FACTORS AFFECTING CLINICAL PERFORMANCE OF DENTAL THERAPY AT INSTITUTE OF HEALTH SCIENCES GABORONE

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Submission date

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CERTIFICATION

CERTIFICATION

This is to certify that the thesis, titled: **Factors affecting clinical performance of dental therapy students at Institute of Health Sciences- Gaborone,** submitted by **Khumo Rapula Peter**, as a partial fulfilment of the requirement for the award of Degree of Master in Higher Education at Botho University is a genuine work under my guidance and supervision. The results embodied in this thesis have not been submitted for any other degree or diploma.

21st April 2021

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DECLARATION

DECLARATION

I **Khumo Rapula Peter**, declare that the work in this dissertation titled: **Factors affecting clinical performance of dental therapy students at Institute of Health Sciences- Gaborone,** has been carried out by myself at Botho University, in the faculty of education, department of Blended and Distance Learning. The information derived from the literature has been duly acknowledged in the text and a list of references has also been provided. Furthermore, no part of this dissertation has been presented previously for another degree or diploma at this or any other institution.

..... 13/04/21 .....

Khumo Rapula Peter **DATE**

DEDICATION

This serves as a tribute, in loving memory of my beloved cousin, Keodiretse K.D Monyatsi, who passed away on the 26 March 2021 (just a week before I was about to submit this thesis), due to covid-19. He left a huge void in our hearts as a family, as he was our role model, our big brother our hero. May his soul rest in perfect peace. I also dedicate it to my lovely wife Pako Peter who was, and is and will always be my pillar of support as she spent sleepless nights keeping me on toes to complete this project. It would be a huge mistake if I forget the apple of my eye, my beloved son in whom I am well pleased, Caleb Pule Peter who is always in my heart, giving me the reason to live and lastly but not least my entire family and siblings who are always proud of my personal achievements. I dedicate this to you all and I say God bless you!.

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ABBREVIATIONS

A.A.D.-Alma Ata Declaration

C.P.X- Clinical Performance Examination

C.R.E.A.T.E-Classification Rubric for E.B.P Assessment Tools in Education

CAT-NE-Clinical Assessment Tool for Nursing Education.

D.A.P-Dental Action Plan

D.A.R-Dental Auxiliary Review

D.T-Dental Therapist

E.B.P- Evidence Based Practices

G.P.A- Grade Point Average

HIV/AIDS-Human Immuno-deficiency Virus/ Acquire Immuno-Deficiency Syndrome

I.H.S-Institute of Health Sciences

O.S.C.E- Objective Structured Clinical Examination

P.A-Portfolio Assessment

P.H.C-Primary Health Care

P.H.C.A-Primary Health Care Approach

P.P.E-Personal Protective Equipment

S.D.S-School of Dental Services

T.P.A- Treatment Planning Assessment

V.M.A-Video Monitoring Assessment

W.H.O- World Health Organization

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ABSTRACT

This study was carried out to determine factors that affect clinical performance of dental therapy students at institute of health sciences in Gaborone. A quantitative descriptive research design with cross-sectional survey was used with the aim of examining the factors affecting clinical assessment of learners. A sample of 9 students were used to study. Attitudes were measured using a prepared questionnaire which was answered online. Two clinical assessment tools were used to assess the learners. One was a standard clinical tool used at the institution, another was a modified clinical assessment tool. The results of the t-test shows there is no difference in clinical performance using a standard and modified assessment tools. Pearson product moment shows a strong association between theory and clinical performance both tools as well as between learners attitude and the clinical performance using both clinical assessment tools. Finally, the t-test results once again show that there is no difference in clinical performance of both male and female. Recommendations made by the researcher are that 1) the clinical assessment instruments need to be reviewed at least after a certain period of time,(3 years is suggested because there are only three levels of study so it is essential that all students use the same tool, 2) the program needs to be improved, partnering with other international institutions can help make learners interested in the course hence change their attitude.

***Keywords**: Clinical assessment tools, Theoretical performance, Attitudes, Male and female learners*

1.0. CHAPTER 1

INTRODUCTION:

Dentistry is predominantly a practical medical program. It emphasizes patient's clinical care which includes history taking, relevant investigations, proper diagnosis, treatment and referral to relevant specialists. In some schools, dental students are trained to start attending to patients from early stages of the training course, mostly from the third year onwards.

These students are basically trained to provide invasive, irrevocable treatment of patients in their care. They develop the knowledge, skills and attitudes necessary to equip them to be competent, and independent practitioners by the time they graduate (Manogue, Brown & Foster, 2001). Therefore, the dental clinic provides the platform in which students would transfer the knowledge from the basic sciences into practical through restructuring their minds. The clinical instructors train the students to independently acknowledge that patient care is essential during of their clinical practice (Gerzina, McLean & Fairley , 2006), and through this training and support, dental teams can understand the role of dental therapists and develop practical processes to facilitate their contribution to patient oriented oral healthcare in general dental practice (Barnes, Emma, Bullock, Ivor & Chestnut, 2019).

Currently, Botswana only offers one dental program (Diploma in Dental Therapy) at the Institute of Health Sciences in Gaborone. It comprises of two parts: theory and practical. The program is completed in six (6) semesters. The first three semesters are entirely theoretical, with a lot of introductory courses. From the fourth to the final semester, the students are then introduced to practical courses/ modules. In these last three semesters, the theory and practice usually run concurrently and the students are expected to pass both theory and practicum in order to progress to the next level. The practical section itself is divided into community oral health practice and clinical practice. The community health practice is mainly practised in a particular (selected) community to carry out the project, it entails, oral health education and screening, whereas the clinical practice is done in hospitals and several other clinics, and performed on the already identified patients. Patients may either be identified from within the community or in the clinics.

When doing assessments of the students in these courses, the researcher observed that there was a noticeable difference in the students' performances in both theory and practical sections of the course. They tend to obtain lower marks in the clinical part as compared to theory. Furthermore, the students usually demonstrate lack of competence or perform

ineffectively when they are in the clinical setting. Even when they are asked basic questions they seem to find it difficult to apply what they have learnt in class on real patients.

This pattern of performance caught the attention of the researcher. Therefore, this study seeks to find out if there are any factors that influence clinical performance of the dental therapy students. Therefore, there is need for thorough investigations to determine the possible factors that may be affecting their clinical performance.

1.1. BACKGROUND

Botswana's health care system is based on the primary health care (PHC) strategy and since the Alma Ata Declaration of 1978 (AAD), the government has forged ahead in ensuring appropriate and affordable health care. The adoption of the primary health care approach (PHCA) and education of appropriate oral health personnel was an attempt to shift from a conventional approach (Which is predominantly treatment-oriented) to prevention approach, because it was ineffective and unaffordable in many developing nations (University of Botswana, & Ministry of health, 2008).

According to the University of Botswana and Ministry of Health (2008) Botswana sought to effectively realize the goals and tenets of primary health care, by initiating a three-year diploma programme for dental therapists in 1983 based on national oral health plan (University of Botswana, & Ministry of health, 2008). As Blue and Kaylor (2016) testify, this move was primarily inspired by a chronic shortage of dentists, the importance of oral health, and the lack of access to oral care led to the introduction of these new oral health practitioners. Prior to the current training curriculum, the initial version put more emphasis on community health orientation through oral disease prevention and oral health promotion to address the country's then present needs, where as in some other countries such as New Zealand, dental therapists (formerly known as dental nurses) have been trained since 1921 and subsequently employed in the public sector, primarily in the School of Dental Service (SDS) (Moffat & Coates, 2011). That is why in their study, Masetla and Mthethwa (2018) described dental therapists as primary oral health care professionals that are trained to perform basic clinical dental treatment and preventive services within a variety of practice settings (Masetla & Mthethwa, 2018). Meanwhile,in the United Kingdom, policy and guidance changes regarding the role of dental therapists (DTs) were implemented in recent years with a view to changing dental care to a more prevention focused teamwork approach. However, success in the adoption of this model of working has been varied (Barnes, et al., 2019). As a result, this provided a platform for those countries that encouraged multi-

disciplinary health teamwork, because they considered dentists and dental hygienists/therapists as the two most prominent professionals within the community who provide oral health care. However, since 1913 the dental therapy profession has changed remarkably (Reinders, Krijnen & Onclin, 2017) because initially the dental therapist used to operate under supervision of dentists in public services in South Africa as part of multi-disciplinary health care team. But now they have been allowed to practice independently since 1992 (Masetla & Mthethwa, 2018), and nowadays, the two professionals work together. In the newly built primary hospitals one would find that dental therapists are treating a high number of uninsured and underinsured patients, which clearly indicate that they are indeed expanding access to dental care in rural areas as well as in developed areas. Dentists appear to have an adequate workload for dental therapists and are delegating a full range of procedures within their scope of practice. In South Africa, it is stated that when a dental therapist was employed, the dentist performed fewer restorative and preventive procedures.(Blue & Kaylor, 2016).

Now, with advent of new diseases like HIV/AIDS, Covid-19 and other opportunistic infections, in Botswana, the curriculum has been revised and more materials have been introduced not only to enhance knowledge but also the clinical skills of the graduates . This was done in an effort to follow global trend, in which more clinical procedures that are introduced to the learners as opposed to those days when they only focused on holistic care of patients. For instance, in South Africa, not only did they focus on oral health promotion and education but also on curative measures such as alleviation of oral abnormalities, pain and disease (Masetla & Mthethwa, 2018). So, the scope within which they were operating involved; examination, diagnosis and treatment planning; exposing radiographs; oral health education; preventive services such as prophylaxis, fluoride therapy, fissure sealants and dietary counselling, preparation of cavities in primary and permanent teeth and restoration with amalgam and composite, stainless steel crowns, pulpotomies, and the extraction of primary teeth (children's teeth). However, these clinicians were limited as they were only trained to be able to do only one type/class of restoration (commonly known as "fillings", on a tooth) called class I, which is only performed on posterior teeth. The same approach is adopted in the UK, as the scope of practice was widened in terms of both their permitted duties and their range of clinical settings. This was facilitated by the increasing number of students entering the program (Rowbotham, Godson & Williams, 2009), while in the US the dental therapists may also extract permanent teeth (adult teeth), as well (Nash, Friedman &

Mathu-Maju, 2012), and the newly revised curriculum now has grafted in a curative approach after making needs assessments across the country. So, the learners are required to do all other types/classes of restorations, i.e. from class I, through to class VI. Now the graduates of the programme are expected to function in a network of multi-disciplinary health care facilities in the country such as district and primary hospitals.

It is quite obvious that a dental therapist is the only individual in the field of dentistry that provides dental services at grass roots level. They are usually placed in remote areas while dentists are concentrated in cities and towns. However, Freeman (2013) observed that providing accessible primary dental care is a challenge for those planning the delivery of dental services in remote areas. Therefore, suggestion was made that there needed to be an expansion of dental care workforce to explore alternative models to provide oral health care especially for vulnerable children due to the scarcity of dentists in those rural and underserved areas, and dentists alone cannot meet that need. He further noticed that these difficulties in meeting the demands for dental care in those areas may have motivated the World Health Organisation (WHO) (e.g. the Primary Health Care Approach, WHO), governments (e.g. the 'Dental Action Plan', Scottish Executive) and the dental profession (e.g. Dental Auxiliary Review: Dental Auxiliary Review Group) to examine workforce strategies to increase the availability, affordability and accessibility of primary dental care for those residing in remote-rural areas (Freeman, Lush, MacGillveray, Themessl-Huber & Richards ,2013).

Due to the upgrading of current district hospitals and construction of primary hospitals in Botswana, more highly skilled dental therapists are required to manage these facilities because of the alarming rate at which dentists are quitting the government sector and open their own private practice clinics. To make matters worse, they recruit some of the dental therapists or even partner with them. Some of the dentists even migrate to other countries searching for greener pastures. So this high proportion of migrant dentists from lower middle income countries points towards deficiencies in oral health service systems and in dental workforce policy, both for these source countries and for the countries they migrate to (Balasubramanian, Spencer, Short, Watkins,Chrisopoulos & Brennan., 2015).

1.2. THEORETICAL AND CONCEPTUAL FRAMEWORK

Clinical Performance in this context, refers to the ability of students to meet certain clinical standards that have been set concerning patients' needs across the cadre. Below is a diagram that shows what really constitute clinical performance, the clinical standard that the learners are expected to meet, and it must be noted that they are measured using clinical assessment tools that are developed by the department of dental therapy.

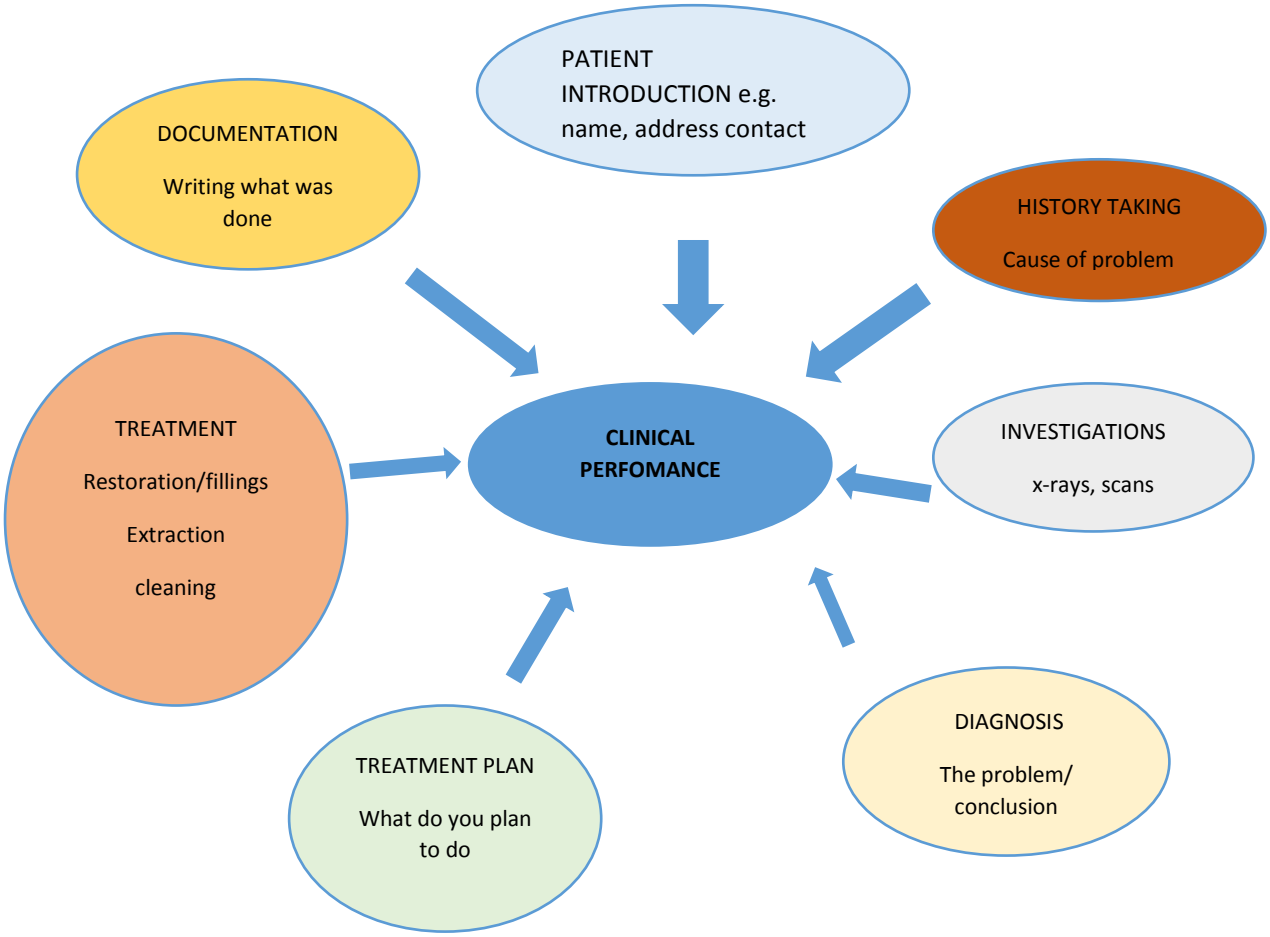

Figure 1: Showing constituents of clinical performance in a conceptual framework

This diagram shows the steps taken when the patient is attended to, by a clinician/student during practical. To fully understand the diagram, the steps are followed in a clockwise manner: the patient is introduced. As he/she enters the consultation room, they would be greeted. It is at this stage where they would asked names and social background. Then they would asked to present the problem that brought them to the clinic. They would be asked to describe their discomfort, when it started and

what they have been doing to help address it, and they would be further asked about the presence of any other medical conditions besides their dental complaints.

After clinical examination, the practitioner would carry out relevant investigations e.g. x-rays, and other dental tests. This is done in order to find out what is the exact problem (diagnosis). After obtaining diagnosis, treatment plan is drawn. The treatment priority is given to the presenting complaint, then the more urgent problems until the patient is stabilized.

After the treatment has been done. The practitioner would document everything they have done on the patient. This helps the practitioner to know what the patient needs during their next visit. Also it helps during the follow up visit, in case the patient is attended by a different person. Now this framework is meant to help the researcher to focus on the basic concepts when explaining the factors that affect students' practical performance. These are standards that the learners are expected to meet when doing their practical work.

1.3. RESEARCH PROBLEM

For the past three years, the researcher has observed that dental therapy students have been getting relatively lower marks in their clinical practice compared to the theory. This pattern of performance has been evident during both formative and summative assessments. It is believed that there may be factors that exist and affect the clinical performance of the students. Therefore, it was found essential that further investigations need to be done to determine these factors.

This study is mainly concentrated on the following factors: assessment methods (which include the use of clinical assessment tools as well as the theoretical assessment tools.), students attitudes and students' gender. Other equally important factors which would not be addressed in this study, but may have contributed to the problem, include: the teaching methods, curriculum overload (studied within a relatively short period of time), admission policies, lecturers' attitudes and motivation, lecturers qualifications and teaching skills, students' socioeconomic challenges, shortage of resources, technology and psychological factors related to learning.

Students' attitude toward the program might have had impact on their clinical performance perhaps as a result of wondering about the future of the cadre. Ahmed (2016) concurs with this assertion that anxiety concerning the future is one of the main features as a result of economic and social changes, and increasingly emerges among university students not only because of the fear of failure in the program, but also because of the fear of lack of job opportunities: which affects joining their specializations. They may subsequently realize that the program they are studying is not in line with their dreams, as such they start to be disinterested. For instance, they start putting less effort in their studies and getting less involved practical sessions. The students' attitude-as described by Geramian (2012), is the way one talks, thinks, behaves, and feels that shows his or her differences-usually plays a huge role in their learning process and this is more expressed during clinical part of the course the researcher observed that the students tend to come late to the clinic, sometimes they are pushed hard to identify patients for themselves. They also defy clinical safety protocols as they prefer to put on their personal clothing when coming to the clinic as opposed to proper personal protective equipment (PPE). This seems to contribute to their struggling to keep up with clinical standards (including clinical skills that they were expected to muster, they also miss clinical instructions given to students before they attend to patients,

and as for the dress codes, they are part of the assessment, as indicated in the assessment tool, hence making them score lower marks) and ultimately their general clinical performance is affected.

They tend to focus on only getting to pass the exams instead of gaining and understanding and applying the theoretical concepts and apply them. This is evident as the researcher noticed the trend which shows that they do very well in their theory but when a question that requires clinical application is pitched, they have no idea how to tackle it, because they would have only crammed the information, without analysing it critically. This may prove difficult when it comes to clinical sessions as they are only effective during physical contact as it involves patient care.

Gardona and Barbosa (2018) believe that the clinical assessment tools should have the capability of objectively identifying important physical and psychic and spiritual changes, examining subjective phenomena and regularly monitoring the progression, regression or stagnation of a health-disease state. However, those that are used, may also contribute to the way marks are allocated to students. They may be inadequate, because they don't have performance criteria, so they may be difficult to interpret, as they do not guide the assessor as to whether the student is doing well or struggling in a particular clinical scenario. Each procedure is allocated marks. However it is easy for assessors to award marks for students in each procedure because there is no performance criterion to guide them.Therefore, this may lead to a lot of subjectivity among assessors when allocating the marks. This may have led to inconsistencies in performances because all that is seen in terms of performance is marks, which does not truly reflect the actual performance of a student given a particular clinical (physical) set up.

While both, males and female are enrolled, in the program it remains to be seen whether their gender orientation plays any roles in their clinical performance. So, the researcher seeks to find out if this had bearing in clinical performances both sets of learners.

1.3.1. RESEARCH STATEMENT

The researcher sought to find out factors that affect the clinical performance of dental therapy students at Institute of Health Sciences in Gaborone.

1.4. RESEARCH AIM

The aim of this study was to determine factors that affect the clinical performance of dental therapy students at Institute of Health Sciences in Gaborone.

1.4.1. RESEARCH OBJECTIVES

i. To determine the impact of differently developed clinical assessment tools on the learners clinical performance
ii. To find out any correlation between learners theoretical performance and clinical performance with different clinical assessment tools.
iii. To find out any correlation between learners attitude and their clinical performance.
iv. To find out the difference between clinical performance of female and male learners.

1.4.2. RESEARCH QUESTIONS

i. Does clinical performance of learners differ with different types of assessment tools?
ii. Is there any correlation between theoretical performance and clinical performance of dental therapy learners with different assessment tools?
iii. Is there any correlation between learners attitude and their clinical performance?
iv. Do female learners clinical performance differ from that of male learners?

1.4.3. HYPOTHESES

H_{01}: There is no difference in clinical performance of learners with different types of assessment tools.

H_{a1}: There is a difference in clinical performance of learners with different assessment tools.

H_{02}: There is no correlation between learners theoretical performance and their clinical performance with different types assessment tools**.**

H_{a2}: There is a correlation between learners theoretical performance and their clinical performance with different clinical assessment tools.

H_{03}: There is no correlation between learners attitude and their clinical performance.

H_{a3}: There is correlation between learners attitude and their clinical performance.

H_{04}: There is no difference between female and male learners clinical performance.

H_{a4}: There is a difference between female and male learners clinical performance.

1.5. SIGNIFICANCE OF THE STUDY.

1.5.1. Developing knowledge

The study results will also motivate the institution to encourage and support students to do research, because it would have been conducted within the institution and would have revealed certain areas that need improvements. After this study has been published, it will bring more information to the education domain. Learners would have access to it and would refer to it while they carry out similar researches. They would also have more knowledge about what they could have done better during their tenure, and they would seek to improve on those areas of weaknesses that the study would have pointed out, thus improving as individuals.

1.5.2. Clinical performance

The results would act as points of reference that learners would use as they seek to improve their own clinical performance. As pointed out before, until one carries a study, there would be nothing to bring to attention any underlying loopholes in the educational system that may have contributed to reduced quality of performance. For instance, the clinical assessment tools may have to be reviewed and modified so that they would capture clinical performance of students effectively and efficiently . This would help students to know which areas they need to focus on when studying for clinical practice.

Awareness of attitudes

Learners' attitudes toward clinical practice are bound to change/improve. They would get to know what is at stake and how important it is to portray certain behaviours as professionals. The most important aspect is that they recognize the value of their profession in the dental sector and how much they are needed in the society. Studies such as this would raise the standard of students' performance, they would learn to search information for themselves, as such becoming responsible candidates and future leaders. It would also raise their awareness that many more subject areas would need more research to unearth new ideas. Hence create more excitement and zeal toward their clinical practice, as they would seek to experience new things in the clinical field.

1.5.3. Institution , ministry of education and health

Results will definitely assist researchers. There will be more information to reference from and rely on during subsequent studies. Very little is known about oral health and no study has been conducted in Botswana concerning dental area, therefore the study would bring awareness even to the policy makers and curriculum developers. Their decision making would be influenced by information which would have been published, because the literature would be relevant.

The institution would be able to re-visit their method of assessments by reviewing their assessment tools, seek to find out how their students can be motivated to address their attitude toward their learning process. Furthermore, curriculum developers in higher education institutions would be provided with concrete evidence to enable them to address and improve dental therapy students' clinical performance by putting necessary measures in place as per recommendations.

1.6. JUSTIFICATION FOR THE STUDY

Whenever there are any effects on academic performance of the students, it is necessary to carry out a research to find out what could be the cause of the problems. To be able to do so, it is imperative to engage students to determine their experiences to help in carrying out the research.

Therefore, as mentioned in the problem statement, students have been getting lower marks in their clinical practice and also that they had been struggling to apply what they learnt in class on real life patients. Hence the study is carried out to determine what leads to such performance by the learners. Consequently, this study seeks to find out how these factors can be averted and recommend what needs to be done for improvement purposes. Furthermore, there have little or no studies of this kind, carried out in the country, that would have help highlight such issues. This lack of research papers in the country may have led to uncertainty surrounding the dental cadre because it is less known and appreciated.

The study would also ensure that quality is not compromised while effectively producing competent and mature clinicians who are able to handle situations on their own. One of the key issues is that most of the clinicians do not want to go and work in rural areas and therefore, depriving those people oral health attention. So our students would be well

equipped to meet the needs of those people. So this study would be of great value in fine tuning and closing that gap effectively hence meeting the aims that were initially set by primary health care facilitators and policy makers and as said by Mahnaz et al. (2012) these findings could be used to rebuild a work environment by health policy makers that supports health workers in providing comprehensive professional care.

1.7. LIMITATIONS OF THE STUDY

1.7.1. Sample size

The fact that the program is offered in only one institution nationwide, entailed that the research be carried out in a single institute this affected the study it difficult to compare with any other institution because there would be limited to one institution with a very small population, especially that only a maximum of 8 students are admitted in the program yearly and any drop-outs will be added to the upcoming class, that is why the study has got 9 participants.

1.8. BRIEF RESEARCH DESIGN

Quantitative descriptive research design with cross-sectional survey. The aim was to examine the factors affecting clinical assessment of learners. A sample of 9 students would be used. Learners' attitudes would be measured using a prepared questionnaire which would be answered online and also use observational method (through the use assessment tools) to collect data.

1.9. CONCLUSION

This chapter was mainly focused on the background of the dental therapy program, the research problem, the research theoretical and conceptual framework, research aims and objectives, justification of the study and the significance of the study. The background of the dental therapy program highlighted that the adoption of primary health care by the Ministry of Health in Botswana prompted the oral health department to introduce the program. which was mainly focusing on community oral health education. The curriculum was later reviewed in 2008, and incorporated curative approach. The aims and objectives, as well as the theoretical and conceptual framework, give the direction of the study while the justification of the study and significance of the study help to give reason why the study is carried and the importance of the study in the educational fraternity because it is done also in the hope that it would trigger the need to bench-mark from other institutions which offer the

same program and seek to make necessary changes that would bring standardization in the program. This would help the government of Botswana to recognise the importance of both dentists and dental therapists and how they complement each other in the field of dentistry and thereby focusing on staff retention and motivation and solve the problem at hand..

CHAPTER 2

2.0. LITERATURE REVIEW

2.1. INTRODUCTION

In chapter one we learnt that the adoption of primary health care by the Ministry of Health and Wellness in Botswana prompted the oral health department to introduce a program called dental therapy. The program focused mainly on community oral health education and later on in 2008, the curriculum was reviewed and curative approach was also considered. The importance of the study and the limitations have been discussed.

This chapter contains mainly the relevant literature that would aid us in carrying out the study. The researcher seeks to see what other institutions have done(if any) concerning the already identified factors that are thought to influence the learners in the clinical practice. It is important to find out what evidence is there to back up the claim made by the researcher that indeed the identified factors are important in the students' clinical performance. The literature that would be sought, would be mainly focused on only those factors that have been identified by the researcher namely: the impact of an assessment tool in learners clinical performance, the correlation between their theoretical performance and clinical performance, the impact of their attitude on their clinical performance and finally, the difference in clinical performance by both male and female learners.

The literature would be reviewed order of each factor and objective question.

2.2. FACTORS THAT AFFECT CLINICAL PERFORMANCE OF DENTAL THERAPY LEARNERS

2.2.1. STANDARD TOOL VERSUS MODIFIED CLINICAL ASSESSMENT TOOL.

Assessment is an essential component of the educational experience. This process helps to ensure that the learners are acquiring necessary knowledge and technical skills. They also increase the capacity to solve the problem and develop critical thinking skills. There are a variety of purposes for conducting assessment in the educational environment. The outcomes of assessment can be used to diagnose student strengths and weaknesses, to identify potential programmatic or curricular challenges, and to monitor students' progression toward, and ultimate attainment of, designated competencies that comprise the capacities of entry-level practitioners. Assessment tools comprise a wide range of instruments and methodologies

designed to gather this information for feedback, diagnostic purposes, and identifying successful attainment of competence. These tools should have fidelity, which refers to the similarity of the assessment tool to the actual competency or student performance being assessed. A high reliability tool is one that is very similar to the actual performance (Kramer, Albino & Andrieu, 2009). When testing the reliability of their physiotherapy clinical assessment tool, Lewis et al. (2008) agreed that the tool should be consistent in whatever it is measuring. However, in their study they concluded that the interrater reliability of a clinical assessment tool for physiotherapy students, namely, the treatment planning assessment (TPA), was poor, and interrater reliability was high. Intrarater reliability was not significantly affected by clinical educator characteristics such as the years of clinical educator's clinical education experience with the TPA and years since graduation from a physiotherapy program (Lewis, Stiller & Hardy, 2008). Skuladottir and Svavarsdottir (2016) recently carried out study with the aim of developing a avalid assessment tool that was meant to guide clinical education and evaluate students' performancein clinical nursing nursing education. The development of this tool was mainly based on theory of nursing as professional caring and the Bologna learning outcomes. They called it the clinical assessment tool for nursing education (CAT-NE). they were guided by Benson and Clark's four steps of instrument development. They further used mixed method approach,interviews and the tool was validated using quantitative assessment (Skuladottir & Svavarsdottir, 2016).

This assessment tool is valid to assess the clinical performance of nursing students; it consists of rubrics that list the criteria for the students' expected performance. According to the students and their clinical teachers, the assessment tool clarified learning objectives, enhanced the focus of the assessment process, and made evaluation more objective. Training clinical teachers on how to assess students' performances in clinical studies and use the tool enhanced the quality of clinical assessment in nursing education (Skuladottir & Svavarsdottir, 2016) and at Leeds, in the United Kingdom there was a study done by Michael Manogue and his colleagues, in 2001 was carried out with the aim of investigating the values and practices of assessment of the clinical practice of dental students. They designed a questionnaire to collect their data and they collected it from the lecturers who teach restorative dentistry. They concluded that it is high time there is change in the approach in clinical assessment of dental students to enhance the development of students learning, assessment procedure and dental programmes. They indeed acknowledged that assessment of learners is central to the effectiveness of any educational programme (Manogue, et al., 2001). On the other hand,

Tilson et al, 2011, conducted a study in the United States of America, aimed at provision of guidance for purposeful classification and development of evidence-based practice (EBP) assessment tools. This paper identifies key principles for designing these assessment tools, and recommends a common taxonomy for new and existing tools, and presents the Classification Rubric for EBP Assessment Tools in Education (CREATE) framework for classifying such tools. Therefore, the assessment tool developers can use this framework by 'checking' the boxes in the grid that represent the assessment category (or categories) and step (or steps) of EBP assessed by their tool. Tilson believed that one cannot rely on only one assessment method as it cannot provide all the data required for judgment of anything so complex as the delivery of professional services by a successful physician (Tilson, Kaplan & Harris, 2011). They shared the common belief with Manogue's findings, for he added that assessment of performance in health care education is dependent upon the choice of appropriate tools to measure the outcomes in question, as such, observation and judgement were the most commonly used assessment tools that were used from day-to-day clinical activities (Manogue, et al., 2001). Meanwhile, Khan et al (2013) developed a guide on conducting an Objective Structured Clinical Examination (OSCE). They asserted that assessment of performance in health care education is dependent upon the choice of appropriate tools to measure the outcomes in question and such tools are designed for determining whether one can 'do things' rather than simply remember, talk and write about them. They agree with the assertion made above by Tilson that an assessment tool used alone is not capable of assessing the combination of knowledge, skills and behaviours, which influence performance within the various contexts of health care (Khan, Ramachandran & Gaunt 2013).

Though there are standards to be followed, the lecturer has to bear in mind that there will always be different types of learners. Awla (2014) says it is widely believed that understanding students' learning style and preferences can benefit both students and teachers.

Now, since being assessed by different lecturers tends to bring an element of subjectivity, as a result of their different perspectives; the dental therapy lecturers at Institute of Health Sciences in Gaborone sought to reduce this by collectively developing a standard clinical assessment tool that served as a guide during clinical assessments. This tool was designed in order to assess different dimensions of skills, such as the correct application, thoroughness of the process, or the efficiency with which the students could complete some or all of the processes (Tilson, et al., 2011).The tools were designed for clinical assessment in operative

and surgical dentistry to monitor progress and measure competence while providing valuable feedback to students with the intent to motivate them toward continual self-directed learning as an overall evaluation of clinical performance by semester. The assessment includes formative daily clinical assessments, formative semi-independent skills assessments, and summative skills assessments (competency assessments) (DIlbone, Delgado & Nascimento, 2016).

In this study the researcher seeks to determine the impact of different types of clinical assessment tools (the standard versus modified assessment tool) on the learners clinical performance of the dental therapy students in Institute of Health Sciences–Gaborone.

2.2.2. **THEORY VERSUS CLINICAL ASSESSMENT TOOLS**

Transitioning from a medical theoretical education to clinical practice is an important, but difficult process for dental students as far as assessment is concerned. Clinical practice and it's assessment is usually conducted in the last year of study, and some students end up not doing well because of shortened time in clinical practice and in ability to translate theory in to clinical practice. Now, Wang, Bi and Zhu carried out their study in 2020, and they observed tremendous results after they implemented the methods. The authors saw demonstration of greater accuracy in diagnosing and formulating treatment plans. Additionally they noticed that even patients were happy with their work practically and they acknowledged them. Consequently, the methods worked for the dental students. Furthermore, in South Korea, Choi and his colleague carried out a study in 2009, when they tested correlation between theoretical assessment and clinical assessments. They acknowledged that written examinations were mainstay mode of assessment for medical students and that they were generally used to test their ability articulate the information they have learned and apply it clinically. However, upon correlation of these examinations with clinical assessment tools, they concluded that the new clinical assessment tools, such as clinical performance examination (CPX), portfolio assessment (PA),video monitoring assessment and (VMA), have no significant correlation with written examinations, despite these tools closely corresponding with real clinical practice. Therefore, they suggested that these tools should be considered as complementary instruments to better assess clinical competence (Choi & Sunwoo, 2009).

While the same assessment methods namely; formative and summative assessments are also used at the Institute of Health Sciences in Gaborone for dental therapy students, in

acknowledgment to the above assessment methods, Abousoud (2011) from Egypt, wrote a letter to the editor asserting that the educational value of formative assessment usually has a relatively more impact on an individual student's learning as compared to terminal (summative) assessment, as long as it is conducted in a conducive environment which allows the student to express both strengths and weaknesses and further suggested that formative assessment should be given more weight than the summative assessment, arguing that it not only motivates and encourages students to be involved in the process, but it also monitors and provides students with real-time feedback on their performance while summative assessment merely takes place at the conclusion of a course of study and is the learner assessment approach most often used in postgraduate medical education. Dolin (2017) agrees with the previous opinions, in an extract from their book, as they were exploring relations between formative and summative assessments. In which they were discussing reliability and validity issues in relation the formative and summative assessments and that the purposes of these two are related and can be merged in developing a dependable approach to summative assessment using evidence collected and used in formative assessment. Now, in the case of student learning, the main purpose of formative assessment is seen as helping learning, while the main purpose of summative assessment is to provide information about what learning has been achieved at a certain time (Dolin, Black & Harlen, 2017).

As for clinical sessions, the students were assessed through clinical observation on during scheduled weekly days with the help of clinical assessment tools. As mentioned previously, these tools have been developed by the dental department instructors. The students were observed as they were dealing with patients, and they were asked questions during the process and marks would be allocated according to each procedure that is being performed, with the guidance of the assessment tool until the student had finished with the client.

Assessing students in the clinical area could have a bearing in the student performance because there is a lot of subjectivity as far the assessors are concerned. Different instructors would have various opinions over the learners' performances for different reasons one of them being natural human error of judgement, hence the introduction of clinical assessment tools. However, the clinical assessment tools used at the institute of health sciences-Gaborone lack certain aspects such as rubrics and performance criterion that guide the instructor as to how much marks to allocate for a student during assessment of a particular skill. It is difficult to allocate the amount of marks as one would not be guided as to when to give a certain number of marks and what rule of thumb dictates whether students have passed or mastered a

skill. This could lead to the error in judgement by clinical instructors due to the nature of the assessment tools. When they carried out a study about "Predicting the clinical performance of dental students with a manual dexterity test", Lugassy et al.(2018) has also made an observation that most of the students find it difficult to graduate as a result of struggling in clinical practice (Lugassy, Levanon & Pilo, 2018).

2.2.3. STUDENTS'ATTITUDE VERSUS THEIR CLINICAL PERFORMANCE

In the same study mentioned above by Tilson et al.(2011) they also discussed about the students' behaviour and attitudes. They observed that learning process can be influenced by the learner's attitude which may either be positive or negative attitude. They describe attitudes as the values ascribed by the learner to the importance and usefulness of something to inform clinical decision-making. Attitudes can strongly predict the future behaviour of the leaners and there is evidence that the more learners practice what they do the more positive attitude they develop towards it (Tilson, et al., 2011). These sentiments were shared by da Silva et al.(2010) year in their study as they were investigating factors influencing students' performance in a Brazilian dental school. Their aim was to investigate variables that influence student's performance in a retrospective sample including all undergraduate students who entered in a Brazilian dental school, in a 20-year period between 1984 and 2003 they had a population sample of 1182. In this study, they concurred that the educational experience of dental students traditionally have focused on characteristics of the learner, academic environment and curriculum structure (da Silva, Nunes & Queiroz, 2010).

Singh and Pottapinjara (2017) set out to investigate undergraduate dental therapy and oral hygiene students' knowledge and attitudes towards their self-care practices and the perceived influence of the dental curriculum on these practices They carried out a descriptive survey of with a population of 64 undergraduate dental students at the University of KwaZulu-Natal, Durban, in south Africa. They used a self-administered questionnaire as a data collection tool. Respondents reported good knowledge and practice of oral health self-care. Such results reflect that the students attitude toward clinical practice was positive because knowledge is inspired learners developing interest and passion in what they do. Concurrently, Moodley et al (2018) also carried out a cross sectional, descriptive study using both qualitative and quantitative methods for collection of data from a study population comprising dentists, dental therapists and oral hygienists in KwaZulu-Natal, South Africa. This study was part of a larger study investigating how the dental curricula could possibly be changed in include the

awareness of occupational health problems, their causes and how they can be prevented. Their results clearly showed that the undergraduate curricula did not have modules that cover occupational health practice, posture training, ergonomics and stress management and then they concluded that there was a need for inclusion of occupational health training in undergraduate in dental curricula this is mainly because a clinical practice requires a need for precision and high concentration and fitness when seeing patients. Therefore, because this training is focused on patient care and conducted under the supervision of a qualified practitioner, it is thus regarded as the most appropriate time and place to educate the student about the prevention of occupational health problems (Moodley, Naidoo & Van Wyk, 2018). So, the researcher seeks to find out if there is any association between learners attitude and their clinical performance. As revealed by Tilson et al (2011) assessment of learners attitude or behaviour can help reveal or what learners have not been taking serious. It can show through them describing how they would do something against how they actually do. When used for formative purposes, behaviour assessments may help learners identify their learning needs, and help teachers evaluate how well their curriculum equips learners in patient care (Tilson, et al., 2011). Chabeli (2001) wrote in a an article that was is focused on the perceptions of twenty nurse educators, purposively selected from three Nursing Colleges affiliated to a university in Gauteng, regarding the use of objective structured clinical examination as a clinical evaluation method within a qualitative and descriptive research strategy and quipped that whenever the learners have negative perceptions, it raises much concern regarding the development of their clinical reasoning skills and yet they are expected to make rational clinical decisions as well as solve problems (Chabeli, 2001). It is indeed important for the learners to be made aware of the importance of being positive in whatever they are expected to do. This will develop their interest in their program of study,leading to more knowledge which inturn would bring confidence and passion.

Park et al had a study, when they analysed the evaluator factors affecting physician-patient interactions in clinical performance examinations. The purpose of their study was to investigate possible ways to increase reliability clinical performance examinations. Now as far as students' attitude is concerned, they suggested that it was necessary that students internalize the correct attitude in their practice (Park, Chun & Lee, 2020). This will help them to be in line with ethical demands of the profession. Learners need to understand that they are not only training to obtain a particular qualification but also attain professonal conduct and good behaviour in the corporate world. At India, Dande (2019) conducted a cross-sectional

study among final year dental students, in terns and post graduate students. A questionnaire was used as a data collection tool. And descriptive statistics were calculated. The study was conducted to assess the atitudes and oractices of dental students in providing oral health care to underserved rural patients. The conclusion reached was that dental students had moderate attitude toward underserved patients even though this was not reflected in their respective practices. Furthermore, it was observed that an attitude of dental students toward underserved patients is a major concern. The paper portrays that or alludes to the fact that attitude development is a complex and multifaceted issue. Studies on the effects of medical education on attitudes have found that students become less humanitarian, less willing to provide all services to those who have no ability to pay, and less willing to become involved in providing care to indigent population. As they progress through their course of training, students become more focused on career goals and feel underserved patients will be those on whom they will often practice and improve their skill (Dande, Gone & Saikrishna, 2019). A study conducted in Kuwait, by Khalaf et al (2019) concluded that more client-centred skills and knowledge are required to bolster their confidence in engaging with the patients (Khalaf, Curtin & O'Reilly, 2019). Their aim in this study was to understand perceptions, attitudes and knowledge of students toward their role in smoking cessations.

2.2.4. CLINICAL PERFORMANCE OF FEMALE VERSUS MALE STUDENTS

In the middle East, there was a study conducted by Al-Surimi (2018) with the aim of evaluating the perception of female students enrolled in dental degrees and hygiene (Therapy) programs toward patient safety culture as well as to determine its associated factors in the Middle Eastern setting. It was a cross-sectional study and a questionnaire was prepared as a data collection tool. They expected the students' perceptions toward patient safety to improve with the increase of clinical training. Female studetns were more empathetic to patients (Al-Surimi, Al Ayadi & Salam, 2018) an assertion to which McKay and Quinonez agrees, as they observed that female dental practitioners have different traits, including more empathy and better communication skills than their male counterparts. They appear as less rushed, more likely to discuss ailments with patients and more humane and caring (McKay & Quiñonez, 2012). Then in Finland, another study was conducted by Karaharju-Survanto et al. (2014) their main aim was to evaluate gender differences amongst young dentists in their self-assessed competence and perceived compatibility of their under graduate education with working life. The population was 90 people:72 women and 18 men and questionnaire was prepared as the data collection tool of the study. Within this study they observed a balanced

performance whereby male dental practitioners felt more confident in their competence than the female in some procedures while, female practitioners felt more confident in others (Karaharju-Survanto, Napankangas & Koivumaki, 2014). Now, in Fujian, China, Xiu-Jiao et al. (2020) sought to investigate the amount and sources of stress in undergraduate dental students as well as the factors associated with stress. The cross-sectional study was conducted the Fujian Medical university , using a questionnaire to collect data. But they found that stress scores and sex were negatively correlated with academic performance and also proved female students had significantly higher grade point averages (GPAs) than male students, which was consistent with a this study (Xiu-Jiao, Chang-Yuan & Song, 2020).

When they did their study, in Japan, Iguchi et al. (2020) aimed to investigate student potential for self-assessment in a clinical dentistry, they had 124 (54 females and 70 males) participants. In the study there was null hypothesis that there was no difference between male and female students' self-evaluation scores and it was conclusively rejected because they found that female students rated higher than males and this became even more as the the training progressed and this was probably because female learners spend more time reading their theory and are more prepared, hence making it easier for them to apply this knowledge in their practical work because they had more self-confidence. Therefore, they do better with several interpersonal aspects of medical care. However, some researchers disagree as reported by Gruppen et al that they tend to underestimate themselves as compared to their male counterparts (Iguchi, Hasegawa & Fujii, 2020). Riley et al. (2011) compared the use of a comprehensive range of specific diagnostic methods, preventive agents and restorative decision making for caries management between male and female dentists. But they did not find gender differences for general categories of diagnostic or restorative treatment. These studies combined specific services into higher-order categories for each area of service provided, so inferences about preferences for one treatment or preventive method over another are not possible (Riley, Gordan & Rouisse, 2011).

2.3. CONCLUSION

The literature that was reviewed, comprised of different studies that were conducted and was ased on those which were relevant and addressing similar factors that this study set out to address, but they were very helpful because some were even carried to help give proper guidelines of how to develop and validate clinical assessment tool. The factors addressed in the literature are: the clinical assessment tools, theoretical performances of students against

their clinical performance, their attitude toward their clinical practice and how they affected their performances and finally the clinical performances of both male and female learners. It must be noted that some of the studies albeit not in the dental area, the studies were similar in the sense that they spoke about the same things- the clinical performances and how they are affected

CHAPTER 3

3.0. RESEARCH METHODOLOGY

3.1. INTRODUCTION

In this chapter, the focus was mainly to look at the way the research was conducted. The chapter discusses research approaches, research paradigm, design, the site where the research was carried out, the population of the study, the exclusion and inclusion criterion, the research instruments, validity and reliability of the instruments, ethical considerations, data collections methods and finally the methods that were used to analyse the data before the conclusion of the chapter. Each of the listed components would be described in detail throughout the chapter.

3.2. RESEARCH PARADIGM AND APPROACH

This study was approached quantitatively. Survey and observation methods were employed. This is because the analysis of the results needed numerical values. For instance, the impact of different clinical assessment tools requires observation of published records (results) of the students alongside those obtained using the modified tool. Furthermore, the theoretical performance showed the marks that were obtained by the learners during theoretical assessments and were compared with the clinical performance marks (using both the IHS practical assessment tool marks and the modified assessment tool marks).

3.3. RESEARCH DESIGN

This is basically the overall strategy that the researcher chose. It consisted of all other component that would be described below. The research design was non-experimental, no situation was changed or manipulated, neither was the experience of the participants altered.

3.3.1 Research methods

This is a cross-sectional descriptive study because the data was collected at one given point, from the same population. A questionnaire that was used to measure learners' attitude toward clinical practice was developed and sent to participants to respond online. Furthermore, learners were observed while they were attending to patients (assessing their various clinical skills, as guided by the assessment tool) and clinical assessment tools were used allocate the marks for them.

3.3.2 Research site

The research study was conducted at Institute of Health Sciences-Gaborone because this is the only place that has relevant participants for this particular study. The program is only offered in the institution.

3.3.3 Population and Sample

The population of the study consisted of dental therapy students which comprised first, second and third year students. Now, the cluster sampling method was employed with the sample size of 9 participants out of 25 students. Therefore 36% of the population was to conduct the study.

3.3.4 Exclusion and inclusion criteria

The participants in this study are both male and females, they are in the same class, no age , national ethnic health or religious restrictions. They are third year (3^{rd}) dental therapy students. The 1^{st} and 2^{nd} year students were excluded because there is lack of practical component,(the one we seek to measure in this study) at that level as compare to the 3^{rd} year students.

3.3.5. Research instruments

This attitude questionnaire used was titled**:** Factors that affect clinical performance of dental therapy students at Institute of health Sciences- Gaborone. It consisted of two parts.(part 1 and part 2). Part 1 contained the consent letter whereby the researcher and the participant was required to sign and put a date, instructions, demographics (age, gender, level of study, education level attained prior to joining the program) part 2 of the questionnaire contained three components of attitudes, the affective, behavioural and cognitive and they were measured using Likert scale of 1-5 (1 Strongly Disagree, 2 Agree 3 Not Sure 4 Agree 5 Strongly Disagree). (see Appendix 2). As for clinical observation tools, the standard one was titled: Tooth extraction, divided in to four columns, clinical performance(what to be observed), maximum marks to be allocated, mark obtained by students and comments. It also has a portion for examiner's signature, students ID and date.(see Appendix 3) Modified observation tool had the title and was divided into two parts : part 1 and 2. Part 1: students' details, examiners name, rubric and performance description, part 2 was for oral examination.

Mark to be allocated are divided into 3 (0 mark(skill not performed), 1 mark (some skills partially performed) 2 all skills performed.(see Appendix 4).

3.3.6. Validity and Reliability

The Attitude questionnaire and as well as modified clinical assessment tool was be given to an expert in the field of research to test their validity.

Reliability will was calculated after data collection using Cronbach's alpha (coefficient alpha) for both the assessment tools and the questionnaire.

Table 1:

Item Statistics showing Mean, Standard deviation for components of attitudes

Item Statistics			
	M	**SD**	**N**
Attitude 1	4.4444	0.72648	9
Attitude 2	4.2222	0.66667	9
Attitude 3	4.3333	0.70711	9

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.519	0.501	3

Note: M=mean, SD= Standard Deviation, N= no of participants NI= No of Items

Table 1 shows M_{att1}=4.4444, SD=0.72648 N=9 NI=3, and M_{att2}=4.2222, SD=0.66667, M_{att3} =4.3333, SD =0.70711

The Cronbach alpha for components of attitude(3) = 0.501

Table 2*:*

Cronbach alpha reliability statistics combining theory, standard and modified assessment marks

	M	SD	N
modified assessment tool	68.2222	6.43774	9
Theory assessment	75.1333	6.02889	9
IHS tool	67.5556	2.26115	9

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.798	0.886	3

M= mean, SD =Standard deviation

Table 2 shows M_{mod}=68.2222, SD=6.43774, N=9 , M theory =75.1333, SD = 6.02889 and M_{std} tool=67.5556, SD =2.26115

The Cronbach alpha for the combined components is 0.886 which means the assessments are reliable.

3.3.7. Ethical considerations

Confidentiality- the questionnaire did not require names from respondents, and responses were not linked to anyone. The records were be kept safe thereafter, as stipulated in the letter attached to the questionnaire itself. (see appendix 1)

Research permit was requested from relevant authorities such as the ministry of tertiary education and the office of principal of Institute of health science in Gaborone. (see appendices 4, 5, 6,7 and 8).

3.3.8. Data collection methods

The participants were approached and given a consent form/letter to read and to sign, and this letter is attached to a questionnaire that would be used to measure the learners' attitude toward their clinical practice, (the tool is described above) (see also appendix 2),. This was done after obtaining research permit from relevant authorities as mentioned above. The attitude questionnaire was sent to the participants to answer online. Also the students were observed during clinical practice. The observation tools (also described above) (are the standard clinical assessment tool (which is usually used at the institution (IHS)) and the one which was modified (from the standard one) by the researcher, to collect data.(see appendices 3 & 4).

Finally, the records were accessed from the academic registrar office for data analysis.

3.3.9.Data analysis methods

The researcher used the statistical analysis method. The data was collected, analysed, interpreted and validated. So, after collecting the descriptive data-the survey (through attitude questionnaire),- which is a descriptive data, it was quantified using this technique, from there the SPSS (Statistical Package for the Social Sciences) was used perform the data analysis. For research question 1, an independent t test was used to test the difference in clinical performance of the learners when using different clinical tools, and the Pearson correlation was used to analyse the relationship between the theoretical performance of the

learners and their clinical performance as well as their attitude toward the clinical practice and their clinical performance which answered research questions 2 and 3 and finally, for research question 4, the independent *t*-test was used to test if male learners performed different from their female counterparts clinically.

3.4. CONCLUSION

Research permit from relevant places was obtained to carry out the research and it was conducted at the Institute of Health Sciences in Gaborone. A sample cluster of 9 participants; the year 3 dental therapy students who were completing the program. All the approach was quantitative and the design was non-experimental, i.e. no situation was neither manipulated, nor the experience of the participants altered. Survey-using attitude questionnaire- and clinical observation (using clinical assessment were methods used to collect data and was analysed quantitatively using statistical analysis.

3. CHAPTER 4

4.0. DATA ANALYSIS AND INTERPRETATION OF RESULTS

4.1. INTRODUCTION

In the previous chapter we were basically mapping out and planning how to approach this study, i.e. how the data would be collected, described, analysed and interpreted. We also pointed out that this study would be interpreted quantitatively because it deals with numbers, and, it would be quantified and analysed using the method of statistical analysis.

Now, in this chapter we shall have a look at the results then analyse, interpret and draw conclusions after testing all the null hypotheses. The data was collected from various sources: the records from institute of health science Gaborone which were accessed by the permission from the principal, research board and ministry of education. The permission was also given so that the participants could be approached and the attitude questionnaire was sent online to the students to answer, so that their attitude toward the clinical practice could be measured as well as through clinical assessment using the two clinical assessment tools –the standard and the modified one. The presentation and interpretation of results will be done according to research objectives, research questions and hypotheses.

4.2. ANALYSIS AND INTEPRETATION OF RESULTS

4.2.1. THE ANALYSIS AND INTEPRETATION OF RESULTS FOR RESEARCH QUESTION 1 AND HYPOTHESIS 1

The null hypothesis is restated

H_{01}: There is no difference in clinical performance of learners with different types of assessment tools

H_{a1}: There is a difference in clinical performance of learners with different assessment tools.

Table 3:

Descriptive Statistics for standard clinical assessment tool and modified clinical assessment tool

		M	N	S D	SEM
Pair 1	IHS practical assessment tool marks	67.5556	9	2.26115	0.75372
	Modified Practical assessment tool marks	68.2222	9	6.43774	2.14591

Note: M=mean N= number of participants, SEM= standard Error Mean, Std Deviation= Standard Deviation

Table 1, shows that for standard assessment tool, M= 67.5556 SD=2.26115 and SEM= 0.75372, while for modified practical assessment tool, mean was 68.2222, with standard deviation of 6.43774 and standard error of 2.14591

Table 4:

Independent T-test analysis of difference in learners performance using standard clinical assessment tool and modified assessment tool

		Paired Differences					t	Df	Sig.(2 tailed)
		M	S D	SEM	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	IHS practical marks – Modified practical tool marks	-0.66667	4.85644	1.61881	-4.39966	3.06632	-0.412	8	0.691

Note: M=mean, S D=standard deviation, SEM= Standard Error of M,

p< 0.05

There is no statistically mean difference (see table 2) in learners performance using the standard clinical assessment tool and modified clinical assessment tool

Table 2, shows the mean difference between the two clinical assessments ($M_{std\ tool} - M_{mod}$) as -0.66667, a standard deviation (SD) of 4.85644, Standard error (SE) mean of 1.61881, 95% confidence interval lower=-4.39966 and upper = 3.06632, *t* = -0.412, Df = 8 and Sig (2-tailed)(p = 0.691). Therefore, the Null hypothesis is accepted and so we conclude that there is no difference in clinical performance of learners with different types of assessment tools

4.2.2. THE ANALYSIS AND INTEPRETATION OF RESULTS FOR RESEARCH QUESTION 2 AND HYPOTHESIS 2

The null hypothesis is restated

H_{02}: There is no relation between learners theoretical performance and their clinical performance with different types assessment tools**.**

H_{a2}: There is a relation between learners theoretical performance and their clinical performance with different clinical assessment tools.

Table 5:

Descriptive Statistics for Theory and clinical assessment tools marks

	M	**S D**	**N**
Theory	75.1333	6.02889	9
IHS practical tool marks	67.5556	2.26115	9
Modified practical tools	68.2222	6.43774	9

M= mean, SD = Standard Deviation N= no of participants

Mean for theory marks was 75.1333. with a standard deviation of 6.02889 while that one for IHS assessment tool, mean was 67.5556 with a standard deviation 2.26115 and modified practical assessment tool, mean was 68.2222, with standard deviation of 6.43774.

Table 6:
Results for Pearson correlation analysis on relationship between Theory marks and both clinical assessment tools marks

		Theory	IHS practical marks	Modified Practical tools
Theory	**Pearson Correlation**	1	0.702*	0.672*
	Sig. (2-tailed)		0.035	0.048
	N	9	9	9
IHS practical marks	**Pearson Correlation**	0.702*	1	0.789*
	Sig. (2-tailed)	0.035		0.011
	N	9	9	9
Mod Practical tools	**Pearson Correlation**	0.672*	0.789*	1
	Sig. (2-tailed)	0.048	0.011	
	N	9	9	9

*. **Correlation is significant at the 0.05 level (2-tailed).**

A Pearson product moment correlation was computed to assess the relationship between learners' theoretical performance and their clinical performance. There was a positive correlation between the two variables r=0.702 (standard tool), n= 9, p =0.035, and for theory versus modified tool, r =0.672, n=9, p= 0.048. these results show there was a strong positive correlation between learners theoretical performance and their clinical performance with different clinical assessment tools. Hence the Null hypothesis is rejected.

4.2.3. THE ANALYSIS AND INTEPRETATION OF RESULTS FOR RESEARCH QUESTION 3 AND HYPOTHESIS 3

The null hypothesis is restated

H_{03}: There is no correlation between learners' attitude and their clinical performance.

H_{a3}: There is correlation between learners' attitude and their clinical performance.

Table 7:
Descriptive Statistics for learners attitudes toward clinical practice-using both clinical assessment tools-standard and modified tools

	M	**SD**	**N**
Modified practical tool Marks	68.2222	6.43774	9
IHS practical Marks	67.5556	2.26115	9
Attitude	55.6667	6.67083	9

M = mean, SD = Standard Deviation, N = no of participants

As shown on the table 5 above, $M_{attitude}$ was 55.6667 with SD = 6.67083, as for standard assessment tool, M_{std} = 67.5556 with SD = 2.26115, while for modified practical assessment tool, M_{mod} = 68.2222, with SD = of 6.43774.

Table 8:
Pearson correlations for attitudes toward clinical practice versus two different assessment tools-standard and modified

		Modified Practical tool Marks	IHS practical tool marks	Attitude
Modified Practical tools	**Pearson Correlation**	1	0.789*	0.142
	Sig. (2-tailed)		0.011	0.716
	N	9	9	9
IHS practical marks	**Pearson Correlation**	0.789*	1	0.460
	Sig. (2-tailed)	0.011		0.212
	N	9	9	9
Attitude	**Pearson Correlation**	0.142	0.460	1
	Sig. (2-tailed)	0.716	0.212	
	N	9	9	9

*. **Correlation is significant at the 0.05 level (2-tailed).**

A Pearson product moment correlation was computed to assess the relationship between learners' attitudes toward clinical practice and their clinical performance. There was a weak positive correlation between the two variables r=0.460 (standard tool), n= 9, p =0.212, and for theory versus modified tool, r =0.142, n=9, p= 0.716. these results show there was a weaker positive correlation between learners theoretical performance and their clinical performance with different clinical assessment tools. Hence the Null hypothesis is rejected

4.2.4. THE ANALYSIS AND INTEPRETATION OF RESULTS FOR RESEARCH QUESTION 4 AND HYPOTHESIS 4

The null hypothesis is restated

H_{04}: There is no difference between female and male learners clinical performance.

H_{a4}: There is a difference between female and male learners clinical performance.

Table 9:

Group statistics showing Male and female clinical performance using standard tool

	Gender	N	M	SD	SEM
Marks	**male**	5	66.7400	2.48857	1.11292
	female	4	68.4750	1.47281	0.73640

Note: N= no of participants, M=mean, SD = standard deviation, SEM= Standard Error Mean

Table 7, shows that for standard assessment tool, M_{male}= 66.7400, SD_{male}=2.48857 and SEM_{male} = 1.11292, M_{female} = 68.4750, SD_{female}=1.47281, SEM_{female} = 0.73640 while for modified practical assessment tool, mean was 68.2222, with standard deviation of 6.43774 and standard error of 2.14591

Table 10:

Independent samples t-test showing male and female clinical performance using standard tool

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	MD	SED	Lower	Upper
marks ihs tool	**Equal variances assumed**	0.677	0.438	-1.224	7	0.261	-1.73500	1.41804	-5.08812	1.61812
marks modified tool	**Equal variances assumed**	0.260	0.626	-1.773	7	0.120	-6.80000	3.83518	-15.86875	2.26875

Note: MD=mean difference, SED=Standard Error Difference

There is no statistically difference (see table 8) in learners performance using the standard clinical assessment tool and modified clinical assessment tool

Table 8 shows the *t*-test difference between male and female learners' clinical performance versus standard clinical assessment tool, Standard Error Difference (SED) mean of 1.4180, 95% confidence interval lower=--508812 and upper = 1.61812, *t* = -1.224, Df = 7 and Sig (2-tailed)(p = 0.261). p>0.05, Therefore, the Null hypothesis is accepted and so we conclude that there is no difference in clinical performance of learners when the standard clinical assessment tool was used.

The same table shows the *t*-test difference between male and female learners' clinical performance versus modified clinical assessment tool, Standard error (SED) mean of 3.83518, 95% confidence interval lower= --15.86875 and upper =2.26875 , t = -1.224, Df = 7 and Sig (2-tailed)(p = 0.120). p>0.05, Therefore, the Null hypothesis is accepted and so we conclude that there is no difference in clinical performance of learners when the standard clinical assessment tool was used.

CONCLUSION

After thorough analysis and interpretation, the researcher arrived to conclusion that there was no difference in clinical performance of learners with different types of assessment tools because the p-value, was >0.05. therefore, the null hypothesis was accepted. On the other hand, the Pearson correlation coefficient was used to test the hypothesis and the null hypothesis was rejected because there was positive correlation between learners' theoretical performance and their clinical performance using both practical assessment tools, just as there was correlation between the learners' attitudes and their clinical performance when using the tools, which also implies that the null hypothesis was rejected. Finally, both p-values for both clinical assessment tools were calculated and were greater than 0.05, then we concluded that there was no difference in clinical performance between male and female learners. So, the null hypothesis was accepted.

4. CHAPTER 5

5.0. DISCUSSION

5.1. INTRODUCTION

In the previous chapter the researcher was analyzing and interpreting the data and drawing conclusions of the findings. After using the *t*-test to determine if learners perform differently when assessed using different clinical assessment tools as well as Pearson correlation to measure the statistical relationship between the theoretical performance and their clinical performance and their attitude' towards the clinical practice and their performance, *t*-test, p-value was then used again to test whether male learner perform differently from their female counterparts clinically and conclusions were drawn thereafter.

Now, in this chapter, we shall look at the implications of these results after they were analyzed. Therefore, the discussion will focus on the conclusions drawn in this study and would be related with the relevant literature. The discussion format is arranged according to the order of research questions.

5.2. DISCUSSION OF RESULTS

5.2.1. DISCUSSION OF RESULTS FOR RESEARCH QUESTION 1: DIFFERENCE IN PERFORMANCE USING DIFFERENT CLINICAL ASSESSMENT TOOLS

In this study the researcher sought to find out if there would be difference in performance in clinical practice by the dental therapy students when they were assessed with different clinical assessment tools. Two assesment tools were used for data collection. One was the standard tool (developed at the Institute of health Sciences, (IHS), while the other one was the modified tool (modified by the researcher). After analysing and interpreting the data, the researcher concluded that there is no difference in clinical performance of learners with different assessment tools. So, when using the modified tool for their assessment, students had performed relatively the same as when the standard tool was used. Despite all the efforts to modify the tool, there was a failure to reject the null hypothesis. However, other researchers continue to believe in the impact of a clinical tool in the performance of leaners that is why Khan (2013) continues to argue that in order to have appropriate clinical assessment tool, it should be designed in order to determine whether one can 'do things' rather than simply remember, talk and write about them (Khan, et al., 2013). Moreover, it is important to understand that assessment tools comprise a wide range of instruments and methodologies designed to gather this information for feedback, diagnostic purposes, and identifying successful attainment of competence (Kramer, et al., 2009).

That is why clinical assessment is one of the most daunting tasks an instructor could face. Besides assessing the students, the clinical instructor have to bear in mind that patient safety should be taken into consideration hence closer attention to details is required when assessing dental student's clinical performance. It also essential to provide continual feedback and motivation for their learning process (Manogue, et al., 2001).

Now in his study, Tilson (2011) in his study, purported that one cannot rely on only one assessment method as it cannot provide all the data required for judgment of anything so complex as the delivery of professional services by a successful physician (Tilson, et al., 2011). Khan (2013) agrees with assertion made above by Tilson (2011) that any assessment tool or method used alone is not capable of assessing the combination of knowledge, skills and behaviours, which influence performance within the various contexts of health care (Khan, et al., 2013).

Manogue (2001) and his team have also observed that methods of assessment influence students' conceptions of learning and their approaches to learning. They further said that assessment of performance in health care education is dependent upon the choice of appropriate tools to measure the outcomes in question, as such, observation and judgement were the most commonly used assessment tools that were used from day-to-day clinical activities (Manogue, et al., 2001).

The way the information is received varies from one learner to the other and obviously the clinical application would differ as a result. That is why Tilson (2011) emphasizes that when developing assessment tools, one should clearly articulate the objectives of the tools to be able to be used on different learners and learning aims (Tilson, et al., 2011). Thus, the tools have to be reliable; that is, the extent to which an assessment tool provides a consistent measure of whatever it is measuring (Lewis, et al., 2008). Though there are standards to be followed, the lecturer has to bear in mind that there will always be different types of leaners. Awla (2014) says it is widely believed that understanding students' learning style and preferences can benefit both students and teachers. He further acknowledges the fact that students learn in various ways. Now, while, it appears impossible to change the learning style of each student in the classroom, it would be better for teachers to modify their teaching style so as to be more consistent with their students learning style (Awla, 2014). On the same note, Tilson (2011) shares the same sentiments in his study on evidence-based practices (EBP), as he emphatically stressed that tools for assessing the effectiveness of teaching EBP needed to

reflect the aims of the curriculum. Learning aims will ideally be matched to the needs and characteristics of the learner audience. He also observed that numerous educators have contributed to defining the complex nature of assessing professional competencies like EBP (Tilson, et al., 2011).

Being assessed by different lecturers tends to bring an element of subjectivity, as a result of their different perspectives. To avert this, the dental therapy lecturers at Institute of Health Sciences in Gaborone sought to reduce this by collectively developing a standard clinical assessment tool that served as a guide during clinical assessments. These tools were designed in order to assess different dimensions of skills, such as the correct application, thoroughness of the process, or the efficiency with which the students could complete some or all of the processes (Tilson, et al., 2011). The tools were designed for clinical assessment in operative and surgical dentistry to monitor progress and measure competence while providing valuable feedback to students with the intent to motivate them toward continual self-directed learning as an overall evaluation of clinical performance by semester. The assessment includes formative daily clinical assessments, formative semi-independent skills assessments, and summative skills assessments (competency assessments) (DIlbone, et al., 2016). The tools should have fidelity, which refers to the similarity of the assessment tool to the actual competency or student performance being assessed. A high fidelity tool is one that is very similar to the actual performance (Kramer, et al., 2009).

The researcher managed to deduce that the modified assessment tool had relatively more of the required qualities compared to the original one. This perhaps led to students performing better in the clinical practice when they were assessed using the tool. Therefore, there was an impact of using different types of clinical assessment tools on the learners clinical performance of the dental therapy students in Institute of Health Sciences –Gaborone. Subjectivity may have played a big role in awarding of marks, because, the assessment tools had no performance criteria, there was nothing that guided the clinical instructors, when awarding the marks.

5.2.2. DISCUSSION OF RESULTS FOR RESEARCH QUESTION 2:CORRELATION BETWEEN THEORETICAL PERFORMANCE AND CLINICAL PERFORMANCE WITH DIFFERENT ASSESSMENT TOOLS.

It is widely acknowledged that written examinations were mainstay mode of assessment for medical students. and that they were generally used to test their ability (Choi & Sunwoo, 2009) yet there was a need to couple it with clinical assessment. While the same assessment

methods namely; formative and summative assessments are also used at the institute of health sciences in Gaborone for dental therapy students, Aboulsoud (2011) opined that the educational value of formative assessment usually has a relatively more impact on an individual student's learning as compared to terminal (summative) assessment, as long as it is conducted in a conducive environment which allows the student to express both strengths and weaknesses (Aboulsoud, 2011) She further suggested that formative assessment should be given more weight than the summative assessment. arguing that not only does it motivates and encourages students to be involved in the process, but it also monitors and provides students with real-time feedback on their performance while summative assessment merely takes place at the conclusion of a course of study (Aboulsoud, 2011). Furthermore, Dolin (2017) agrees with the previous opinions and concludes thus; in the case of student learning, the main purpose of formative assessment is seen as helping learning, while the main purpose of summative assessment is to provide information about what learning has been achieved at a certain time (Dolin, et al., 2017).

As for clinical, sessions at the students were assessed through clinical observation on during scheduled weekly days with the help of clinical assessment tools. As mentioned previously, these tools have been developed by the dental department instructors. The students were observed as they were dealing with patients, and they were asked questions during the process and marks would be allocated according to each procedure that is being performed, with the guidance of the assessment tool until the student had finished with the client.

Now the researcher uses the data collected by conducting the clinical assessment using both clinical assessment tools. This data was then correlated with the theoretical marks which were recorded in the academic registrar office's data base. Then the researcher used Pearson correlation coefficient to test the hypothesis, it was found that there was positive correlation between the theoretical performance and the clinical performance of the learners with tools being used to obtain the marks. So the null hypothesis was successfully rejected. These findings are backed by a similar study carried out by Choi and Sunwoo (2009) when they tested if there was correlation between theoretical assessment and clinical assessment. They also, correlated these tools with each other to determine the feasibility of each as a replacement of the other tools (Choi & Sunwoo, 2009). Finally they arrived to the same conclusion that there was correlation between theoretical performance and clinical performance it is also observable that assessing students in the clinical area could have a bearing in the student performance because there is a lot of subjectivity as far the assessors

are concerned. Different instructors would have various opinions over the learners performances for different reasons one of them being natural human error of judgement. Hence the introduction of clinical assessment tools. However, the researcher noticed that clinical assessment tools used at IHS Gaborone do not have certain performance indicators such as rubrics that guide the instructor as to how much marks to allocate for a student during assessment of a particular skill. This could have related to the error in judgement of lecturers when allocating the marks.

It is noticeable that students got relatively lower marks in clinical practice (with both clinical assessment tools) as compared to theoretical marks. Which is an observation made by Lugassy (2018) who quipped that most of the students find it difficult to graduate as a result of struggling in clinical practice (Lugassy, et al., 2018) which could be thought to be due the nature of the assessment tools as well as leaners having not grasped the theoretical concepts and thereby struggling to apply them clinically.

Some writers emphasize that formative assessment should be used even in clinical sessions for they believe that when it is implemented in a way that ascertains the learner's knowledge, understanding and skills, it would yield valid and reliable results. Also that the leaners would have chance to perform better. Therefore, it is advisable for assessors to apply different tools to assess their students over a period of time, during the course of semester. Examples include observation of task performance and gathering of information on what students know, understand and can do, for instance during clinic sessions, case discussions and research activities. These assessments should be curriculum based and the skills tested should be those previously taught. This type of assessment is made effective when students are given feedback immediately for them to have opportunity to see where they should improve for the next assessment session as they would know what would be expected of them (Aboulsoud, 2011).

5.2.3. DISCUSSION OF RESULTS FOR RESEARCH QUESTION 3: CORRELATION BETWEENSTUDENTS'ATTITUDES AND THEIR CLINICAL PERFORMANCE WITH DIFFERENT CLINICAL ASSESSMENT TOOLS.

Attitude-as defined by psychologists- is a learned tendency to evaluate things in a certain way. The evaluations can include that of people, issues, objects, or events, and such evaluations can either be positive or negative, though they can also be uncertain at times (Cherry, 2020). So, the way Cherry (2020) put the definition, it is consistent with the fact that learners can develop a certain attitude toward a subject basing on how they feel when it is

dispensed thus influencing students' learning process. On the other hand, Tilson et al (2011) described attitudes as the values that help inform clinical decision-making. He further observed that it can strongly predict the future behaviour of the leaners, and that the more learners practice what they do the more positive attitude they develop toward it. This is because he believes that behaviour results from what learners actually do in practice (Tilson, et al., 2011) that is why some scholars believe that, there is a need to describe dental therapy and oral hygiene students' knowledge, attitudes and practices towards oral health self-care and the perceived influence of the dental curriculum on these practices (Singh & Pottapinjara, 2017) to ensure that the students master these practices and eventually influencing their behaviour toward the program and patient care.because, the patient interaction helps dental students increase their confidence when performing new skills (Henzi, et al., 2006). This prompted the reseacher carry out this study in order to find out if the students'attitude correlates with their clinical practice in dental therapy program. Therefore, all the components of attitude were measured and the performance results from the different assessment tools (the IHS assessment tool and the modified tool) were used in this study. After the results were obtained, they were analysed and the Pearson Correlation coefficient correlation between attitude and clinical performance using both clinical assessment tools were on the positive side of 0, therefore, the null hypothesis was rejected and then concluded that there was actually positive correlation between learners attitude and their clinical performance with different clinical assessment tools. This result has shown that indeed the attitude of a student can truly have impact in their learning process which is in agreement with what Tilson said earlier (Tilson, et al., 2011) and as far as clinical practice is concerned in dental therapy, learners' performance have been influenced by their perception of the course. When one looks at their responses it can be deduced that they were uncertain about their future upon completion of the program. This was reflected in their clinical marks. Those who displayed a relatively bad attitude got relatively lower marks. One cannot overemphasize that for students to do well in their clinical practice, they need to have precision and high concentration because the training is focused on patient care. That is the reason why the students are supervised by highly qualified instructors throughout the procedures (Moodley, et al., 2018).

Assessment of learners attitude or behaviour can help reveal or what learners have not been taking serious. It can show through them describing how they would do something against how they actually do. When used for formative purposes, behaviour assessments may help

learners identify their learning needs, and help teachers evaluate how well their curriculum equips learners in patient care (Tilson, et al., 2011). However, the whenever the learners have negative perceptions, it raises much concern regarding the development of their clinical reasoning skills and yet they are expected to make rational clinical decisions as well as solve problems (Chabeli, 2001). It is indeed important for the learners to be made aware of the importance of being positive in whatever they are expected to do. This will develop their interest in their program of study,leading to more knowledge which inturn would bring confidence and passion.

It is necessary that students internalize the correct attitude in their practice (Park, et al., 2020). This will help them to be in line with ethical demands of the profession. Learners need to understand that they are not only training to obtain a particular qualification but also attain professonal conduct and good behaviour in the corporate world. However, Dande (2019) has observed that an attitude of dental students toward underserved patients is a major concern. He believes attitude development to be a complex and multifaceted issue. Studies on the effects of medical education on attitudes have found that students become less humanitarian, less willing to provide all services to those who have no ability to pay, and less willing to become involved in providing care to indigent population. As they progress through their course of training, students become more focused on career goals and feel underserved patients will be those on whom they will often practice and improve their skills (Dande, et al., 2019). A study conducted in Kuwait, by Khalaf (2019) concluded that more client-centred skills and knowledge are required to bolster their confidence in engaging with the patients (Khalaf, et al., 2019). The impact of the time elapsed from completion of high school until dental school admission in student's performance reinforces importance of previous educational experiences for success in university entrance immediately after high school and performance at graduation (da Silva, et al., 2010).

5.2.4. DISCUSSION OF RESULTS FOR RESEARCH QUESTION 4: THE DIFFERENCE BETWEEN CLINICAL PERFORMANCE OF FEMALE AND MALE LEARNERS.

Teachers play a huge role in supporting and stimulating students in their learning process, as they master clinical skills. They do so by observing their performance and allowing students to complete tasks success-fully at their own pace. For instance, at IHS Gaborone, students usually are sent to clinical attachment session, in their sixth and final semester. During this

period they work on their own and after some time they would assessed on what they have learnt in addition to how they perform at that particular moment. They would be provided with constant constructive feedback. This has made learners to acknowledge the skills they have gained and keep evaluating themselves and have chance to seek to improve with time. Karaharju-Survanto (2014), carried out a self-assessed study and concluded that there was large gender difference to perform the procedures. Male dental practitioners felt more confident in their competence than the female in some procedures while. female practitioners felt more confident in others so it was a balanced performance (Karaharju-Survanto, et al., 2014).

Meanwhile, in this particular study, the researcher sought to find out if there was any difference in clinical performance between male and female learners. The Significant value (2 tailed) value that was obtained for standard clinical assessment tool was 0.261, the p value that was calculated using data obtained using modified tool was found to be 0.120, and with these values, they are greater than 0.05 therefore the null hypothesis was accepted and concluded that there is no significant difference between female and male learners in clinical performance This leads to the conclusion that female learners performed the same way male performed clinically. These findings showed that gender, does not have any impact in clinical performance of the learners. However, When they carried a similar study, Xiu-Jiao et al. (2020) proved that female students had significantly higher GPAs than male students, which was consistent with a this study . However, a study conducted in Israel reported that sociodemographic variables such as gender were not related to the academic performance of therapy students (Xiu-Jiao, et al., 2020). However, studies similar to that of Xiu-Jiao (2020) have been conducted to find out who, among male and female learners, tend to perform better in clinical settings not only dental but also other disciplines. Some even found that female dental students, especially dental hygiene students, are evidently concerned about patient safety (Al-Surimi, et al., 2018). This patient-care attitude led to them being more passionate during the training days. On top of that since it is believed that passion comes from and understanding what one is doing, female learners spend more time reading their theory and are more prepared, hence making it easier for them to apply this knowledge in their practical work. Because they have more self-confidence. Therefore, they do better with several interpersonal aspects of medical care. However, some researchers disagree and as reported by Gruppen et al (n.d) that they tend to underestimate themselves as compared to their male counterparts (Iguchi, et al.,2020), but McKay (2012) insists that female dental practitioners

have different traits, including more empathy and better communication skills. They appear as less rushed, more likely to discuss ailments with patients and more humane and caring (McKay & Quiñonez, 2012). Nevertheless, traditional studies of impact of gender on student performance found that men outperformed women, attributing possible reasons as: women's lowest sense of self-esteem-as Iguchi (2020) suggested-stereotype threat, fear of success, test anxiety, and certain other personal characteristics. Despite all these different opinions, some studies such as that done by Fields et al (n.d) recently investigated the impact of gender in student's performance among dental students and found that there were no significant differences. Authors related this result to no presence of true differences or low power of the sample to detect small differences, yet their results still showed a trend to feminization of dentistry accompanied by better performance of women in academic assessments (da Silva, et al., 2010). After graduation, when the individuals join the corporate world some articles published, made subtle implications that male dental practitioners were more productive and provided more dental care to the community to a greter extent than female. Riley et al. (2011) believes that this could be due to females having lower income, working less hours in a week, seeing less patients as well as working part time. Fewer studies have reported specifically on female dentists' clinical decision patterns. A report about Australian dentists by Brennan found higher rates of caries prevention used by female dentists, however, Atchison did not find gender differences in services that were grouped into a single category of "sealants/fluoride varnish/topical varnishes." The Brennan (n.d) study did not find gender differences for general categories of diagnostic or restorative treatment. These studies combined specific services into higher-order categories for each area of service provided, so inferences about preferences for one treatment or preventive method over another are not possible (Riley, et al., 2011). Despite all these differing conclusions made by various studies, this study has shown that there is a difference between female and male clinical performance and that female outperformed the male learners clinically.

5.3. CONCLUSION OF EMPERICAL RESEARCH RESULTSSUMMARY

The conclusion that was reached was that there was no difference in students' clinical performances using different clinical assessment tools. While there was correlation between learners' theoretical performance and clinical performance with different clinical assessment

tools, the correlation between these clinical performances and their attitudes also existed and lastly it was found that there was no difference in clinical performance between male and female students.

5.4. EDUCATIONAL IMPLICATIONS OF THE RESULTS OF THE STUDY

5.4.1. Enhance Knowledge

The results of this study would play a vital role in the education fraternity both local and internationally. They would build part of foundation work for further researches and provide reference to future research projects, and even Nath (2005) agrees with this as she said, that since 1980, educational research has always relied on the importance case studies in their area because it enhances their knowledge capacity. Therefore, the research believes that this research study will aid the future during their learning process, having laid the foundation. They would be able to critique and come up with better and solutions in education sector particularly in the dental fraternity. they will be able generate multiple avenues in different circumstances and be able to make decisions of their own (Nath, 2005).

5.4.2. Keep up with learning philosophy

These results would further motivate other learners to develop their own knowledge capacity and become more creative. This would bring the best out of individual students as they would not solely rely on the information they receive from the class as we are moving towards student-centred learning these days with current learning philosophy-constructivism-which is defined by McLeod as a learning approach in which individuals actively construct or make their own knowledge and that learners experiences determine their reality (McLeod, 2019) as it allows them to source out information for themselves. They would become more confident and develop critical thinking as they interact with their learning environment.

5.4.3. Teaching aide as back up literature

This would play a critical role in ensuring that there would be available literature, for the students and institutions at large. This is considered one of the best practices in teaching and learning. It helps students to develop deeper understanding of a particular concept, because it focuses on a specific, hypothetical problem, supporting literature that aligns with the main themes of the story, and guiding questions that help the learner gain the most from understanding the concepts and objectives of the case study by applying critical and higher order thinking skills (Trujillo-Jenks, 2014). Therefore this particular study can be of great importance in providing a backup literature more especially if a

scenario that is used is based on facts. The factors that this study have just explored, are all valid and the students clinical performance hinges around all of them. It is historical that those who came before have benefited from case studies done on others prior to them. However, Nath (2005) has observed that many colleges of education, for example, want to prepare students for urban experiences or to focus upon precise situations, but available placements in the field may not support these exact circumstances or concepts under consideration--nor can a shared experience or frame of reference for a group or class be guaranteed in field placements (Nath, 2005) finally the study can be used in testing practices

5.5. RECOMMEDATIONS / FURTHER RESEARCH DIRECTIONS

5.5.1. Review of clinical assessment tools

The clinical assessment instruments need to be reviewed at least after a certain period of time, (3 years is suggested because there are only three levels of study so it is essential that all students use the same tool).

5.5.2. Review the program/ consider institutional partnership

The program needs to be improved, partnering with other international institutions can help make learners interested in the course hence change their attitude. This can also help in exchanging knowledge and improving assessment methods and tools, or sometimes students being sent abroad as attachment as part of their learning process in the program.

5.5.3. Start increasing number of admission and at higher frequency at the institution

Moreover, the number of students can also be increased through admission and this can only happen when resources are available that is; more staff being hired and facilities in the institutions being improved. Additionally, would be valuable to repeat this research study with better approaches and more population.

5.5.4. Embrace new technology

Other ways that can allow more students will be to improve teaching methods and the use of technology. Virtual classroom can be vital in these cases. This is because nowadays students are more interested in new technology and they are familiar with technological gadgets. This can go a long to change students attitude toward their learning process.

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APPENDICES

APPENDIX 1

Table 11*: Summary of Descriptive Statistics for Theory and attitude vs Clinical assessment*

	N	Minimum	Maximum	Mean	Std. Deviation
Attitude	9	47.00	67.00	55.6667	6.67083
Theory	9	65.80	83.00	75.1333	6.02889
ihs practical marks	9	65.10	71.40	67.5556	2.26115
Practical tools	9	60.00	80.00	68.2222	6.43774
Valid N (list wise)	9				

APPENDIX 2

INFORMATION SHEET AND CONSENT FORM

INTRODUCTION

I am Khumo Rapula PETER, a final year MED student at a BOTHO UNIVERSITY. I am undertaking a study on **FACTORS THAT AFFECT CLINICAL PERFORMANCE OF DENTAL THERAPY STUDENTS AT INSTITUTE OF HEALTH SCIENCES- GABORONE.**

Therefore, I am kindly interested in your views and experiences regarding your training in dental therapy in clinical practice.

PURPOSE AND BENEFITS OF THE STUDY

The study seeks to explore student experiences during their training, particularly their clinical practice, and finding what factors affect their performance in this area. The findings of this study will be utilized in informing the educational policy makers on how to improve the clinical performance of the students.

Research evidence on these factors could inform the government's efforts to improve the quality of education especially at tertiary level. Furthermore, there have been no research papers published in the area of dental section. This has led to a less aware of the importance of improvement of oral health education and prevention. Should this be published, it would lay a foundation for many students and dental education experts to do more research in the cadre.

YOUR RIGHTS AND CONFIDENTIALITY

Taking part in this research is voluntary and if you do not wish to complete the questionnaire, your decision will respected. The information will be used only for the purposes of this study. Please do not write your name but rather initials. Only the researcher will have access to the data. Numbers and codes will be used throughout the study to ensure confidentiality and anonymity. You may not necessarily benefit personally from the research but future students may benefit as the findings are implemented. If you are willing to participate in this research please indicate by signing the consent below.

Consent statement

I have been given the opportunity to answer the questions concerning the study. I understand that I may at any time during the study revoke my consent and withdrawal from the study without any penalty.

Yes I participate in this study

Student id#.....

Signature of participant…… date…….

Signature of researcher…….date……

Instructions

1. ***This tool consists of three sections:***
    - ***the letter of consent section,***
    - ***Part 1: the Demographics and***
    - ***Part 2: short answer questions.***

PART 1

i. Please fill in the demographic details below

ii. Place a tick (✓)on the relevant information about your demographics

Gender
- Male
- Female

Age
- 18-20 years
- 21-25 years
- 26-Above

Level of study
- Level I
- Level II
- Level III
- Other

Education level ***(Prior to joining the program)***
- Secondary
- Tertiary
- Other

MEASUREMENT OF ATTITUDES OF DENTAL THERAPY STUIDENTS TOWARD CLINICAL PRACTICE

QUESTIONNAIRE

PART 2

i. Place a tick (✓) on the appropriate number which agrees with your opinion (Do not tick on more than one answers)

ii. *You are not required to write your name on the sheet*.

Attitudes of dental Therapy students in providing oral health care to patient dental clinics.

ATTITUDE COMPONENT	**MEASURING SCALE**				
A. Affective component	**Strongly Disagree**	**Disagree**	**Not Sure**	**Agree**	**Strongly Agree**
1. Wearing recommended clothes in clinic is essential					
2. Putting on proper PPE is not tedious					
3. I find it comfortable to put on mask for a prolonged hours during clinic sessions.					
4. When attending to my patients, the sight of blood does not affect me.					
5. The patient is always right at all times					
6. It is not good to be fearful when working sharp instruments					
B. Behavioural component	**Strongly Disagree**	**Disagree**	**Not Sure**	**Agree**	**Strongly Agree**

1. Clinical sessions are the most exciting as compared to theory.					
2. It is important to ensure that patients are being attended to in time (i.e. reduce waiting period)					
3. I enjoy attending clinical sessions that are outside the school premises/territory					
4. I tend to be calm and comfortable when I attend to a patient who is rude.					
5. The more clients I attend to, the more confident I feel.					
6. I always look forward to attend to clients especially during morning sessions					
C. Cognitive component	**Strongly Disagree**	**Disagree**	**Not Sure**	**Agree**	**Strongly Agree**
1. The curriculum work workload is well balanced.					
2. Working with patients is an amazing experience.					
3. I believe that the clinical skills we learn are relevant to societal needs.					
4. There is a great future upon					

completion of dental therapy program.					
5. I would recommend someone to study the program					
6. The program prepares me enough for the corporate world					

a. What are your general views about the program?

……
……
……
……

b. If you were to choose again would you still, choose the same program?

Yes, or No

If No, why?

……
……
……
……

c. Are there any recommendations that can be made to improve the program?

……
……
……
……

APPENDIX 3

DENTAL THERAPY PROGRAMME

EVALUATION TOOL –PRACTICAL (EXODONTIA) (ORIGINAL)

TOOTH EXTRACTION

CLINICAL PERFORMANCE WHAT TO OBSERVE	**TOTAL MARKS**	**LE/EE MARKS**	**COMMENTS**
Dress code and PPE	**5**		
Introduction and patient sitting	**5**		
Cleaning, disinfection and Infection control	**10**		
Communication skills and Behaviour management	**5**		
Patient information History taking.	**15**		
Oral examination - Extra oral Intra oral	**13**		

Diagnosis	**10**		
Treatment plan Treatment	**5** **15**		
Discharge and Documentation	**7**		
Viva.	**10**		
TOTAL	**100**		

Candidate Number: _____ Date of Examination: _____

Examiner: _____

APPENDIX 4

TOOTH EXTRACTION (MODIFIED)

PART 1 CLINICAL OBSERVATION

Candidate ID _____ GENDER…… DATE…….EXAMINER……..

- ***Please write the mark along each description according to the dots to indicate student performance***

Performance description *Marks are given according to students who shows the following:*	**2** **Excellent** *(all required skilled well performed)*	**1** **Good** *(partially performed with omissions of some major components and skills)*	**0** **Poor,** *(Unsatisfactory not performed the skill)*	**comments**
1. **PPE and Dress code** • Proper dress code(long sleeve shirt, trousers • Closed shoes • Gloves, head and shoe covers, plastic apron and white lab/clinic coat				
2. Infection control, • Cleaning and disinfection • Frequent hand washing				
3. **Communication skills and Behaviour management** • **Patient information** -Demographics				

4. History taking, • Introduction and patient sitting • Very polite and gentle • Building rapport with patient, and asking relevant questions. and				
5. **Clinical examination** • **Extra-oral** (TMJ, lymph nodes, facial symmetry) • **Intra-oral** (Soft tissues and Hard tissues(teeth**)**				
6. Relevant investigations, • Tooth percussions and vitality tests • Gingival pocket probing depths • X-rays				
7. **Accurate diagnosis** • After performing all tests is the diagnosis reached the accurate one?				
8. Treatment plan • Treatment plan arranged according to most urgent issues to be addressed)				

9. **Treatment done**, • Treatment explained to the patient, • Consent obtained from patient, • The patient being made comfortable throughout the procedure by constant communication, and relevant medication prescribed.				
10. Documentation • Notes clearly written after treatment, referral (when necessary).				
TOTAL MARKS /40				

PART TWO oral examination

	ORAL EXAMINATION/ INTERVIEW **(VIVA) (***place a tick(✓) in the appropriate box to allocate marks*				
		2 *(Student answers the questions fully, and shows full knowledge of the subject***)**	**1** *Students partially knows some of the stuff, but most of the time they need assistance*	**0** **(***have no idea of what is going on, no knowledge for basic concepts.)*	**Comments**
1	• **Confidence** Composed, well collected, fluent and speak clearly and loudly				
2	• **Critical thinking** Able to know thinking through what needs to be done for the client given various scenarios Rationalize every decision made on a particular set up Always analyses implications of care given Reflects omissions and corrective measures Able to make inferences and relationships in information at hand or about the client's condition				
3	• **Relates theory to practice** Always integrates gives theoretical basis when dealing with a clinical presentation				

4	• **Knowledge of drugs used** Knows medication to be prescribed and why.				
5	• **Student reflection** Skills learnt Challenges How problems were managed What they would have done better				
TOTAL /10			**OVERALL TOTAL %**		

APPENDIX 5

RESEARCH PERMIT LETTER FROM MINISTRY OF TERTIARY EDUCATION

Telephone : 3655400 / 3655483
Fax : 3914271
E-mail: botsamote@gov.bw

REPUBLIC OF BOTSWANA

Block 6, Government Enclave, Headquarters
Private Bag 00517 Gaborone

MINISTRY OF TERTIARY EDUCATION, RESEARCH, SCIENCE AND TECHNOLOGY

REF: MOTE 1/18/6 IX (26)

16th December 2020

Khumo Rapula Peter
P O Box AE41 AEH
GABORONE

Dear Sir

Application for Research Permit:
Factors Affecting Clinical Performance of Dental Therapy Students at Institute of Health Sciences: Gaborone

Reference is made to your application on the above captioned matter.

Your application for Research Permit for the proposed research titled: '***Factors affecting Clinical Performance of Dental Therapy Students at Institute of Health Sciences: Gaborone'*** has been granted. The permit is valid for one (1) year. You are kindly advised to peruse section 4.4 to 5.0 of 'Guidelines for Application for Research Permit' in Botswana.

Any changes in the proposed research should be communicated, without fail, to the Permanent Secretary, Ministry of Tertiary Education Research Science and Technology citing above reference. You are advised to submit final research report to the Department of Research, Science and Technology.

By copy of this letter, the Director of Research Science and Technology (DRST) is advised to take note of this development and ensure that deliverables to government are timely met. Furthermore, you are requested to deposit completed research report to DRST.

Yours faithfully

DEPARTMENT OF RESEARCH SCIENCE & TECHNOLOGY
RECORDS MANAGEMENT
P/BAG BS 70, GABORONE

Dr. Kekgonne E. Baipoledi
For/Permanent Secretary

cc: Director of Research Science and Technology

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APPENDIX 6

RESEARCH PERMIT LETTER FROM INSTITUTE OF HEALTH SCIENCES - GABORONE

(25)

TELEPHONE: 3953033/3655700
TELEGRAMS: SABAOKI
REFERENCE: S.N.
FAX. NO: 3900935

INSTITUTE OF HEALTH SCIENCES
P.O. BOX 985
GABORONE
BOTSWANA

15 October 2020

DR. KHUMO RAPULA PETER
Institute of Health Sciences
P O Box 985
Gaborone

Dear Sir/Madam

RE: PERMISSION TO CONDUCT RESEARCH STUDY - YOURSELVE

Reference is made to your research proposal submitted for ethical review.

I have the pleasure to notify you that your proposal titled, **"Factors Affecting Clinical Performance of Dental Therapy Students at Institute of Health Sciences: Gaborone"** has been **APPROVED.**

Permission is therefore granted to start collecting data, and please note that this approval shall be valid for a period of twelve months effective 16/10/2020. It is expected that you share a copy of your research results with the institution at the end of your study.

The research should be conducted as outlined in the proposal, and any changes made should be communicated to the chairperson of the Institution Review Board of IHS-Gaborone.

I wish you success in your studies.

Yours faithfully

Ronald P. Masunda.
Chairperson – IRB
Cell; 73420540

APPENDIX 7

RESEARCH PERMIT REQUEST LETTER FROM BOTHO UNIVERSITY

029/LTRE/GBE/2020

08 October 2020

TO WHOM IT MAY CONCERN

RE: REQUEST FOR PERMISSION TO CONDUCT RESEARCH

This is to confirm that Khumo Rapula Peter ID 1819085 is a student at Botho University, studying for Masters in Higher Education.

The student would like to conduct research under the topic, "**Factors affecting clinical performance of dental therapy students at Institute of Health Sciences: Gaborone**"

In light of the above, The Faculty of Health and Education at Botho University seeks your permission to allow him to carry out this research and accord him the necessary support as it will help in the completion of his studies.

The information collected will be used solely for this research and will be treated with a high level of confidentiality and anonymity.

Yours sincerely

Mr. Tom Atonga
Manager, Library, Teaching and Research Excellence Department (LTRE)
Office of Quality Management (OQM)
Botho University – Gaborone Campus

APPENDIX 8

REQUEST FOR RESEARCH PERMIT LETTER FROM BOTHO UNIVERSITY

INSTITUTIONAL REVIEW BOARD

BOTHO UNIVERSITY

P.O. Box: 501564
GABORONE

07/ 10/ 2020

DEAR SIR/MADAME

RE: REQUEST FOR LETTER OF APPLICATION FOR RESEARCH PERMIT

My name is KHUMO RAPULA PETER. I am an MED student, my student ID is 1819085, and this letter serves as a request to your office to grand me a cover letter to apply for research permit for my research study.

I have attached my research proposal along this letter.

Thank you in advance

Your sincerely

KHUMO RAPULA PETER (1819085).

APPENDIX 9

APPLICATION FOR RESERCH PERMIT AT INSTITUTE OF HEALTH SCIENCES

24

P.O BOX AE 400 AEH
Gaborone

The Principal
Institute of Health Sciences-Gaborone
P.O. Box 985
Gaborone

09/ 10/ 2020

ATT: IRB chairperson

Dear Sir/Madam

RE: REQUEST FOR REVIEW OF MED PROPOSAL

My name is KHUMO RAPULA PETER. I am an MED student at Botho University, and this letter serves as a request to your office to review my proposal and hopefully grant me a research permit for my research study.

I have attached my research proposal and release(introduction) letter from my institution, along this letter.

Thank you in advance,

Your sincerely

.....

Dr. KHUMO RAPULA PETER

INSTITUTE OF HEALTH SCIENCES
REGISTRY
13 OCT 2020
P.O. BOX 985 GABORONE