

The use of peer teaching to promote active learning amongst senior medical students

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Declaration

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Abstract

A critical review of the curriculum at the University of Sefako Makgatho Health Sciences prompted the faculty to explore educational strategies that would engage students to actively learn. Peer teaching was the strategy selected by the coordinator to enhance student learning over the last two academic years. The use of formal lectures prepared and presented by each student to their peers replaced the traditional lectures presented by the faculty.

This study was intended to explore the perceptions of senior medical school students on the strategy of peer teaching and learning and furthermore, to direct faculty to intervene in some or other way to optimize this strategy.

An evaluative research design using qualitative research methods was used to generate data from the fifth- year medical school students which comprised of three focus group interviews of nine participants each totalling twenty-seven and sixty-six participants who completed a questionnaire. The data were analysed together, which revealed three major themes, namely, perceptions as a peer teacher, perceptions as a peer learner and recommendations

The findings suggested that the preparation for teaching engaged students to actively learn using several portals of learning that led to an in-depth approach toward learning. The preparation required students to revisit their prior knowledge and integrate this knowledge to gain a holistic understanding of their topic. Students were both extrinsically and intrinsically motivated. Furthermore, students believe the process of preparation assisted them in retention of this knowledge into their long term memory.

The experience of teaching itself was also beneficial to learning as it presented an opportunity for the peer teacher to verbalize their understanding of the content. The value of communication skills and the array of emotions felt also showed to be significant elements of learning that were brought forward during the teaching experience. Students appreciated this experience as it provided them with the opportunity to practice for their role as a doctor.

Students' perceptions of themselves as peer learners generated mixed views. Even though the students appreciated the social and cognitive congruence that peer teaching achieved, there were concerns about being taught the incorrect information and that the format of lectures was not engaging enough to enhance their learning. These findings provide faculty with the insight to consider the use of other educational strategies that would captivate students to learn. The recommendation from students was to introduce peer teaching earlier and to provide more

opportunities throughout the curriculum. Furthermore, students also suggested to involve senior peers to teach junior students as they believe it would be more beneficial to both the peer teacher and the peer learner. Students also expressed the need for medical professionals to be equipped with the skills of teaching to enable them to impart knowledge better.

Future studies are suggested to explore the impact this peer teaching experience had on their approach to learning and if this experience assisted them in the preparation for their role as a doctor is needed.

This study concludes that peer teaching is beneficial to student learning, however research on alternative peer learning activities other than lecturing needs to be explored for optimal learning.

Opsomming

'n Kritiese oorsig van die kurrikulum by die Sefako Makgatho Gesondheidswetenskappe Universiteit het die fakulteit geïnspireer om ook ondersoek in te stel na die opvoedkundige strategieë wat studente by aktiewe leer sou betrek. Die geselekteerde strategie was eweknie-leer met die oogmerk om leer by studente in die laaste twee akademiese jare van hul studieprogram te verbeter. Die tradisionele lesings, soos aangebied deur die fakulteit, is vervang met formele lesings deur studente - voorberei en aangebied aan medestudente.

Hierdie studie het ten doel gehad om die persepsies van senior mediese-studente oor die strategie van eweknie-leer te verken, en ook om die fakulteit bewus te maak van moontlike intervensies om hierdie strategie te optimaliseer.

'n Evaluatiewe navorsingsontwerp met die gebruik van kwalitatiewe navorsingsmetodes is aangewend om data te genereer. Data is ingesamel deur gebruik te maak van drie fokusgroep-onderhoude met nege vyfdejaar studente per fokusgroep; dus sewe-en-twintig studente in totaal, sowel as ses-en-sestig deelnemers wat 'n vraelys voltooi het. Al die data is saam ontleed en drie hoof temas is geïdentifiseer naamlik, persepsies van om 'n eweknie-onderwyser te wees, persepsies van om 'n eweknie-student te wees en spesifieke aanbevelings in hierdie verband aan die fakulteit.

Die resultate dui daarop dat die voorbereidingswerk wat gepaardgaan met onderrig, studente genoop het om 'n dieper-benadering tot leer te volg. Die ondervinding van die onderrig opsigself was ook voordelig vir leer omdat dit aan die eweknie-onderwysers die geleentheid gebied het om hulle begrip van die inhoud te verbaliseer. Die waarde van kommunikasievaardighede en die emosies betrokke wat gedurende die onderrig ondervinding teenwoordig was, was ook betekenisvolle elemente noodsaaklik vir leer.

Die persepsies van studente as eweknie-leerders het gemengde sienings gegeneer. Studente het wel die sosiale en kognitiewe kongruensie wat bereik word met eweknie-leer waardeer, maar daar was ook kommer dat hulle nie die korrekte informasie tydens die lesings gekry het nie, en ook dat die formaat van die lesings hulle nie genoegsaam betrek het om hulle leer te verbeter nie. Hierdie inligting kan moontlik die fakulteit laat besef om ook ander leerstrategieë wat studente aanspoor om te leer, te oorweeg.

Studente het aanbeveel dat hulle vroeër in die kurrikulum aan eweknie-leer blootgestel behoort te word en dat daar meer geleenthede daarvoor tydens die verloop van die kurrikulum voorsien

moet word. Studente het ook voorgestel dat senior studente gebruik moet word om junior studente te onderrig, omdat hulle glo dat dit meer voordelig sal wees vir beide die onderwyser en die eweknie-leerder. Die behoefte aan mediese-praktisyns wat toegerus is met onderwysvaardighede om hulle in staat te stel om kennis meer effektief oor te dra, is gemeld.

Voorstelle vir toekomstige studies is om die impak van die eweknie-leer ervaring op die studente se eie benadering tot leer te bepaal, sowel asof hierdie ondervinding hulle ondersteun met hulle voorbereiding vir hulle rol as dokters.

Die studie het in samevatting bevind dat ewe-knie leer-en onderrig tot voordeel van studente-leer is, maar dat wyer as tradisionele lesings as wyse van ewe-knie onderrigstrategie gekyk word en dat alternatiewe metodes in dié opsig ook verder ondersoek word.

Chapter 1: Introduction

1.1 Research orientation

Medical education is revolutionizing with a change in focus from teaching to learning (Karakitsiou et al., 2012). This requires a transformation from an instruction paradigm to a learning paradigm where the institution is responsible to produce learning rather than to provide instruction (Bagg & Tagg, 1995).

To engage students in the process of learning demands interactive instructional techniques which involves students doing things and reflecting on what they are doing (Bonwell & Elison, 1991). As Chickering and Gamson (1987), profoundly stated “Learning is not a spectator sport”. Flexner (1910:53) in his report compiled over a hundred years ago stated “Modern medicine like all scientific teaching is characterized by activity. The student no longer merely watches and listens, memorizes while learning: he does”. At the turn of the 21st Century there is still an urgency that calls for a reform in medical education to promote health care professionals to be educated to mobilize knowledge and engage in critical thinking and ethical conduct. This fundamental shift may be guided by transformative learning where the focus is shifted from fact memorization to searching, analysis and synthesis of information (Frenk et al., 2010).

Through the exploration and application of adult learning theories, it is clear that the perceptions of both the student and the teacher need to change. The student takes responsibility for their own learning and the teacher becomes a learner (Taylor & Hamdy, 2013). The role of the teacher changes dramatically from merely presenting knowledge to facilitating and guiding student learning (Grabinger & Dunlap, 1995).

Active learning is, for example, a strategy that engages the student in the learning process by involving them in doing meaningful activities and thinking about it. It is learner-centred and fosters deeper learning by the student. It encourages metacognition and engaging the student in higher order thinking in analysis, synthesis and evaluation (Bonwell & Elison, 1991). Students cannot merely sit and listen passively as onlookers, but internalize what they have learnt through discussion and application (Chickering & Gamson, 1987).

There is no precise definition of active learning, however the characteristics have been outlined. Graffam, (2007) describes it as having three interrelated components:

- Intentional engagement: the student learns through performing a skill/s either in real or simulated settings.
- Purposeful observation: the student learns through watching and listening through role play or role modelling either in a real or simulated setting.
- Critical reflection: This is essential to concrete the learning by giving meaning through analysing and questioning and reframing the experience.

Peer teaching is an educational strategy that embraces active learning. The concept of peer teaching, the premise of peer assisted learning is not new and has been used widely in medical education (Ten Cate & Durning, 2007a). Peer teaching can be defined broadly as: “People of similar social groups who are not professional teachers helping each other to learn and learning themselves by teaching”. Peer teachers are students who teach fellow students (Topping, 1996).

Lecturing is still a dominating teaching strategy, even though research indicates its limitation in learning (Fink, 2003). However, traditional lectures can be modified to active learning engagements without the loss of content (Graffam, 2007). In this study, the use of peer teaching as an active form of learning is examined as a possible educational strategy to cover content initially given as traditional lectures by clinical experts.

1.2 Background

The Curriculum Development Committee (CDC) at the University of Sefako Makgatho Health Sciences University (SMU) reviewed the fifth- year medical degree programme in 2014 and invited students who completed the academic year to provide feedback. Poor attendance to whole class lectures was a major concern. The lectures covered a period of nine weeks and this was divided into three-week sessions thrice within the academic year. The students’ feedback was that it was a “waste of time” as it was boring, and they didn’t feel they learnt much from it. Instead they admitted that they regarded whole class lectures as “break time” and many students used it as a vacation period.

A reshuffling of the curriculum created space, which could be used for small group teaching as a replacement for these lectures. Students at each academic year were divided into six smaller groups which rotated through the clinical disciplines. At 5th year level there were approximately 35 students per group. This rotation was five weeks long and the redesign of the curriculum extended this rotation to seven weeks. One of the rotations is the Practice of Medicine (POME)

within which one week was assigned to cover the content of class lectures in total. This meant that these lectures were repeated six times in the year.

Lectures presented specific common clinical topics grouped under clinical themes that involved several disciplines. With the advantage of having small groups, the clinical themes were divided into smaller topics and assigned to students (Addendum 1). Students prepared their topic and presented it with the use of PowerPoint over 20 minutes to their fellow classmates and to clinical experts invited from the different clinical departments. Another 20 minutes was dedicated to discussion and feedback. During the preparation students were encouraged to approach the clinical experts and the coordinator for any assistance they needed. I as the researcher was also the coordinator of this module. Students were assessed using a rubric. Attendance was essential for both the presenter and their classmates.

1.3 Problem statement

Two years after the radical change from a passive to active engagement of learning in the 5th year medical degree programme with regards to whole class lectures and peer teaching, there was a need to evaluate the effectiveness of the change to some extent. The literature clearly outlines peer teaching as an educational strategy that promotes learning, however this being the first exposure of peer teaching in the medical curriculum at SMU and it was crucial to explore the students' perspectives and the impact it had on their learning. Do students perceive peer teaching and peer learning as an effective way of teaching and learning? Faculty needs to understand the belief students have about this teaching strategy – and to react to it, if necessary.

1.4 Research question

What are the perceptions of 5th year medical students regarding the strategy of peer teaching on their learning, and does faculty have to intervene in some or the other way to optimize this strategy?

1.5 Research objectives

From the research question, the following objectives were formulated to execute the study:

- To explore the influence preparation for lecturing to their peers have on the learning of the students.
- To gain insight into the perception students have on the validity of the teaching they receive from peers.
- To evaluate the contribution the interactivity between peers have on their learning.

1.6 Delineations and limitations

The use of lectures as a form of peer teaching may not be the optimal method to illicit active learning. However, the feedback and discussion sessions with the clinical expert after each presentation were included to stimulate interaction amongst students. Lectures were used as the form of peer teaching due to logistical reasons. Ideally, a more interactive method that required more collaboration amongst the students should have been employed.

The students invited to participate in this study only included those students who completed their rotation in the peer teaching lectures. This included the students from the first three rotations of the six rotations in the 2016 academic year. Ideally, capturing the perceptions of students from the beginning and the end of the academic year may have presented a more holistic view.

The assessment scores of the students were not correlated to the student's perceptions of their learning as this may not be a true reflection of their learning. However, the assessment scores were used to guide the research in selecting the students invited to the focus group interviews. This was to cover the spectrum of perspective and achieve a good representation of students.

This study focuses on students' perception of learning and not on the facilitator's perception of student learning. It would have been important to include the facilitator's perception in this study but this was not possible due to time constraints.

1.7 Definitions of terms and concepts

Peer teaching: The acquisition of knowledge and skills through active helping and supporting among status equals or matched companions. It is a teaching interaction between people (students) from similar social groupings who are not professional teachers helping each other to learn and learning by themselves by doing so (Topping, 2005). Peer teaching, peer teaching and learning, peer-assisted learning and peer tutoring are some of the terms used to describe peer teaching. For clarity, in this study the use of peer teaching will be used.

Interactive teaching: The interchange of ideas and concepts between the students, teachers and knowledge content that aims to promote discussions and actively involve all participants in their learning (Kaur, et al., 2011).

Learner-centred teaching: The shift from a teacher-centred approach, where the fundamental change is the role of the educator from that of a didactic teacher to that of a facilitator of learning (Spencer & Jordan, 1999).

1.8 Brief chapter overview

This thesis is structured into five chapters. Chapter one is a brief overview of the study. Chapter two is dedicated to reviewing the literature which focuses on the components of learning and the evolution of peer teaching followed by the types of peer teaching, implementation and the conceptual framework of peer teaching. The focus will then be directed to the benefits and challenges of peer teaching. The third chapter explains the research methods of research and the research design. It includes the focus group interviews and the questionnaire used in this study. In chapter four the findings from the generated data are captured together with a discussion of the findings, where the findings are compared with other studies in the literature. The final chapter concludes the study by linking together the significant findings and presenting the suggestions from this study.

Chapter 2: Literature Review

2.1 Introduction

With the ever-increasing number of students and institutions limited resources, an increased demand is placed on the teaching staff potentially compromising student learning. Peer teaching can possibly assist with this 'educational crisis', but at the same time also offers students an opportunity to take responsibility for their own learning (Boud et al., 2001; Ten Cate & Durning, 2007b).

This literature review captures the philosophies, theories and components of learning which are embedded in peer teaching. Peer teaching explores the social dynamics and interactions as well as the communication and interpersonal skills that influence learning. However, before exploring peer teaching, it is imperative to first focus on the learning process with the aim to understand what learning is and how it happens.

2.2 Defining learning and the components of the learning process

The understanding of how people learn has developed substantially over the decades with several different theories about and approaches to learning offering greater insight into the learning process. Key to the learning process are the cognitive, affective and metacognitive components that direct optimal student learning (Vermunt, 1996; Ten Cate et al., 2004). An understanding of the theoretical underpinnings of these components will be explored with the aim to achieve a comprehensive understanding of the learning process. This begins with the cognitive component of the learning process and then leads to the study of the social and behavioural aspects of learning entwined within peer teaching.

2.2.1 Cognitivism and the social impact of learning

Cognitivism is the focus on the inner mental activities of the human mind and is imperative for understanding how learning occurs. It is the mental process of processing information by relating, structuring, analysing, concretizing, applying, memorizing, critical processing and selecting of major and minor points (Vermunt, 1996). This component of learning fosters a key learning theory crucial in medical education where the cognitivist orientation is aimed at meaningful learning through relating new knowledge to that which is already known (Torre et al., 2006).

The leading psychologist Vygotsky presented a theory on cognitive development with a focus on the role of cultural and social interactions. A key feature of this theory is the Zone of Proximal Development (ZPD) that is based on two levels of attainment. One level is the actual

development level, which is a child's capability of problem solving without the guidance from adults or collaboration with capable peers. The second is the level of potential development, which is a child's capability of problem solving with the guidance from adults or collaboration with capable peers. The ZPD is the distance between the actual developmental level and the level of potential development. The use of a more knowledgeable person can assist a child in potentially more knowledge, but that knowledge must be at the child's level of comprehension (Vygotsky, 1978). In other words, the teacher must be capable of matching the instructional strategies so that it is attuned to the students learning capabilities. This Vygotskian school of thought was employed in peer teaching to support the cognitive benefits of learning, which suggests that peers may perceive the ZPD more easily than an expert (Topping, 2005, Ten Cate & Durning, 2007a; Taylor & Hamdy, 2013).

Social interaction plays an important role in learning and is a crucial feature that is embedded in cognitivism. According to the social cognitive theory, learning occurs in a social environment and can occur by observation alone. This theory suggests that learning occurs through the interactions with, and the observations of others, through which students are able to acquire knowledge, skills, strategies, beliefs and attitudes (Schunk, 2012). To assimilate new knowledge or skills students must imitate and reinforce the observed behaviour by rehearsing it (Torre, 2006).

Another form of learning, where features of social, cognitive and behavioural components are interlinked is cooperative learning, which is defined as a carefully structured form of group work where student pursue common goals while being assessed individually. At a fundamental level, cooperative learning is based on cooperation rather than competition to promote learning (Prince, 2004). The foundation of cooperative learning is built on the social interdependence, cognitive development and behavioural learning theories (Johnson et al., 1998). Social interdependence arises when the outcome of the individuals is influenced by their own and the other's actions. The components that constitute the social interdependence theory reveal some of the key elements which enhance interaction and promote learning, and these are: social interdependence, entitativity, promotive interaction, individual accountability and personal responsibility, and social skills (Johnson & Johnson, 2009).

Social interdependence can be positive, negative or be non-existent. Positive interdependence is where students work within a group seeking a common goal and care about each one another's learning (Kaufman et al., 1997). This cooperation leans towards promoting

interactions as students encourage and facilitate each other's endeavour to learn. Torre et al., 2016, suggest that a positive interdependence could encourage the development of material interdependence where the learning material which is interrelated is divided within a group so that each member's contribution is required to solve the problem. This places a responsibility of every member of the group to strive towards their best effort as the outcome is a reflection of the entire group's performance (Johnson & Johnson, 2009). Positive interdependence may be further improved by engaging students to provide feedback to their peers, which may lead to an improvement of the individual student and assist the group in achieving its outcome (Torre et al., 2016).

Entitativity is the perception that the group is a unified whole with each member coalescing in pursuit of the same common goal. The identity of the individual member is defined by that of the group which leads to each member making a greater effort for the benefit of the success of the group (Johnson & Johnson, 2009).

Promotive interaction is the facilitation shared within group members to support and encourage each other through the process of accomplishing the common goal. This could be in the form of feedback to improve performance or sharing of resources. Individual accountability and personal responsibility are fundamental to the cooperative learning process. If the members of the group feel that they are answerable and dependent on each other to reach the common goal then the degree of responsibility towards the group is greater, which results in increased accountability (Torre et al., 2016; Johnson & Johnson, 2009; Johnson & Johnson, 2005).

Social skills are another key component of social interdependence theory as it guides the development towards a better relationship between group members. These include the ability to support and trust each other, the ability to communicate through sharing of ideas and information and in the face of conflict come to a constructive settlement. This fosters significant relationships between members and promotes positive achievements (Johnson & Johnson, 2009).

Another feature of cooperative learning is cognitive development, which once again focuses on the theories of Vygotsky and Piaget. These theories view working cooperatively with more capable peers or facilitators as an essential prerequisite for cognitive development and intellectual growth. Learning through cooperation assists the students to cognitively rehearse and restructure information, to incorporate it into existing knowledge and to enhance retention of knowledge (Johnson et al., 1998).

Behavioural learning theory in cooperative learning is driven by extrinsic motivation that provides incentives for members of a group to participate in the group's effort as opposed to the social interdependence theory, which is based on intrinsic motivation that is driven by interpersonal factors and a group effort to achieve a goal (Johnson et al., 1998). Motivation plays a very important role in learning and includes thus the affective component of learning.

2.2.2 Affective component of the learning process

Within the affective component of learning are the feelings and emotions that affect the progression of learning. The affective component of learning explores the motivation that moves students to learn. Self Determination Theory (SDT) is a key theory that explores the psychology of the motivational process. This theory differentiates several distinct types of motivation with the most basic distinction focusing on the difference between intrinsic and extrinsic motivation to demonstrate the rationale in achieving different goals (Ryan & Deci, 2000; Ryan & Deci, 2008). Ten Cate et al. (2011) suggest that understanding SDT may uncover numerous elements that determine the failures and successes in medical education.

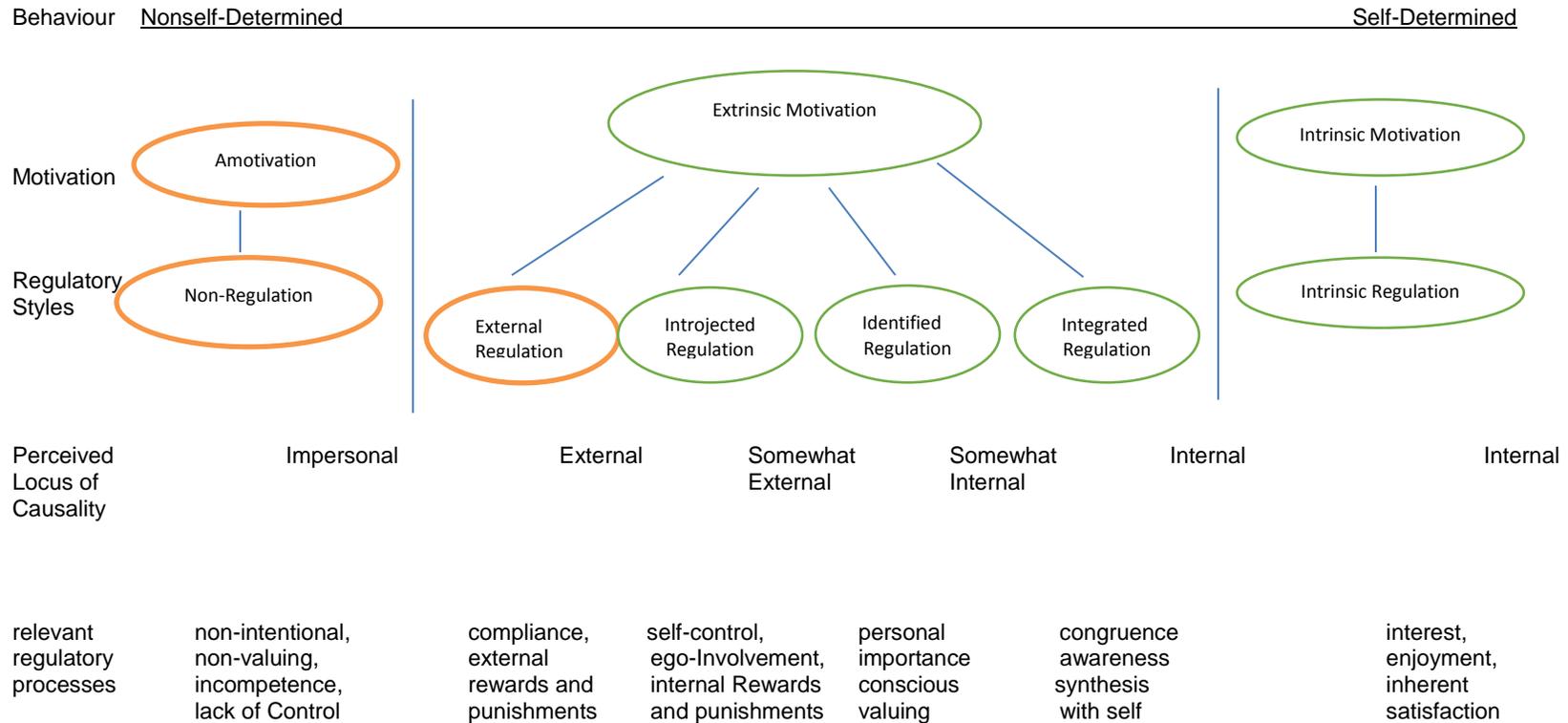
Intrinsic motivation is driven by an inherent interest in the activity and a natural inclination towards assimilation, mastery and exploration that is vital for cognitive and social development. When the students experience a sense of autonomy or free choice to continue the activity they then spend more time on the activity which increases their intrinsic motivation which leads to improved academic performance and well-being (Ryan & Deci, 2000; Ten Cate et al., 2011). Furthermore, Benware and Deci (1984) suggested in their study that learning for teaching created more intrinsic motivation than learning for writing an assessment. However, there are factors that hinder intrinsic motivation such as deadlines, directives, evaluations and imposed goals.

Extrinsic motivation in contrast pertains to pursuing an activity to attain a separable outcome of instrumental value. Even though extrinsic motivators often hinder intrinsic motivation due to the lack of autonomy, students can still feel autonomous while extrinsically motivated (Deci & Ryan, 2008). SDT suggests that this is due to the differing degrees to which the value and regulation of the requested behaviour have been internalized and integrated (Ryan & Deci, 2000). Internalization is the process of realizing a value and integration is the process of transformation of a value into their own to emanate from within their sense of self.

Within the SDT, there is a sub theory known as Organismic Integration Theory (OIT), which details the different forms of extrinsic motivation and the contextual factors that influence the

regulation for these behaviours (Deci & Ryan, 1985). The figure 1 below illustrates the self determination continuum of the types of motivation. Beginning from the far left is amotivation which is a state of lacking the intent to act. This is followed by the category with the least autonomous forms of extrinsic motivation: external regulation, which is behaviour performed to complete an external demand. Introjected regulation that appears next is a type of internal regulation where behaviour is regulated by contingent self-esteem such as ego involvement. Moving on, as a more autonomous form of extrinsic motivation, is regulation of behaviour through identification, which involves a conscious valuing of a regulation. The most autonomous form of extrinsic motivation is the integrated regulation. Integration occurs when identified regulations are completely assimilated to the self. This means that they have been evaluated and brought into congruence with one's others values and needs (Ryan & Deci, 2000).

Figure 1: SDT illustrating the spectrum of motivation



Adapted from (Ryan & Deci, 2000)

2.2.3 Metacognitive component of the learning process

The cognitive and affective components of learning may not be sufficient for the learning process if the student does not know how to learn (Ten Cate et al., 2004). Metacognition is the insight of one's own mental processing which includes the student's ability to plan study activities, to monitor and evaluate their progress and to identify and attend to any personal lack of knowledge (Flavel, 1979; Veerman et al., 2006; Ten Cate et al., 2004).

Metacognition can be categorized into two types, namely metacognitive knowledge and metacognitive regulation. Metacognitive knowledge is the knowledge about the strategies one develops in how to acquire knowledge and skills (Driessen, 2014). The development of the student's ability to assess their learning and plan for further knowledge through continuing education includes time management, exploring strategies to keep up to date with journals and explore opportunities to apply new knowledge and gain new experiences and these are considered mature, internalized metacognitive skills (Ten Cate, 2004). To enhance metacognition the use of active teaching and learning strategies need to be incorporated into the curriculum (van Vliet et al., 2015).

Metacognitive regulation is the monitoring of one's level of knowledge, which assists in discovering any deficiencies and employing different strategies to overcome these deficiencies (Driessen, 2014). Metcalfe, 2009, suggests that it is essential to monitor one's metacognition to determine its accuracy for it to be effective in regulating learning. One of the factors enhancing the accuracy of metacognition is an active approach to learning as opposed to a passive approach (Thiede & Therriault, 2003).

The importance of developing metacognitive skills is crucial for medical doctors as they are increasingly challenged to keep up with the rapid evolution and expansion of medical knowledge that changes professional practice. This demands that medical educators should prepare students to embark on life-long learning by mastering their metacognitive skills (Burman et al., 2014).

This is but one of the many skills essential in preparing students to become doctors. Other important areas that also requires attention are communication and interpersonal skills.

2.3 Communication and interpersonal skills

Communication is an essential and core clinical skill that assists a doctor to interact positively with a patient, but in essence communication is usually limited to what is said and not how, to whom or when they say it. Interpersonal skills capture the latter elements that contain the emotional content of the dialogue though this skill still lacks a common language and conceptualization in medical education (Dyche, 2006).

The focus in a medical curriculum is usually on interactions with patients, however, an emerging aspect includes clinical teamwork with peers and colleagues. Communication skills and interpersonal skills deal with aspects of speaking up to supervisors, clarity in assuring the sequence of the message and attention to roles and relationships, monitoring and backup. These skills are generally learnt through the hidden curriculum or sometimes not at all (Duffy, 2004).

The value of communication and interpersonal skills has gained sufficient importance to shift from the hidden curriculum. This is currently specified as a competency in the medical curriculum which clarifies what is effective in the transfer of information with patients and their families, but also includes peers in their profession (Rider & Keefer, 2006). This has been further reinforced and outlined in CanMEDS (Frank, Snell & Sherbino, 2015), embedding this skill permanently within the medical curriculum.

Communication skills have been outlined as the ability to listen effectively, to obtain information through effective questioning, present information using explanatory skills that are effective, to be able to counsel and educate patients and to have the ability to make informed decisions using the patient's information and preferences. Interpersonal skills require a doctor to be able to build and to maintain a beneficial relationship and furthermore, to also display respect and caring behaviours (Duffy et al., 2004).

Identifying communication and interpersonal skills as a core competency is a significant step forward, however, teaching and assessing these skills still remains a challenge (Modi et al., 2016). One of the educational strategies has the potential to enhance these skills is peer teaching.

2.4 Peer teaching

Embedded within peer teaching as an educational strategy that embedded within are several theories which promote active learning. The next section aims to present a comprehensive understanding of the philosophies surrounding peer teaching.

2.4.1 Defining peer teaching

The term peer teaching may seem clear in its definition, but it is not just a single undifferentiated educational strategy. Its complexity is demonstrated in the variety of teaching and learning employed in this context (Goldschmidt & Goldschmidt, 1976; Boud et al., 2001).

The literature reveals several types of peer teaching in higher education and its development through the years (Goldschmidt & Goldschmidt, 1976; Whitman, 1988). Ten Cate & Durning (2007a) outlined three dimensions in practice into which peer teaching can be classified. These dimensions include:

1. Distance between the student and the peer teacher

This distance is based on the stage of training. The stage of training can be equal or at the same level and is known as peer teaching. When there is a difference of levels where peer teaching is from an advanced level of training, this is referred to as near peer teaching.

2. Group size of students taught

The size of the group of students taught requires different approaches to teaching in the spheres of knowledge, skills and attitudes. The group sizes can vary from one to one peer teaching or peer tutoring, small group settings or large group settings.

3. Formality of teaching

The formality of the teaching encounter can range from informal to formal. Students could work together informally by assisting each other in preparation for assessments or explaining difficult concepts for better understanding. Within a formal dimension, students could be required to replace the teachers by providing lectures or serve as teachers for problem based learning session (Ten Cate & Durning, 2007a).

There is a great diversity in the terminology and definitions of types of peer teaching that is based on the different approaches, historical origins, academic disciplines and countries in which peer teaching was developed (Ross & Cameron, 2007). The table below captures the different terminology most frequently used in current literature.

Table 1: Peer teaching terminology in different arrangements (Source: Ten Cate & Durning, 2007a)

Examples of the different arrangements	Distance	Group size	Formality	Terminology used in literature
Students work together to prepare for a test, rehearsing with each other	Low	Low	Low	Peer assisted learning (PAL) Peer counselling Cooperative learning
Personal coaching by an experienced senior	High	Low	Low	Near peer tutoring Near peer mentoring
Senior medical students rehearse within groups of junior medical students	High	High	High	Near peer teaching
Residents function as formally scheduled tutors or mentors	High	Low	High	Near peer tutoring Near peer mentoring
Teaching assistants in lab classes or skills training; residents as group teachers	High	High	High	Near peer teaching (within the same level of training) Cross level teaching (different level of training)
Student organized extracurricular, voluntary group activities	High	High	Low	
Students take turns to teach their small group	Low	High	High	Reciprocal teaching Co-teaching
Scheduled dyad tasks within a lecture or small group sessions	Low	Low	High	Peer assisted learning Co-tutoring Reciprocal tutoring Teaching dyads Peer monitoring
Senior students or residents counsel junior students in clinical clerkships	Low	Low	Low	Student mentoring Peer modelling Peer coaching

With the wide variety of different arrangements that need to be considered in the design of peer teaching within a curriculum, attention to the organizational aspects of the implementation is extremely important for optimal learning to occur.

2.4.2 Implementation of peer teaching

Over the last three decades the focus has been the outlining of the organizational variables for the delivery of peer teaching. One of the frameworks developed by Topping and Ehly (2001), classified them into 13 variables as described below.

1. Curriculum content: This includes the knowledge or skills or combination to be covered in the curriculum.
2. Contact constellation: The dynamics of the ratio of peer teacher to the group of students can vary. At times there could be one peer teacher who can have between 2 to 30 or more in a group of students.
3. Within or between institutions: Most peer teaching occurs within institutions however it can also take between different institutions or for example between universities and schools.
4. Year of study: The distance between the peer teacher and the student can vary between the same or different levels.
5. Ability: This may be divided between cross ability or same ability basis. The peer teacher may have a superior mastery over a small part of the curriculum or may be of equal ability but steering towards a deeper understanding.
6. Role continuity: The role of a peer teacher does not to be permanent. All students can be a peer teacher by switching roles strategically.
7. Time: Peer teaching can be embedded into regular class time or outside class time. It could also include a combination of both.
8. Place: The location of peer teaching could vary enormously.
9. Helper characteristics: There is an assumption that the peer teachers need to be best students, which is not always true. The use of average or weak students as peer teachers can be beneficial to the learning of the peer teaching.
10. Characteristics of the helped: The students taught by the peer teacher could be anyone, or they could be students who underachieve or fail due to difficulties.

11. Objectives: This may target cognitive or intellectual gains, academic achievements, affective and attitudinal gains, social and emotional gains, self-image or self-concept gains or any combination.
12. Voluntary or compulsory: Some tasks are voluntary and others compulsory.
13. Reinforcement: There could be extrinsic rewards such as marks or certificates for the peer teachers. Research indicates that providing extrinsic reinforcement does not damage intrinsic reinforcement.

There are numerous variables that need to be considered to make the implementation of peer teaching successful. It is also important to understand the philosophies underpinning the learning process. The focus of the following section will highlight the benefits of peer teaching embedded in the learning process and also discuss the challenges that surrounds it.

2.4.3 Factors influencing the learning process in peer teaching

An old saying “to teach is to learn twice” is one of the phrases describing the learning processes in peer teaching (Ten Cate & Durning, 2007b). There are several areas of learning that can be promoted by adopting the peer teaching strategy which will be discussed in this section.

2.4.3.1 Cognitive benefits of peer teaching

In this educational strategy the teacher – learner duality is that teaching is related to learning on the part of the teacher and this understanding of teaching may result in the teacher becoming a better learner (Dandavino, Snell & Wiseman., 2007).

The engagement of the peer teacher stimulates learning through the preparation to teach which demands the reflection and constant assimilating of new information into existing knowledge together with challenging existing knowledge to accommodate the new information to reach equilibration (Topping, 1996). Considering learning from the self-explanation effect, where students are required to explain the knowledge to themselves then to others, showed a greater understanding to that knowledge than merely receiving the explanation from another (Chi et al., 1994).

Teaching can serve as a powerful instrument in the learning process (Ten Cate & Durning, 2007b). When learning through the teaching process, the peer teacher is again challenged because the knowledge needs to be simplified, clarified and exemplified (Topping, 2005; Topping, 1996; Lockyer et al., 2016). To fully explain a concept to another one first needs to have truly grasped it, embodying and crystallizing thought into language, as suggested by Vygotsky (Topping & Ehly, 2001). Boud et al., 2001, state that communication and articulation of

knowledge provides the peer teacher with insight of whether students understood what they have studied.

A cornerstone of peer teaching is the cognitive congruence that exists between the teacher and learner, which suggests under the cognitive congruence theory that teachers with a knowledge base similar to that of the students are more effective teachers than experts (Lockspeiser et al., 2006; Moust & Schmidt, 1995; Ten Cate & Durning, 2007a). This is supported by Vygotsky's school of thought, which suggests that for learning to be optimized the distance between what is known and what is still to be learnt is just enough to stimulate active inquiry and this lies within the zone of proximal development (Topping & Ehly, 2001).

2.4.3.2 Metacognitive benefits of peer teaching

Peer teaching promotes students to take responsibility for their learning which encourages the development of their metacognitive skills (Stigmar, 2016). Through the progression of peer teaching begins a self-awareness of reflecting and accurately assessing one's own learning strategies. This enables the student to self-regulate and self-monitor their learning approaches, which can lead to adapting more effective strategies which can be applied to different contexts (Dandavino, Snell & Wiseman., 2007; Topping & Ehly, 2001).

2.4.3.3 Motivational and emotional impact of peer teaching on learning

Peer teaching enhances the intrinsic motivation in students due to the conditions, which evoke the emotions of competence, autonomy and relatedness that are honed when in the role of a teacher as compared to being in a role of a passive learner (Ten Cate & Durning, 2007a). The active participation of students makes learning more autonomous. This encourages interactions through discussions and feedback thereby increasing the relatedness amongst students. Furthermore, students are intrinsically motivated when they take on the responsibility by actively participating in their learning (Kusurkar, Croiset & Ten Cate, 2013).

Peer teaching may also foster self-confidence in students by teaching others. When a person is placed in a certain position then that person may adapt their perception of themselves in accordance with that position. Hence a student adopting the role of a teacher may build self-confidence and belief in their own expertise within the role of a teacher (Ten Cate & Durning, 2007a).

2.4.3.4 Enhancing communication and interpersonal skills

A significant skill developed in peer teaching is communication which students can utilize throughout their career (Manyama et al., 2016). Chou et al, revealed that peer teaching is a

strategy that may enhance communication and interpersonal skills. This study has shown that with students who had prior experience with peer teaching displayed more sensitivity in the area of interpersonal communication (Chou et al., 2013).

2.4.3.5 Creating a positive learning environment

Students' perceptions of their learning environment has an influence on their learning and a meaningful learning environment, which encourages closeness amongst students and a positive emotional environment promotes learning (Wayne et al., 2013).

In peer teaching this promotes learning due to the trusting relationship between peers which is according to the social congruence theory. This theory relies on the trusting relationship between peer teachers and students where there is no hierarchy. The students feel less threatened and are able to admit to ignorance and misconceptions which can be corrected and creates better understanding (Topping, 2005). Students engage in deeper learning with peers as they form relationships which allows them to freely explore concepts, learn to listen and critique each other without the presence of authority (Boud, Cohen & Sampson., 2001)

2.4.4 Challenges in peer teaching

The value of peer teaching to as an effective learning strategy is compelling, however there are a few challenges stated in the literature that could hinder the learning process.

The planning and implementation of peer teaching may unveil potential pitfalls, which may require review and alterations of certain aspects along the way. To avoid some of these pitfalls, it is important to arrange appropriate stakeholders, pay attention to training the peer teachers. and to clarify practical arrangements (Ross & Cameron, 2007).

A study by Bulte et al. (2007) discovered that despite the fact that learning was enhanced by the social and cognitive congruence, students were still concerned that peer teachers may not reflect the knowledge of an experienced expert in the field. Furthermore, in a less formal teaching environment, the peer teacher had difficulty taking control of the group as they were taken less seriously. This also impacted their objectivity when evaluating and assessing their peers. Some suggestions made by the students was that they receive training on how to teach for effective group learning and guidance on handling difficulties within peer teaching.

Another factor that may be obstructive to the learning process is social loafing. Social loafing or free riding is when members within a group shirk their responsibilities in the hope of gaining from others in the group (Aggarwal, 2008). This causes a threat to the positive interdependence

within a group. Usually this occurs when the group size is too large and group members are not identifiable or group members are not evaluated individually. This could be reduced by evaluating and providing feedback to include each individual within the group (Torre et al., 2016).

2.3 Conclusion

In peer teaching the key is learning, and this literature review has focused on several theories and philosophies that provide a solid foundation upon which peer teaching is built. The social construct of peer teaching creates a complex learning environment which challenges the students at a cognitive, affective and metacognitive level of learning. Furthermore, students have the opportunity to confront their own communication and interpersonal skills, which are clearly uncovered in their interactions during peer teaching. Addressing each component separately provided an in-depth understanding that guided the reasoning of using peer teaching as a learning strategy that promotes students to learn actively.

Peer teaching has gained popularity over the years and with its development the various teaching and learning methods have been outlined. Organizing peer teaching interactions focuses on several variables that need to be considered before implementation. With the wide variety of teaching and learning methods to choose from, it becomes a vital process to contemplate before implementation as this phase could determine the success or failure of a peer teaching programme.

At SMU, the use of peer teaching was employed over the last two academic years, and this is the first to attempt to capture the perception of students that experienced peer teaching and the effect it had on their learning was attempted to be captured. Furthermore, it also provided the opportunity to gain insight and assist to assist the faculty to make improvements for the future.

Chapter 3: Methodology

3.1 Introduction

In an attempt to optimize learning in a module, the faculty of health sciences embarked on a peer learning process. To understand the perceptions of the students about the learning that happened during the contact time in the module, scientific qualitative research was necessary. The methodology as described in this chapter was used to achieve the following specific research objectives and provide insight into the research question of this project.

Research question

- What are the perceptions of 5th year medical students about peer teaching and the effect it has on their learning at the Sefako Makgatho Health Sciences University?

Research objectives

-
- To explore the influence preparation for lecturing to their peers have on the learning of the students.
- To gain insight into the perception students have on the validity of the teaching they receive from peers.
- To evaluate the contribution the interactivity between peers has on their learning.
-

This chapter outlines the research methodology which includes the study design, research instruments, study population and sampling, data collection, data analysis, rigor, assumptions and limitations, envisaged contribution of the study and ethical considerations.

3.2 Research study design

The study design follows an evaluative research design using qualitative research methods to generate data. Qualitative research is used to explore intricate details about phenomena such as feelings, thought processes and emotions. Furthermore, qualitative research study design is useful to gain an understanding into substantiating areas about which little is known about (Straus & Corbin, 1990; Maree, 2007).

This qualitative research method was best suited in this study as it explores the depth and describes with richness the understanding from students on their experience with peer teaching.

This design method offered a perspective on peer teaching as promoting active learning to 5th year medical students.

3.3 Research Instruments

The instruments used to collect data were a questionnaire and focus group interviews. The purpose of using of the two instruments was to embark on the principle of triangulation with the aim to ensure trustworthiness of the study. The principle behind triangulation is to get a better understanding of matters from more than one perspective (Denscombe, 2007).

3.3.1 Questionnaire

Questionnaires are a widely used method for data collection in medical education (Artino, 2010). In this study it was an optimal method as it reached a large number of participants in a short period of time (Marree, 2007).

A questionnaire (Addendum 2) was compiled with a combination of open- and closed-ended questions. Closed-ended questions were used to capture demographical questions such as age, gender and race. There were other dichotomous questions embedded within the open-ended questions that provided a direct response before leading to open-ended questions that were set to capture an in-depth response and thoughts from the students.

The questionnaire was piloted with five students prior to its use to ensure that it was understandable. Participants did not write their names or student number to ensure confidentiality.

3.3.2 Focus group interviews

There are several definitions of a focus group, however, the essential features can be summarized as follows (Stalmeijer, Mcnaughton & van Mook , 2014):

- A small group discussion, ideally between 8 to 10 participants, with the focus around a specific topic is conducted.
- The discussion is led by moderator who stimulates active engagements of the participants.
- The interaction between the participants explores an in-depth insight of the topic that will form the focus of the analysis.

The attitudes, feelings, beliefs, experiences and reactions of the participants are captured through a multiplicity of perspectives in the interactions within a group (Gibbs, 1997).

The questions selected for this study were discussed with colleges and peers to ensure clarity. (Addendum 2)

3.4 Study population and sampling

A purposive sampling strategy was adopted in this study, which is a non-random sampling method aiming to include a group of people or setting with a particular characteristic (Bowling, 2009).

The study population involved the students in the fifth year medical degree programme at Sefako Makgatho Health Sciences University who completed the POME module in the 2016 academic year. There were between 35 to 40 students in a group rotating through the POME every seven weeks, six times during the academic year. Three groups of were invited to participate in the study students upon completion of the module.

From each group, nine participants were invited for focus group interviews. The use of purposeful sampling using maximum variation sampling, which aims to capture diverse variations which had emerged was applied to cover the spectrum of perspectives using their assessment scores, which were divided into below average, average and above average categories. Three participants from each category were selected with the aim to achieve a good representation of the students.

The remaining participants were requested to complete a questionnaire.

3.5 Data collection

Data was generated using a questionnaire and focus group interviews as a means of triangulation (see 3.3). In this study person triangulation was adopted, which is the collection of data from individuals and groups by making use of the questionnaires and focus groups respectively (Bergley, 1996). Using multiple methods of data collection improves the validity and trustworthiness of the study (Maree, 2007).

All the focus group interviews were conducted by a moderator with the proficiency in focus group interviews to ensure that an in-depth perspective of the participants was attained. The moderator was a retired professional nurse and served as a research associate in the Family Medicine Department at the Medical University of South Africa (MEDUNSA). Her qualifications include several research training courses in research methodology, introduction to survey research quantitative and qualitative research skills training.

During the first focus group interview the researcher was present to capture notes such as key words and phrases to keep account of the interview. The second and third interview was not attended by the researcher to allow an open, honest discussion.

Each interview was conducted in an air-conditioned boardroom within the university campus over a period of approximately one hour due to the time constraints. The interviews were recorded on audiotape and transcribed verbatim onto a computer into a Word document. The transcriptions were done by an independent person and reviewed by the researcher thereafter.

The participants requested to complete the questionnaire were given approximately 45 minutes by the assistant administrator at the end of each of the rotation. The researcher captured each questionnaire in a table format.

3.6 Data analysis

The data from the focus group interviews and the questionnaires were analysed together and organized into codes and themes (see 4.3). According to Plowright (2011:20) “there is no necessity to restrict data processing to mathematical analysing numerical data and using narrative analysis for narrative data. Narrative data can be transformed into numerical information and numerical information can be described using narrative”. All the combined data was considered together carefully and with caution to avoid generating a weakened or an invalid conclusion from the combined data.

The questionnaires were captured in an Excel document for both the close ended and open-ended questions and the focus group interviews were transcribed verbatim into a Word document. The researcher immersed herself numerous times with the content of the data to identify codes. A co-researcher was not used to assist in the coding process. Coding is a transitional process that occurs between data collection and further data analysis (Saldana, 2009). The codes were further organized into categories and themes with the intension of progression towards the development of theories (Saldana, 2009). These findings were correlated with related existing studies in the recent literature that reflects broadly on peer teaching as a form of active learning.

3.7 Rigor

With quantitative research validity and reliability are crucial criteria in the accuracy of the study however, in qualitative research the trustworthiness of a research study is important in evaluating its worth (Tavakol & Sandars, 2014). This requires establishing the credibility,

transferability, dependability and confirmability of a study (Frambach, van der Vleuten & Deuring, 2013).

Credibility is the extent to which the study's findings are trustworthy and believable to others (Stalmeijer, Mcnaughton & van Mook, 2014; Frambach, van der Vleuten & Deuring, 2013). Credibility was ensured by triangulation of data from questionnaires and focus groups. A literature search was also conducted to capture the different perspectives on this topic.

Transferability is the extent to which the findings can be transferred to other settings (Stalmeijer, Mcnaughton & van Mook, 2014; Frambach van der Vleuten & Deuring, 2013). The researcher cannot specify the transferability of the findings beyond presenting in detail the sampling strategy outlined and the findings reflected in existing literature from different settings that can be used by the reader to determine its applicability to other settings. However, the principle of peer teaching should be the same in any learning setting, and therefore the findings of this study should be transferable to other settings.

Dependability is the extent to which the findings are consistent in relation to the contexts in which they are generated. (Stalmeijer, Mcnaughton & van Mook, 2014; Frambach et al., 2013). The use of three focus group interviews was regarded as sufficient to achieve data saturation. The data was continuously analysed throughout the data collection period to inform further data collection and re-examination of data using insights during the analysis.

Confirmability is the extent to which the findings are based on the participants and settings instead of the researchers' biases (Stalmeijer, Mcnaughton & van Mook, 2014; Frambach et al., 2013).

3.8 Assumptions and limitations

The assumption made in this study was that participants were honest in their response. Ideally in this study design, a control group of students not exposed to peer teaching should also be included to explore the difference perceptions of learning (Bowling, 2009). However, due to the design of the curriculum and limitation of time this was not possible.

3.9 Envisaged contribution of the study

The findings of this study are going to be presented to the Curriculum Development Committee of the faculty of health science at SMU to explain changes made in the curriculum. This will assist the committee members to make a decision regarding the use of peer teaching amongst

senior students in the future. It will highlight if students perceive peer teaching as useful educational strategy for learning.

3.10 Ethical considerations

Ethical clearance to conduct this study was obtained from the Health Research Ethics Committee (HREC) at the University of Stellenbosch (Addendum 3) and the Sefako Makgatho University Research Ethics Committee (SMUREC) at the University of Sefako Makgatho Health Science University (Addendum 4) to conduct this study.

The participants were invited on a voluntary basis and were able to decline the invitation or withdraw from the study at any point. A full explanation was given in the form of an information leaflet and a letter of informed consent was completed and signed by all participants.

(Addendum 5)

Confidentiality and anonymity were maintained throughout the gathering of information and all responses shared during the study were kept private. Data were to be presented in an anonymous manner to protect the identities of the students.

3.11 Conclusion

This chapter attempted to describe the research design and how the data was collected using multiple methods to capture the different perspectives while ensuring the trustworthiness and abiding to a strict ethical code of conduct. The next chapter will provide the findings which were captured and analysed.

Chapter 4: Findings and Discussion of findings

4.1 Introduction

This chapter presents the findings of the study, focusing on the perspectives of students about peer teaching as a form of active learning to promote learning of senior medical students. A questionnaire and focus group interviews were conducted to generate data. This data was coded and several categories were identified. From these categories three themes clearly emerged. The findings will be presented by firstly focusing on the demographics of the participants followed by a description of the themes that emerged from the data. The findings will be discussed together with the description of the codes.

4.2 Demographics of participants

The participants were profiled according to the gender, age and race group. A total of 27 participants were invited to the focus group interviews with nine students per group. All 27 participants invited agreed to be part of a focus group interview. The remainder that completed the questionnaire totalled 66 participants. Of the 93 participants from both the focus group interviews and the questionnaire 40 were females and 53 were males; they ranged from 21 to 38 years of age. The wide age gap is due to few students in a medical degree programme starting this degree later in life as opposed to starting directly after matriculating . 68 % of the participants were black, 18% were white and 14% were Indian. At SMU there are very few coloured students and none were present in this study. According to the SMU School of Medicine Selection committee meeting minutes, the group of students selected for this study was representative of the student population at SMU.

4.3 Description of themes

The findings presented here are representative of the questionnaire and focus group interviews which were analysed together to reflect the codes and themes that emerged. The analysis process was based on the framework of Huberman and Miles (1994). In the application of this framework, the process of coding required the researcher to complete several cycles of searching for patterns in an attempt to organize the data in order to synthesize meaning. Codes that shared some characteristics that could be linked were then grouped into categories. This process again required several cycles of reorganization before it could be considered refined. Thereafter, the categories were analysed and grouped into codes, categories and themes as summarized in Table 2. The relationship of these two different theories will be demonstrated below.

The three themes that emerged were: perceptions being a peer teacher, perceptions being a peer learner and students' recommendations. Each of these themes will be explained and representative quotes, obtained during the focus group discussions and the questionnaires, will be added to substantiate the corroborate code.

Table 2: Table of codes, categories and themes

Codes	Categories	Themes
(4.3.1.1.1) Revision of prior knowledge (4.3.1.1.2) Realize own learning gap (4.3.1.1.3) Construction of new knowledge and skills (4.3.1.1.4) Retention of knowledge (4.3.1.1.5) Research of several resources (4.3.1.1.6) Motivation to learn	(4.3.1.1) Learning through preparation	(4.3.1) Perceptions being a peer teacher
(4.3.1.2.1) Integration of knowledge (4.3.1.2.2) Providing correct information (4.3.1.2.3) Expert in own topic	(4.3.1.2) Challenges in preparation	
(4.3.1.3.1) Teaching experience (4.3.1.3.2) Preparation for future role as doctor	(4.3.1.3) Learning through peer teaching	
(4.3.1.4.1) Value of communication as a skill (4.3.1.4.2) Experience of emotions with presentations	(4.3.1.4) Communication	

<p>(4.3.1.5.1) Feedback from peers</p> <p>(4.3.1.5.2) Feedback from clinical experts</p>	<p>(4.3.1.5) Feedback</p>	
<p>(4.3.2.1.1) Peers are relatable</p> <p>(4.3.2.1.2) Peers are approachable</p>	<p>(4.3.2.1) Benefits of presentations from peers</p>	<p>4.3.2 Perceptions being a peer learner</p>
<p>(4.3.2.2.1) Being taught incorrect information</p> <p>(4.3.2.2.2) Peer teaching in lecture format</p>	<p>(4.3.2.2) Concerns in learning from peers</p>	
<p>(4.3.3.1.1) Early introduction and more frequent opportunities</p> <p>(4.3.3.1.2) Effects of assessment on learning</p> <p>(4.3.3.1.3) Teaching by senior peers</p>	<p>(4.3.3.1) Needs of students</p>	<p>4.3.3 Recommendations</p>
<p>(4.3.3.2.1) Teach the teacher</p>	<p>(4.3.3.2) Recommendations for the faculty</p>	

4.3.1 Theme 1: Perceptions being a peer teacher

The students in the study reported quite extensively on their experiences as teachers. They reported on how they actually learn while preparing for a lecture as well as the challenges they experienced while preparing for the lecture. It was evident that their learning also continued during the teaching experience. They reported on the importance of good communication as well as the vital role feedback plays. The following descriptions of the categories in this theme will illustrate this.

4.3.1.1 Category: Learning through preparation

The students expressed that the preparation for the presentation was significant to their learning. The preparation caused the students to view learning from a different angle. This required them to think differently about learning, which caused them to follow different approaches to their learning as will be explained below.

4.3.1.1.1 Revision of prior knowledge

It was evident that students found the preparation of the teaching sessions to be a good learning experience. While preparing, they realized the repetitive nature of teaching and the benefits of repeating work, especially when they realized that some work was misunderstood. It forced the students to make sure about their own knowledge while preparing. This is in fact a self-regulation process as described by Vermunt and Verloop (1999) as one of the necessary learning activities in effective learning. The following statement made during one of the focus group discussions, is evident of it:

“The revision taught me that I am actually repeating the work that you have done, and it makes it easier to file things or re-file things that you have filed wrong or misunderstood.”

4.3.1.1.2 Realize own learning gap

Students gained insight into their knowledge during the preparation and in trying to understand their topic they realized what they know but also discovered what they still needed to learn. This awareness is important in the learning process, as Pencheon (in Smith, 1999) emphasized that the most important thing to know is what you don't know. In lifelong learning ignorance and uncertainty are acceptable and the focus should be on how to find out what you don't know. The quotation below demonstrates the students' insight in their learning gaps:

“It tells you what you know, because you take things for granted sometimes. 'cause when you think of something you think you know this. But when you actually have to think about it you realize there are so many gaps. It helps you see what you know and what you need to know and going forward”.

4.3.1.1.3 Construction of new knowledge and skills

Through the preparation of the topic students indicated that they were able to add on to their knowledge and their skills. To gain an in-depth understanding of the topic students were required to delve into and challenge their prior knowledge. Through the constructive process of learning students gain meaning through several cognitive activities. Elaboration is one of those activities which fosters the activation of prior knowledge on which new knowledge can be related to (Dolmans et al., 2005). As explained by a student:

“It helped me understand the topic well and it also helped me to learn and master the other conditions that I didn't know about”.

An important skill that students reflected on was that they had gained the skill of analysing information, which was actively encouraged by the responsibility of providing correct and relevant knowledge. The quote below describes the acquisition of this skill which they also believed to be valuable in their ability to learn.

“I got a topic that was very broad, and I started to learn that we won't know everything. So, I had to filter out that information which is a skill I didn't have before. So, I had to filter and look at what is important for our level. So for me, through this type of teaching I learnt that for us it's about picking up conditions. So, through that I was able to come up with a different way to approach these things and I am now it using to study.”

Another important skill that students found useful was the use of technology as reflected in the quote below.

“It was the first time I have actually compiled an actual power point presentation all by myself”.

Information technology has vastly infiltrated medical education to play an integral role in enhancing the teaching and learning strategies (Ward et al. 2001). The implementation of electronic medical education to enhance the learning environment generally focuses on the development of faculty members' competencies of the use of computers and associated

applications and not on students' development in this aspect. This is due to the assumption that students are already familiar and capable of using information technology (Saffari, Takmil & Arabzabeh., 2014). This research study indicates that students can benefit from the exercise of demonstrating their use of technology.

4.3.1.1.4 Retention of knowledge

Students found that the preparation process aided them in remembering what they have learned and which they believed would be stored in their long-term memory. This is in agreement with other research studies that suggest that one of the benefits of peer teaching is the improved ability to retrieve the content of the topic from memory as compared to a student who did not teach the topic (Bene & Bergus, 2014). Additionally, the emotion of stress due to the preparation to teach rather than the preparation to learn has shown to contribute to better retention (Gregory et al., 2011). This is explained by the following quote:

"I understand it so well that forgetting it will have to be so difficult. I think it was good and I will always have this information in me forever".

4.3.1.1.5 Research of several resources

In preparing for the teaching session, the students researched several resources in gathering different perspectives to help them gain an in-depth understanding of their topic. This finding underlines a key element in self-directed learning where the student is responsible to actively search for understanding through identifying resources (Spencer & Jordan, 1999). The following quotation illustrates it:

"I learnt more about the theme I was given. I had to consult different books, articles and even the internet just to fully understand and prepare for my presentation as formal as I could and provide good content."

4.3.1.1.6 Motivation to learn

Students reflected that they were motivated by their peers who had already delivered a presentation and made use of these presentations to bench mark their own presentations. Apart from the extrinsic motivation, some students revealed that during the research of their topic they developed an interest and enjoyment which is inherent to intrinsic motivation. The quotations

below indicate the different inspirations respectively. This is congruent with studies indicating that peer teaching promotes both intrinsic and extrinsic motivation (Ten Cate & Durning, 2007a).

“And to go back to the listening thing. For me I found that it actually pushed me more when it came to preparing for my presentation. Because on Monday when all of this started I was expecting you know people were gonna come with presentations. And you know we were just gonna be the way we are amongst ourselves. You gonna take something from somewhere and put it up and just talk or read or whatever. But people were going up there and they have slides, but they are explaining so in depth and they are teaching things so well that it puts pressure on you to say I can’t just go up there and talk nonsense”.

“I had to research my topic, and this helped me learn a lot as I ended up reading an article in a journal with enthusiasm which is something I have never done before”

4.3.1.2 Category: Challenges in preparation

During the preparation of the presentations students experienced some difficulties with processing the information. They found it difficult to integrate knowledge previously gained through learning and to relate that knowledge and information to their peers. They also knew that they were expected to be the ‘expert’ on the topic they had to present and therefore they only concentrated on that at the expense of their learning in other topics. The following codes which emerged from the data, capture these difficulties.

4.3.1.2.1 Integration of knowledge

In the preparation of their topic, students were required to integrate their basic knowledge from previous years and to integrate several other disciplines to present a complete understanding. Many students encountered difficulty with integrating this knowledge as reflected below. However, studies reveal that integration is an essential process of learning as it assists in the development of a higher order thinking (Gulpinar & Yegen, 2005). Furthermore, the ability to integrate over time may also increase student engagement and retention of knowledge (Bandiera et al., 2013).

Therefore, even though students expressed difficulty with the integration of knowledge, this challenge enhanced their learning abilities. One student explained it as follows:

“Integration becomes a problem. It’s that you have stored everything in isolation. When you bring it all together all of a sudden it seems that you just connecting dots and the challenge is connecting those dots.”

Furthermore, students also came to the realization that the responsibility of integration lies within themselves and not their facilitators. This is important in self-directed learning as the “self” is responsible for learning and the outcome of learning. It assists the student in confronting who they are as learners and what it means to learn (Poole, 2012).

“I think that (okay valid) the registrars and consultants are not helping us gel everything together. But when do we then take responsibility for our own studies and our own practicing of medicine later in life?”

4.3.1.2.2 Providing correct information

One of the major concerns of the students was whether what they were going to teach contained the correct information as they felt responsible for their peers’ learning. Although clinical experts were present to provide feedback and provide guidance where students provided wrong or incorrect information to their peers, they did not want to appear unprepared or ignorant in front of their peers. The following quotation illustrates it:

“I found it very challenging for us because you are addressing people that are sort of on the same intellectual level. Even though there are variations, but more or less it’s the same. You just cannot lie to those people. You don’t want to deliver lies to them because they will know that know you are out of order.”

4.3.1.2.3 Expert in own topic

Students felt that they had become experts in their own topics, but as peer learners they did not gain as much learning from their peers teaching. To teach requires preparation, communication and the responsibility of ensuring that the learning takes place (Hurst, 2004). Students were now only receiving their learning through their peer’s lecture which may be the reason they perceived their learning as insufficient This could be because they knew that their peers went through the same learning problems as they experienced, or maybe do not have that much trust in their peers’ teaching. The following quote stresses their focus on their own preparation:

“I feel like I know more about what I did but to tell you the truth I don’t remember what others presented. I obviously gonna pay more attention to my topic and everything and

present it and get over and done with it. Chances are I don't know about what other people presented. I'll just know my topic"

4.3.1.3 Category: Learning through peer teaching

The results of the study show that students gain much in terms of learning through peer teaching. The opportunity to prepare for the teaching event as well as the teaching event itself contributes enormously to their own learning. They also experience it as good a preparation for their future role as doctors.

4.3.1.3.1 Teaching experience

The experience itself of teaching was expressed as a major learning opportunity by students. Studies suggest that teaching which includes the preparation for it as well as the teaching itself, as opposed to coursework which only includes studying, stimulates more learning in students (Schmidt, 2010). When teaching their peers and having to clarify their understanding when questioned, students realized that it confirmed their own understanding. This discovery of what they know and what they still need to know is an important insight in the learning process (Dolmans et al., 2005). This is an important pillar of the learning process which is the self-regulatory process of learning (Vermunt & Verloop, 1999). The following statement explains this student's experience:

"When you truly know something, you should be able to teach it to the next person. It shows you that sometimes perhaps when you read something, you thought you really understood it. Until someone asks you a question then you realize, okay, maybe I don't understand it as well as I thought I did and I need to go back. Until that happens, you will not go back because you think you know it."

4.3.1.3.2 Preparation for future role as doctor

Students shared that they appreciated the experience of teaching as a preparation for their role as a future doctor. Two of the competencies advocated by CanMEDS for a doctor, include being a communicator and a scholar, which includes peer teaching and learning, providing the opportunity to practice and enhance these roles (Frank, Snell & Sherbing., 2015). One of the participants in one of the focus groups explained it as follows:

“Personally, they are building us; they are growing us. Because throughout our careers we will be presenting to different people. Some of us will be fortunate enough to do presentations even at international levels”.

Furthermore, due to the social and cognitive congruence studies, peer teaching serves as a transitional knowledge community that closes the distance between being a medical student and a doctor. Peer teaching prepares students for their future roles by bridging the gap between being a student and to being a doctor (Lockspeiser et al., 2008).

4.3.1.4 Category: Communication

Communication in all forms is a skill, which also contains an element of emotion. Peer teaching and learning is mostly about effective communication, and students experienced this to be crucial during this process.

4.3.1.4.1 Value of communication as a skill

During the experience of peer teaching students became aware that the ability of being able to express oneself effectively is key in the transfer of knowledge. They further acknowledged that it is a skill that can be learned and is essential for the preparation of their role as a medical professional in the future. This is echoed in studies that identify communication as a key skill of a good doctor (Frank, Snell & Sherbing., 2015; Buckman, 2002). Mohamad et al. (2012) suggest that peer teaching is a possible strategy that can be used to improve communication skills. One of the participants in the study explained it as follows:

“We take talking for granted but it’s actually a skill. Public speaking is a skill that is acquired. You acquire it. The more you engage in public speaking that is how you refine the art of communication. I might be sitting on a great deal of knowledge but if I’m not able to communicate clearly it essentially becomes useless. So, you have to work on it so for future references you will be able to become effective.”

4.3.1.4.2 Experience of emotions with presentations

Students reported that they experienced several emotions ranging from positive to negative while preparing for the teaching event and presenting to their peers. These emotions were evoked because the act of teaching involves the verbalization of what they know in front of an audience. The engagement with other students during teaching was seen in a positive light by

some students who encountered this experience as an opportunity to build self-confidence, as stated below:

“It is a very good exercise needed to build confidence. It is better to fumble now than to embarrass yourself at a later stage”.

However, other students expressed feelings of fear and anxiety and experienced this as a daunting task as verbalized in the following quote:

“With me it was quite an experience, like I’m a shy person who doesn’t like to talk in class but then I have to...like I’m forced to...I’d have to present. So, with me I get scared. I think about it the whole night. It even makes me think what I wanted in life...I don’t know”.

Research shows that emotion has a considerable influence on learning with positive emotions such as enjoyment, hope and pride enhancing learning and learning with negative emotions such as anxiety and boredom impacting a poor learning outcome (Artino, Rochelle and During., 2010; Perkrun, Elliot & Maier., 2009). Recent studies delving into the impact of emotions on learning are helping to discover its complexity and the interplay of other factors such as self-regulated learning and motivation has on academic achievements (Mega, Ronconi & Beni., 2013).

4.3.1.5 Category: Feedback

Feedback, a crucial aspect in learning, is not a one-way process (Ramani & Krackov, 2012). Feedback should be comprehensive, and comments should include the process of knowledge acquisition and also be on their non-cognitive skills such as communications skills (Mubuuke, Louw & van Schalkwyk., 2016). In this specific health sciences education event, feedback is given to the students by both the clinical experts and their peers whom they have taught.

4.3.1.5.1 Feedback from peers

Students had different feelings towards receiving feedback from their peers after a presentation. Some students expressed that they felt more comfortable asking for clarity from their peers than from clinical experts. This could be due to the social congruence between the students as they

share similar social roles, which creates a comfortable environment that enhances learning (Topping, 2005; Lockspeiser et al., 2008). The following quote illustrates this:

“Students are more comfortable to acknowledge to their peers that they don’t know, and I found that students are more likely to help you and they usually have more guts to ask students to explain concepts than asking lecturers”

Other students provided a different view on feedback from their peers and were concerned that the feedback given was overly good and therefore dishonest. They were not comfortable with providing negative feedback as they felt they were helping their peers just because they were being assessed. This is in alignment with studies, which, indicates that there are no objective measurements regarding the accuracy of feedback (Burgess, McGregor & Mellis., 2014). However, another study deals with this issue regarding the inaccuracy of feedback from peers and suggests that it can be addressed by exploring the role of anonymity in peer feedback (Gukas et al., 2008). This is an important suggestion that should be considered for feedback from peers in the future. The following quote explains this:

“Students are not honest with each other. They always say that the presentation was good even though it was not. They never constructively criticize their peers. I think it would work better if students are given the assurance before the presentation that their criticism will not affect the speaker’s mark, maybe then they will be honest in their comments”

4.3.1.5.2 Feedback from clinical experts

Students found that feedback from the clinical experts enhanced their learning process as it corrected their misunderstanding immediately. They also appreciated that the clinical expert has experience and was therefore able to assist them to connect the theory they researched to the experience gained from an authentic situation. A student in one of the focus groups stated it as follows:

“When I prepared my presentation like in terms of management, I went to a certain book and I just took it the way it was. But then the doctors that are present, they actually come and correct you and say no, this is actually how you’re (are) supposed to look at it, and this is how you’re supposed to go about it. I think here a doctor has experience plus a book. That is why he was able to say, no, rather manage it this way and not that way”.

This study reinforced the notion that feedback is key in the learning process and for it to be effective, it needs to be given timeously (Ramani & Krackov, 2012). In this study feedback given by an expert in the discipline providing specific information was given directly after observing and listening to the student's presentation. These elements are considered to be significant for strong and effective feedback to students (van de Ridder et al., 2008).

4.3.2 Theme 2: Perceptions being a peer learner

This teaching strategy of peer teaching and learning involves the students to be not only as teachers, but also learners. The results of the study on this educational strategy also reveal the effect this has on the learning process of students. The benefits of being taught by a peer as well as the concerns about it, will be discussed in the following sections.

4.3.2.1 Category: Benefits of presentations from peers

Students reported that there are definite advantages being by a peer such as they were able to relate to their peers easier and felt more comfortable with them and found them to be more approachable.

4.3.2.1.1 Peers are relatable

One of the benefits voiced by the students was the ability to relate to their peer teachers. They felt that they were being taught at an appropriate level and their peers could empathize with them. The cognitive congruence demonstrated in the peer teaching, as captured in the quotations below, suggests the value of the learning experience, which is consistent with research studies (Lockspeiser et al., 2008).

“Sometimes specialists talk over our heads. We are not at their level yet. Therefore, fellow students understand where our knowledge is, and they will keep it simple. It's also nice to share an easy way to learn something with fellow students, whether it's a mnemonic or song etc.”

4.3.2.1.2 Peers are approachable

Students indicated that they felt free and unrestrained because of their familiarity with each other and this created a comfortable and safe learning environment. Studies suggest that students perform better when they perceive their environment as a meaningful learning environment, a positive emotional climate and when they share a closeness between each other (Wayne et al., 2013). This also captures the social

congruence which students share in peer teaching because of their similar social roles (Lockspeiser et al., 2008). This is shown in the quotation below:

“It is much easier and helpful that we teach each other, and it becomes easy because we are free to ask each other questions and correct each other more openly because we know each other very well”

4.3.2.2 Category: Concerns of learning from peers

It was also evident from the data that there were not only benefits from being taught by peers, but also a few concerns about it. Mostly it was the fear of being taught incorrect information by their peers, and also that not everybody appreciated the strategy of being taught by peers because of their own learning preferences, which may differ from this particular educational strategy.

4.3.2.2.1 Being taught incorrect information

Students were concerned about being given the incorrect information by peers. This concern could stem from their perceptions as peer teacher when they found it difficult during their preparation in presenting the correct information. Studies indicate that there is no significant difference in knowledge or skills outcomes of students when taught by peers or clinical experts (Ress et al., 2016).

“We don’t have the necessary knowledge yet. If a presenter gives wrong information on a subject which we are not fully familiar with, we might not even notice. This will lead to a whole class receiving and understanding incorrect work”

4.3.2.2.2 Peer teaching in lecture format

Students expressed that their ability to learn was based on their own learning style. With lectures being the only platform used in this peer teaching strategy it is apparent why it may not meet the learning needs of every student. Stated below are the different perspectives of the students.

Some students felt the lectures in general were boring for them irrespective of who was presenting them. The quote from one of the students in one of the focus groups explains this negative perception some students had about lecturing:

“It’s irrelevant who is teaching. Whether it be a colleague or whether it be a senior lecturer or whatever. It’s really not about the person. After a few hours it doesn’t matter how interesting the speaker is you just switch off.”

Other students appreciated the lectures, but only if the presenter captured their attention. The following quote represents this.

“Okay, sometimes we found that there were certain peers who lectured the audience in a certain way, where they kept the audience entertained, in a sense that the audience felt part of it. So long as it was interactive it wasn’t boring. But as long as it progressed to a point where the speaker was reading slides or presenting information that you didn’t feel you could identify with, you switch off, you just watch the time”.

Fewer students however found that they were satisfied with the lectures as stated below:

“Honestly speaking, if somebody presents to me the whole day I would focus the whole day. Even if I am no longer following what you are saying but as you continue I will write down everything. But I also appreciate that other people are not like me. They get tired. They get bored. Others are visual learners. Others are practical learners”.

From a logistical angle, it is difficult to satisfy each student’s learning style and the literature suggests that there are no empirical grounds to adjust teaching instructions to suit different learning styles. Rather, the focus should be on combining different forms of instruction befitting the content of knowledge that is most effective for learning (Rohrer & Pashler, 2012).

4.3.3 Theme 3: Students’ recommendations

The students participating in this research made general recommendations in terms of what they regard as important to them as students but also made specific recommendations to faculty to react upon. This will be stated in the following sections.

4.3.3.1 Category: Needs of students

Students presented several suggestions to assist in the improvement of the design and implementation of peer teaching. Students found the experience of peer teaching was positive and they should have more exposure to this educational strategy. However, the role of assessment in their learning was varied. Furthermore, they reflected that the use of near peer teaching may be equally beneficial to both the peer teacher and the peer learner.

4.3.3.1.1 Early introduction and more frequent opportunities

Students appreciated the opportunity of teaching their peers and the potential it had for their improvement. However, this being introduced only from their fifth year was seen as too late. The suggestion was made to introduce it earlier in their studies and to provide more opportunities to practice these skills. Including students involved in their education in terms of design, delivery and evaluation is crucial to their engagement and satisfaction (Furmedge, Iwata & Gill., 2014). The following quote illustrates this:

“I think there could be great potential space for peer teaching, you know us lecturing each other, in the core foundation years. If we have more exposure to public speaking, we’d gain more skills and confidence and even eye contact and even the way we compile presentations.”

4.3.3.1.2 Effect of assessment on learning

Students shared mixed views regarding to them being evaluated for their performance. Some students felt that it was an important driving force that motivated them to perform better. Other students, however, felt the evaluation may not be a true reflection of their efforts and knowledge. They believed that this was due to their anxiety and fear that influenced their presentation and also because they were being assessed.

“Okay in terms of marks what I think is if us as students were told that this thing is not for marks then we were not going to put much effort in it. Then they won’t do their work”.

“So, when you are nervous and there are marks attached to it and they criticize it likes if you didn’t do your work and you actually put so much effort into it, so I think it’s kind of unfair”.

The role of assessment in medical education is currently under scrutiny, questioning the belief that assessment drives learning (Schuwirth & van der Vleuten, 2004; Wormald et al., 2009). There is a shift from the assessment of learning to the assessment for learning. In the assessment of learning (summative assessment), the focus is on categorizing the student as pass or fail where motivation is guided by their assessment mark, which does not necessarily promote learning. In the assessment for learning (formative assessment), the focus is on providing feedback so that students can strive towards continuous improvement (Pugh & Regehr, 2016; Harrison & Wass, 2016). In this study the role of assessment was both

assessment of learning and assessment for learning, which served both formative and summative purposes.

4.3.3.1.3 Teaching by senior peers

Another suggestion that students participating in this research made was to make use of seniors peers to teach junior students. They were of the opinion that it could have exceptionally good benefits for both the senior and junior students on their learning process. Known as near peer teaching, this educational strategy is seen as practical and effective for a medical school. It is an emerging strategy that has been shown to be beneficial to both peer teacher and peer learner (Nelson et al., 2013 & Rodrigues et al., 2009). The following quotation illustrates this:

“I believe it will be most beneficial when older/senior students teach the younger/junior students. It helps the senior students remember better.”

4.3.3.2 Category: Recommendations for faculty

Students also proposed a suggestion to faculty to improve the quality of teaching of the medical professionals by empowering them with the skill of how to teach.

4.3.3.2.1 Teach the teacher

Upon embarking on teaching and being in the lecturer’s position the students realized that teaching is a skill which is essential for a medical professional, because they are responsible for imparting knowledge. One of the roles a doctor has to adopt is that of an educator, but sadly, upon qualifying, doctors are still not equipped with the skills to teach. This is being addressed by medical training and regulatory bodies. Peer teaching is a strategy that can be adopted to address this issue within the undergraduate curriculum (O’Shanghnessy, 2017). The importance of this is illustrated by the following quote:

“It could be let’s say one year before you actually write your primary exams, that you get a teaching course too. It can be a post graduate diploma. That you will need this thing, because you’ll get to a point where you need to impart all of this knowledge into people and help us integrate knowledge.”

4.4 Conclusion

The findings of this study indicate that peer teaching stimulated students to actively learn and this inculcated a deep approach toward learning. Through the preparation for peer teaching

students gained an understanding of teaching and learning, which may assist them in becoming better learners and furthermore aided them in their retention of knowledge. The responsibility of teaching peers motivated students to actively seek a holistic understanding of their topics through different portals of learning. Additionally, the exposure to teaching revealed the elements of the hidden curriculum such as communication skills and giving feedback. Students recommended more opportunities and an earlier introduction to peer teaching to assist them in mastering these skills.

As peer learners, students discovered that through cognitive and social congruence between peers, this created a better learning environment. However, students were concerned about being given incorrect information and some students complained that the use of formal lectures was boring and did not cater for different types of learners. Furthermore, students were overcome with different emotions resulting from the act of presenting and the burden of being assessed.

The following chapter will conclude this research study with a conclusion and recommendations of this assignment.

Chapter 5: Conclusion

5.1 Introduction

This final chapter concludes the assignment, summarises the findings and brings forward the evidence discovered through the research. This chapter concludes with the recommendations to faculty on the implementation of this educational strategy in the future.

5.2 Summary of findings

The findings of this study indicate that peer teaching stimulated students to actively learn, which also includes the fostering of a deep approach toward learning. This is evident from the findings that the process of preparing for the lecture engaged the students in adopting several learning strategies to actively seek a holistic understanding. This challenged students to revisit prior knowledge and integrate this knowledge in the construction of a new perspective through analysing several resources in the process. The students also believed that this process will enable them to retain this knowledge in their long-term memory.

Students were extrinsically motivated to perform well so that they appeared knowledgeable to their peers and reach the benchmark set by previous peers' presentations. However, while engaged in their preparation this prompted them to develop a genuine interest in their topic which resulted in them to be intrinsically motivated.

This teaching experience could be regarded as effective for student learning, because it tested their understanding through verbalization and their ability to answer questions. Additionally, the teaching experience exposed the students' communication skills, which students found to play a pivotal role in their performance. Students became insightful of the value of being a good communicator and, being in their senior years, they appreciated that this experience provided them with the opportunity to practice for their role as a doctor.

Another aspect which was regarded as important by the students was the fact that they became aware of the different emotions experienced during the teaching experience, which influenced their performances resulting in some students finding the experience positive while others expressed feelings of fear and anxiety.

Students who were taught by their peers reflected on different perspectives of their learning. They appreciated the cognitive and social congruence between students, as it created a non-threatening and relaxed environment that enhanced their learning.

One of the concerns students expressed was the accuracy of the information received from their peer teachers, but students were satisfied with a clinical expert being present to correct any misunderstandings. Their perception of feedback from their peers, however, was mixed. Although students felt more comfortable with feedback from their peers, they did not trust the honesty of it.

Another issue for the students was the use of formal lectures by peer teachers, as this strategy may not have satisfied the different learning styles of every student.

A suggestion from students for the future use of peer teaching was making use of senior students to teach the junior students. They believed this would be more helpful to both the peer teacher and the peer learners.

5.3 Conclusions

From this assignment it is evident that most students actively learned through the preparation process and the teaching experience. The preparation process caused them to deeply engage with the learning material, and deep internal thinking and reflection happened. The teaching process required them to verbalize what they have learned and this together with the preparation process enhanced learning of the students.

With regards to students learning from their peers, it could be inferred that the learning curve was less steep. The use of formal lectures as a peer teaching strategy may have contributed to a more passive approach of learning (by the students not presenting) which may not be fulfilling the function of developing understanding and promoting student learning. Furthermore, formal lectures did not engage the students in in-depth discussions which could have enhanced the learning of the peer learners.

5.4 Suggestions for applications for research

Being in the teacher's position for the first time presented the students a view of the elements required to become a good teacher. The students' recommendation to faculty was to make certain that faculty members attend formal training aimed at improving their teaching and facilitation skills. This will enhance the overall teaching and learning at SMU.

Implementing the peer teaching strategy earlier in the curriculum will provide students with the opportunity to practice the art of teaching and learning. This will encourage students to pursue a more self-directed approach to learning which can be honed from their initial years of study.

The use of an assessment tool and a feedback framework for students to evaluate their peers may enhance the significance of the role of the students learning from their peers and thus create a greater degree of activity between students. During the design of the peer teaching curriculum, different teaching strategies need to be explored and adapted to include different learning styles of students and motivate strategies that incite more dialogue between the peer teacher and peer learner.

Long-term follow-up with students in this study may provide insight into the influence peer teaching and peer learning had on their approach to learning and furthermore, to explore if this experience assisted them in the preparation for their future role as a doctor.

5.5 Closing

This research study firmly concludes that peer teaching stimulates students to actively learn through the process of preparation and through the teaching experience. However, as a peer learner, the use of formal lectures as a peer teaching strategy does not seem to encourage active student learning.

References

- Aggarwal, P. 2008. Social loafing on group projects structural antecedents and effect on student satisfaction. *Journal of Marketing Education*. 30(3):255-264.
- Artino, A.R., Rochelle, J.S.L. & Durning, S.J. 2010. Second year medical student's motivational beliefs, emotions, and achievements. *Medical Teacher*. 44:1203-1212.
- Bagg, R.B. & Tagg, J. 1995. From learning to teaching – A new paradigm for undergraduate education. *Change*. 27(6):12-25.
- Bandiera, G., Boucher, A., Neville, A., Kuper, A. & Hodges, B. 2013. Integration and timing of basic and clinical sciences education. *Medical Teacher*. 35:381-387.
- Bene, K.L. & Bergus, G. 2014. When teachers become learners. *Family Medicine*. 46(10):783-787.
- Benware, C.A. & Deci, E.L. 1984. Quality of learning with an active versus passive motivational set. *American Educational Research Journal*. 21(4):755-765.
- Bergly, C.M. 1996. Using triangulation in nursing research. *Journal of Advanced Nursing*. 24:122-128.
- Bonwell, C.C. & Elison, J.A. 1991. *Active learning: creating excitement in the classroom*. George Washington University. Washington DC: Ashe-Eric Higher Education Report 1.
- Boud, D., Cohen, R. & Sampson, J. 2001. *Peer learning in higher education: learning from and with each other*. UK: Kogan Page.
- Bowling, A. 2009. *Research Methods in Health. Investigating health and health services*. New York: Open University Press.
- Buckman, R. 2002. Communications and emotions. *British Medical Journal*. 325:679.
- Bulte, C., Betts, A., Garner, K. & Durning, S. 2007. Student teaching: views of student near-peer teachers and learners. *Medical Teacher*. 29(6):583-590.
- Burgess, A., McGregor, D. & Mellis, C. 2014. Medical students as peer tutors: A systematic review. *BMC Medical Education*. 14:115.

- Burman, N.J., Boscardin, C.K. & van Schaik, S.M. 2014. Career long learning: relationship between cognitive and metacognitive skills. *Medical Teacher*. 36:715-723.
- Chou, C.L., Masters, D.E., Chang, A., Kruidering, M. & Hauer, K.E. 2013. Effects of longitudinal small group learning on delivery and receipt of communication skills feedback. *Medical Education*. 47:1073-1079.
- Chi, M.T.H., de Leeuw, N., Chiu, M.H. & Lavancher, C. 1994. Eliciting self-explanations improves understanding. *Cognitive Science*. 18:439-477.
- Chickering, A.W. & Gamson, Z.F. 1987. Seven principles for good practice. *American Association for Higher Education (AAHE) Bulletin*. 39:3-7.
- Dandavino, M., Snell, L. & Wiseman, J. 2007. Why medical students should learn how to teach. *Medical Teacher*. 29:558-565.
- Deci, E.L. & Ryan, R.M. 1985. *Intrinsic motivation and self-determination in human behavior*. Boston: Springer.
- Deci, E.L. & Ryan, R.M. 2000. Intrinsic and extrinsic motivations: classic definitions and new directions. *Contemporary Educational Psychology*. 25:54-67.
- Deci, E.L. & Ryan, R.M. 2008. Facilitating optimal motivation and psychological well-being across life's domains. *Canadian Psychology*. 49(1):14-34.
- Denscombe, M. 2007. *The good research guide*. England: Open University Press.
- Dolmans, D., Wolfhagen, I., Grave, W.D. & van der Vleuten, C. 2005. Problem based learning: Future challenges for educational practice and research. *Medical Education*. 39:732-741.
- Driessen, E. 2014. When I say... metacognition. *Medical Education*. 48:561-562.
- Duffy, F.D., Gordon, G.H., Whelan, G., Cole-Kelly, K. & Frankel, R. 2004. *American Medicine*. 79(6):495-507.
- Dyche, L. 2007. Interpersonal skill in medicine: the essential partner of verbal communication. *Society of General Internal Medicine*. 22:1035-1039.

- Fink, L.D. 2003. *Creating significant learning experiences. An integrated approach to designing college courses*. San Francisco: Jossey–Bass.
- Flavell, J.H. 1979. Metacognition and cognitive monitoring. A new area of cognitive developmental inquiry. *American Psychologist*. 34(10):906-911.
- Flexner, A. 1910. *Medical Education in the United States and Canada Bulletin Number Four*. New York: The Carnegie Foundation for the Advancement of Teaching.
- Frambach, J.M., van der Vleuten, C.P. & Durning, S.J. 2013. Quality criteria in qualitative and quantitative research. *Academic Medicine*. 88(4):552.
- Frank, J.R., Snell, L. & Sherbino, J. (Editors). 2015. *CanMEDS 2015 Physician Competency Framework*. Ottawa: Royal College of Physicians and Surgeons of Canada.
- Frenk, J., Chen, L., Bhutta, Z.A., Cohen, J., Crisp, N., Evans, T., Fineberg, H., Garcia, P., Ke, Y., Kelley, P., Kistnasamy, B., Meleis, A., Naylor, D., Pablos-Mendez, A., Reddy, S., Scrimshaw, S., Sepulveda, J., Serwadda, D. & Zurayk, H. (2010) Health professionals for a new century: transforming education to strengthen health systems in an interdependent world. *The Lancet*. 376(9756):1923-1958.
- Furmedge, D.S., Iwata, K. & Gill, D. 2014. Peer-assisted learning- beyond teaching: How can medical students contribute to the undergraduate curriculum? *Medical Teacher*. 36:812-817.
- Gibbs, A. 1997. Focus groups. *Social research update*. 19(8), 1-8.
- Goldschmid, B. & Goldschmid, M.L. 1976. Peer teaching in higher education: a peer review. *Higher Education*. 5:9-33.
- Gregory, A., Walker, I., McLaughlin, K. & Peets, A.D. 2011. Both preparing to teach and teaching positively impact learning outcomes for peer teachers. *Medical Teacher*. 33:e417-e422.
- Graffam, B. 2007. Active learning in medical education: Strategies for beginning implementation. *Medical Teacher*. 29:38-42.
- Grabinger, R.S. & Dunlap, J.C. 1995. Rich environments for active learning: a definition. *Association for Learning Technology Journal*. 3(2):5-34.

- Gulpinar, M.A. & Yegen, B.C. 2005. Interactive lecturing for meaningful learning in large groups. *Medical Teacher*. 27(7):590-594.
- Gukas, I.D., Miles, S., Heylings, D.J. & Leinster S.J. 2008. Medical student's perceptions of peer feedback on an anatomy student-selected study module. *Medical Teacher*. 30:812-814.
- Harrison, C. & Wass, V. 2016. The challenge of changing to an assessment for learning culture. *Medical Education*. 50:702-708.
- Huberman, A.M. & Miles, M.B. 1994. *Qualitative data analysis* (2nd edition). London: SAGE.
- Hurst, J.W. 2004. The overlecturing and underteaching of clinical medicine. *Archives of Internal Medicine*.164:1605-1608.
- Johnson, D.W., Johnson, R.J. & Smith, K.A. 1998. Cooperative learning returns to college: what evidence is there that it works? *Change*. 30:27-35.
- Johnson, D.W. & Johnson R.J. 2005. New developments in social interdependence theory. *Genetic. Social and General Psychology*. 131(4):285-358.
- Johnson, D.W. & Johnson R.J. 2009. An educational psychology success story: social interdependence theory and cooperative learning. *Educational Researcher*. 38(5): 365-379.
- Karakitsiou, D.E., Markou, A., Kyriakou, P., Pieri, M., Abuaita, M., Bourgousis, E., Hido, T., Tsatsaragkou, A., Boukali, A., de Burbure, C. & Dimoliatis, I.D.K. 2012. The good student is more than a listener-The 12+1 roles of the medical student. *Medical Teacher*. 34:e1-e8.
- Kaur, D., Singh, J., Mahajan, A. & Kaur, G. 2011. Role of interactive teaching in medical education. *International Journal of Basic and Applied Medical Sciences*. 1(1):54-60.
- Kusurkar, R.A., Croiset, G., Ten Cate, T.H.J. 2011. Twelve tips to stimulate intrinsic motivation in students through autonomy supportive classroom teaching derived from self-determination theory. *Medical Teacher*. 33: 978-982.

- Lockspeiser, T.M., O'Sullivan, P., Teherami, A. & Muller, J. 2008. Understanding the experience of being taught by peers: the value of social and cognitive congruence. *Advances in Health Science Education*. 13:361-372.
- Lockyer, J.M., Hodgson, C.S., Lee, T., Faremo, S., Fisher, B., Dafoe, W., Yin, V. & Claudio, V. 2016. Clinical teaching as part of continuing professional development: does teaching enhance clinical performance. *Medical Teacher*. 38: 815-822.
- Manyama, M., Stafford, R., Mazyala, E., Lukanima, A., Magele, N., Kidenya, B.R., Kimwaga, E., Msuya, S. & Kauki, J. 2016. Improving gross anatomy learning using reciprocal peer teaching. *BMC Medical Education*. 16:95.
- Marree, K. 2007. *First steps in research*. Pretoria: Van Schaik.
- Mega, C., Ronconi, L. & Beni R.D. 2013. What makes a good student? How emotions, self-regulated learning and motivation contribute to academic achievement. *Journal of Educational Psychology*. 106(1):121-131.
- Metcalfe, J. 2009. Metacognitive judgements and control of study. *Current Directions in Psychological Science*. 18(3): 159-163.
- Modi, J.N., Chhatwal, A.J., Gupta, P. & Singh, T. 2016. Teaching and assessing communication skills in medical undergraduate training. *Indian Pediatrics*. 53(6):497-504.
- Mohamad, N., Abu Baker, N., Zulkifli, S.M., Norfaezah, L., Hao, T.W. & Khing, S.S. 2012. Implementation of peer teaching among medical students. *Procedia – Social and Behavioral Sciences*. 60:529-533.
- Moust, J.H.C. & Schmidt, H.G. 1995. Facilitating small group learning: a comparison of student and staff tutor's behavior. *Instructional Sciences*. 22:287-301.
- Mubuuke, A.G., Louw, A.J.N. & van Schalkwyk, S. 2016. Utilizing student's experiences and opinions of feedback during problem based learning tutorials to develop a facilitator feedback guide: an exploratory qualitative study. *BMC Medical Education*. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4709989/> [accessed 17/11/2017].
- Nelson, A.J., Nelson, S.V., Linn, A.M.J., Raw, L.E., Kildea, H.B. & Tonkin A.L. 2013. Tomorrow's educators...today? Implementing near-peer teaching for medical students. *Medical Teacher*. 35:156-159.

- O'Shanghnessy, S.M. 2017. Peer teaching as a means of enhancing communications skills in anaesthesia training: Training perspectives. *Ireland Journal Medical Science*. Available at: <https://link.springer.com/content/pdf/10.1007/s11845-017-1637-5.pdf> [accessed 15/08/2017].
- Pekrun, R., Elliot, A.J. & Maier, M.A. 2009. Achievement goals and achievement emotions: Testing a model of their joint relations with academic performance. *Journal of Educational Psychology*. 101(1):115-135.
- Plowright, D. 2011. *Using mixed methods: Frameworks for an integrated methodology*. Los Angeles: SAGE.
- Poole, G. 2012. The culturally sculpted self in self- directed learning. *Medical Education*. 46:728-737.
- Prince, M. 2004. Does active learning work? A review of the research. *Journal of Engineering Education*. 93(3):223-231.
- Pugh, D. & Regehr, G. 2016. Taking the sting out of assessment: Is there a role for progress testing? *Medical Education*. 50:721-729.
- Ramani, S. & Krackov, S.K. 2012. Twelve tips for giving feedback effectively in a clinical environment. *Medical Teacher*. 34:787-791.
- Rees, E.L., Quinn, P.J., Davies, B. & Fotheringham, V. 2016. How does peer teaching compare to faculty teaching? A systematic review and meta-analysis. *Medical Teacher*. 38(8):829-837.
- Rider, E.A. & Keefer, C. 2006. Communication skills competencies: definitions and a teaching toolbox. *Medical Education*. 40:624-629.
- Rodrigues, J., Sengupta, A., Mitchell, A., Kane, C., Maxwell, S., Cameron, H., Ross, M. & Ford, M. 2009. *Medical Teacher*. 31:e51-e57.
- Rohrer, D. & Pashler, H. 2012. Learning styles: where is the evidence? *Medical Education*. 46:630-635.
- Ross, M.T. & Cameron, S. 2007. Peer assisted learning: a planning and implementation framework: AMME Guide No 30. *Medical Teacher*. 29:527-545.

- Ryan, R.M. & Deci, E.L. 2000. Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychology Association*. 55(1):68-78.
- Ryan, R.M. & Deci, E.L. 2008. Facilitating optimal motivation and psychological well-being across life's domains. *Canadian Psychology*. 49(1):14-34.
- Saffari, Z., Takmil, F. & Arabzabeh, R. 2014. The role of educational technology in medical education. *Journal of Advances in Medical Education & Professionalism*. 2(4):183.
- Saldana, J. 2009. *The coding manual for qualitative researchers*. London: SAGE.
- Schmidt, M. 2010. Learning from teaching experience: Dewey's theory and preservice teacher's learning. *Journal in Music Education*. 58(2):131-146.
- Schunk, D.H. 2012. *Learning theories: an educational perspective*. (6th ed). Boston: Pearson.
- Schuwirth, L. & van der Vleuten, C. 2004. Merging views on assessment. *Medical Education*. 38:1208-1211.
- Sefakgo Makgatho Health Sciences University. 2015. School of Medicine Selection Committee meeting minutes.
- Smith, R. 1999. "I don't know: the three most important words in education. *BMJ: British Medical Journal*. 318:7193.
- Spencer, J.A. & Jordan, R.K. 1999. Learner centered approaches in medical education. *BMJ: British Medical Journal*. 318:1280-1283.
- Strauss, A. & Corbin, J. 1990. *Basics of grounded theory methods*. Beverly Hills: SAGE.
- Stalmeijer, R.E., Mcnaughton, N. & van Mook, W.N. 2014. Using focus groups in medical education research. AMEE Guide No 91. *Medical Teacher*. 36(11):923-939.
- Stigmar, M. 2016. Peer to peer teaching in higher education: a critical literature review. *Mentoring and tutoring: Partnership in learning*. 24(2):124-136.
- Tavakol, M. & Sandars, J. 2014. Quantitative and qualitative methods in medical education research: AMEE Guide No 90: Part 1. *Medical Teacher*. 35:746-756.

- Taylor, D.C.M. & Hamdy, H. 2013. Adult learning theories: Implications for learning and teaching in medical education: AMEE Guide No 83. *Medical Teacher*. 35:e156-e1572.
- Ten Cate, O., Snell, L., Mann, K. & Vermunt, J. 2004. Orientating teaching towards the learning process. *Academic Medicine*. 79(3): 209-228.
- Ten Cate, O. & Durning, S. 2007a. Dimensions and psychology of peer teaching in medical education. *Medical Teacher*. 29(6):546-552.
- Ten Cate, O. & Durning, S. 2007b. Peer teaching in medical education: twelve reasons to move from theory to practice. *Medical Teacher*. 29(6):591-599.
- Ten Cate, O., Rashmi, A., Willams, G.C. & Willams, K. 2011. How self-determination theory can assist our understanding of teaching and learning processes in medical education. AMEE Guide No 59. *Medical Teacher*. 33:961-973.
- Thiede, K.W. & Therriault, D.J. 2003. Accuracy of metacognitive monitoring affects learning of texts. *Journal of Educational Psychology*. 95(1):66-73.
- Topping, K.J. 1996. The effectiveness of peer tutoring in further and higher education: A typology and review of the literature. *Higher Education*. 32:321-345.
- Topping, K.J. 2005. Trends in peer learning. *Educational Psychology*. 25(6):631-645.
- Topping, K.J. & Ehly, S. (Eds.). 1998. *Peer-assisted learning*. Mahwah NJ and London UK:Lawrence Erlbaum.
- Topping, K.J. & Ehly, S. 2001. Peer assisted learning: a framework for consultation. *Journal of Educational and Psychological Consultation*. 12(2):113-132.
- Torre, D.M., Daley, B.J., Sebastian, J.L. & Elnicki, D.M. 2006. Overview of current learning theories for medical educators. *The American Journal of Medicine*. 119(10):903-907.
- Torre, D.M., van der Vleuten, C. & Dolmans, D. 2016. Theoretical perspectives and applications of group learning in PBL. *Medical Teacher*. 38: 189-195.
- Van de Ridder, J.M.M., Stokking, K.M., McGaghie, W.C. & Ten Cate, O. 2008. What is feedback in clinical education? *Medical Education*. 42:189-197.

- Van Vliet, E.A., Winnips, J.C. & Brouwer, N. 2015. Flipped class pedagogy enhances student metacognition and collaboration learning strategies in higher education but effects does not persist. *CBE Life Sciences Education*. 14:1-10.
- Veerman, M.V.J., van Hout–Wolters, H.A.M. & Afflerbach, P. 2006. Metacognition and learning: conceptual and methodological considerations. *Metacognition Learning*. 1:3-14.
- Vermunt, J.D. 1996. Metacognitive and affective aspects of learning styles and strategies: A phenomenographic analysis. *Higher Education*. 31:25-50.
- Vermunt, J.D. & Verloop, N. 1999. Congruence and friction between learning and teaching. *Learning and Instruction*. 9:257-280.
- Vygotsky, L. 1978. *Interaction between learning and development*. Cambridge: Harvard University Press.
- Ward, J.P., Gordon, J., Field, M.J. & Lehmann, H.P. 2001. Communication and information technology in medical education. *The Lancet*. 357:792-796.
- Wayne, S.J., Fortner, S.A., Kitzes, J.A., Timm, C. & Kalishman, S. 2013. Cause and effect? The relationship between student's perception of the medical school learning environment and academic performance on USMLE Step 1. *Medical Teacher*. 35:376-380.
- Whitman, N.A. 1988. *Peer teaching: to teach is to learn twice*. ASHE-ERIC Higher Education Report No 4. Washington D.C.: Association for the Study of Higher Education.
- Wormald, B.W., Schoeman, S., Somasunderam, A. & Penn, M. 2009. Assessment drives learning: An unavoidable truth? *Anatomical Sciences Education*. Available at: <https://www.researchgate.net/publication/26801830> [accessed 21/09/2017].

Addendums

Addendum 1: List of clinical themes and topics for presentation

Clinical themes and topics

	Theme	Topic	2016 proposal of topics
1	Patient with dyspnea	Applied anatomy and physiology of the respiratory system	Family Medicine & Internal Medicine
		Asthma	
		Cardiac failure	
		Pulmonary embolism	
		COPD	
		TB	
2	Patient with fever	Physiology of thermoregulation	Internal Medicine
		Immune response: infectious and non-infectious causes of fever	
3	Patient with thyroid disease	Applied anatomy and physiology of the thyroid	Chemical Pathology & Surgery & Internal Medicine
		Hyperthyroidism	
		Hypothyroidism	
		Thyroid enlargement and tumors	
4	Patient with heartburn and epigastric pain	Applied anatomy and physiology of upper GIT	Surgery & Internal Medicine
		Peptic ulcer disease	
		Hiatus hernia and GERD	
		Gallbladder disease	
		Pancreas disease	
5	Patient presenting at Orthopaedic department with the following diagnosis	Open fractures	Orthopaedic
		Osteomyelitis	
		Osteoarthritis	
6	Patient with severe traumatic injury	Primary evaluation and resuscitation	Skills center
		Paediatric trauma	
		Head and spine injuries	
		Chest injuries	
		Abdominal and pelvic injuries	
		Burns	
		Drowning and	

		suffocation/choking	
7	Patient presenting with bleeding	Physiology of coagulation	Hematology
	Patient presenting with fever and leukocytosis	DIC – clinical presentation, pathophysiology and management	

Addendum 2: Questionnaire and focus group interview questions

Title of Study: The use of peer teaching to promote active learning amongst senior medical student.

Please complete this questionnaire as honestly as possible. It is anonymous to protect your identity.

Demographics:

Gender: Male /Female

Age:

Race group:

As a peer teacher:

1. Is this the first time you presented a formal lecture to your classmates? Yes / No
2. If no provide more details.

3. Did your preparation for the lecture help you learn the topic? Yes / No
4. If yes, in what way did the preparation help your learning?

5. If no, why do you think the preparation was not helpful in your learning?

6. How did this preparation impact the retention of your knowledge of the topic?

7. How do you feel about lecturing /teaching to your classmates?

As a peer learner:

8. Did you find that the teaching from your peer adequate for your learning? Yes /No

9. How do you feel about the learning from your peers lecture/ teaching?

10. What do you consider are the strengths of students teaching students?

What do you consider are the weaknesses of students teaching students?

Addendum 3: Ethical clearance from University of Stellenbosch



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Approval Notice Response to Modifications- (New Application)

24-Feb-2016
Sukrajh, Verona V

Ethics Reference #: [Copyright]
Title: The use of peer teaching to promote active learning at senior students

Dear Dr Verona Sukrajh,

The **Response to Modifications - (New Application)** received on **17-Feb-2016**, was reviewed by members of **Health Research Ethics Committee 2** via Expedited review procedures on **23-Feb-2016** and was approved.
Please note the following information about your approved research protocol:

Protocol Approval Period: **23-Feb-2016 -22-Feb-2017**

Please remember to use your **protocol number** [Copyright] on any documents or correspondence with the HREC concerning your research protocol.

Please note that the HREC has the prerogative and authority to ask further questions, seek additional information, require further modifications, or monitor the conduct of your research and the consent process.

After Ethical Review:

Please note a template of the progress report is obtainable on [Copyright] and should be submitted to the Committee before the year has expired. The Committee will then consider the continuation of the project for a further year (if necessary). Annually a number of projects may be selected randomly for an external audit.

Translation of the consent document to the language applicable to the study participants should be submitted.

Federal Wide Assurance Number: [Copyright]
Institutional Review Board (IRB) Number: [Copyright]

The Health Research Ethics Committee complies with the SA National Health Act No.61 2003 as it pertains to health research and the United States Code of Federal Regulations Title 45 Part 46. This committee abides by the ethical norms and principles for research, established by the Declaration of Helsinki, the South African Medical Research Council Guidelines as well as the Guidelines for Ethical Research: Principles Structures and Processes 2004 (Department of Health).

Provincial and City of Cape Town Approval

Please note that for research at a primary or secondary healthcare facility permission must still be obtained from the relevant authorities (Western Cape Department of Health and/or City Health) to conduct the research as stated in the protocol. Contact persons are [Copyright] at Western Cape Department of Health [Copyright] and [Copyright] at City Health [Copyright]. Research that will be conducted at any tertiary academic institution requires approval from the relevant hospital manager. Ethics approval is required BEFORE approval can be obtained from these health authorities.

We wish you the best as you conduct your research.

For standard HREC forms and documents please visit: [Copyright]

If you have any questions or need further assistance, please contact the HREC office at [Copyright]

Addendum 4: Ethical clearance from SMU



**Sefako Makgatho Health Sciences University
Research & Postgraduate Studies Directorate
Sefako Makgatho University Research Ethics Committee
(SMUREC)**

Molotlegi Street, Ga-Rankuwa 0208
Tel: (012) 521 5617/3698 | fax: (012) 521 3749
Email: lorato.phiri@smu.ac.za
P.O. Box 163 Medunsa 0204

Dr V Sukrajh
Practice of Medicine
Copyright

Dear Dr Sukrajh

RE: DR V SUKRAJH - REQUEST PERMISSION TO CONDUCT A STUDY AT SMU

SMUREC NOTED a letter dated 04 March 2016 requesting permission to conduct a research study at Sefako Makgatho Health Sciences University.

Study Title:	The use of peer teaching to promote active learning at senior students
Researcher:	Dr V Sukrajh
University:	University of Stellenbosch
Qualification	MPhil Health Science Education
Ethics Reference No:	Copyright
Approval letter date:	24 February 2016

SMUREC APPROVED and GRANTED the researcher permission to conduct the above mentioned study at Sefako Makgatho Health Sciences University.

Yours Sincerely,

Copyright

Copyright

DEPUTY CHAIRPERSON SMUREC

07 April 2016



**SEFAKO MAKGATHO
HEALTH SCIENCES UNIVERSITY**
SMU Research Ethics Committee
Chairperson

Date: 07/04/2016.....

Addendum 5: Information leaflet and consent form

PARTICIPANT INFORMATION LEAFLET

TITLE OF THE RESEARCH PROJECT: The use of peer teaching to promote active learning amongst senior medical students

REFERENCE NUMBER: Copyright

PRINCIPAL INVESTIGATOR: Dr V Sukrajh

ADDRESS: Practice of Medicine, School of Medicine, Sefako Makgatho Health Science University, Skills Centre building, Basement, Office number 7

CONTACT NUMBER: Copyright

Dear Student

My name is Dr V Sukrajh and I would like to invite you to participate in a research project that aims to understand your perception of peer teaching as a form of active learning during the year rotation.

Please take some time to read the information presented here, which will explain the details of this project and contact me if you require further explanation or clarification of any aspect of the study. 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 (HREC) at Stellenbosch University** and will be conducted according to accepted and applicable National and International ethical guidelines and principles, including those of the international Declaration of Helsinki October 2008.

Confidentiality and anonymity will be maintained throughout the gathering of information and all responses shared during the study be kept private. Data will be presented in an anonymous manner to protect the identities. The result of this study is to be presented to the Curriculum Development Committee as feedback to the changes made in the curriculum. This will assist the committee members on the decision forward on the use of peer teaching at senior students in the future.

If you are willing to participate in this study please sign the attached Declaration of Consent and place it in the box available.

Yours sincerely

Dr V Sukrajh

Principal Investigator

Declaration by participant

By signing below, I agree to take part in a research study entitled

I declare that:

- I have read the attached information leaflet 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 pressurized to take part.
- I may choose to leave the study at any time and will not be penalized or prejudiced in any way.
- I may be asked to leave the study before it has finished, if the 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