSC and what they did and saw in the clinical environment differed. Research on the transferability of skills learned in simulation reiterates the importance of effective relationships and communication between education institutions and clinical settings ^[2]. Improving communication and feedback between the CSC and the clinical environment will greatly improve the consistency of clinical skills training.

The use of interactive computer-based resources in a CSC has been researched intensively and the most important finding is that it should contribute to the learning experience of the students by assisting them in building their knowledge and problem-solving skills ^[10]. The responses from the students in this research highlight the fact that there is still room for improvement to optimise the use of the Web-CT component in the Clinical Skills module. The main suggestion from them was to revise the content and to utilise it better as a teaching tool. Some suggestions included the compulsory use of Web-CT in theoretical preparation prior to sessions in the CSC, and showing, with the help of demonstrational videos, more procedures not often seen in the clinical environment.

Research suggests that the way the content, objectives and goals of the logbook are communicated to all role players is vital. For the logbook to be used optimally, all the objectives need to be standardised and re-aligned. One should also take the changing healthcare system into consideration, as not all students may be exposed to all the required procedures ^[11].

In the South African context, patients are treated more in outpatient centres or primary healthcare settings and the more extensive/complicated cases are referred to tertiary healthcare institutions. Often, educational opportunities in these tertiary healthcare institutions cannot be utilised optimally due to the pressure for speed and maximum efficiency, as a great number of patients must be seen, examined and treated. Shorter hospital stays for patients who are admitted also play a role in the availability of cases ^[3]. This is exacerbated when clinicians have to deal with overcrowding (of patients and too many students) and schedules that are running late, which result in less time spent on educating and training students ^[3]. In order to create the optimal pathway for practise, both clinical and academic staff should have an effective, synergistic relationship with the clinical setting ^[2, 3].

With regard to the summative OSCE participants in other research studies also acknowledged that despite the anxiety they caused, OSCEs were effective for encouraging them to practise skills more often, and made them feel competent and more empowered when they entered the clinical environment ^[2, 12]. This was also clear from the responses received from students in this study.

By incorporating the existing literature in the field of medical simulation training as well as the perceptions of the students participating in the Clinical Skills module, allowed the researcher to give feedback to the course coordinators in order for them to re-evaluate and make changes in the current Clinical Skills module as deemed necessary. These changes might improve the learning experience of future students.

Conclusion

Students who had undergone training sessions in the CSC at Stellenbosch University indicated that they had enjoyed a superior learning experience, which was evident from their mostly positive attitudes and praise for the Clinical Skills module implementation. Students stated that their overall perceptions of training in a CSC were positive, that the skills taught were relevant to what they were expected to do in the clinical environment and that it did increase their confidence and competence. They did, however, identify a few structural stumbling blocks with regard to different components of the Clinical Skills module.

It is hoped that this research may lead to curriculum reform in order to enhance the teaching and learning experience of medical students rotating through the CSC at Stellenbosch University.

Acknowledgement

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6 CONCLUSION

The aim of this research project was to assess the perceptions medical students have regarding the Clinical Skills module as part of the MBChB curriculum presented at Stellenbosch University. The feedback from the students were needed in order to *evaluate the usefulness and relevance of the Clinical Skills module* and to be able to *make recommendations and suggestions to the course coordinators for possible changes in the curricula*. Throughout the whole study and process of data analyses, the researcher constantly returned to the primary and secondary research objectives to ensure that the study remained focused and flowed within a well-constructed framework.

As shown by Figure 6.1 the primary objective was to determine to which extent the Clinical Skills module needs to be changed to enhance the teaching and learning experience for future medical students. This objective was achieved by data collection through focus group discussions. The discussions were constructed around the five different components of the Clinical Skills module.

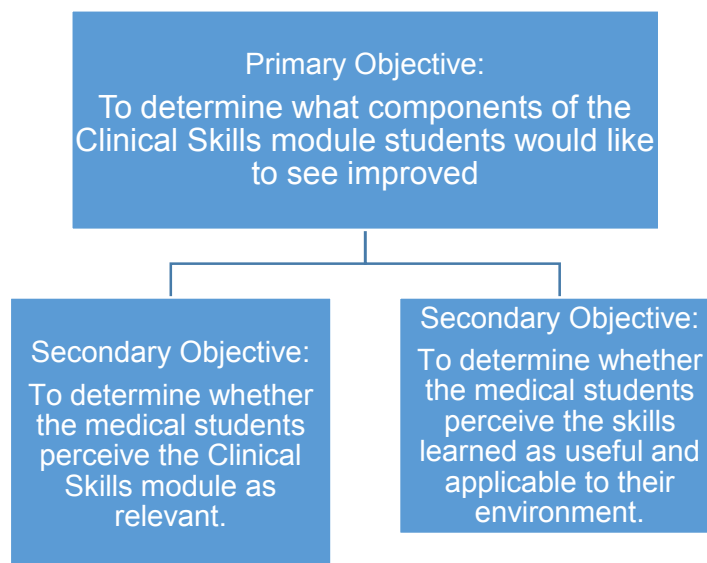


FIGURE 6.1 Primary and secondary research objectives

Two secondary objectives were achieved to support the primary research objective. Firstly, it was determined if the students perceived the Clinical Skills module as relevant in preparing them for their clinical rotations and secondly if they find the skills and content of the module useful and applicable to what they see in the clinical

environment. These secondary objectives provide the bridge to the primary objective.

It was established that the students indeed found the Clinical Skills module relevant, useful and valuable. The feedback of the students were analyzed and specific recommendations with regards to the different components of the Clinical Skills module were made. This may provide the basis for module evaluation and to guide curricula changes if deemed necessary.

For a summary of the research findings and recommendations, refer to **Addendum D**.

7 LIMITATIONS OF THE STUDY

It can be argued that the small sample size did not fully represent all the medical students, but the researcher feels that data saturation occurred with the number of participants interviewed as no new data emerged from the discussions after the fourth focus group discussion. For more information regarding sample size, refer to **Addendum C**.

As a qualitative researcher one should always be self-reflective about how you influence the research process, as one cannot separate oneself from the research and the analysis that you do ^[34]. One way that I ensured objectiveness in this research project was to make use of member-checking during the analysis of the data to make sure the findings remained authentic and without bias. A member of the research team were used for this purpose and reduced the occurrence of any researcher bias.

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ADDENDUM A:
AJHPE Author Guidelines

Author Guidelines

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Named authors must consent to publication. Authorship should be based on substantial contribution to: (i) conception, design, analysis and interpretation of data; (ii) drafting or critical revision for important intellectual content; and (iii) approval of the version to be published. These conditions must all be met (uniform requirements for manuscripts submitted to biomedical journals; refer to www.icmje.org).

CONFLICT OF INTEREST

Authors must declare all sources of support for the research and any association with a product or subject that may constitute conflict of interest.

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Provide evidence of Research Ethics Committee approval of the research where relevant.

PROTECTION OF PATIENT'S RIGHTS TO PRIVACY

Identifying information should not be published in written descriptions, photographs, and pedigrees unless the information is essential for scientific purposes and the patient (or parent or guardian) gives informed written consent for publication. The patient should be shown the manuscript to be published. Refer to www.icmje.org.

ETHNIC CLASSIFICATION

References to ethnic classification must indicate the rationale for this.

MANUSCRIPTS

Shorter items are more likely to be accepted for publication, owing to space constraints and reader preferences.

Research articles (including shorter research reports) must not exceed 3 000 words, with up to 6 tables or illustrations. These articles are usually observations or research of relevance to education in the health professions. References should be limited to no more than 15. Please provide a structured abstract not exceeding 250 words, with the following recommended headings: Background, Objectives, Methods, Results, and Conclusion.

Forum articles must not exceed 1 500 words, must be accompanied by an abstract. References must be limited to no more than 15.

Editorials (1 000 words or less) are by invitation only.

Review articles are by invitation only.

Letters to the editor, for publication, should be about 400 words with only one illustration or table, and must include a correspondence address.

Abstracts should be no more than 500 words in length, and structured according to the following subheadings: Context and setting, Why the idea was necessary, What was done, and Results and impact.

Obituaries should be about 400 words and may be accompanied by a photograph.

MANUSCRIPT PREPARATION

Refer to articles in recent issues for the presentation of headings and subheadings. If in doubt, refer to 'uniform requirements' - www.icmje.org. Manuscripts must be provided in **UK English**.

Qualification, affiliation and contact details of ALL authors must be provided in the manuscript and in the online submission process.

Abbreviations should be spelt out when first used and thereafter used consistently, e.g. 'intravenous (IV)' or 'Department of Health (DoH)'.

Scientific measurements must be expressed in SI units except: blood pressure (mmHg) and haemoglobin (g/dl). Litres is denoted with a lowercase 'l' e.g. 'ml' for millilitres). Units should be preceded by a space (except for %), e.g. '40 kg' and '20 cm' but '50%'. Greater/smaller than signs (> and 40 years of age'. The same applies to ± and °, i.e. '35±6' and '19°C'.

Numbers should be written as grouped per thousand-units, i.e. 4 000, 22 160...

Quotes should be placed in single quotation marks: i.e. The respondent stated: '...' Round **brackets** (parentheses) should be used, as opposed to square brackets, which are reserved for denoting concentrations or insertions in direct quotes.

General formatting The manuscript must be in Microsoft Word or RTF document format. Text must be single-spaced, in 12-point Times New Roman font, and contain no unnecessary formatting (such as text in boxes, with the exception of Tables).

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If tables or illustrations submitted have been published elsewhere, the author(s) should provide consent to republication obtained from the copyright holder.

Tables may be embedded in the manuscript file or provided as '**supplementary files**'. They must be numbered in Arabic numerals (1,2,3...) and referred to consecutively in the text (e.g. 'Table 1'). Tables should be constructed carefully and simply for intelligible data representation. Unnecessarily complicated tables are strongly discouraged. Tables must be cell-based (i.e. not constructed with text boxes or tabs), and accompanied by a concise title and column headings. Footnotes must be indicated with consecutive use of the following symbols: * † ‡ § ¶ || then ** †† ‡‡ etc.

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REFERENCES

Authors must verify references from the original sources. Only complete, correctly formatted reference lists will be accepted. Reference lists must be generated manually and **not** with the use of reference manager software. Citations should be inserted in the text as superscript numbers between square brackets, e.g. These regulations are endorsed by the World Health Organization,^[2] and others.^[3,4-6] All references should be listed at the end of the article in numerical order of appearance in the **Vancouver style** (not alphabetical order). Approved abbreviations of journal titles must be used; see the List of Journals in Index Medicus. Names and initials of all authors should be given; if there are more than six authors, the first three names should be given followed by et al. First and last page, volume and issue numbers should be given.

Wherever possible, references must be accompanied by a digital object identifier (DOI) link and PubMed ID (PMID)/PubMed Central ID (PMCID). Authors are encouraged to use the DOI lookup service offered by **CrossRef**.

Journal references: Price NC, Jacobs NN, Roberts DA, et al. Importance of asking about glaucoma. *Stat Med* 1998;289(1):350-355. [<http://dx.doi.org/10.1000/hgjr.182>] [PMID: 2764753]

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Other references (e.g. reports) should follow the same format: Author(s). Title. Publisher place: publisher name, year; pages. Cited manuscripts that have been accepted but not yet published can be included as references followed by '(in press)'. Unpublished observations and personal communications in the text must not appear in the reference list. The full name of the source person must be provided for personal communications e.g. '...(Prof. Michael Jones, personal communication)'.

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ADDENDUM B:
Comprehensive Literature Review

COMPREHENSIVE LITERATURE REVIEW

1.1 Introduction

An extensive literature review was conducted by studying various publications and sources on simulation and skills training in the medical field as well as how programme evaluation with regards to simulation training are done. Academic articles, books, medical journals and websites were used to obtain the needed literature. Several online databases were also used: EBSCOhost Research Databases, Google Scholar and SA ePublications. To ensure a well-defined search, specific key words were used such as simulation training, skills training, student perceptions and programme evaluation.

The literature review provided a comprehensive understanding of the construct of simulation training – locally as well as internationally - and this background information was then used as a basis for the comparison of the current state of simulation training practices in South Africa.

1.2 Simulation training

Skills training with simulation is an instructional process that substitutes real patient encounters with artificial models, live actors or virtual-reality patients ^[4]. The goal of simulation training is to replicate patient-care scenarios in a realistic environment to provide feedback and assessment ^[5, 6]. Properly conducted, training in simulation creates an ideal educational environment, as learning activities can be designed to be predictable, consistent, standardised, safe and reproducible^[4, 7]. With simulation training students can develop their knowledge, skills and attitudes while protecting patients from unnecessary risks ^[8].

Simulation training, facilitated in the Clinical Skills Centre (CSC) at the Stellenbosch University, forms an integral part of the various undergraduate medical education curricula. The Clinical Skills module, facilitated in the CSC, offers an alternative to learning with real patients and allows a broad range of skills to be practised and mastered. Specific learning goals and objectives are identified and students can

successfully achieve these goals and objectives, as learning takes place using trained instructors in dedicated teaching time.

By making use of the CSC, where simulation training takes place, pressure on clinically based learning, teaching and assessment is alleviated. Additional possibilities for self-directed learning, reflection on clinical practice and structured assessment also arise, as the CSC contains a sophisticated mix of virtual and physical simulators blended with real clinical equipment to provide varying levels of teaching and learning opportunities [9].

The shift to simulation-based medical education (SBME) worldwide was mainly influenced by the changes in healthcare delivery through which reduced patient reliability, as learning opportunities, became a reality [7]. SBME is suited for independent learning and can save faculty time by allowing a wide variety of clinical conditions and situations to be reproduced on demand, and therefore allows a standardised experience for all students. This transforms curricular planning from an ad hoc process, dependant on patient availability, to a proactive learning environment with great flexibility options for educators [7].

The module consists of various components, including scheduled teaching and learning sessions in the CSC, the completion of a logbook during the structured clinical rotations in the clinical environment, learning material that is provided on the interactive online learning site, Web-CT, and a summative examination at the end of the module.

During the sessions in the CSC the desired skills and specific procedures are demonstrated and students get the chance to practise under supervision, with feedback being provided.

1.3 Learning approaches used in the Clinical Skills module

The learning approaches that are utilised in this module are discussed below.

A behaviouristic approach to learning is used through which students' behaviour is changed by them observing the correct techniques and ways of using skills [10]. These demonstrations are facilitated by trained healthcare professionals. Students are then allowed to practise the skills and formative feedback is given to correct and shape their performance. When a behaviouristic approach to learning is used, three

basic behavioural assumptions are followed, namely that observable behaviour is the focus of learning, the environment shapes the behaviour and the reinforcement of the behaviour is central to the learning process [10, 11].

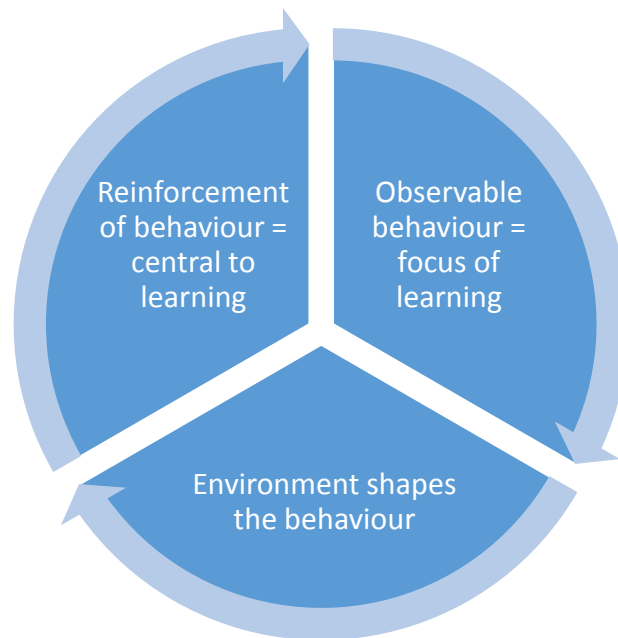


Figure 1 Behaviouristic approach to learning [10]

Peer assessment is also used, with students using specific assessment tools provided by the lecturers to evaluate one another while using skills and performing procedures. The Social Learning approach is also used, since students learn from lecturers and one another and motivate themselves to become competent in the desired behaviour [11]. According to Bandura's Social Learning theory [13], models are an important source of learning for new behaviour and for achieving behavioural change in institutionalised settings [12]. Through Social Learning, students learn from someone else, via observation, imitation, and modelling. Social learning requires paying *attention* to the person(s) being observed, *remembering* the observed behaviour, the ability to *replicate* the behaviour, and a *motivation* to act in the same way. The theory has often been called a bridge between behaviourism and cognitive learning theories, as it encompasses attention, memory, and motivation [12, 13].

For the summative assessment at the end of the module an Objective Structured Clinical Examination (OSCE) was introduced to assess the students on the 'shows

how' level of Miller's Pyramid of Assessment [14, 15]. Miller's Pyramid of Assessment provides a framework for assessing clinical competence in medical education [16]. The first two levels, 'knows' and 'knows how', assess the cognition of the students. For the assessment of knowledge, written examinations can be used. The application of knowledge ('knows how') is tested by clinical problem-solving abilities. In this case, multiple-choice questions are used to assess the theory underpinning each procedure.

The third ('shows how') and fourth ('does') levels assess student behaviour. At the third level ('shows how'), specific clinical skills are assessed, usually in an OSCE, through standardised patient or clinical examination in the clinical environment. At this level a student is required to demonstrate the integration of knowledge and skills into successful clinical performance [16]. In this particular Clinical Skills module, students' clinical performance is assessed by means of an OSCE.

The ultimate goal of training in the CSC is to allow students to perform on the last and highest level ('does'), enabling them to perform correctly and competently in the clinical environment. This is currently not feasible due to large numbers of students and because of the way in which this level is assessed is to ask the patients receiving the care how competent and successful the students were. This in-depth feedback required from this level is one of the reasons it cannot be utilized in this module, as it is very labour intensive [16].

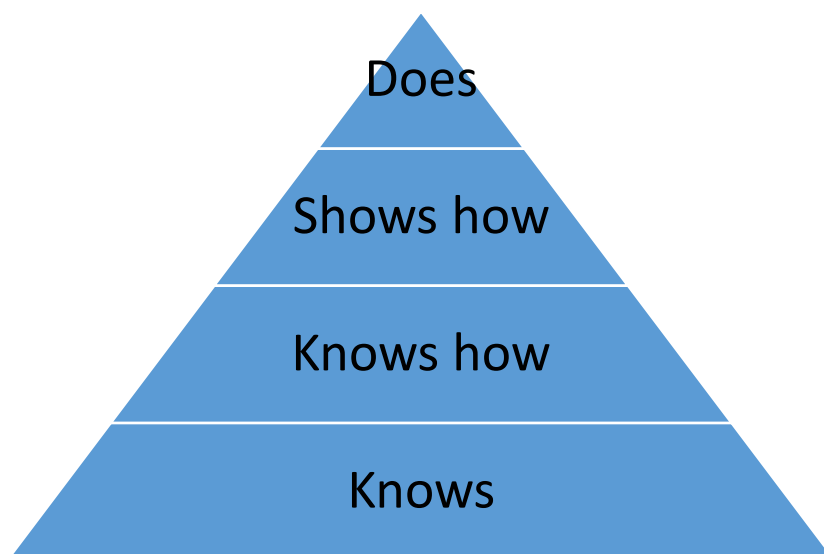


Figure 2 Millers' Assessment Pyramid [16]

1.4 Benefits of using a Clinical Skills Centre

The literature reveals many other benefits of using a CSC for skills training.

It provides a safe, non-threatening learning environment that reduces anxiety and improves student confidence:

Various research studies conducted on simulation-based training in Clinical Skills Centres report that students find this educational approach valuable [4-6, 8, 17-19]. They value the opportunity to hone their skills in a safe, non-threatening, risk-free and supportive environment highly, as they can learn and practise skills without negative patient outcomes [4, 5]. The opportunity to practise skills and repeat procedures allows students to become more confident in their performance [8, 20]. This controlled environment also reduces the stress and anxiety they experience when practising skills in the clinical environment, where they may cause harm to patients [6, 7, 17, 21].

It allows for guidance and immediate feedback.

In the Best Evidence Medical Education (BEME) structured review done by Issenberg et al [5], 47% of the journal articles included in their study, reported that educational feedback about clinical decisions and the quality of actions performed were the most important feature of simulation-based medical education [22]. This was also clear from the study conducted by McGaghie et al [24] where students who received feedback after their use of skills in the CSC achieved significantly better results than those who did not receive any feedback. This shows that strong feedback has a clear impact on students' clinical behaviour and assists them in becoming competent practitioners.

Most simulation-based medical education feedback is formative, as its purpose is to improve students' clinical performance and guide them rather than to present summative judgements (pass/fail) [23]. The ability to seek guidance and feedback from the lecturer during simulation exercises is described as very valuable [9, 24]. This was also evident from the study

conducted by Weller ^[18], where feedback and guidance allowed the students to correct incorrect techniques and to improve the skills being learnt.

Deliberate practice opportunities are available, which can lead to the mastery of skills.

According to Okuda et al ^[4], the ultimate goal of simulation training is that for one to master one's trade. The deliberate practise opportunities available in the CSC allow students to become a master by providing them with opportunities for intense repetition of the skills, rigorous assessment of their performance, specific informative feedback, and improved performance in a controlled setting.

In the BEME systematic review, repetitive practise was also noted as the second most important feature (39% of journal articles cited) involving the use of simulation in medical education ^[5].

Deliberate practise is an important property of simulation training and is used to shape, refine and maintain student knowledge, skills and attitudes. Deliberate practise has at least nine features or requirements when used to achieve medical education goals ^[24]. It relies on:

- Highly motivated learners with good concentration who
- engage with a well-defined learning objective or task at an
- appropriate level of difficulty with
- focused, repetitive practise that leads to
- rigorous, precise measurements that yield
- informative feedback from educational sources and where
- trainees also monitor their learning experiences and correct strategies, errors and levels of understanding, engage in more deliberate practise and continue with
- evaluation to achieve a standard of mastery and then
- advance to another task or unit.

From the study by McGaghie et al ^[24], the evidence is clear that repetitive practise involving medical simulations is associated with improved learner outcomes. Simulation-based practise in medical education appears to

approximate a dose-response relationship in terms of achieving desired outcomes; more practise yields better results.

Deliberate, repetitive practise is also linked to improving the transferability of skills learned in the CSC to the clinical environment [6, 24]. By practising skills in a realistic environment by using different scenarios, students will be able to better transfer the skills learned to the practical setting [17, 25].

Predictable and consistent clinical experiences are available to all students.

In the clinical setting, there is no guarantee that every student will have a uniform clinical experience, see a representative patient mix and learn all the necessary skills [4, 7, 22]. Often, educational opportunities cannot be utilised because of the pressure for speed and maximum efficiency. This is exacerbated when faculty and staff have to deal with overcrowding and schedules that are running late [26]. Moreover, practising clinicians who have students working with them may not be familiar with the learning goals and objectives, nor have the knowledge, attitudes or skills to teach successfully. In addition, patient considerations such as safety, quality of care, inconvenience and discomfort, as well as medico-legal issues, may make it impossible for a novice to practise and acquire skills, even when a suitable patient is encountered during the clinical experience. Simulation training in the CSC offers an alternative to learning with real patients. Specific learning goals and objectives can be defined, and all students can successfully achieve the goals and objectives, as learning takes place using trained instructors in dedicated teaching rather than patient care time [22].

Such a stepwise approach will allow learners to be exposed gradually to tasks with which they feel comfortable and competent and will minimise any 'wasted' clinical time [26].

However, it must be remembered that simulation is not real life, that simulated performance does not completely correlate with performance with real patients, and that even in the age of advanced simulation, the value of instruction and learning at the bedside is still of critical importance [4, 6, 7, 22]. Training through simulation may facilitate the transfer of skills to the real-world setting of the clinical environment [21], but cannot replace it completely.

Kneebone et al. [27], argue in their paper that continual interaction between Clinical Skills Centres and the clinical environment will ensure that relevant skills are learned and reinforced and learning will realise its full potential. However, for the CSC to contribute to optimal teaching and learning, simulation must be as realistic and authentic as possible. A lack of authenticity in CSCs can threaten the transferability of skills learned into the reality of practice [28]. In addition, to enhance the transferability of skills, there needs to be consistency between the teaching that occurs in the CSC and in the clinical setting [27].

It allows for safe patient care.

Medical training must at some point use live patients to hone the skills of health professionals, but there is also an obligation to provide optimal treatment and to ensure patients' safety and well-being [7]. Balancing these two needs represents a fundamental ethical tension in medical education. Simulation-based learning can help mitigate this tension by developing health professionals' knowledge, skills and attitudes while protecting patients from unnecessary risk [8]. As patients become increasingly concerned that students are 'practising' on them, medical education is becoming focused more on patient safety and quality than on bedside teaching [4]. Recent discussions of medical error and risk-reduction strategies have highlighted simulation as an important tool in improving the safe delivery of medical care [8].

While a real clinical experience has always been at the heart of medical education, teaching in CSCs is needed to supplement and enhance it. Therefore, the focus should not be on comparing CSC teaching with teaching in the clinical setting, but the emphasis should rather be on exploring how the CSC (and the Clinical Skills module) can facilitate and prepare students for the learning and implementation of clinical skills in practice [6, 29].

Simulation-based medical education is therefore a complementary educational modality rather than an attempt to replace real-patient training encounters. Moreover, by adopting simulation as a standard of training and certification, health

systems will be viewed as more accountable and ethical by the populations they serve [8].

As seen from the information above, simulation training seems to be the way forward in medical education and in order to guide and assist the students comprehensively, evaluation of the existing practices and modules are needed [44]. For this the students' perceptions are valuable as they are the ones moving from the simulated environment into the clinical field where they need to apply the skills learned in the Clinical Skills Centres.

In the study by Houghton, et.al. [6], participants (academic staff, clinical staff and nursing students) were interviewed to explore what role the Clinical Skills Laboratory (CSL) plays in preparing students for the real world of practice. The perceptions of the teaching and assessment strategies employed in the CSL were the main focus of the study. The results focussed on the transferability of skills to practice and no real recommendations for module or programme changes were made.

Freeth and Fry [9] also used nursing students' and tutors' perceptions about, and experiences of, the learning and teaching events in the CSC to inform programme changes. They however made use of a mixed method of data gathering and not pure qualitative research.

Studies evaluating students' perceptions on simulation-based training programmes across the world are overwhelmingly positive [6, 24, 30], however, no South African studies could be found that used student perceptions to guide programme evaluation.

One study conducted at the University of Pretoria [43], made some recommendations for the optimum use of the Skills Laboratory after student perceptions were gathered from focus group discussions. The main aim of the research was to explore and describe the experiences students had of skills training and the impact that the acquisition of these skills has on their clinical practice and not for the purpose of evaluating the skills module as a whole.

1.5 Programme evaluation according to Kirkpatrick's model

As seen above, the use of students' perceptions to assess specific aspects of a clinical skills programme or module is widely researched. The link between their perceptions and programme evaluation however, is not much researched. This gap in the simulation field were addressed by this research whereby the feedback received from the students regarding their experiences in the CSC and the Clinical Skills module, directly influenced curricula reform and changes if deemed necessary by the course coordinators.

Kirkpatrick's four level of evaluation ^[44] was used as a guide to report on the findings of the study.

When looking at evaluation of a newly implemented programme, one of the methods used is to ask the persons involved in the programme how they experience it. For the purpose of this research project, Kirkpatrick's four level of evaluation was used to recommend module changes according to the feedback received from the students.

The four levels used to evaluate a training programme/ module are:

- 1 Reaction – This level measures how students react to the training. The training should be *perceived as valuable* and the course material, venue and facilitators should all *enhance the overall experience*. Reaction measurement to the newly implemented programme/ module is important as it may help to improve the training experience for future students as well as *to identify important areas or topics that are missing from the current curricula*.
- 2 Learning – At level two the aspects that students have learned are assessed. In other words, how much did their knowledge increase as a result of the training? Specific learning objectives are stated for the programme or module and the *relevance of the outcomes* are measured through feedback from the students. Here it is useful to know what gaps students identify in the theoretical component or the module. To know what students are learning and what they aren't will help to improve future training.

- 3 Behaviour - Here students are asked how much the training they received allowed them to change their behaviour. In other words, are they able to *apply* the skills and knowledge?
- 4 Results – At this last level the final results of the training or programme are analysed and this will determine if the programme are training what it should. In other words, does it meet the expectations of the different stakeholders and students?

For the purpose of this research, only the first three levels of programme evaluation were utilized as the feedback received from the students only spread from their own perceptions of the Clinical Skills module.

The recommendations made to the course coordinators were thus related to the objectives of the study which determined the relevance, usefulness and valuableness of the different components of the Clinical Skills module, as perceived by the students, to suggest possible module changes.

Future research in this field may focus on the theoretical and practical results of the students and how the Clinical Skills module impacts on the overall performance of medical students in the clinical environment.

ADDENDUM C:
Methodology

METHODOLOGY

The research method that was followed for this study, in order to meet the research objectives, is a qualitative approach through semi-structured focus group discussions.

1 Research design

A qualitative research approach was used in this study to attain an in-depth sense of what the fourth, fifth and sixth-year medical students think of the Clinical Skills module. This approach was chosen because rich, descriptive data could be gathered with the intention of developing an understanding of how these students understand, interpret and attach meaning to the experiences in the Clinical Skills module. The emphasis of qualitative research is therefore on the quality and depth of information gathered [1].

Another aspect of qualitative research is that it uses techniques that give the researcher the scope to interpret data and discover meaning from unstructured responses such as text, without relying on numerical measurement [32]. Qualitative research was specifically applicable to this research as it provided richer and valuable information and unforeseen insights within the research context [32]. A qualitative study, such as this one, not only provides a more open-ended and flexible framework for the research to address the stated objectives, but also reveals possible areas for future research [33].

For qualitative research to be credible, findings need to be trustworthy and believable in that they reflect participants', researchers' and readers' experiences with the phenomenon, but at the same time the explanation is only one of many 'plausible' interpretations possible from the data [34]. To ascertain credibility in this research project a few conditions for quality had to be adhered to, namely:

- a. Methodological consistency [35, 36] – The method chosen must be followed though until the end of the project

- b. Clarity of purpose – This research project’s aim is to describe the perceptions of the medical students and not to build new theory.
- c. Having self-awareness ^[37] – Since the qualitative researcher forms such an integral part of both the research process and findings, it is important that the researcher remain aware of biases and assumptions. As the researcher conducting the study was not affiliated to the CSC at Stellenbosch University, biases and assumptions were not a problem in conducting the project.
- d. Having sensitivity – For the topic, for the participants and for the research. As Davies and Dodd ^[38] explains, one should “step into the shoes of the participants” and feel at a “gut level”, otherwise you lose some of the richness and depth of the qualitative data. “A cold and distant researcher may serve to enhance the validity of qualitative research, but can erode the credibility of the findings by preventing the researcher from developing sensitivity, empathy, carefulness, respect, and honesty needed to accurately capture the viewpoints of the participants” ^[38]. Another aspect of sensitivity is the way data collection takes place. Were the questions driving the data collection arrived at through analysis, or were concepts and questions generated before the data were collected? In other words, did the analysis drive the research or was the research driven by some pre-conceived ideas or assumptions that were imposed on the data? The latter may not be wrong, depending upon how careful the researcher was to put aside bias and honestly seek to find contradictions in the data to the assumptions made ^[34]. In this research, member-checking of the data also assisted in making sure no bias or fixed assumptions influenced the interpretation of the data.
- e. Applicability – Or the usefulness of the findings. The question that needs to be answered is: Do the findings offer new explanations or insights? Can they be used to develop policy, change practice or add to the knowledge base of a profession? The aim of this research is to give recommendations to the Clinical Skills module coordinators on specific aspects the students identified as areas to improve the module on, in order to enhance the teaching and learning experience of future students rotating through the module. The

applicability and usefulness of the findings is very specific and on a small scale, but it may also assist other institutions in guiding module/ programme changes.

2 Data gathering method

Focus group discussions were the most useful form of data gathering within the context of the study. As the research problem covers a wide-ranging area with five different components, it enabled the researcher to get a broader and more comprehensive understanding of the issues relevant to this module ^[33]. The opportunity to gain a large amount of responses on the topic, in a limited period of time, proved to be one of the many advantages of this type of data gathering technique ^[39]. Another advantage of group interviewing is that participants' interaction among themselves replaces their interaction with the interviewer/ facilitator leading to a greater emphasis on participants' points of view ^[39]. Similarly, Levy ^[40], states that hearing how participants respond to each other gives insight not just into their natural vocabulary on a topic, but also when they are willing to challenge others and how they respond to such challenges. This increases the depth of the data collected as higher levels of participant involvement are reached.

As the goal of the study was to evaluate the Clinical Skills module in order to assist in curriculum changes the aim was to assess the implementation of the different components of the Clinical Skills module with regards to the feedback received from the students participating in the module.

3 Research Setting

The participants in this research were all undergraduate medical students at the Stellenbosch University, enrolled in 2013, in either their fourth, fifth or sixth year. At the time of data collection, these students were either on clinical rotations/ blocks in Tygerberg Hospital or Stikland Hospital, or attended classes on the Tygerberg Campus. Interviews were conducted at Stikland Hospital, as well as in the Clinical Skills Centre on the Tygerberg Campus.

4 Population

The study population was 598 medical students in either their 4th, 5th or 6th year of studies at the medical campus of Stellenbosch University.

Twenty-four undergraduate medical students, eight from each year group, were recruited to take part in the research.

The fourth-year medical students were chosen to reflect on their rotation through the Clinical Skills Centre (CSC) in their third year for the 'Early Clinical Rotation module', and also because they were at the time participating in the 'Middle Clinical Rotation module' in the CSC.

Fifth-year medical students were chosen as they had recently completed their 'Middle Clinical Rotation module'.

The sixth-year medical students had completed their rotation through the CSC and their perceptions regarding their experiences were required, as they had also been the first group to take this Clinical Skills module as a compulsory part of the medical curriculum. They were also the first group to do the summative examination at the end of the module rotation.

5 Sampling

The process of sampling enabled the researcher to lower costs, collect data at a greater speed, and ensure accuracy of results by way of recording the discussions [33]. The purpose of a sample is to "represent the characteristics of the population it purports to represent" [33].

Students were conveniently sampled for this research, based on ease of access and willingness to participate [34]. The class representatives of each year group were asked to inform their fellow students of the research when they saw them in specific classes or blocks. In this way willing participants were identified and recruited. These students were then contacted by SMS, email and telephone. The rationale of the study was clearly explained to them and they were also made aware that the participation in this research was completely voluntary, with no rewards/ incentives being offered.

Word of mouth from students who had already agreed to participate in the study helped to recruit more students.

Due to the difficulty in recruiting enough students at a time that suited most of them, not all year groups were represented equally. The table below shows the breakdown of the participating students.

Table 1 Participating students

Year group	Number of students
4	11
5	8
6	5

The lack of enough students recruited in the sixth-year group was seen as a limitation of this study. The researcher intended to interview more final-year students because these students had been the first group to rotate through the CSC in the structured Clinical Skills module. In retrospect, the research should have been conducted while the students were still on campus and in class blocks, as the logistics around setting up a suitable time and place for the focus group discussions would have been easier to organise and implement. This was evident in the better response received from the fourth-year students, who had all been in a class block at the time of the interviews.

Morgan ^[39] and Calder ^[41] however argues that if the facilitator of the focus group can clearly anticipate what will be said next in a group discussion, then the research is done; this usually takes 3-4 groups. Thus, research that is exploratory in nature or simply aimed at “getting someone’s perspective” will take only a few groups with relatively high degree of structure. Another important determinant of the number of groups is the number of different population subgroups required. The more homogeneous your groups are in terms of both background and role-based perspectives, the fewer you need. The usual group size of 6-10 allows a greater contribution from each participant whereas in bigger groups participant involvement may lessen ^[39].

From the three different year groups recruited, the researcher are confident that the amount of focus group discussions and participants in each group led to optimal data

collection and data analysis that may be representative of the broader student population.

Generalizability of the results will always be an issue, especially when making use of focus group discussions where the sample size is not very big ^[39]. There is often no reason to believe that a randomly sampled group holds shared perspectives on a topic. A typical solution, given the small sample size of focus groups samples, is to work with theoretically chosen subgroups from the total population. In other words, “concentrate on those population segments that are going to provide the most meaningful information” ^[39]. Participants should really have something to say about the topic and they should feel comfortable saying it to each other. Also, when all the participants share virtually identical perspectives on a topic, then this can lead to a flat, unproductive discussion.

The willing students for this research had all very strong opinions of the Clinical Skills module and when the theoretical results of the candidates who had been willing to participate in the study were analysed, it was interesting to note that their marks fell in both ranges from the good (above 70%) and the not so good (below 50%) performers. This was a good indication that different types of students attended the focus group discussion and in that way might make the data more representative of the bigger population.

6 Data collection

In the focus group discussion the facilitator firstly introduced herself and the respondents were informed of the intended use of the data. A general background of the study was given. Secondly, the five components of the Clinical Skills module was used to initiate the discussion, but the open-ended nature of the discussion also provided room for the respondents to give other relevant information or for the facilitator to probe for additional insight on certain aspects. Lastly, the facilitator asked an overall opinion of the module to act as summary.

These semi-structured focus group discussions were held with participants during their lunch hour, for each year group separately and on days that suited the most

students. The fourth-year group was interviewed together, but the fifth and sixth-year groups were split into different discussion interviews, as all the students could not attend at the same time. Two of the fifth-year sessions were held at Stikland Hospital, and all the other interviews in the CSC on the Tygerberg Campus of Stellenbosch University. Lunch was offered during these sessions.

All the focus group discussions were audio-recorded as the response occurred, by recording it on tape and by writing down notes to ensure that the participant's interest was maintained ^[33].

The focus group discussion strategy was chosen for this research on the basis of the assumption that group interaction will be productive in widening the range of responses, activating forgotten details of experiences and releasing inhibitions that may otherwise discourage participants from disclosing information ^[1]. This was specifically true for the sixth-year students, who had already completed their Clinical Skills module in 2012. In focus group discussions, participants also build on each other's ideas and comments to provide an in-depth view not attainable from individual interviews. Unexpected comments and new perspectives can be explored easily within the focus group and add value to the study ^[1, 3].

7 Data analysis

Data was collected by means of focus group discussions. The audio-recorded data was then transcribed and coded by making use of an inductive data analysis process to identify themes and to interpret the qualitative data. Data analysis generally implies identifying patterns in data, such as recent behaviours, objects, or a body of knowledge, and then sorting, categorizing, evaluating and comparing the interpreted data ^[42].

Figure 1 Coding process – categorizing



Figure 2 Coding process – identifying themes



The five components of the Clinical Skills module were used as broad themes and data from the focus group discussions were then categorized into specific aspects relating to the perceptions and feedback received of the students.

The processed data was then used to relate to the research problem at large, and also to address each dependent research objective. This enabled the researcher to draw specific conclusions and make corresponding recommendations.

ETHICAL CONSIDERATIONS

To ensure that all research was done in correspondence with the Stellenbosch's University ethical research requirements all necessary documentation was submitted to the Health Research Ethics Committee and the MBChB programme committee for review and approval. To protect the respondent during the research process the following guidelines were followed. Firstly, the benefits of the research for the respondents were explained. Secondly, the respondent's agreed to take part in the study voluntarily and confidentiality was ensured through not using any names, and thirdly, clear and written informed consent was obtained ^[33].

ADDENDUM D:
Summary of Research Findings and Recommendations

RESEARCH FINDINGS AND RECOMMENDATIONS

Since the research findings and discussion of the results were done in much detail in the article, a summary of the student experiences in all five components of the Clinical Skills module will be given. The feedback and possible changes they would like to see will be stated as recommendations at each module component.

<u>Student experiences</u> of the different components of the Clinical Skills module	<u>Recommendations</u> for module changes spreading from the student feedback
TEACHING SESSIONS IN THE CLINICAL SKILLS CENTRE	
Positive experience, enjoyed the sessions, received valuable feedback and guidance, improved confidence, feel more empowered, information received are relevant and useful	Earlier exposure to the CSC More sessions to practice skills Sessions before clinical rotations
ONLINE LEARNING SITE (Web-CT)	
Negative experience overall, information on the site is not valuable, useful or relevant to the module outcomes No off campus access reduced the usefulness of Web-CT	Make sessions compulsory with the screening of demonstrations of the skills taught as to allow for more practice time in the CSC More relevant online videos and demonstrations Revise the multiple choice questions used during examinations as it was not relevant, clear or the correct answers

	Allow off campus access
LOGBOOK	
<p>Mostly negative experience – checking up on the students and forcing them to do certain skills</p> <p>Stressful</p> <p>Not relevant as the skills required for a specific year group were unrealistic and unattainable</p> <p>Some experienced it as positive as it motivate students to do the skills</p>	<p>Revise the content of the logbook as not all the skills and outcomes are relevant to each specific year group</p> <p>Make sure the outcomes needed to be reached are achievable as not all the rotations in the clinical environment exposes students to the same skills and procedures</p> <p>Standardize the outcomes with other clinical module requirements</p>
ROTATION THROUGH THE CLINICAL ENVIRONMENT	
<p>Clinical environment not accommodating to the students, do not allow them to do the skills</p> <p>Not informed regarding the objectives and outcomes needed to be reached</p> <p>Procedures and skills not done as learned in the CSC, which in turn reduced the relevance of the skills taught</p> <p>Confusing and stressful</p> <p>Unpredictable exposure to cases</p>	<p>Improve the communication between the CSC and the clinical environment to ensure all personnel is on the same page with regards to outcomes, objectives and expectations of the students</p> <p>Streamline the objectives of the module with the opportunities available in the clinical environment</p>

OBJECTIVE STRUCTURED CLINICAL EXAMINATION (OSCE)	
<p>Overall positive experience – good learning experience, very valuable</p> <p>Feeling of empowerment</p> <p>Feeling more confident</p> <p>Will be more useful if it can be done more, maybe as formative assessments after each clinical block</p>	<p>Improve the transparency of the scoring rubric as students would like to know what they are being assessed on</p> <p>Give clearer instructions at each station</p> <p>Standardize the assessment process as students were not sure what was expected of them at all the stations</p> <p>Implement more structured formative assessment opportunities throughout the year.</p>