

**LEARNING IN THE CLINICAL SKILLS AND SIMULATION CENTRE UNIVERSITY
OF GHANA: MEDICAL STUDENTS' EXPERIENCES OF TEACHING SESSIONS:
AN EXPLORATORY STUDY**

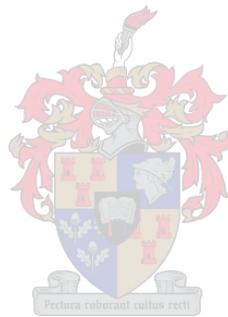
by

AYISHETU MUNIRU (18236405)

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

Supervisor

Mrs Elize Archer



Date Submitted

March 2016

DECLARATION

I, the undersigned, hereby declare that the work contained in this assignment is my original work and that I have not previously submitted it, in its entirety or in part, at any university for a degree.

Date: March 2016

ACKNOWLEDGEMENTS

I am highly indebted to many people whose effort has contributed to the successful completion of this dissertation.

Special thanks go to my husband Mr Allen Asante for his immense support and assistance.

My appreciation also goes to my supervisor, Mrs Elize Archer, whose intellectual advice and direction encouraged a good write up.

Further appreciation goes to staff of the Clinical Skills and Simulation Centre, University of Ghana Medical School and the various authors whose work served as guidance and a reference to the study.

Last but not the least; my profound gratitude goes to my entire family for their unconditional support.

ABSTRACT

Many Clinical Skills and Simulation Centres have been established in medical institutions around the world. In Ghana, the Clinical Skills and Simulation Centre, University of Ghana Medical School is a facility for simulation based medical training. The Centre provides a realistic patient experience, which is artificially created to mimic substantial experience of the real world in a fully participatory and interactive situation. The desire to ensure patient safety and the quality of patient care delivery has become necessary and it is for this reason that simulation has a huge role to play. This research explores medical students' experiences of teaching and learning sessions in the Clinical Skills and Simulation Centre, University of Ghana Medical School with the aim to optimise teaching and learning of clinical skills.

Qualitative data was collected from medical students through focus group discussions. The data were analysed using thematic networks, which is an analytical tool for qualitative research. Several basic themes were identified from the interview transcripts, which were categorised into five broad organizing themes being; positive experiences, negative experiences, challenges, motivation and recommendations. Out of these organising themes, emerged the global theme, which was medical students' experiences of teaching sessions at the Clinical Skills and Simulation Centre.

The thematic analysis identified the process of skills acquisition as a mainly positive experience expressed by the medical students amidst the negative experience of some of the students and a challenge with regards to the distance of the Centre from the main campus. Students were however, motivated by their need to practise and suggested some useful recommendations to improve upon their teaching and learning sessions at the Centre.

ABSTRAK

Verskeie Kliniese Vaardigheids- en Simulasie Sentra is deesdae gevestig in mediese instellings regoor die wêreld. In Ghana is die Kliniese Vaardigheids- en Simulasie Sentrum, Universiteit van Ghana Mediese Skool, 'n fasiliteit vir simulasie gebaseerde mediese opleiding. Die Sentrum bied 'n realistiese pasiënt ervaring, wat kunsmatig geskep word om aansienlike ervaring van die werklike wêreld in 'n ten volle deelnemende en interaktiewe situasie na te boots. Die behoefte om die veiligheid van pasiënte en die lewering van gehalte pasiënt-sorg te lewer het nodig geword en dit is om hierdie rede dat simulasie 'n groot rol het om te speel. Hierdie navorsing ondersoek ervarings van onderrig- en leer-sessies van mediese studente in die Kliniese Vaardigheids- en Simulasie Sentrum, Universiteit van Ghana Mediese Skool, met die doel om onderrig en leer van kliniese vaardighede te optimaliseer.

Kwalitatiewe data is ingesamel van mediese studente deur fokusgroepbesprekings. Die data is ontleed deur gebruik te maak van tematiese netwerke, wat 'n analitiese instrument is vir kwalitatiewe navorsing. Verskeie basiese temas is uit die onderhoud-transkripsies geïdentifiseer, wat verdeel kan word in vyf breë organiserings temas naamlik positiewe ervarings, negatiewe ervarings, uitdagings, motivering en aanbevelings. Uit hierdie organiserings temas, het die globale tema na vore gekom, naamlik die ervarings van die onderrigssessies van mediese student by die Kliniese Vaardigheids- en Simulasie Sentrum.

Die tematiese analise het die proses van verkryging van vaardighede as 'n hoofsaaklik positiewe ervaring deur die mediese studente uitgewys te midde van die negatiewe ervaring van 'n paar van die student. Die afstand van die sentrum tot by die hoofkampus was vir baie student 'n uitdaging. Studente is egter gemotiveer deur hul behoefte om te oefen en het 'n paar nuttige aanbevelings voorgestel om op hul onderrig en leer sessies by die Sentrum te verbeter.

TABLE OF CONTENTS	PAGE
1. Introduction.....	1
1.1 <i>Teaching, learning and assessment in the CSSC, UGMS.....</i>	1
1.2 <i>Access to the use of the CSSC by medical students.....</i>	4
1.3 <i>Statistics for the usage of the CSSC over the last four years.....</i>	4
2. Extended Literature Review.....	5
2.1 <i>Teaching and learning of clinical skills.....</i>	5
2.2 <i>Advantages of simulation in medical education.....</i>	7
2.3 <i>Value of deliberate practise.....</i>	8
2.4 <i>Feedback in clinical skills acquisition.....</i>	9
2.5 <i>Disadvantages of using simulation.....</i>	10
3. Extended Research Methodology.....	11
3.1 <i>Population and sampling.....</i>	11
3.2 <i>Data Collection.....</i>	12
3.3 <i>Data Analysis.....</i>	13
3.4 <i>Trustworthiness.....</i>	13
4. Extended Results.....	14
5. Extended Discussion.....	21
6. The manuscript prepared for publication in <i>African Journal of Health Professions Education</i>	
Medical Students' Learning Experiences in the Clinical Skills and Simulation Centre University of Ghana: An Exploratory Study.....	28
7. Closing comments.....	41
References.....	42
List of Addenda	
Addendum A: Participant Information Leaflet and Consent Form.....	48
Addendum B: Interview prompts.....	51
Addendum C: Focus Group Interview transcript.....	52
Addendum D: Author Guidelines for AJHPE	66
Addendum E: Author Information.....	69
Figure 1. : Statistics for the usage of the CSSC over the last four years.....	29

1. INTRODUCTION/ BACKGROUND

The Clinical Skills and Simulation Centre (CSSC), University of Ghana Medical School (UGMS) is a facility for training medical students with the required clinical skills needed for future practice. Simulation provides a real patient experience artificially created to replicate the substantial experience of the real world in a fully participatory and interactive situation ^[1]. The facility supports the acquisition, maintenance and enhancement of clinical skills of the University of Ghana medical students.

The CSSC offers training to medical students from the Basic Sciences level to final year. Teaching in the CSSC involves the use of mannequins, simulators and sometimes the use of simulated patients to acquire clinical skills.

1.1 TEACHING, LEARNING, AND ASSESSMENT IN THE CSSC, UGMS.

Teaching and learning sessions for clinical skills acquisition in the CSSC involves Power Point presentations by lecturers, demonstration sessions, small group discussions by medical students, poster presentations, and reflective activities on the topic or skills to be learnt.

Furthermore, the medical students are taught communication skills, history taking and presentation skills, reasoning skills, working in a team, physical examination skills and procedural skills in the CSSC. In addition to the CSSC, these skills are also taught and practised in the Korle Bu Teaching Hospital where the students have their clinical rotations.

However, demonstration sessions and hands-on activities (practise) of clinical skills with feedback is the teaching method that is mostly used when teaching in the CSSC. Medical students are put into groups of about ten to fifteen (10-15) students per session. The demonstration session is taught by using the five-step method for teaching psychomotor skills ^[2]. In this method, there is an attempt to let students understand the need for particular skills acquisition and its' use in the delivery of care. The second step requires the instructor to silently demonstrate the skills exactly as it should be done. This creates a mental picture of what the skills look like. After that, the instructor repeats the skills but this time, describes each step in the procedure. Following that, students are asked to describe the procedure systematically. The instructor ensures that students understand and remember each step in the procedure. Finally, students perform their first attempt of the skills while the instructor coaches by observing

carefully and providing feedback accordingly ^[2]. The types of simulations that are used for teaching and learning in the CSSC include standardized patients, human patient simulators, part or partial task trainers and anatomical models.

The CSSC uses both formative and summative assessments. The purpose of the formative assessment is to provide students with feedback, whilst the summative assessment is conducted to see whether students are competent and to decide whether they can progress. The purpose of the summative assessment is to qualify medical students to the next clinical rotation and it is conducted in the form of an Objective Structured Clinical Examinations (OSCE).

Furthermore, the CSSC has structured curricula for teaching medical students. The UGMS has a five-year curriculum. In the first two years, medical students are taught Basic Sciences before the start of their clinical year. The first clinical year is the students' year three, which comes after the two years of Basic Sciences, whilst the second clinical year is actually year four.

Table 1.1.1: Basic Sciences & First Clinical Year Students' Learning Activities in The Clinical Skills and Simulation Centre.

Category of student	Department that teaches the skills	Clinical skills taught
Basic Sciences	Medicine	<ul style="list-style-type: none"> • Auscultation of heart and lung sounds
	Physiology	<ul style="list-style-type: none"> • Electrocardiography (ECG)
	Anatomy	<ul style="list-style-type: none"> • Anatomy of the torso • Breast examination
First Clinical Year	Surgery	<ul style="list-style-type: none"> • Abdominal examination • Prostate examination • Rectal examination • Male and female catheterization
	Medicine	<ul style="list-style-type: none"> • Auscultation of heart and lung sounds • Physical examination

Table 1.1.2: Second Clinical Year Medical Students’ Learning Activities At The Clinical Skills and Simulation Centre.

Category of student	Group of student	Department that teaches the skills	Clinical skills taught
Second Clinical Year	Junior Clerks (First eight weeks Rotation)	Paediatrics	<ul style="list-style-type: none"> • Neonatal Resuscitation • Auscultation of heart and lung sounds (Children and Infants)
		Surgery (Ear Nose and Throat)	<ul style="list-style-type: none"> • Examination of the ear
		Obstetrics & Gynaecology	<ul style="list-style-type: none"> • Labour delivery mechanisms and episiotomy suturing using obstetrical mannequin
		Surgery (Eye)	<ul style="list-style-type: none"> • Funduscopy • Examination of the eye
	Senior Clerks (Second eight weeks Rotation)	Paediatrics	<ul style="list-style-type: none"> • Infant IV line placement • Intraosseous access • Lumber puncture • Catheterization
		Obstetrics & Gynaecology	<ul style="list-style-type: none"> • Vaginal speculum examination • Examination of various uteri • Family planning methods

Table 1.1.3: Final Year Students’ Learning Activities At The Clinical Skills and Simulation Centre.

Category of student	Department that teaches the skills	Clinical skills taught
Final Year	Anaesthesia	<ul style="list-style-type: none"> • Cardiopulmonary Resuscitation • Basic Life Support (BLS) • Advance Cardiac Life Support (ACLS) • Pain Relief Management

The tables 1.1.1, 1.1.2, and 1.1.3 above represents the category of students who are taught at the CSSC as well as the clinical skills they have to acquire at the various educational levels.

1.2 ACCESS TO THE USE OF THE CSSC BY MEDICAL STUDENTS

The CSSC is located about five hundred meters away from the main UGMS campus. Besides the regular teaching sessions by the various Departments held at the CSSC, medical students have the opportunity to practice in their own time what they have been taught. The following measures are in place to enable them to practice.

1. Access to the facility from Monday to Friday (8am-5pm)
2. Additional weekend (Saturdays) access to the Centre for those who do not make time during the weekdays.
3. A facilitator who assists in teaching students to learn and practice clinical skills with feedback.

1.3 STATISTICS FOR THE USAGE OF THE CSSC OVER THE LAST FOUR YEARS

Over the last four years (2011, 2012, 2013 & 2014), the total number of students who were taught at the CSSC has not increased significantly, however there is a substantial difference between the total number of students who attended the teaching sessions and those who returned to the Centre to practice what has been taught. Table 1.3.1 below shows unpublished statistics for the usage of the Centre over the last four years.

Table 1.3.1 Statistics For The Usage Of The Centre Over The Last Four Years

Year	2011	2012	2013	2014
Total number of students that attended teaching sessions	2,141	2,155	2,471	2,486
Total number of students who returned to practise what they were taught	323 (15%)	615 (28%)	743 (30%)	782 (31%)

Although literature has identified the value of deliberate practise using simulation in medical education ^[3, 4], the figures in the table 1.3.1 above is an indication that most of the students who were taught did not return to practise what has been taught.

2. EXTENDED LITERATURE REVIEW

Introduction

Simulation has seen tremendous recognition in medical education. The adoption of simulation and its exponential growth in healthcare education has been well documented in reviews that have examined the evidence of its effectiveness in medical education ^[5]. The main purpose of simulation is to mimic reality in a way that induces a realistic experience ^[6, 7].

Simulation guarantees a safe environment for learners to learn from their mistakes and work towards achieving proficiency. This applies to all procedural skills taught at the Simulation Centre including intravenous line placement, passing of urinary catheters, forceps delivery of babies, intubating the airway of a patient and resuscitation among many others ^[8].

2.1 Teaching and learning of clinical skills

Essential learning features in simulation includes repeated practice, feedback, active and independent learning ^[9]. Training with a virtual reality simulator has been shown to enhance the essential learning features that facilitate cognitive and motor learning, such as repeated testing, feedback and self-controlled practice ^[10].

Various forms of experiences, such as using different senses and different realistic situations promote curiosity and the desire to learn, which are essential for motivation and meaningful learning ^[11]. Furthermore, it has been shown that learning is facilitated when prior knowledge is activated and students are actively engaged in deliberate practice and in small group discussions, which takes place in a meaningful context ^[12].

The cognitive psychology literature states that, the recall of information and its applications are best when it is taught and practised in a context, which is similar to real life or workplace ^[13]. It has been emphasized that simulated context similar to real life or the workplace help to bridge

the gap between classrooms and clinical environments ^[14]. In the same way, other researchers maintain that students should be challenged by active engagement in the learning process that replicates real situations as closely as possible ^[15, 16]. Moreover, realism creates the basis for meaningful learning and this can lead to improvement in professional education ^[17, 18]. These are some of the responsibilities and roles played by CSSC.

Simulation based learning is believed to be superior to the traditional style of medical education from the viewpoint of the active and adult learning theories. Learning theories are efforts to explain how students learn. There are learning situations and assumptions that are explained based on different learning theories. Learning theories informs teaching and the use of various resources including technology to inform students' physical, mental and social learning activities ^[19].

In the CSSC, a number of learning theories can be applied for teaching clinical skills. The behaviouristic learning orientation for example, is useful for demonstrating psychomotor or technical skills and for the development of competencies ^[20]. There is a focus on the mastery of prerequisite steps before moving to subsequent steps with the aim of reinforcement of what the teacher want the learner to learn. The expected outcome from the behaviourist orientation is the change in behaviour of the students. The educator's role is to manipulate the environment for the students to give a specific response. Three behavioural assumptions are applicable with the behaviouristic orientation being: 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 ^[20, 21]. In the same way, behaviourist approach to medical education is often used in the evaluation and the development of clinical skills teaching as well as teaching in the simulated case scenarios.

The social orientation of learning plays a role in the CSSC. Within this learning orientation, learning emerges from the interactions and observations of other within the social context ^[20]. With deliberate practice taking place in the group, social learning enhances the experiences of the students as they interact and learn from each other.

In addition, the experiential learning theory help students to learn from their experience and that effective perception and processing of experiences improves performance ^[15]. Feedback from the

experience is important in the reinforcement of performance and the students' ability to apply the knowledge in new circumstances. Experiential learning is the basis for simulation training and it draws on the students' personal experience however, facilitation and supervision only create and provides space for students to try out new things, reflect on their experiences, arrive at new conclusions and think about how they would apply these conclusions to their work and life. Learning was described as following a cycle of experiential stages based on concrete experience, observation and reflection, abstract conceptualisation and testing concepts in new situations ^[15]. In the same way, simulation allows for the simplification of processes that learners can absorb and this is where simulation offer most educational value emphasising on the process of skills acquisition and not the acquired skill ^[15, 22].

2.2 Advantages of simulation in medical education

Patient safety is enhanced and education is improved when students acquire first-hand experience using simulation ^[1]. One of the objectives and principles in the Competency Framework for 2015 of the Royal College of Physicians and Surgeons of Canada emphasize patient safety, and it is in achieving this outcome that simulation can have a huge role to play ^[23]. The CSSC, UGMS provides a standardized simulated teaching and learning environment where there is no risk for patients ^[24, 25, 26].

Another advantage of using simulation in medical education is that, learners can develop at their own rate and individual learning styles can be accommodated. Simulation can facilitate on-demand learning and scenarios can be created as required ^[27].

Simulation provides medical students with the opportunity to use real hospital equipment and tools to better their clinical learning skills. The use of real hospital tools also helps in the transfer of skills to human patient ^[8, 28]. More so, the benefits of using simulation in clinical teaching are increasingly reported as adding further validity to its use in healthcare education ^[5, 29]. Like all educational modalities, the effectiveness of simulation depends on how well it is used. Simulation should be used prior to patient care experiences in a healthcare institution, and its integration into the institutions curriculum must be well planned and outcome driven.

The use of simulation in teaching clinical skills does not only promote team training, understanding of team collaboration and communication but also, it can help faculty to develop a

standardized curriculum since all learners are introduced to the same scenarios ^[30, 31]. This is intended to increase standardisation whereas variability in training is reduced ^[32]. According to other researchers, learning clinical skills in a simulated environment allows for a uniform, predictable and consistent clinical experience for all medical students ^[33, 34, 35, 36]. This also has a tendency to reduce student anxiety during the transfer of skills ^[37]. In the healthcare environment today, such training is necessary because the clinical area can be very unpredictable and students are not exposed to the same learning opportunities and patient cases ^[36].

Simulation has the tendency to increase the rate of clinical skills acquisition to a competent level ^[38, 39]. This is because simulation offers the opportunity for repeated practice at a pace determined by the learner ^[32].

According to classic theory on self-efficacy, students gain self-confidence out of repetitive practice ^[40]. Students who are self-confident take on more challenges and recover from failure more quickly ^[40]. Confidence is an important variable for learning clinical skills in the CSSC and it has been shown that students with increased self-confidence have a better chance in improving their clinical skills acquisition ^[41, 42].

2.3 Value of deliberate practise

The use of a Simulation Centre is to acquire the necessary competence in performing clinical skills. However, it takes a conscious effort and voluntary practice to acquire such competence. Furthermore, one of the key principles concerning the acquisition of competence is the learner's engagement into deliberate practice leading to desired educational outcomes ^[3, 4].

Deliberate practice includes the repetition of performance of intended cognitive or psychomotor skills usually in a focused domain, resulting in increasingly better skills performance. Learners who have the opportunities for repetitive practice usually acquire the needed skills within a shorter period than those who do not engage in repetitive practice ^[4].

Deliberate practice is an essential methodology in the promotion of life-long learning in medical schools. The desire of medical students to be actively engaged in learning events, which are meaningful, is usually motivation for competence and mastery of clinical skills ^[43].

Furthermore, learning is often facilitated when prior knowledge is activated and students are actively engaged in deliberate practice and in small group discussions, which takes place in a meaningful context ^[12]. More so, deliberate practice was equated to constant skill improvement ^[44]. Deliberate practice has been identified to be a more powerful predictor of expert performance rather than just an experience or an academic aptitude among many students ^[44].

Psychomotor learning studies have proven that students who engage in repetitive practice learn more than those who do not ^[45, 46]. This educational benefit may result from students who practice deliberately having better awareness, in the moment, of whether or not the current learning episode is going well. In any case, students may use this spontaneous self-monitoring process to make better learning decisions ^[47, 48]. Again, when an acquired clinical skill is repeatedly practised in a naturalistic simulated environment, it simulates the student's reflection on his or her performance ^[49].

However, it has been identified that students engaging in deliberate practise may be intrinsically motivated in a sense that student enjoy learning and practising for its own sake and they receive positive feedback on learning outcomes ^[50]. Students have built-in pleasure for the learning activity itself and have a driving force to learn, perform and a wish to succeed. On the contrary, some students may be extrinsically motivated to learn and practise because they want to attain a desired grade (pass) or avoid punishment and not because they desire to learn ^[50]. Students who are intrinsically motivated to learn are deep learners and they develop a life-long learning whilst students who are extrinsically motivated to learn are found to be predictors to shallow cognitive engagement in learning task ^[51].

2.4 Feedback in clinical skills acquisition

Feedback is an essential element of learning process that can help learners to reach their maximum potential. Again, prompts and detailed feedback on performance in simulation helps learners to achieve desired learning outcomes ^[52]. In addition, learning objectives are met when learners are provided with feedback. This can be ensured when the feedback arising from the learning experience is discussed ^[15]. In the CSSC, constructive feedback is an important element for clinical skills acquisition; it helps students to increase their skills while working to achieve

the expected outcome and raises students' awareness about their performance, which guides their subsequent performances ^[53].

Deliberate practice coupled with feedback plays a critical role in building competence; ^[4] the learner develops knowledge, skills, behaviors, and attitude in an iterative process over time ^[52]. However, as much as feedback is important in clinical skills acquisition, there are also barriers that may affect prompt and effective feedback from taking place ^[54]. For example, there may not be an appropriate time for prompt feedback during a teaching session or an instructor may not know how to translate observations into specific and nonjudgmental feedback ^[54].

2.5 Disadvantages of using simulation

Aside all the advantages of simulation in medical education, there are however some disadvantages too. Some of the challenges are funding, maintenance of mannequins, the use of high fidelity simulators, and the limited number of trained personnel to run simulation programmes ^[55]. In Africa and other resource-constrained areas, challenges such as the lack of teaching and learning materials tend to affect students' performance ^[56, 57]. Another limitation is the problem of transfer of the acquired skills from the simulated environment to the real world and thus human patients ^[58].

Therefore, we as educators should be reminded that clinical skills acquisition using simulation training could not be the only learning opportunity for medical students. Medical students need to be exposed to real patients ^[58, 59]. Since the performance of simulation cannot accurately be correlated with performance with real patients, the value of instruction and learning at the bedside will always stay critically important. While 'real' clinical experiences have always been at the heart of medical education, teaching in the CSSC is needed to supplement and enhance it. The emphasis should be on exploring how the CSSC could facilitate and prepare medical students for the learning and implementation of clinical skills in practice ^[34].

The aim of this research was to make use of medical students' experiences of their teaching sessions in the CSSC in order to optimize the teaching and learning activities. The research findings could potentially be useful for lecturers as well as the Departments that are involved with teaching sessions at the CSSC. The study had the following objectives:

1. To explore the learning experiences of medical students on their clinical skills acquisition in the CSSC.
2. To explore (from the students' experiences) the effect of the teaching sessions at the CSSC on their clinical performance.
3. To determine what motivate the few students who return to practise the clinical skills taught.

3. EXTENDED RESEARCH METHODOLOGY

Exploratory research design was used in this research because the researcher wanted to explore a situation, which is not well understood. This includes subjects with high level of ignorance and uncertainty. Exploratory research tackle new problems on which little or no previous research has been conducted and it is the initial research, which forms the basis and provides direction for a more conclusive research effort to be conducted in the future ^[60]. In this study, exploratory research was conducted in order to identify key issues and variables, it is not intended to provide conclusive evidence therefore it is usually associated with flexibility and lack of structure. When conducting exploratory research however, the researcher should be willing to change his/her direction because of revelation of new data and new insights that might arise ^[61].

Furthermore, gathering qualitative data could be very useful when attempting to find out about medical students' learning experiences. The overall goal of qualitative data is the development of concepts that will help us understand social phenomena in natural settings drawing emphasis to the meanings, experiences, and views of the participants ^[62]. Qualitative data analysis helps to gain deeper understanding of the concept in order to provide an insight into a given condition: how it arose, and how it could be improved ^[63].

3.1 Population and sampling

The population that was used for this study was medical students in the basic sciences, first clinical, second clinical, and final years. These groups were selected for the study because they comprised students in the medical school that are required to attend sessions at the CSSC as part of their curricula.

Purposive technique for sampling of participants was used in a way that an equal number of students from each respective year group was involved in each of the focus group interviews. This sampling strategy ensured an equal representation of the four different year groups of the medical students who attend sessions at the CSSC. Due to the various schedules for the various year groups, it was easiest to conduct each interview per year group, for example conducting the focus group interview for the first year students at one time. The total amount of students that took part in the interviews were twenty-four. None of the students who were invited refused to participate in the interviews and participation was entirely voluntary.

3.2 Data collection

Medical students were invited to participate in the focus group interviews by providing them with invitation letters, which was sent to them three days ahead of the interview date. In addition, respondents gave their consent by signing a consent form, which contained information about the research (Addendum A). This included the aim of the interview and the kind of information expected to be covered during the focus group interview. Giving the students this information was to give them an idea of what to expect during the interview as well as to give them the opportunity to reflect on their experiences of the teaching sessions at the CSSC before the discussion.

The semi-structured focused group interviews, which was conducted with open-ended prompts was tape-recorded for analysis afterwards. The purpose of the open-ended prompts (Addendum B) was to generate as many views and experiences as possible from the group. The interview prompts were selected based on the issues that developed from the literature review.

The principal investigator was the interviewer and four (4) focus group interviews were conducted. The interviews were conducted in groups of six (6) medical students per focus group interview. During the interview, participants were able to build on each other's comments and ideas, which provided an in depth views on students experiences ^[64].

The interviews were conducted at the Clinical Skills and Simulation Centre of the University of Ghana Medical School. Each interview lasted for about one hour and the data was collected within about a one-week period. The data obtained from the interviews was written into transcripts by the researcher and it was used for the data analysis.

3.3 Data analysis

Qualitative data analysis typically explores themes, codes, patterns, and narrative structure within research text such as interview transcripts into a meaningful interpretation ^[62]. In this study, data gathering and analysis was conducted parallel to ensure that data was well managed and to ensure continuous focus of the rest of the interviews.

After the interview recordings were transcribed, the students' experiences and thoughts were extracted from the transcripts into meaningful units using a thematic network approach ^[65]. Several basic themes were identified from the interview transcripts, which were then sorted into various organizing themes and then in a global theme.

3.4 Trustworthiness

Trustworthiness is used to describe validity and reliability in qualitative research ^[66]. It includes credibility, truth-value, consistency, neutrality, applicability, transferability and dependability that has been implemented in all the processes of the research ^[67]. To ensure credibility and trustworthiness, the transcripts of the interviews were sent to the respective participants of the interviews to confirm whether the transcriptions were exactly what the participants had said in the interviews. To ensure further trustworthiness, the reflexive approach was adopted where the 'researcher becomes aware of his/her effect on the process and outcomes of the research' that was implemented ^[68]. This was ensured by consistent awareness of the researcher's personal feelings and experiences, which might have been influenced by the study. The researcher achieved this by coaching a medical student as a moderator for one of the interviews. The reason was to encourage the respondents to see the interviewer as their peer in order to allow the medical students to contribute genuinely and provide their honest opinions during the interviews, without the influence of the researcher who is also an instructor to the students. However, there was no significant difference between the interview transcripts moderated by the coached medical student and the transcripts of the other interviews moderated by the researcher. The researcher conducted the analysis alone however; it was subjected to review and discussion with the researcher's supervisor.

4. EXTENDED RESULTS

Demographics

Table 4.1

DEMOGRAPHIC VARIABLE	TOTAL
Male	13
Female	11
AGES	
20-24	1
25-29	21
30+	2

The demographics of the participants of the interviews illustrated in the table 4.1 above is an indication of a gender proportion of 54.2% males to 45.8% females. This depicts that there were 8.4% more male respondents than that of the female. The researcher advertently maintained the gap to reflect the gender structure at the institution. Out of the entire students population of about 500 students 58.5% are males and 41.5% are females, therefore selecting more males than females was a reflection of the gender balance of the University.

FOCUS GROUP INTERVIEWS

The results obtained from the data from the focus group interviews revealed several basic themes. These basic themes were grouped into five (5) broad organizing themes identified as: positive experiences, negative experiences, challenges, motivations, and recommendations. The global theme ‘medical students’ experiences’ was identified out of the five (5) organizing themes.

ORGANIZING THEME 1. POSITIVE EXPERIENCES

This theme is made up of group of basic themes, which explored medical students’ most useful encounter during their teaching and learning sessions at the CSSC.

Basic theme 1.1 Acquisition of skills

The majority of the medical students interviewed said that the process of acquisition of clinical skills in the CSSC were their most valuable encounter. Medical students mentioned that they were able to acquire intended clinical skills before they starts their clinical rotation. For example, one of the respondent (R3) said *'...by the time we started introduction to clinical, we already knew how to measure blood pressure and some other physical examination skills, which we had learnt from the CSSC.'*

Basic theme 1.2 Opportunity for repeated practise

Another positive experience expressed by the medical students was the fact that they could practise clinical skills repeatedly using the mannequins. This is something they could not do when learning with a human patient and for them; those were their interesting experience. For instance respondent (R2) said *'.....I think one advantage the mannequin also have is that you can always try again but normally when you have the human being you can't do that so it gives you the chance to repeat until you find yourself being comfortable with it.'*

Basic theme 1.3 Exposure to wide range of clinical skills

Medical students also mentioned that they get the opportunity to examine and experience rare conditions in the CSSC, which they would otherwise not experience on the ward whilst they were still medical students. This is what respondent (R19) said *'...I get to experience things that I would otherwise not have experienced on the ward like CPR'*

Basic theme 1.4 Mannequins depict humans

Some of the medical students interviewed mentioned that some of the mannequins they used at the CSSC presented anatomical features of the human body that made it as though they were working on real patients. They expressed this as a positive experience learning with the mannequins. Respondent (R21) said *'...the mannequins we used have been crafted as close to human, for example the IV arm presented anatomical features which made it look as though you were setting lines on a real patient'*

Basic theme 1.5 Correction of mistakes

Furthermore, some of the medical students interviewed mentioned that there was no tension when learning with the mannequins because they had the opportunity to receive feedback and to correct their mistakes. This built their confidence and increased their speed through repetitive practise. Respondent (R1) mentioned ‘...*I make a mistake and I can refer there is nobody on my ‘neck’ so it helped me build confidence and then also increased my speed as I practised repeatedly*’

Basic theme 1.6 Practical understanding of abstract skills

Some of the medical students mentioned that what was a useful learning experience in the CSSC was the fact that the sessions were more practical, they understood what they had read (theory) better by doing (practical), and once they were able to perform a clinical skill, they could explain the reasons behind the theory better. Respondent (R4) said ‘....*so once you are able to get that understanding from the first-hand experience by practising, it makes it easier to explain certain things*’.

Basic theme 1.7 Realistic environment

One of the medical students mentioned that the CSSC had an environmental set-up, which was similar to that of the hospital wards. The environment was so real that she almost thought that she was learning with human patients and not a mannequin. Respondent (R13) said ‘...*the environment and settings at the CSSC is quiet and depicts the hospital environment at times it makes you forget that you are dealing with mannequins*’

Basic theme 1.8 Basic hospital equipment

Some of the medical students mentioned that their most useful experience in the CSSC was the fact that they had the opportunity to see and use basic hospital equipment. They further mentioned that they first saw and used the equipment in the CSSC before they used them on the ward. Respondents (R5 & R6) said ‘...*basically, it has helped me with the instrumentation. Mostly you know they require that you know the name of the instrument, its parts, and how they are used*’.

R6 said ‘... *It was at the CSSC that I first saw a correct spinal needle*’

ORGANIZING THEME 2. NEGATIVE EXPERIENCES

This organizing theme is made up of several basic themes, which identified the deficiencies in the teaching and learning sessions at the CSSC encountered by some of the medical students interviewed.

Basic theme 2.1 Large number of students

The majority of the students interviewed said that their number is large and because of that, the student to mannequin ratio is high. The students sometimes do not get the hands on experience during teaching and learning session at the CSSC. For example, respondent (R4) said ‘...*our numbers are a lot so sometimes we don’t get that hands on time...*’

Furthermore, the students mentioned that due to their large number, the available mannequins become inadequate and this poses a lot of pressure on the few available mannequins. Respondents (R18 & R20) said ‘...*sometimes there is a lot of pressure on the mannequins because we are a lot and the mannequins are few*’. Again, respondent (R20) said ‘...*the mannequins are not enough compared to our population. There is always pressure and you have to wait for your turn to practise*’.

Basic theme 2.2 Over usage of mannequins

Another negative experience made mentioned by the students was the fact that some of the parts of the available mannequins were worn-out. This was due to constant puncturing, piercing and over use of such mannequin parts. This posed a lot of pressure on the mannequins and eventually did not serve its intended purpose. The students asked for worn-out mannequin parts to be replaced to improve upon its quality and serve its purpose. Respondent (R1) said ‘...*using the mannequins helped just that some of the mannequins due to over use don’t really serve the purpose they are supposed to...*’ Respondent (R2) said ‘...*some of the mannequins they have become worn out they don’t depict the same quality with time so some of them should be changed or replaced*’.

Basic theme 2.3 Lack of instructional manuals

Medical students identified the lack of instructional manuals and procedures as a challenge for using the CSSC to practise voluntarily. They mentioned that they want to be able to read instructional manuals on how to use some of the mannequins and to perform some of the procedures on their own even without an instructor. Respondent (R15) said *'...procedures should be pasted on the walls so that we will know how to use it so that if the instructor or whoever is supposed to help us is not around we can use it ourselves.'* Respondent (R15) said *'...we don't have any instruction so to say a standard operating procedure that you would have to follow to go through everything on your own.'*

ORGANIZING THEME 3. CHALLENGES

This organizing theme is made up of several basic themes, which identified some of the challenges the medical students encountered during their sessions at the CSSC. Some of these challenges accounted for the reasons why the medical students do not return to practise clinical skills on their own.

Basic theme 3.1 Distance

The medical students interviewed gave a number of challenges including distance from the main campus to the CSSC as being the major challenge identified. Some of the students interviewed associated the distance as the reason why they do not return to practise clinical skills on their own. Respondent (R2) said *'...honestly, I do not return to practise on my own because it is a lot of distance for me'*.

Furthermore, another student (R15) also said *'...distance from the main clinical area to this place is quite far and we don't really get transportation in and out, even taxis don't come here unless you take a dropping up to this end'*

Basic theme 3.2 Academic pressure

Another identified challenge by the medical students was academic pressure. They complained of having too many scheduled academic activities and not having time to use the CSSC for

individualized practice of acquired clinical skills. This is what respondent (R7) said '*...our timetables are packed, we seldom have time to come and practise at the CSSC*'

ORGANIZING THEME 4. MOTIVATION

This theme explored the factors that drive medical students to use the CSSC amidst the negative experiences and the challenges they encounter when using the facility.

Basic them 4.1 The need to practise

Although the medical students identified distance from the main campus to the CSSC as a major challenge, some of them were motivated by the need to practise clinical skills and did not consider the distance as a challenge at all. This is what one of the students said (R5) '*...I come here on my own. In my mind, I don't think the distance is that much but when walking here you feel it but the need to practice drives me to be here*'

Basic theme 4.2 Preparation towards exams

Other medical students were motivated to practise clinical skills because of their need to prepare towards their clinical exams. Such students came to practise the required CSSC before it was time for their clinical examination. For instance respondent (R2) said '*...basically for examination purposes, so maybe we have an exams coming up and I know that I needed to perfect a skill say CPR then I will come and practise*'

Basic theme 4.3 Improved clinical performance

Some of the medical students mentioned that they were able to improve upon their clinical performance when they used the facility to practise clinical skills and this motivates them to use the facility often. This was an observation made by respondent (R20) '*... I have observed that whenever I use the simulators to practise clinical skills, I am able to perform that skills better in my exams than when I did not use the mannequins. This has helped me improved my clinical skills performance over the years*'

Basic theme 4.4 Students build confidence

The medical students were motivated to use the CSSC because they became more confident when they practised using the mannequins before they attended to real patients and they felt good knowing that they had actually performed the skill on a mannequin. Respondents (R17 R5) said ‘... *I do not usually use the CSSC frequently but each time I did, I built on my self-confidence, I feel good when I am able to master a clinical skill*’. (R5) said ‘...*it has given me confidence when I am approaching a patient because I know I have tried it before*’.

Basic theme 4.5 Access to internet facility

Some of the medical students were motivated to use the CSSC because it has a Wi-Fi internet facility available. The students were able to research whilst they learn. The access to the internet facilitated students’ learning at the CSSC. This was what one of the respondent said (R18) ‘...*personally, I also access the internet whenever I come here, it facilitate my learning especially when I’m working on research*’.

ORGANIZING THEME 5. RECOMMENDATIONS

This organizing theme identified some of the recommendations and suggestions made by the medical students to help improve upon their teaching and learning sessions at the CSSC.

Basic theme 5.1 Purchase of high fidelity mannequins that are more interactive

One of the important recommendations made by some of the medical students was to increase the number of mannequins available at the CSSC. This will minimize the mannequin to student ratio. They also recommended that the CSSC should purchase high fidelity and more interactive mannequins, which could facilitate surgical emergency sessions. Respondent (R11) said ‘...*you could maybe open up and expose us to more surgical processes where there is more interactive mannequins, the ones lying there seen very passive*’.

Basic theme 5.2 Structure individualized practise into scheduled academic activities

More so, the medical students recommended that self-practise activities should be structured and incorporated into their timetables so that it would be recognized as part of the academic activities where they would have no excuse attending such sessions. Respondent (R5) said ‘...*there should*

be a structured session for individualized learning or coming back to practise. This could be incorporated into the curriculum so that we won't have an excuse for not coming back to practise.

Basic theme 5.3 Expansion of venues

One of the medical students interviewed recommended that the facility should be expanded such that there would be more space to accommodate many students at a time. Respondent (R10) said '*...I think the place needs to be expanded to accommodate a lot of students*'.

Basic theme 5.4 Increase publicity

The students interviewed felt that there is still the need for the CSSC to increase its publicity by advertising it to the university community. They suggested that newly admitted medical students should visit the CSSC as part of their orientation programme. Respondent (R20) said '*...I think more awareness should be created by the medical school on the presence of the CSSC and should be introduced as part of the orientation process*'.

Basic theme 5.5 Transportation

Finally, the medical students suggested that the university should provide them with a school bus readily available to transport students to and from the CSSC to motivate them to return to the CSSC for individualized practise of clinical skills. Respondent (R22) suggested this '*...The school should make provision for school buses to convey us to and from the CSSC whenever we want to use the place for self-directed learning*'.

5. EXTENDED DISCUSSION

UGMS students' experiences with teaching and learning sessions at the CSSC have been explored and the results from the focus group interviews discussed in this section. Medical students' experiences that have been identified in this study would perhaps provide the CSSC with valuable insights into how these educational experiences could be maximised to improve clinical skills teaching and learning session.

ORGANIZING THEME 1. POSITIVE EXPERIENCE

5.1.1 Acquisition of skills

Clinical skills acquisition is an integral part of medical education therefore this is an indication of the importance of the presence of the CSSC in the medical institution. The medical students felt that they were able to acquire the desired clinical skills to the point of proficiency where they could now transfer the skills to human patient. This is in line with the fact that simulation has the tendency to increase the rate of clinical skills acquisition to a competence level ^[32].

5.1.2 Opportunity for repeated practise

Deliberate practice is an essential methodology in the promotion of life-long learning in medical schools ^[43]. The medical students expressed one of their useful experiences in the CSSC as having the opportunity for repeated practise. Medical students could repeat a particular clinical skill over again until they were comfortable to transfer the skill to human patient. It was further identified that the repetitive practise also gave them the opportunity for detecting and correcting of their mistakes, polishing their skills, and finally making their performance effortless and automatic. Although deliberate practice was found to be a more powerful predictor of expert performance rather than just an experience or an academic aptitude, the medical students identified that they did not only acquire skills through repetitive practise but also increased their speed of skills acquisition as they practiced repeatedly ^[44]. The medical students said that they developed self-confidence and competence out of repetitive practise and this could be associated with the classic theory on self –efficacy ^[40].

5.1.3 Exposure to wide range of clinical skills

This study revealed that medical students were exposed to a wide range of clinical skills in the CSSC than on the ward. They mentioned that they would not be asked to perform some of these skills on human patients whilst they were still medical students but needed to acquire such skills as part of their curriculum. It has been shown that, a number of high fidelity simulators used in the CSSC exposes the medical students to wide variety of patient conditions including patient demographics, pathologies and responses to treatment ^[58]. This increase the number and variety of patients that students encounter when using high fidelity mannequins as compared to students

learning with simple anatomical models, which could be used for learning specific skill [58]. On the contrary, the medical students identified that they learnt wide range of medical conditions using some of these simple anatomical models (ear and eye models with slides) which supplemented their learning in areas where the range of real patients was restricted.

5.1.4 Mannequins depict human

Researchers have maintained that medical students should be challenged by active engagement in a learning process that replicates real situations as closely as possible [15, 16]. In this research, medical students appreciated the resemblance of the simulators to an equivalent real life situation. More so, simulators fidelity can be assessed based on its engineering or psychological fidelity [32]. However, this study identified that some of the simulators used by the medical students in the CSSC had both engineering and psychological fidelity features. This made the simulators as life like. It has been shown that the resemblance of a simulation to an equivalent real-life situation is a critical determinant of transfer of clinical skills to human patients [28].

5.1.5 Correction of mistakes

Simulation provides a safe environment that allows for mistakes without embarrassment and fear of harming patients. Medical students are expected to learn from their mistakes and to develop skill competency. It was evident in this study that learning in the CSSC permitted the medical students to refer and to correct their mistakes under little stress. The views of students from this research strengthens the existing fact that the CSSC is a safe environment for students to acquire first hand clinical skills before their exposure to human patients [24, 25, 26].

5.1.6 Practical understanding of abstract skills

It was determined in the research that medical students had the opportunity to understand abstract skills by performing the skills themselves instead of reading and using their imagination. The students shared the view that the hands on sessions made much sense when they could apply the theoretical principles during the demonstration of skills. The CSSC provided the medical students with a platform where they could integrate their theoretical knowledge with practical skills training. The students' views were linked to the theory of experiential learning [20]. Again, there is a call for education to be grounded in real experience, as experiential learning became a key part of constructivist learning [22].

5.1.7 Realistic environment

The cognitive psychology literature states that, the recall of information and its applications are best when it is taught and practised in a similar or real life context or workplace ^[13]. One of the findings in this study was that the CSSC is a realistic environment, which was similar to the hospital settings. This made the learning experience in the CSSC realistic to the learning experience at the hospital. This confirms the argument that simulated context similar to real life or the workplace help to bridge the gap between classrooms and clinical environments ^[14].

5.1.8 Basic hospital equipment

The use of basic hospital equipment in the CSSC cannot be compromised, as demonstration of clinical skills requires the use of appropriate hospital equipment. Learning in the CSSC provided the medical students with the opportunity to not only acquire clinical skills but also learn the uses of some of the hospital equipment used for teaching and learning. This confirms the existing fact that simulation provides medical students with the opportunity to use real instruments to better their clinical skills ^[8].

ORGANISING THEME 2. NEGATIVE EXPERIENCES

5.2.1. Large number of students

It was evident in this study that sometimes the large student to mannequin ratio per a demonstration session was a major constraint for the medical students to practice and develop competency in performing basic clinical skills. The students identified that they sometimes do not get the hands on experience during teaching and learning sessions. Large number of students has been identified to be a constraint that hinders effective teaching and learning activities among medical students in this study. It has been reported previously that low students to teacher or mannequin ratios are preferred for the promotion of effective clinical training especially in the CSSC where students require more time to practise and acquire basic clinical skills ^[56].

It was also evident that it takes longer to teach an hour lesson because students would have to wait for their turn to practise during the lesson. Teaching is conducted in small groups and the same lesson is taught a few different times ^[55].

5.2.2 Over usage of mannequins

This research revealed that some of the mannequins available at the CSSC were being over used to the extent that they do not serve their purpose any longer. The over usage of some of these mannequins resulted from excessive puncturing and piercing causing tear and wear of some parts of the mannequins. Medical students associated the over usage of these mannequins with large student numbers and inadequate mannequins thereby putting a lot of pressure on the few available mannequins.

5.2.3 Lack of instructional manual

The medical students identified that they needed instructional manuals as guidelines during their individualised practise of clinical skills. The students perceived the lack of adequate feedback and instructions on how to use some of the mannequins as one of the challenges in this study. Feedback ought to be informative and it should allow the student to remain on course in reaching a specific goal ^[53].

ORGANISING THEME 3. CHALLENGES

5.3.1 Distance

This study identified that medical students were challenged by the distance from the main campus to the CSSC. Whist majority of the medical students attributed the distance as being the reason for not returning to practise clinical skills other medical students were motivated by their need to practise acquired clinical skills; they did not see the distance as a challenge for not using the CSSC. However, a research has shown that increase and easy access to educational facility has a well-defined impact on students' time use ^[57].

5.3.2 Academic pressure

One of the challenges identified in this research was that the medical students had too many scheduled academic activities to participate. They find their schedule overwhelming, they do not get time to practise clinical skills learnt. They believed that they were already overworked and once practising of clinical skills taught was not a compulsory school activity they find reason not to practise clinical skills.

ORGANISING THEME 4. MOTIVATION

5.4.1 The need to practise

One of the reasons why medical students use the CSSC to practise clinical skills was motivated by their desire and need to learn and practise clinical skills. Acquired clinical skills using simulation is transferred to real patient. Medical students have the need to practise clinical skills to the point of proficiency in order to be able to transfer these skills. This research revealed that the medical students were however, intrinsically motivated to practise clinical skills in a sense that they enjoy learning and practising for its own sake and they receive positive feedback on learning outcomes ^[50]. They have built-in pleasure for the learning activity itself and have a driving force to learn, perform and a wish to succeed.

5.4.2 Preparation towards clinical exams

Another motivation for the medical students to use the CSSC was to prepare towards their clinical examination. It was identified that medical students who use the CSSC to practise clinical skills always wait until a day or two to their clinical examination before practising clinical skills taught. This group of students were extrinsically motivated to practise in preparation of their exams because they want to attain a certain grade or pass their clinical exams and not because they find pleasure in the learning activity ^[50]. Furthermore, extrinsic motivators were found to be predictors to shallow cognitive engagement in learning task ^[51].

5.4.3 Improved clinical skills performance

It was also identified that students who use the CSSC to practise clinical skills improved upon their clinical performance during clinical examinations and in real situations ^[38, 39]. The students reiterated that the clinical simulation experience had enhanced their skills in many aspects of their medical training including physical and psychosocial assessment, problem solving, and decision-making, understanding the basis for intervention, and developing the role within the profession.

5.4.4 Students build self-confidence

This study revealed that medical students were motivated to use the CSSC because they felt that they became confident after practising with the mannequins before they attended to real patients. They felt good knowing that they have performed the skill before. Students who have increased

self-confidence have a better chance of succeeding in their clinical goals ^[41] and are more likely to test and use their clinical skills ^[42].

According to the classic theory on self-efficacy, individuals with a strong sense of self-efficacy or confidence take on more challenges and recover more quickly from failure. This sense of self-efficacy develops from “mastery experience” ^[40]. Thus, self-confidence can also be achieved through repetitive practise.

5.4.5 Access to internet facility

The study identified that medical students were motivated to use the CSSC because they had easy access to the internet, which they used to watch videos on some of the clinical skills. Some of the students used the internet to search for various hospital instruments and how to use them whilst other students used the internet for academic research. The use of the internet allows for quick access to vast resources and information, it can also be used as a communication tool to facilitate teaching and learning. When used appropriately, the internet is superior to the conventional education tool although it has the disadvantage of verifying the reliability of information resources. It can also distract students and have a negative influence on them when not used appropriately.

6. THE MANUSCRIPT

[Prepared for publication in the African Journal of Health Professions Education]

Medical Students' Learning experiences In The Clinical Skills And Simulation Centre University Of Ghana: An Exploratory Study

ABSTRACT

Background. Many Clinical Skills and Simulation Centres (CSSC) have been established in medical institutions around the world. In the University of Ghana Medical School (UGMS), the CSSC is a facility for simulation based medical training. The CSSC provides a realistic patient experience, which is artificially created to mimic substantial experience of real clinical procedures in an interactive situation. Simulation has a huge role to play because the desire to ensure patient safety and the quality of patient care delivery has become necessary in medical education.

Objective. To make use of medical students' experiences of their teaching sessions in the CSSC in order to optimise the teaching and learning activities.

Method. Qualitative data were collected through four focus group discussions with the medical students using open-ended prompts. The interviews were tape-recorded and the data were analysed using thematic networks, which is an analytical tool for qualitative research.

Results. Basic themes that were identified from the interview transcripts were categorised under five broad organizing themes being positive experiences, negative experiences, challenges, motivation and recommendations.

Conclusion. The students identified the process of skills acquisition as a mainly positive experience amidst the negative experience of large number of students, and a challenge of distance to the CSSC from the main campus. Students were however, motivated by their need to practise and made recommendations including purchasing of more mannequins, structuring individualised learning into their curriculum, provision of standard operating procedures, and the replacement of worn-out mannequin parts to improve teaching and learning sessions at the CSSC.

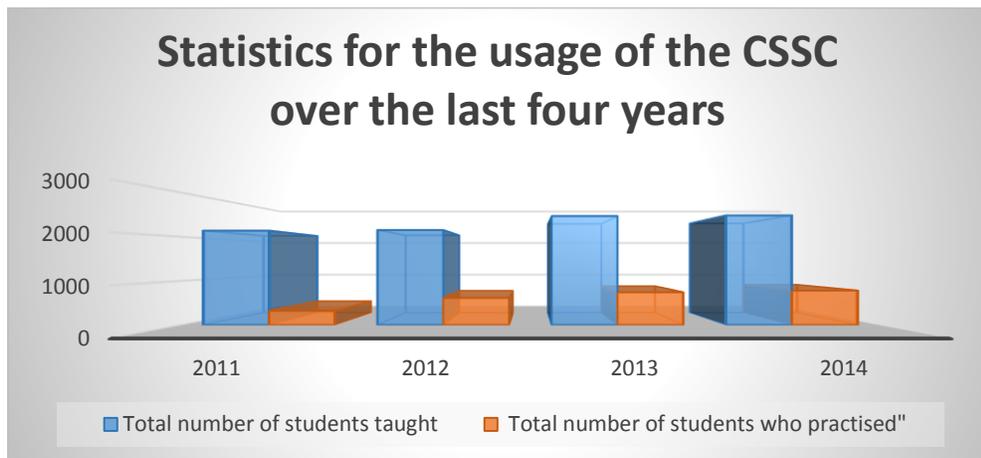
Keywords: clinical skills, simulation, medical students, teaching and learning experiences.

INTRODUCTION/ BACKGROUND

The Clinical Skills and Simulation Centre (CSSC), University of Ghana Medical School (UGMS) is a facility for training medical students with the required clinical skills needed for future practice. The CSSC supports the acquisition, maintenance, and enhancement of clinical skills for the University of Ghana medical students. Teaching involves the use of mannequins, simulators and sometimes the use of simulated patients to acquire specific clinical skills.

In the CSSC, demonstration sessions of clinical skills are taught by using the five-step method for teaching psychomotor skills ^[1]. Medical students have the opportunity to practice in their own time what they have been taught, an additional weekend (Saturday) access, and a facilitator who assist and guides students to practice clinical skills. However, Fig. 1. below represent unpublished findings on the statistics for the usage of the CSSC-UGMS over the last four years (2011, 2012, 2013, & 2014).

Fig. 1.



The aim for this study was to explore the learning experiences of the medical students including their positive experiences. However, this study is focused on the negative learning experiences of the medical students, the challenges they face during teaching sessions, their motivation to practise clinical skills as well as their possible recommendations in order to help improve and optimize the teaching and learning experiences of the students in the CSSC.

LITERATURE

Simulation has seen a tremendous recognition in medical education. The adoption of simulation and its exponential growth in healthcare education has been well documented in reviews that has examined the evidence of its effectiveness in medical education ^[2]. The main purpose of simulation is to mimic reality in a way that induces a realistic experience ^[3].

Simulation has a role to ensure patient safety because students have acquired first-hand experience before attending to patients. It was identified that simulation trained students perform better in real situations ^[4]. Simulation can facilitate on-demand learning and scenarios can be created as required. However, simulators fidelity can be assessed based on how realistic the simulator is (engineering fidelity) and the critical element of the simulator that accurately simulate specific behaviours that is required to complete the task (psychological fidelity) ^[5]. The use of simulation promote team training, understanding of team collaboration and communication, it can help faculty to develop a standardized curriculum. According to other researchers ^[6], learning clinical skills in the CSSC allows for a uniform, predictable and consistent clinical experience for all medical students. This also has a tendency to reduce student anxiety during the transfer of skills ^[7]. Students gain self-confidence out of repetitive practise and self-confident students take on more challenges and recover from failure more quickly ^[8]. Students with increased self-confidence have better chance in improving their clinical skills acquisition ^[9].

One of the key principles concerning the acquisition of competence is the learner's engagement into deliberate practice leading to desired educational outcomes ^[10]. Providing learners with the opportunity for conscious and deliberate practice is one of the main principles applied in the domain of teaching technical competence. Learners who have the opportunities for repetitive practice usually acquire the needed skills within a shorter period ^[10]. More so, students engaging in deliberate practise may be intrinsically motivated in a sense that intrinsically motivated students have a driving force to learn and a wish to succeed ^[11]. They are deep learners and develop a life-long learning. However, other students may be extrinsically motivated to learn because they want to attain a desired grade or avoid punishment ^[11]. Students who are extrinsically motivated to learn are found to be predictors to shallow cognitive engagement in learning task ^[12].

Feedback is an important element of learning process that can help students to reach their maximum learning potential. Prompts and detailed feedback on students' performance helps to achieve desired learning outcomes. However, constructive feedback helps students to increase their skills while working to achieve the expected outcome and raises students' awareness about their performance, which guides their subsequent performances ^[13].

There are however some challenges regarding the use of simulation in medical education. These include funding, maintenance the use of high fidelity simulators, and the limited number of trained personnel to run simulation programmes. In Africa and some other resource constraint areas, challenges such as the lack of teaching and learning materials tends to affect students' performance ^[14]. Another limitation is the problem of transfer of the acquired skills from the simulated environment to the human patients ^[6]. Therefore, we as educators should be reminded that clinical skills acquisition using simulation training could not be the only learning opportunity for medical students. Medical students need to be exposed to real patients. Since the performance of simulation cannot accurately be correlated with performance with real patients, the value of bedside learning still stays critically important. While 'real' clinical experiences have always been valued in medical education, teaching and learning in the CSSC is however needed to supplement and enhance it ^[6].

Therefore, this study has an objective to explore the negative learning experiences as well as challenges faced by medical students in order to improve teaching and learning of clinical skills in the CSSC.

RESEARCH DESIGN

In this study, exploratory research design was used because it is most useful when the researcher wants to find out about a problem, which is not well, understood. In addition, qualitative data can assist to gain deeper understanding of a specific concept in order to provide an insight into a given condition; how it arose, and how it could be improved ^[15]. In order to understand the data from the student interviews, thematic data analysis was used.

Population and sampling

The population that was used for this study was medical students in the basic sciences, first clinical, second clinical, and final year students. Purposive technique for sampling of participants

was used and the sampling strategy ensured an equal representation of the four different year groups of the medical students who attended sessions at the CSSC. Twenty-four medical students were interviewed.

Data collection

Medical students were invited to participate in the focus group interviews by providing them with invitation letters prior to the interview date. In addition, respondents gave their consent by signing a consent form (Addendum A). The semi-structured focus-group interviews were conducted with open-ended prompts (Addendum B) and were tape-recorded for analysis afterwards.

Four (4) focus-group interviews were conducted in groups of six (6) medical students per focus group interview. The interviews were conducted at the CSSC of the UGMS. Each interview lasted for about one hour and the data was collected within about a one-week period. The data obtained from the interviews were written into transcripts by the researcher and it was used for the data analysis.

Data analysis

After the interview recordings were transcribed, the students' experiences and thoughts were extracted from the transcripts into meaningful units using a thematic network approach, an analytical tool for qualitative data. Several basic themes were identified from the interview transcripts, which were then sorted into various organizing themes and then in a global theme.

Ethical approval

Ethical clearance was approved by the Health Research and Ethics Committee with the reference number (S15/03/049) from Stellenbosch University as well as the Ethical and Protocol Review Committee with protocol identification number (MS-Et/ M.8-P3.10/2014-2015) from the University of Ghana Medical School.

RESULTS

FOCUS GROUP INTERVIEWS

The results obtained from the data from the focus group interviews revealed several basic themes. These basic themes were grouped into five (5) broad organizing themes identified as: positive experiences, negative experiences, challenges, motivations and recommendations. Under the theme “positive experiences”, a number of basic themes emerged such as acquisition of skills, opportunity for repeated practise, exposure to wide range of clinical conditions and building of self-confidence. In addition, it was identified that the students were either intrinsically or extrinsically motivated to use the CSSC to self-practise. However, for the purpose of this paper, the researcher focused on the negative learning experiences, challenges the medical students encounter during teaching and learning sessions and suggested recommendations in order to improve teaching and learning sessions at the CSSC.

ORGANIZING THEME 1. NEGATIVE EXPERIENCES

This organizing theme is made up of several basic themes, which identified the deficiencies in the teaching and learning sessions at the CSSC encountered by some of the medical students interviewed.

Basic theme 1.1 Large number of students

The majority of the students interviewed said that their number is large and because of that, the student to mannequin ratio is high. The students sometimes do not get the hands on experience during teaching and learning session at the CSSC.

Respondent (R20) said ‘*....the mannequins are not enough compared to our population. There is always pressure and you have to wait for your turn to practise*’.

Basic theme 1.2 Lack of instructional manuals

Medical students identified the lack of instructional manuals and procedures as a challenge for using the CSSC to self-practise. They mentioned that they want to be able to read instructional manuals and to perform some of the procedures on their own even without an instructor.

Respondent (R15) said '*...we don't have any instructions so to say a standard operating procedure that you would have to follow to go through everything on your own.*

ORGANIZING THEME 2. CHALLENGES

This organizing theme is made up of several basic themes, which identified some of the challenges the medical students encountered during their sessions at the CSSC. Some of these challenges accounted for the reasons why the medical students do not return to practise clinical skills on their own.

Basic theme 2.1 Distance

The medical students interviewed gave a number of challenges including distance from the main campus to the CSSC as being the major challenge identified. Some of the students interviewed associated the distance as the reason why they do not return to practise clinical skills on their own. Respondent (R15) said '*...distance from the main clinical area to this place is quite far and we don't really get transportation in and out, even taxis don't come here unless you take a dropping up to this end*'

Basic theme 2.2 Academic pressure

Another identified challenge by the medical students was academic pressure. They complained of having too many scheduled academic activities and not having time to use the CSSC to practice acquired clinical skills.

Respondent (R7) said '*...our timetables are packed; we seldom have time to come and practise at the CSSC*'

ORGANIZING THEME 3. MOTIVATION

This theme explored the factors that drive medical students to use the CSSC amidst the negative experiences and the challenges they encounter when using the facility.

Basic them 3.1 The need to practise

Although the medical students identified distance from the main campus to the CSSC as a major challenge, some of them were motivated by the need to practise clinical skills and did not

consider the distance as a challenge at all. This is what one of the students said (R5) *'...I come here on my own. In my mind, I don't think the distance is that much but when walking here you feel it but the need to practice drives me to be here'*

Basic theme 3.2 Preparation towards exams

Other medical students were motivated to practise clinical skills because of their need to prepare towards their clinical exams. Such students came to practise the required CSSC before it was time for their clinical examination. For instance respondent (R2) said *'...basically for examination purposes, so maybe we have an exams coming up and I know that I needed to perfect a skill say CPR then I will come and practise'*

ORGANIZING THEME 4. RECOMMENDATIONS

This organizing theme identified some of the recommendations and suggestions made by the medical students to help improve upon their teaching and learning sessions at the CSSC.

Basic theme 5.1 Purchase of high fidelity mannequins that are more interactive

One of the recommendations made by some of the medical students was to increase the number of high fidelity and more interactive mannequins, which could facilitate surgical emergency sessions.

Respondent (R11) said *'...you could maybe open up and expose us to more surgical processes where there is more interactive mannequins, the ones lying there seen very passive'*.

Basic theme 5.2 Structure individualized practise into scheduled academic activities

More so, the medical students recommended that individualized learning should be structured and incorporated into their timetables so that it would be recognized as part of the academic activities where they would have no excuse attending such sessions.

Respondent (R5) said *'...there should be a structured session for individualized learning. This could be incorporated into the curriculum so that we will not have an excuse for not coming back to practise.'*

DISCUSSION

ORGANISING THEME 1. NEGATIVE EXPERIENCES

The large student to mannequin ratio about (10:1) per a demonstration session currently, was a major constraint for the medical students to practice and develop competency in performing basic clinical skills. This hinders effective teaching and learning activities among medical students in this study. It has been reported previously that low students to teacher or mannequin ratios are preferred for the promotion of effective clinical training where students require more time to practise and acquire basic clinical skills ^[17]. The students have to share everything and it takes longer to teach an hour lesson because students would have to wait for their turn to practise during the lesson. Presently, teaching is conducted in small groups between ten and fifteen students and the same lesson is taught a few different times.

The medical students identified that they needed instructional manuals to serve as guidelines and to provide feedback during their individualised practise of clinical skills. The students perceived the lack of adequate feedback and instructions as one of the challenges for clinical skills acquisition. This study supports the importance of constructive and effective feedback, which allows the student to remain on course in reaching a specific goal ^[16].

ORGANIZING THEME 2. CHALLENGES

This study identified that medical students were challenged by the distance from the main campus to the CSSC. Whilst the majority of the medical students attributed the distance as being the reason for not returning to practise clinical skills other medical students were motivated by their need to practise acquired clinical skills; they did not see the distance as a challenge for not using the CSSC. However, increase and easy access to educational facility has a well-defined impact on students' time use.

In addition, the medical students had too many scheduled academic activities to participate. They found their schedule overwhelming. They believed that they were already overworked and once practising of clinical skills taught was not a compulsory school activity they found reason not to practise clinical skills.

ORGANISING THEME 3. MOTIVATION

It was found that some of the medical students were motivated by their desire to learn and practise clinical skills. It was reiterated that intrinsically motivated students develop pleasure for the learning activity itself and have a driving force to learn, perform and a wish to succeed. Intrinsically motivated students develop deep learning approach ^[11]. It was revealed that this group of students who use the CSSC to practise clinical skills improved upon their clinical performance during clinical examinations and in real situations ^[4].

In addition, the medical students were motivated to use the CSSC in order to prepare towards their clinical examination. Medical students felt that they became confident after practising with the mannequins before they attended to real patients. Students who have increased self-confidence have a better chance of succeeding in their clinical goals ^[9] and are more likely to test and use their clinical skills ^[8]. However, extrinsically motivated students practise in preparation towards their exams because they want to attain a certain grade or pass their clinical exams and not because they find pleasure in the learning activity. Students who are extrinsic motivators were found to be predictors to shallow cognitive engagement in learning task ^[12].

RECOMMENDATIONS FOR IMPROVEMENT IN TEACHING SESSIONS

A deeper understanding of teaching and learning experiences of the medical students in the CSSC was gained from the analysis of the focus group discussions about their positive experiences, negative experiences, challenges and motivations explored in this study. The medical students have suggested strategies that they feel would be useful in alleviating some of the difficulties that they have encountered during teaching and learning sessions at the CSSC with the aim of optimising their clinical skills acquisition. The following recommendations were drawn out of the students' suggestions that may enhance the effectiveness of teaching and learning of clinical skills at the CSSC.

In order to optimise medical students' learning during clinical skills sessions in the CSSC, the following reforms have been suggested:

1. The CSSC should purchase more mannequins including high fidelity simulators to promote students' interactive skills and to minimise the current mannequin to student ratio (1:15) during teaching sessions at the CSSC.

2. Individualised learning should be structured into scheduled academic activities, where each of the student would be given a slot on their timetable to practise clinical skills.
3. Standard operating procedures should be provided for all the clinical skills taught at the CSSC to increase the students practising opportunities and encourage them to learn to be more active in their learning.
4. The facility should be expanded in terms of venues to accommodate a reasonable number (at least twenty) of students at a time.
5. Worn-out mannequin parts should be replaced at the CSSC to serve their purpose and to enhance teaching and learning activities.
6. The CSSC should make provision for school bus to transport the medical students to and from the CSSC for both structured teaching sessions and individualised learning activities.

These recommendations shows how the medical students could be better supported through their learning of clinical skills in the CSSC and the changes that need to be considered for learning at the CSSC in the future. The clinical tutors from the various departments who are involved in teaching clinical skills sessions at the CSSC can use the insights presented here in this study to tailor their teaching approaches in order to optimise the clinical learning experience for medical students during their teaching and learning sessions at the CSSC.

STRENGTHS AND LIMITATIONS

Finding out about the learning experiences of students in the CSSC could provide valuable information for faculty development. Hence, the results of this study may improve our understanding of medical students teaching and learning experiences and how they can be supported to enhance this academic experience.

In addition, the results of the study will add to the existing literature about students' learning experiences in the CSSC to facilitate the acquisition of clinical skills.

However, comparing the results of the focus group discussions suggested that saturation was reached. The results of this study were in line with other publications about the medical students' positive and negative experiences and the challenging effects on the students. Since the study was conducted in only one institution, different findings may arise from different institutions. This study may therefore be limited by the small sample size. The researcher may also be biased

since she is a staff member of the CSSC. Further study is important to establish whether the results can be generalised.

CONCLUSION

The study explored medical students' experiences of teaching and learning sessions in the CSSC. The medical students' responses from this study indicated that they have had most useful learning experiences, attributed to some of the positive and valuable experiences they shared in this research. It was also indicated that the clinical skills they acquired were relevant to their medical training. Aside from their positive experiences, the students also shared negative experiences as well as some challenges they encountered during their teaching and learning sessions in the CSSC. This largely accounted for the reasons medical students do not return to practise clinical skills at the CSSC. Finally, those who return to practise clinical skills shared their motivations and suggested useful recommendations to optimize learning in the CSSC.

It is hoped that the recommendations of this research will enhance the teaching and learning experience of the medical students rotating through the CSSC at the University of Ghana Medical School.

RECOMMENDATION FOR FURTHER RESEARCH

Clinical skills acquisition in the CSSC is well received. However, support from faculty and guidance for the medical students is required to establish a greater capacity for growth and improvement in clinical skills teaching. This study focussed on the University of Ghana medical students' teaching and learning experiences in the CSSC. For us to optimise teaching and learning at the CSSC effectively, clinical tutors' teaching experiences should also be explored. Further studies should examine the clinical tutors' point of view on their experiences with teaching sessions at the CSSC.

CONFLICT OF INTEREST STATEMENT

None Declared

REFERENCES

1. George JH, Doto FX. A Simple Five-Step Method for Teaching Clinical Skills. *Family Medicine*, 2001;33 (8): 577-578.
2. Issenberg B, McGaghie WC, Petrusa ER, et al. Features and uses of high- fidelity medical simulations that lead to effective learning: a BEME systematic review. *Med Teach* 2005;27:10–28
3. Cioffi J, Purcal N, Arundell F. A pilot study to investigate the effect of a simulation strategy on the clinical decision making of midwifery students. *Journal of Nursing Education*, 2005;44(3), 185–191.
4. Teteris E, Fraser K, Wright B, McLaughlin K. Does training learners on simulators benefit real patients? *Advances in health sciences education*, 2012;17(1), 137-144
5. Maran N, Gavin RJ. Low- to high fidelity simulation – a continuum of medical education. *Med Ed* 2003; 37 (Suppl 1):22–28.
6. Scalese RL, Obeso VT, Issenberg SB. Simulation technology for skills training and competency assessment in medical education. *Journal for General Internal Medicine*. 2007;23(suppl. 1):46-49
7. Freeth D, Fry H. Nursing students’ and tutors’ perceptions of learning and teaching in a clinical skills centre. *Nurse Education Today*. 2005;25:272-282.
8. Clark MC, Owen SV, Tholcken MA. Measuring student perceptions of clinical competence. *J Nurse Educ*, 2004;42(12), 548-554.
9. Lundberg KM. Promoting self-confidence in clinical nursing students. *Nurs Educ*, 2008;33(2), 86-89.
10. Ericsson KA, Lehmann AC. Expert and exceptional performance: evidence of maximal adaptation to task constraints, *Annual Review of Psychology*, 1996;47, pp. 273–305.
11. Ryan RM, Deci EL. Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-Being. *American Psychologist*. 2000;55:68-78. Doi: 10.1037/0003-066x.55.1.68.
12. Walker COT, Greene BA, Mansel RA (2006). Identification with academics, intrinsic/ extrinsic motivation, and self-efficacy as predictors of cognitive engagement. *Learning and Individual Differences*. 2006;16:1-12. Doi:10.1016/j.lindif.2005.06.004.

13. Van de Ridder JMM, Stokking, KM, McGaghie CW, Cate OTJ. What Is Feedback In Clinical Education? *Medical Education* 2008;42:189-197 DOI: 10.1111/j.1365-2923.2007.02973.x
14. Ramani S, Leinster S, AMEE Guide no 34: Teaching in the clinical environment. *Medical Teacher*, 2008;30(4):347-364
15. Denzin NK, Lincoln YS. Handbook of qualitative research (2nd ed.). Thousand Oaks: Sage Publications 2000.

7. CLOSING COMMENTS

Medical students' learning experiences in the CSSC, UGMS has been explored in this assignment and it has been presented in the form of an article. In the extended literature, extended methodology, extended results and extended discussion sections of this assignment, further information has been provided to supplement the article. It must be noted that the researcher did not have the time and resources to consider the entire student population who have sessions at the CSSC. However, the population selected for the study is believed to fairly represent the entire population of the student body. Therefore, the findings truly reflect the situation on the grounds as pertained to learning and learning in the CSSC, UGMS. Major findings from the analysis of the data and interpretations from this research assignment have been summarised and conclusion drawn from the study. Appropriate recommendations such as: purchasing of new and more interactive mannequins, structuring of individualised learning into scheduled academic activities, provision of standard operating procedures, expansion of venues, increased publicity of the CSSC, replacement of worn-out mannequin parts and the provision of school bus to transport the students to and from the CSSC were made. These recommendations when appropriately implemented would contribute to enhancing effective teaching and learning sessions at the CSSC. This study provides opportunity for future research in other areas of concern, which has been identified in this study.

REFERENCES

1. McGaghie WC, Issenberg SB, Petrusa ER, Scalese RJ. A critical review of simulation-based medical education research: 2003-2009. *Med Educ.* 2010;44 (1):50-63. Doi:10.1111/j.1365-2923.2009.03547.x.
2. George JH, Doto FX. A Simple Five-Step Method for Teaching Clinical Skills. *Family Medicine*, 2001;33 (8): 577-578.
3. Ericsson KA, Lehmann AC. Expert and exceptional performance: evidence of maximal adaptation to task constraints, *Annual Review of Psychology*, 1996;47, pp. 273–305
4. Ericsson KA. Deliberate practice and the acquisition and maintenance of expert performance in medicine and related domains, *Academic Medicine*, 2004;79(10, Suppl.), pp. S70–S81
5. Issenberg B, McGaghie WC, Petrusa ER, et al. Features and uses of high- fidelity medical simulations that lead to effective learning: a BEME systematic review. *Med Teach* 2005;27:10–28
6. Cioffi J, Purcal N, Arundell F. A pilot study to investigate the effect of a simulation strategy on the clinical decision making of midwifery students. *Journal of Nursing Education*, 2005;44(3), 185–191.
7. Jeffries PR. Guest Editorial. Technology trends in nursing education: Next steps. *Journal of Nursing Education*, 2005;44(1), 1–4.
8. Fried GM. (2008) *FLS assessment of competency using simulated laparoscopic tasks. J Gastrointest Surg*; 2008;12:210–12.
9. Johannesson E, Olsson M, Petersson G, Silén C. Learning features in computer simulation skills training. *Nurse Education in Practice*, 2010;10, 268–273.
10. Wulf G, Shea C, Lewthwaite R. Motor skill learning and performance: A review of influential factors. *Medical Education*, 2010;44, 75–84.
11. Marton F, Booth S. *Learning and awareness*. Mahwah, New Jersey: Lawrence Erlbaum Associates, Inc1997.
12. Van Der Vleuten CP, Dolmans D, Scherpbier A. The need for evidence in education, *Medical Teacher*, 2000;22(3), pp. 246–250.
13. Bransford JD, Brown AL, Cocking RR. *How people learn: Brain, mind, experience, and school*. Washington, DC: National Academy Press. 1999

14. Khan K, Pattison T, Sherwood M. Simulation in medical education. *Medical Teacher*, 2011;33, 1–3.
15. Kolb DA. *Experiential Learning. Experience as the Source of Learning and Development* (Englewood Cliffs, NJ, Prentice-Hall). 1984
16. Miller NE, Dollard JC. *Social Learning and Imitation*. New Haven, CT: Yale University Press.1941
17. Silén C. Responsibility and independence in learning: What is the role of the educators and the framework of the educational programme? In C. Rust (Ed.), *Improving student learning: Improving student learning—theory, research and practice 2003* (pp. 249–262). Oxford: The Oxford Centre for Staff and Learning Development.
18. Murray C, Grant MJ, Howarth ML, Leigh J. The use of simulation as a teaching and learning approach to support practice learning. *Nurse Education in Practice*, 2008;8, 5–8.
19. Shuell T. Conceptions of learning: Evolving theories of learning. 2013. Retrieved January 16, 2015, from <http://www.education.com/reference/article/theories-of-learning>.
20. Torre DM, Daley BJ, Sebastian JL, Elnicki M. Overview of Current Learning Theories for Medical Educators. *The American Journal of Medicine*. 2006;119 (10): 903-907.
21. Skinner BF. *About behaviourism*. Knopf; New York.1974
22. Dewey J. *Experience and education*. New York, NY: Collier Books 1938
23. Frank JR, Snell L, et al. *Draft CanMEDS 2015 Physician Competency Framework—Series I*. Ottawa: The Royal College of Physicians and Surgeons of Canada; 2014 Feb.
24. Swamy NJ, Chen C, Fournet PY, Strub K, Bhargavan J. Secure distributed programming with value-dependent types 2013.
25. Hibshi A, Eldeek B, Ayuob N, Aboella O. Students' Perceptions about Their Preparedness to the Clinical Phase of a Medical Curriculum with Preclinical Clinical Skill Course: *Research Journal of Medical Sciences*..2010.346-351 DOI: 10.3923/rjmsci
26. Dyrbye et al. Early clinical experiences from students' perspectives: a qualitative study of narratives. *Academic Medicine*. 2007;82 (10), 979-988 910.1097/ACM.1090b1013e318149e318129c
27. Gordon JA, Oriol NE, Cooper JB. Bringing good teaching cases _to life_: a simulator-based medical education service. *Acad Med*: 2004;79 (1):23–7.

28. Norman G, Dore K, Grierson L. The minimal relationship between simulation fidelity and transfer of learning. *Med Educ.* 2012 46 (7):636-47. Doi: 10.1111/j.1365-2923.2012.04243.x.
29. McGaghie WC, Issenberg SB, Petrusa ER, Scalese RJ. A critical review of simulation-based medical education research: 2003-2009. *Medical Education.* 2010;44:50-63.
30. Ellis D, Crofts JF, Hunt LP, Read M, Fox R, James M. Hospital, simulation center, and teamwork training for eclampsia management: A randomized controlled trial. *Am J Obstet Gynecol*, 2008;111(3), 723-731.
31. Lasater K. High-fidelity simulation and the development of clinical judgment: Students' Experiences. *Journal of Nursing Education*, 2007;46(6), 269-276.
32. Maran N, Gavin RJ. Low- to high fidelity simulation – a continuum of medical education. *Med Ed* 2003; 37 (Suppl 1):22–28.
33. Okuda Y, Bryson EO, DeMaria S, Jacobson L, Quinones J, Shen B, Levine AI. The utility of simulation in medical education: what is the evidence? *Mount Sinai Journal of Medicine.* 2009: 76:330-343
34. Scalese RL, Obeso VT, Issenberg SB. Simulation technology for skills training and competency assessment in medical education. *Journal for General Internal Medicine.* 2007: 23 (suppl. 1):46-49.
35. Kneebone R, Scott W, Darzi A, Horrocks M. Simulation and clinical practice: strengthening the relationship. *Medical Education.* 2004;38: 1095-1102
36. Lane JL, Slavin S, Ziv A. Simulation in Medical Education: a Review. *Simulation & Gaming.* 2001;32:297-314.
37. Freeth D, Fry H. Nursing students' and tutors' perceptions of learning and teaching in a clinical skills centre. *Nurse Education Today.* 2002;25:272-282.
38. Teteris E, Fraser K, wright B, McLaughlin K. Does training learners on simulators benefit real patients? *Advances in health sciences education*, 2012;17(1), 137-144
39. Barsuk JH, McGaghie WC, Cohen ER, O'Leary KJ, Wayne DB: Simulation-based mastery learning reduces complications during central venous catheter insertion in a medical intensive care unit. *Crit Care Med.* 2009; 37: 2697-2701 et al 2009
40. Bandura A. *Social learning theory.* Englewood Cliffs, N.J.: Prentice-Hall. 1977

41. Lundberg KM. Promoting self-confidence in clinical nursing students. *Nurs Educ*, 2008;33(2), 86-89.
42. Clark MC, Owen SV, Tholcken MA. Measuring student perceptions of clinical competence. *J Nurse Educ*, 2004;42(12), 548-554.
43. Heimestra R. Self-directed learning. In: Husen T, Postlethwaite TN, Eds. *The International Encyclopedia of Education*, 2nd ed. Oxford: Pergamon Press. 1994
44. Ericsson KA. The influence of experience and deliberate practise on the development of superior expert performance. *The Cambridge handbook of expertise and expert performance*. 2006;38:685-705
45. Chiviacowsky S, Wulf G. Self-controlled feedback: does it enhance learning because performers get feedback when they need it? *Research Quarterly for Exercise and Sport* 2002;73(4), 408–415.
46. Keetch KM, Lee TD. The effect of self-regulated and experimenter-imposed practice schedules on motor learning for tasks of varying difficulty. *Research Quarterly for Exercise and Sport* 2007;78(5), 476–486.
47. Schunk DH. Social cognitive theory and self-regulated learning. In *Self-regulated Learning and Academic Achievement: Theoretical Perspectives*, 2nd edn (Zimmerman BJ, Schunk DH. eds), Lawrence Erlbaum Associates Publishers, Mahwah, NJ, USA, pp. 2001:125–151.
48. Eva KW, Regehr G. “I’ll never play professional football” and other fallacies of self-assessment. *The Journal of Continuing Education in the Health Professions* 2008;28(1), 14–19.
49. Schön D. *Educating the Reflective Practitioner*. San Francisco: Jossey-Bass Publishers 1987.
50. Ryan RM, Deci EL. Self-Determination Theory and the Facilitation Of Intrinsic Motivation, Social Development, and Well-Being. *American Psychologist*. 2000; 55:68-78. Doi: 10.1037/0003-066x.55.1.68.
51. Walker COT, Greene BA, Mansel RA. Identification with academics, intrinsic/ extrinsic motivation, and self-efficacy as predictors of cognitive engagement. *Learning and Individual Differences*. 2006;16:1-12. Doi:10.1016/j.lindif.2005.06.004.
52. Krackov SK, Pohl H. Building expertise using the deliberate-practice curriculum-planning model. *Med Teach* 2011;33(7); 570-575.

53. Van de Ridder JM, Stokking KM, McGaghie WC, et al. What is feedback in clinical education? *Med Educ.* 2008;42:189-197.
54. Hesketh EA, Laidlaw JM. Feedback. *Developing the teaching instinct: Med Teach* 2002;24(3):245-248
55. Morton J. “Teachers Lament Lack Of Money For Needed School Supplies.” *Tuscaloosa news. Tuscaloosa news*, 2007 Web. 9 sep 2015.
<http://www.tuscaloosanews.com/article/20070808/NEWS/708080343>.
56. Ramani S, Leinster S. AMEE Guide no 34: Teaching in the clinical environment. *Medical Teacher*, 2008;30(4):347-364
57. Guarcello et al. The effect of availability and distance to school on children’s time allocation in Ghana and Guatemala. 2008
58. Issenberg BS, Ross JS. *Best evidence on high-fidelity simulation: what clinical teachers need to know.* Blackwell Publishing. 2007
59. Houghton CE, Casey D, Shaw D, et al. Staff and students’ perceptions and experiences of teaching and assessment in Clinical Skills Laboratories: Interview findings form a multiple case study. *Nurse Education Today.* 2012;32:e29-e34
60. Brown RB. *Doing your dissertation in business and management. Exploratory Research. The Reality of Research and Writing,* Sage Publications 2006
61. Saunders M, Lewis P, Thornhill A. *Research methods for business students (4th edition)* Harlow: Pearson Education. 2007
62. Pope C, Mays N. Reaching the parts other methods cannot reach: an introduction to qualitative methods in health and health services research. 1995: *BMJ* 311:42-45.
63. Denzin NK, Lincoln YS. *Handbook of qualitative research (2nd ed.)*. Thousand Oaks: Sage Publications. 2000
64. Wells K. The strategy of grounded theory: possibilities and problems. *Social Work Research*, 1995;19(1): 33-37.
65. Attride-Stirling J. *Thematic networks: an analytical tool for qualitative research.* SAGE Publication London 2001
66. Lincoln Y, Guba E. *Naturalistic inquiry.* New York: Sage. 1985
67. Davies D, Dodd J. Qualitative research and the question of rigor. *Qualitative Health Research*, 2002;12 (2):279-289.

68. Thorpe & Holt. *The SAGE dictionary of qualitative management research*. London: SAGE Publications Ltd 2008.

Addendum A: Participant Information Leaflet And Consent Form

TITLE OF THE RESEARCH PROJECT: LEARNING IN THE CLINICAL SKILLS AND SIMULATION CENTRE UNIVERSITY OF GHANA: MEDICAL STUDENTS' EXPERIENCES OF TEACHING SESSIONS: AN EXPLORATORY STUDY

REFERENCE NUMBER: 21303

PRINCIPAL INVESTIGATOR: Ayishetu Muniru

ADDRESS: CSSC Number 24 Slater Avenue, Korle Bu, Accra

CONTACT NUMBER: +233 24232 7546

You are being invited to take part in a research project. Please take some time to read the information presented here, which will explain the details of this project. Please ask the study staff or doctor any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied that you clearly understand what this research entails and how you could be involved. Also, your participation is **entirely voluntary** and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part.

This study has been approved by the **Health Research Ethics Committee at Stellenbosch University** and will be conducted according to the ethical guidelines and principles of the international Declaration of Helsinki, South African Guidelines as well as the University of Ghana Medical School for Good Clinical Practice and the Medical Research Council (MRC) Ethical Guidelines for Research.

What is this research study all about?

- To investigate medical students' experience(s) about learning in the Simulation Centre.
- To find out from the students' the benefits they can derive from learning in the Clinical Skills and Simulation Centre.
- To determine the reason(s) that has accounted for few students returning to practice clinical skills taught.
- To determine what motivates students who return to the Centre to use the facility to practice on their own.

Why have you been invited to participate?

- You have been invited to participate in this research because you are a medical student who attends teaching and learning sessions at the Clinical Skills and Simulation Centre.

What will your responsibilities be?

- Your responsibility would be to respond honestly to a series of open-ended questions from the interviewer.

Will you benefit from taking part in this research?

- Your views count as every information you provide will help the simulation centre to provide recommendations that will go a long way to improve teaching and learning activities at the simulation centre.

Are there in risks involved in your taking part in this research?

- There is no risk involved.

If you do not agree to take part, what alternatives do you have?

- N/A

Who will have access to your medical records?

- N/A

What will happen in the unlikely event of some form injury occurring as a direct result of your taking part in this research study?

- N/A

Will you be paid to take part in this study and are there any costs involved?

You will not be paid to take part in the study. There is no cost involve.

Is there anything else that you should know or do?

- You can contact the Health Research Ethics Committee at 021-938 9207 if you have any concerns or complaints that have not been adequately addressed by your study investigator.
- You will receive a copy of this information and consent form for your own records. Kindly contact the principal investigator on 024-2327546 for further information.

Declaration by participant

By signing below, I agree to take part in a research study entitled (*Learning in the Clinical Skills and Simulation Centre University of Ghana: medical students experiences of teaching sessions*).

I declare that:

- I have read or had read to me this information and consent form and it is written in a language with which I am fluent and comfortable.
- I have had a chance to ask questions and all my questions have been adequately answered.
- I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.
- I may choose to leave the study at any time and will not be penalised or prejudiced in any way.
- I may be asked to leave the study before it has finished, if the study doctor or researcher feels it is in my best interests, or if I do not follow the study plan, as agreed to.

Signed at (*place*) on (*date*) 2015.

.....
Signature of participant

.....
Signature of witness

Declaration by investigator

I (*name*) declare that:

- I explained the information in this document to
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above
- I did/did not use an interpreter. (*If an interpreter is used then the interpreter must sign the declaration below.*)

Signed at (*place*) on (*date*) 2015.

.....
Signature of investigator

.....
Signature of witness

Addendum B: Prompts For Focused Group Interviews

1. Students' Biography.
2. What are your experiences of learning clinical skills in the CSSC?
3. How did the mannequins contribute towards your learning?
4. For what purpose do you use the CSSC?
5. Why do you or do you not use the CSSC to practice clinical skills
6. In your opinion, what are some of the benefit(s) you have derived from using the CSSC?
7. How has individualised learning contributed to your clinical skills development and academic performance?
8. Have you experienced challenges regarding the use of the CSSC during teaching and learning sessions?
9. Give recommendation(s) on how the CSSC could improve its teaching and learning activities

Addendum C: Extract From The Interviews Transcripts

INTERVIEW TRANSCRIPT -1

Students biographies: PSE 26 yrs, GCW 28yrs, AA 28yrs, PB 29yrs, BF 25yrs, AA 26 yrs.

Interviewer: What are your experiences with teaching sessions at the CSSC?

Respondents 1: I think it's been a positive experience although the contact time hasn't been a lot, the little time we spend at the CSSC gives us an idea of what to expect in real life situation. It gives us the opportunity to what to expect in real life situation.

Respondent 2: Sometimes because of our large numbers, we are not able to have enough time to do what we want to do. By the time you realize time is up and you have to go back but in all I think it has been good.

Respondent 3: I also think that coming back to practice a clinical skill only after a session with a consultant is inadequate. May be the sessions should be more than once. It is always difficult for me to grasp something after the first time. Again, if we could have something like an instructional manual on how to use some of the mannequins it would be very helpful especially when the facilitator is attending to other students but then I think it generally gives us an idea of what to do when we encounter such a situation in a real patient.

Respondent 4: Coming back to practise on your own makes you acquire the skill even though it might not be on a real patient. You get the basic skills. However, even when we come with our consultants, our numbers are a lot so sometimes we don't get that hands on time. I am able to learn more when I come back on my own.

Respondent 5: I also believe that the sessions we have had over here has been very helpful. Regarding individualized learning, I think it should be structured into our curriculum so that we won't have an excuse for not coming back to practise. Transportation from the main campus to the CSSC has been one of the challenges for many of us especially those of us who do not have cars. The CSSC could make provision for transportation services to convey us here anytime we want to come and practise.

Interviewer: How did the mannequins contribute towards your learning?

Respondent 1: Yeah it did contribute positively, because I could remember when we were doing O&G a couple of friends and I were here to practice intravenous access technique and some of the cardiac skill. Generally, it helped because sometimes you just have to try to remember what you heard, or what you saw or what you felt and I think for surgery exams, the breast examination mannequin was an example. Generally, I think using the mannequins helped just that some of the mannequins due to over use don't really serve the purpose they are supposed to but then I think it is good.

Respondent 2: I think one advantage the mannequins also have is that you can always try again but normally when you have the human being you cannot do that so it gives you the chance to repeat until you find yourself being comfortable with it. However, you cannot practise with the human patients over again, they usually will complain or sometimes you are not sure if you are confident enough so this serves

as an opportunity where you can repeat until you are comfortable with yourself and the process you are learning.

Respondent 3: I first learnt to do a digital rectal examination on a mannequin before I had my first experience with a patient. During the procedure, I felt for the prostate, how it felt like, where it was and all that so when I tried it on a real patient, I knew what I was doing based on what I had experienced at the CSSC. Some of the mannequins were very helpful because, they were very similar to what you find in the human being. The ones that requires the auscultation like the heart sound sometimes you don't hear anything sometimes what you hear is very refined so even if you were to listen to an actual patient you can't really make out what they say is there.

Respondent 4: I remember during ophthalmology rotation the slides we looked at really helped because when you go to the clinic you don't get a lot of patient to examination. It helped me with funduscopy.

Respondent 5: With the practise of some of the clinical procedures like passing a speculum for vaginal examination, you can't go and be practicing on a normal patient on the ward so using the mannequin helped a lot. Again, when we went to the emergency during anesthesia some of the resuscitation done with the neonates also helped especially during our rotation at the Neonatal Intensive Care Unit. So I would ask for other departments who do not have mannequins here to also come in with mannequins.

Interviewer: For what purpose do you use the CSSC.

Respondent 1: I use it for both teaching sessions and self-practice. Sometimes we come in a group other times too I come on my own to do individualized learning. The internet also helps a lot at least when we are learning and we want to do any search for anything, we could just go online so for me it is a good environment to study.

Respondent 2: For me I use the CSSC basically for examination purposes , so maybe we have an exams coming up and I know that I needed to perfect a skill, say CPR then I will come and practice but honestly I do not return to practice on my own because it's a lot of a distance for me.

Respondent 3: Personally, I think it depends on which stage of the programme you are. This is because when I was in 2nd year we were close to the CSSC and mostly our lecturers made us use the Centre. It was sort of part of the whole process so I found myself being at the Simulation Centre most of my free periods because I needed to practice. Also, I was personally studying at the Centre but then as I got to the clinical year and I move farther away I don't personally come here to practice clinical skills unless there is a teaching session that says I have to be here. Again, if it's in a group that we have to actually practice for something then I use the place.

Respondent 4: Well, I come here as part of the course work (teaching sessions) because, there are a lot of things to do in the academic year so unless I decide to come here and then again the issue of the distance comes in so mostly I come here if it is part of the course work.

Respondent 5: We usually come here in our numbers when we have a practical work with our consultant or something but after the practical when I want to get a better handle on what was taught or something I saw and I think the manikins here can be of help why not?... I come here on my own. In my mind, I don't

think the distance is that much but when walking here you feel it but the need to practice drives me to be here.

Respondent 6: Some of the things that we are supposed to learn for example, the heart sounds using the auscultation mannequin is a bit fine-tuned and refined. So listening to a normal patient and a patient with a diseased organ is a bit more realistic but then for palpation for example, using the breast mannequins sometimes they are so real that you can use it to learn. I think it depends on which system you are working with. I use the mannequins depending on what system I am looking at.

Interviewer: What were some of the benefits that you derived from learning in the CSSC.

Respondent 1: A lot , I think almost every rotation where we had to come here it always helped with the physical examination from heart sounds to fundoscopy , everything O&G. I think almost every system.

Respondent 2: I remember before we got to our clinical year, we were brought here by one of our consultants to come and learn how to measure blood pressure. By the time we started introduction to clinical, we already knew how to measure blood pressure and some other physical examination skills, which we had learnt from the CSSC. I have learnt a lot.

Respondent 3: I can't say how much I have benefited from learning in the CSSC but it's a cumulative thing. It has contributed to my studying and understanding of certain concepts because when I take a book to read it's all abstract until I get the chance to experience what is written in the book. I have always realized that there is a big difference between what is written in the book and what you experience. So once you are able to get that understanding from the first-hand experience by practicing, it makes it easier to explain certain things so in that sense it's been very useful.

Respondent 4: Personally, I think...so far I have passed my exams and all that but also it has given me confidence when I am approaching a patient because I know I have tried it before and even if I have tried and tried and I don't look perfect I don't look clumsy. I think it gives me some confidence.

Respondent 5: I have benefited a lot from using the mannequins. Even when I leave medical school and I start working as a house officer, I can always come back to refer in the CSSC when it becomes necessary. When you leave a particular department you might not practice that thing again until you become a house officer but I know that with the mannequins here if the need be I can just come and brush up on those skills.

Interviewer: How has individualized learning contributed towards your skills development and has it affected your academic performance?

Respondent 1: Yes it has. I remember when we were doing O&G, we came here a couple of times as a group to practice and I think after that I was confident and believed that if I said I have measured the fundal height I believed that was it and I was ok and it was right because mostly it ended up being right. So coming back here still give me confidence and still makes me know what I am doing and I think it has helped because I remember a particular session I had to just try and remember everything and just do them.

Respondent 2: It has helped me in retaining some of the concepts, for example sometimes you do not understand everything at once so I come on my own and practise over and over again until I am confident. However, if I don't pay attention during the demonstration session and I wait for a long time before I decide to come and practise, I miss a lot and it feels like starting afresh so for those times I disciplined myself to come within a short interval of the studies. This became a part of me and I didn't have to wait for a long time before coming to practise.

Respondent 3: With the use of the autoscope when we were doing ear examination, we were a lot and it was within a short period so when we had the session, even if you didn't see properly you just had to move on for someone's turn. So when I came back on my own I had time for myself and I was able to learn how to do ear examination.

Respondent 4: I also remember during paediatrics they taught us lumbar puncture and that's something you don't get to practice on the patient because as a medical student no one is going to allow you to do that. When we came, we were quite a lot but after that I came back later and tried to identify the landmarks and how to do it and it's still with me, I think if you ask me to do it I will be able to.

Respondent 5: Personally, it helped me with the equipment. Mostly you know they require that we know the name of the equipment; its parts, and how they are used. When you are doing it in front of your consultant and colleagues there is a lot of tension so coming here on my own to do it, I make a mistake and I can refer there is nobody on my 'neck' so it helps me build the confidence and then increased my speed as I practiced repeatedly.

Respondent 6: There is just one thing I also remembered when he was talking about the lumbar puncture thing. It was at the CSSC that I first saw a correct spinal needle because on the ward they don't have it. I heard from my predecessors that in an examination, at an OSCE station they could bring an instrument and ask you to name it so if you have just been on the ward you won't be able to identify some of the instrument. The examiners have a way of improvising so when you meet it in an exam you will just be there, be blank, and will not know what it is because you have not seen it at all.

Interviewer: Have you experienced any challenge regarding the use of the CSSC.

Respondent 1: The internet, because when you come here with the hope of coming to browse or something and the internet is not working it's disappointing and I think that's a challenge.

Respondent 2: Some of the manikins they have become worn out they don't depict the same quality with time so some of them should be changed or replaced.

Respondent 3: I also think that our numbers are large and for that reason the CSSC should have more mannequins to enhance group work.

Respondent 4: Some subjects or departments don't have mannequins and I don't think it will be bad to have videos on some of the skills.

Respondent 5: The repetitive practice gave us confidence; you know what you are doing. It gives you some base line confidence even before you attend to the patient.

Interviewer: Suggest some recommendations for improvement.

Respondent 1: Maybe this shouldn't be my first and maybe this is farfetched but I was wondering can it be relocated and expanded? Because, I feel that more students will actually patronize the CSSC if it was a bit closer to the main campus infrastructure because it's like you are tired the whole day. Aside the Saturdays if you have to come here in the evening for your own personal studies it a bit dark and if you don't have a car you have to pick a taxi or you would have to walk.

Respondent 2: On a normal day, it doesn't really occur to you that you would want to go to the CSSC to practise on your own unless you have a scheduled activity at the CSSC. I think the publicity has to be increased to draw students' attention. Usually there is a problem of getting the drivers to bring students here. They complain about not telling booking the bus on time so if the drivers could be more friendly and the students' also book on time.

Respondent 3: More mannequins should be provided.

Respondent 4: They do not sell food or snacks around so when you come and you are hungry there is nothing to eat. So if you can provide a snack bar.

Respondent 5: In addition to the advertisement, I think students' should be introduced to the use of the facility even before they start the clinical rotations. Because for most of the regular students I think, it's their clinical year that they come here for the first time.

Respondent 6: I wanted to suggest that because some of us were almost here all the time so before we got to do the clinical rotations, we knew that there is a place that we can actually go and practice so it forms part of the resource you know you can actually use to study before you start clinical year.

INTERVIEW TRANSCRIPT-2

Students Biographies: IN 30, DD 29, MH 27, GR 27, MY 26, AM 26

Interviewer: What are your experiences of learning clinical skills in the CSSC?

Respondent 7: My first encounter was during my ENT & Ophthalmology rotation. It was very helpful because there were slides of the retina that I used my ophthalmoscope in viewing, which would have been difficult in viewing in a normal patient. I had an idea of how the conditions looked like in the form of pictorial view and it reduces the stress we go through in having to see the things on the real patient.

Respondent 8: Yes, it was very helpful. We had the opportunity to use the lab whiles we were doing the theory part of our studies and even during the clinical, we did a lot of things: listening to heart sounds, breath sounds, looked at the pelvis, we did procedures like the lumbar puncture and venipuncture. It was very helpful but the other experience was that we were a lot, sometimes we had to wait for our turn to use the mannequins.

Respondent 9: I had a good experience; I was not scared of making mistakes because there was no life at stake so I built my confidence before attending to human patient. I also got the chance to use the defibrillator, which gave me the firsthand experience in how to use it.

Respondent 10: We had quite useful sessions at the CSSC; we practiced many clinical skills including CPR. However, I think the place need to be expanded in terms of the venues and the mannequins.

Respondent 11: I think simulation exposed us to rare conditions, which we do not come by every day for example CPR. The teaching was very effective because it was hands on although it wasn't real. I think adequate feedback should be provided even for individualized learning.

Respondent 12: The CSSC has many things to learn with and we were able to see and touch these things and not imagined them. For example, the ENT, the CPR, the breast, and the different tumour sizes were all very helpful. The internet connection was helpful as well.

Interviewer: How did the mannequins that you used contributed to your learning?

Respondent 7: I believe they contributed positively and overall enhanced our practical learning spirit/experience.

Respondent 8: We were not afraid of making mistakes with the mannequins and we were confident. It helped us acquire the skill but in relation to having performed that procedure on a real patient, we would have been scared we would make mistakes but learning with the mannequins were very helpful and I think we should get more of it.

Interviewer: For what purpose did you use the CSSC?

Respondent 7: It used it for both teaching and individualized learning and in preparation for clinical exams. I remember when we were going to do our final part 1 exams we went there to do some examination on our own.

Interviewer: Why would you or would, you not use the CSSC.

Respondent 7: I use the CSSC because it equips me with the skills I need to acquire, because when I go there and I practiced some of the skills, I become confident to transfer the skills to real patient.

Respondent 8: we may not be able to learn and practise on real patients as often as we desire because they will complain but with the mannequins, you can practice as many times as you want to perfect yourself.

Interviewer: In your opinion what are the benefits you derived from learning in the CSSC?

Respondent 9: I gained confidence by doing the same thing repeatedly and some of the conditions maybe we would not have met during our clinical rotations in medical school for example Cardiopulmonary Resuscitation (CPR). We got the chance to practice that so it's not as if we haven't done it before although we have not experienced it in an actual situation.

Respondent 10: Generally, we had a good practice; We got to see things that we probably won't have access to on the ward, because of the large numbers also we might not be able to do something's but you always do it when you are in the CSSC.

Respondent 11: The mannequins at the CSSC made learning quite easy and fun so we wanted to do it repeatedly, but if they were not easy to use or were hectic, I don't think we would have wanted to be there at all.

Interviewer: How has individualized learning using the mannequins contributed towards your clinical performance?

Respondent 11: Especially for Obstetrics & Gynecology, it helped a lot because we went there on our own to practice some of the procedures. The mannequins helped us to practise some of the skills. In addition, during our medicine rotation when we heard breath sounds from patients that we weren't sure of we always came to the CSSC to listen to it.

Respondent 12: I think it does, I am speaking hypothetically because I didn't use the CSSC for individualized learning often. I had just used it once and that was because I wanted to see the conditions that affect the retina but for my exam I didn't really have the set of conditions that I saw from the mannequins, "I didn't see a lot of them in my exams." however, I think my response is based on the fact that I used it less frequently.

Interviewer: What accounted for your less frequent use?

Respondent 7: Our timetables are packed, we seldom have time to come and practice at the CSSC.

Respondent 8: The location of the CSSC is a bit far from school.

Interviewer: During your sessions at the CSSC, did you experience challenges regarding the use of the mannequins or accessing the Centre?

Respondent 9: Some of the mannequins weren't functioning properly; for example, the lumbar puncture and venipuncture mannequin has been punctured several times and worn out making it use difficult.

Respondent 10: The number of mannequins were not enough, so especially when its examination time there's a lot of pressure there so either you wait for long before you get the chance to use the mannequin or you don't get the chance to use it.

Respondent 11: The closing time should be extended especially during exam periods we want to do many things but by 5pm the CSSC closes and we don't get enough time.

Interviewer: How about your experiences with the weekend access to the place?

Respondent 12: That one has been very useful, especially when we had a very busy week and we need to practice clinical skills.

Interviewer: How often (frequent) do you use the CSSC for individualized learning?

Respondent 7: I think I went there on a total of about four times, on two occasion I did not use the mannequins I just went there to read. On the second occasion, I used the mannequins to practise in preparation towards an exam.

Respondent 8: I was there only once for self-directed learning apart from the normal sessions we had with our lecturers. My main problem was that the CSSC is far from our residence and it takes a lot of force to get me going there.

Respondent 9: I used it the CSSC very often but there is no food or snack bay. We usually don't get anything to eat when we are hungry.

Respondent 10: I use the CSSC about twice every rotation but most of the time it was because the consultant asks us to go and practise a skill.

Respondent 11: I used the CSSC once to practise for part 1 exams. In obs&gyn we don't really get the chance to practice with the patient as much as we want so I use the CSSC instead. Again, there was too much pressure on the mannequins and it wasted a lot of time.

Respondent 12: Personally, I was there about three times; average once a week prior to my part 1 examination. It helped me improve my clinical skills in passing urethra catheterization and bi manual pelvic examination.

Respondent 8: Well for me it was helpful, it wasn't about using the mannequins only. For those of us who weren't on campus the load-shedding was a problem for us. We used the CCS to study because there was always light. It got to a point sometimes twice or thrice a week, we will go there just to study

Interviewer: What are your suggestions and or recommendations for improvement in teaching and learning sessions at the CSSC?

Respondent 7: I would strongly encourage students who do not use the place to patronize the facility and if the Centre could be expanded with more mannequins. We need a snack bar at the Centre too.

Respondent 8: The location of the CSSC is a limitation for easy access to most of the students. I also think that the closing time should be extended to 10 pm at least that's when the library closes.

Respondent 9: I think individualized learning can be incorporated in our school time table and you should have signatures for it.

Respondent 10: I also think there should be instructions on some of the procedures so that we can practise the skills on our own without a resident.

Respondent 11: The surgical skill that we can practise at the CSSC are only few for example suturing. The Centre could maybe open up and expose us to more surgical and active process the mannequins lying there seem very passive so that they can actually feel like there's an emergency going on.

Respondent 12: One of my problem was with the time, I think it should be extended but not drastically to about 10pm, I think 7pm is okay and some of the mannequins should be changed especially the ones for venipuncture they were too worn out hence difficult to use them.

INTERVIEW TRANSCRIPTS-3

Students' biographies: AEK 25years, SA 29years, BSAL 28years, AAA 28years, EAA 30 years, JK 27years.

Interviewer: What are your experiences of learning clinical skills in the CSSC?

Respondent 13: It's been a positive experience. The environment and settings at the CSSC is quiet and depicts the hospital environment. At times, it makes you forget that you are dealing with mannequins. However, sometimes when we are doing individualized learning, we are not able to get all the materials and access the equipment that we need because other students might also be using it. For example the auscultation mannequin is not enough therefore you hardly get to use it, apart from that it has been ok.

Respondent 14: It has been very helpful just that sometimes you are disappointed if you don't get what you want, for example if u want to use a tool and that particular tool is not available.

Respondent 15: I have had clinical skills training for over a year at the CSSC and it's been very helpful. It has provided us with the opportunity to have practical experiences with the mannequins not necessarily having to practice on human patients who are sometimes not readily available. We have also learnt the differences between the various heart sounds. My challenges have been that when you come here alone without an instructor it becomes very difficult because we don't have any instruction so to say a standard operating procedure that you would have to follow to go through everything on your own.

Respondent 16: Using the mannequins has been very good although most patient understand that this is a teaching hospital, they get tired with us examining them. More so, we can't perform every maneuver with the human patients. The environment is serene for learning however, our school activities are packed, and we don't get time to practise at the CSSC. It's also a bit far from our hostel.

Respondent 17: The Saturdays has been useful because we get busy with school during the week. The closing time for the Saturdays should be extended. 2pm is still not enough for us.

Respondent 18: We are all clinical year students and most of the time we spend the time in the clinic and the little time we get we either read on your own or we come to the CSSC to practice clinical skills. We see many conditions that we read about at the CSSC.

Interviewer: How has the mannequins contributed towards your learning in the CSSC.

Respondent 13: The mannequins present a wide range of conditions for learning various medical examinations and it has contributed positively to our learning skills.

Respondent 14: I would like to say its been very helpful towards my medical education because it has provided me with the practical understanding of some of the theoretical conditions. Unfortunately, we don't see or hear everything on the ward this serves as an avenue where we get to see and listen to some of those rare conditions for instance the heart murmurs.

Respondent 15: The mannequin is one of the main equipment used in the CSSC and they have been very useful because we practice all our examination procedures on them we just hope that they will be kept in good shape so that we can continue to use them.

Respondent 16: So once the mannequins are available, the CSSC serves as a sort of a library where we can always go to and acquire clinical skills and it has contributed positively to our studies

Interviewer: For what purpose do you use the CSSC?

Respondent 17: We use it for both teaching purposes and self-directed learning and for group work as well.

Respondent 18: I use the CSSC for teaching sessions with my consultant and clinical instructors and I use as well for self-directed learning and sometimes with a group but with the frequency I would say I come here probably once in a month for self-directed learning due to the distance.

Respondent 13: I use the CSSC for self-directed learning and sometimes teaching sessions. With the self-directed learning mostly once a week, with the teaching sessions it depends on my rotation but mostly once in about two or three weeks.

Respondent 14: I do use the CSSC for both self-practice and for teaching sessions as well. Hmm usually once in two weeks to self-practise and then twice a month for a teaching session.

Interviewer: Why do you or do you not use the CSSC for individualized practice?

Respondent 15: The CSSC help me have confidence with whatever I have been thought in the ward and also try to revise what I have already learnt and because I also try to understand things better my own way.

Respondent 16: The main reason why I use the CSSC is for self-directed learning, I come here most often to learn because, I need to practise clinical skills in order to perform better in my exams.

Respondent 17: I do not usually use the CSSC frequently but each time I did, I built on my self-confidence, I feel good when I am able to master a clinical skill.

Respondent 18: I use the facility for self-directed learning and I come here about twice a week. During exams, I use the CSSC with my friends learning in groups. We are able to practise all the clinical skills in preparation for our exams. Personally, I also access the internet whenever I come here. It facilitate my learning especially when I'm working on a research.

Interviewer: What are some of the benefits that you have derived from using the CSSC.

Respondent 13: I have benefitted positively, it has improved my academic performance. I am the type that when reading I want to read around the subject a lot so with the mannequins available and the internet, I am able to broaden my knowledge gap. It has helped me improve upon my clinical performance during ward rounds. I will continue to use the facility until I complete school.

Respondent 14: The internet has helped me with my assignment. I am also able to do my project work. The mannequins has contributed to improve my performance in terms of clinical exams.

Respondent 15: Simulation has been very useful. Our studies has been to pass our exams and acquire skills for clinical practice and I must say that the first goal is to impact our exams, and what we are here to learn or to practice has gone a long way to help us pass our exams.

Interviewer: What are some of the challenges you have experienced regarding the use of the CSSC?

Respondent 17: The challenge has been that sometimes we are a lot and we do not get the chance to practise. There is limited time to practise before the next class. This put us in a hurry situation and we end up missing the opportunity to practise unless you come again to practise on your own.

Respondent 18: Sometimes there are a lot of pressure on the mannequins because we are a lot and the mannequins are a few. We all want to practise.

Respondent 13: Some of the equipment do not work as expected because of the pressure on the available mannequins and other equipment.

Respondent 14: The other challenge is that sometimes you come here and there are teaching sessions going on, you can't interrupt the class you have to either go back or wait for them to finish the class and that takes about 2 to 3 hours before you can do your learning.

Respondent 15: The other thing is the distance from the main campus to the CSSC. We do not really get transportation in and out, even taxis don't come here unless you take a dropping up to this end.

Respondent 16: Another challenge is the working time. Could it be extended to about 9pm instead of 5pm? This is because school closes around 4pm and we don't get time to come and practise.

Interviewer: How often do you use the CSSC to practise clinical skills on your own?

Respondent 13: Twice a week.

Respondent 14: Once a week.

Respondent 16: Not very often, say once an academic year.

Respondent 18: Once per rotation.

Interviewer: Give suggestions and recommendations for improvement of the CSSC

Respondent 13: The CSSC should purchase new and more active mannequins. Again, the school has many buses that can convey us to and from the CSSC whenever we want to come and practise clinical skills.

Respondent 15: I would suggest that standard operating procedures should be pasted on the walls so that we can learn on our own. We will also know how to use the mannequins so that if the instructor or whoever is supposed to help us is not around we can use it ourselves.

Respondent 17: They should provide a standard operating procedure so that when you come here as an individual you will be able to use the manikins for the maximum benefit that you desire. Then also looking at the pressure on the mannequins here, I think it's about time that the numbers are increased and those that are spoilt are repaired because the student population keep increasing yet there hasn't been increase in the number of mannequins here.

Respondent 18: The publicity of the CSSC must be increased so that students become aware of the facility even before they start their clinical year.

INTERVIEW TRANSCRIPT- 4

Students biographies: AY 24yrs, PS 28yrs, PSB 29yrs, BOT 25yrs, KBA 25yrs, FBY 25yrs

Interviewer: What are your learning experiences of clinical skills at the CSSC?

Respondent 19: I have had a good experience there for pediatrics when we were learning how to set lines, I think we had a good time in learning how to bag babies.

Respondent 20: Personally, I think it is a very helpful initiative for the establishment of the CSSC. It has been very useful because during anesthesia we learnt Basic Life Support (BLS) and the Advance Life Support (ALS) which we were made to do on the mannequins and I think it was very useful.

Respondent 21: I learnt how to set intravenous lines placement, resuscitation, and various examinations using the mannequins, which we could relate to our patient. I mean it was very helpful and educative.

Respondent 22: I think the whole experience has been useful. The most interesting clinical skills I learnt was on neonatal resuscitation session during pediatrics rotation and that of anesthesia. We also had the opportunity to view various slides for ophthalmology showing various pathologies and we found those very useful.

Interviewer: What was the mannequins' contribution towards your learning?

Respondents 19: For us, when we were doing CPR the mannequins were very helpful. It made learning easy.

Respondent 20: We viewed slides of the various pathologies of the eye when we were learning funduscopy, which we would not have seen in the human patient.

Respondent 21: The mannequins we used have been crafted as close to humans, for example the intravenous arm mannequin presented physiological, anatomical and clinical features, which made it, look as though you were setting lines on a real patient. After I learnt how to set lines using the mannequins, I was not afraid to do it on human patients.

Respondent 22: The mannequins gave a real representation of what to expect when we were ready to transfer these skills to real life. For example, the labor delivery mannequins gave us the opportunity to palpate for the various presentation of labour and the availability of the mannequins made it possible for us to learn all these skills.

Respondent 23: The auscultation mannequin was also very useful; we actually listened to all the heart and breath sounds.

Interviewer: For what purpose did you use the CSSC?

Respondent 19: I used the CSSC for self-directed learning to practise clinical skills and to attend teaching sessions.

Respondent 20: I used the CSSC for teaching session, and self-directed activities. We also attended some of our lectures there.

Respondent 21: Aside the teaching sessions and the self-practise, we could also do research work there because they had internet access as well.

Respondent 23: We used to go and study there.

Interviewer: Why would you or would, you not use the CSSC to practice clinical skills.

Respondent 19: I use the CSSC because I get to experience things that I would otherwise not have experienced on the ward like CPR. If there was a patient that really needed resuscitation as a medical

student, I would have been the first person to be called to do CPR so I got the opportunity to learn and to practise some skills that I needed in my clinical practise that I could not do on the ward.

Respondent 20: I use the Simulation Centre a lot especially to prepare for my clinical exams.

Interviewer: What were some of the benefits that you derived from using the CSSC?

Respondent 19: I got to practice skills and got to practice to the point of proficiency.

Respondent 20: Also, it's a very calm environment for research work and personal studies as well.

Respondent 21: I gained a lot of confidence while using the mannequins. This helped too in my exams because I knew I was well prepared.

Interviewer: How has self-learning using mannequins contributed to your clinical performance?

Respondent 19: the CPR sessions we had at the CSSC helped us in our anaesthesia OSCE and learning the pelvis and the baby helped us in our O & G rotation and also for pediatrics, we actually had to bag a baby and so we got to practice there.

Respondent 20: I have observed that whenever I use the simulators to practice clinical skills, I am able to perform that skills better in my exams than when I did not use the mannequins this has helped me improved my clinical skills performance.

Interviewer: What are some of the challenges you have encountered at the CSSC?

Respondent 24: I think the CSSC closes at 5pm; we would have loved them to extend the closing time. In addition, necessities like drinking water and snacks are not available in that area hence making it a major challenge for students.

Respondent 20: The mannequins are not enough compared to our population. There is always pressure and you have to wait for your turn to practice or you may have to go and come back and it takes a lot of courage to go back again.

Interviewer: How often do you visit the CSSC for self-practise?

Respondent 19: I want to three times in a week.

Respondent 20: Oww, very often.

Respondent 21: About three times a week.

Respondent 22: Once a week

Interviewer: How has repetitive practice improve your clinical performance?

Respondent 19: I got skillful in some of the things, like CPR by my exam time I was confident, I was able to do it in front of the examiners, and that helped.

Respondent 24: It sharpened us in most of the skills we acquired.

Respondent 21: Practicing clinical skills repeatedly, helped me to master some of the skills, I was not scared performing the procedures on human patients because I had learnt the skills repeatedly on the mannequins.

Interviewer: Give recommendation for improvement on teaching sessions at the CSSC

Respondent 19: I think maybe more of the manikins for some of the procedures should be made available and a manual on how to use them if the facilitator is unavailable, we would be able to read and use them.

Respondent 20: I think more awareness should be created by the medical school on the presence of the CSSC and should be introduced as part of the orientation process for the MB 2 students as a facility to acquire clinical skills.

Respondent 21: Maybe if they can extend the closing time so that other students can have access to the CSSC whenever they want.

Respondent 22: The school should make provision for school buses to convey us to and from the centre whenever we want to use the place for self- directed learning.

Addendum D: African Journal of Health Professions Education Guideline



Author Guidelines

Accepted manuscripts that are not in the correct format specified in these guidelines will be returned to the author(s) for correction, and will delay publication.

AUTHORSHIP

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.

RESEARCH ETHICS COMMITTEE APPROVAL

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 \pm and $^{\circ}$, i.e. '35 \pm 6' and '19 $^{\circ}$ 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).

ILLUSTRATIONS AND TABLES

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.

Figures must be numbered in Arabic numerals and referred to in the text e.g. '(Fig. 1)'. Figure legends: Fig. 1. 'Title...' All illustrations/figures/graphs must be of **high resolution/quality**: 300 dpi or more is preferable but images must not be resized to increase resolution. Unformatted and uncompressed images must be attached as '**supplementary files**' upon submission (not embedded in the accompanying manuscript). TIFF and PNG formats are preferable; JPEG and PDF formats are accepted, but authors must be wary of image compression. Illustrations and graphs prepared in Microsoft Powerpoint or Excel must be accompanied by the original workbook.

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](http://CrossRef.org).

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]

Book references: Jeffcoate N. *Principles of Gynaecology*. 4th ed. London: Butterworth, 1975:96-101. *Chapter/section in a book:* Weinstein L, Swartz MN. Pathogenic Properties of Invading Microorganisms. In: Sodeman WA jun, Sodeman WA, eds. *Pathologic Physiology: Mechanisms of Disease*. Philadelphia: WB Saunders, 1974:457-472.

Internet references: World Health Organization. *The World Health Report 2002 - Reducing Risks, Promoting Healthy Life*. Geneva: World Health Organization, 2002. <http://www.who.int/whr/2002> (accessed 16 January 2010).

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)'.

PROOFS

A PDF proof of an article may be sent to the corresponding author before publication to resolve remaining queries. At that stage, **only** typographical changes are permitted; the corresponding author is required, having conferred with his/her co-authors, to reply within 2 working days in order for the article to be published in the issue for which it has been scheduled.

CHANGES OF ADDRESS

Please notify the Editorial Department of any contact detail changes, including email, to facilitate communication.

CPD POINTS

Authors can earn up to 15 CPD CEUs for published articles. Certificates may be requested after publication of the article.

CHARGES

There is no charge for the publication of manuscripts.

Submission Preparation Checklist

As part of the submission process, authors are required to check off their submission's compliance with all of the following items, and submissions may be returned to authors that do not adhere to these guidelines.

1. Named authors consent to publication and meet the requirements of authorship as set out by the journal.
2. The submission has not been previously published, nor is it before another journal for consideration.
3. The text complies with the stylistic and bibliographic requirements in **Author Guidelines**.
4. The manuscript is in Microsoft Word or RTF document format. The text is single-spaced, in 12-point Times New Roman font, and contains no unnecessary formatting.
5. Illustrations/figures are high resolution/quality (not compressed) and in an acceptable format (preferably TIFF or PNG). These must be submitted as 'supplementary files' (not in the manuscript).
6. For illustrations/figures or tables that have been published elsewhere, the author has obtained written consent to republication from the copyright holder.
7. Where possible, references are accompanied by a digital object identifier (DOI) and PubMed ID (PMID)/PubMed Central ID (PMCID).
8. An abstract has been included where applicable.
9. The research was approved by a Research Ethics Committee (if applicable)
10. Any conflict of interest (or competing interests) is indicated by the author(s).

Addendum E: Author's Information

AUTHORS:

1. Ayishetu Muniru (BSC)
2. Elize Archer (Sr)

CORRESPONDENCE ADDRESS:

Ayishetu Muniru
No. 24 Slater Avenue
Korle Bu –Accra
Ghana
Tel: +233 242327546
Email: munisuaisha@yahoo.com

CONTACT INFORMATION OF CO AUTHOR:

Mrs Elize Archer
Email: elizea@sun.ac.za