CHALLENGES IN IMPLEMENTATION OF PROBLEM-BASED LEARNING (PBL) APPROACH IN MOI UNIVERSITY SCHOOL OF MEDICINE KENYA: PERSPECTIVES OF FACULTY MEMBERS

BY

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DECLARATION

Declaration by Candidate

This thesis is my original work and has not been presented for a degree at any other University. No part of this thesis may be produced without the prior written permission of the author and/or Moi University.

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DEDICATION

To the school leadership, I believe that this piece of work will inspire more research in Problem-Based Learning (PBL) teaching strategy.

It takes a well-structured PBL strategy to deliver effective teaching and learning to medical students.

I dedicate this work to the tutors utilizing the PBL strategy in Moi University School of Medicine (MUSOM).

ACKNOWLEDGMENT

My journey as a master's student in medical education has received tremendous support from the Moi University faculty and specific individuals. I take this opportunity to give thanks to Moi University School of Medicine Office of the Dean for the administrative support and encouragement during proposal writing and data collection. I also wish to thank my supervisors; Dr. Frankline Boibanda who always welcomed any question from me regarding this work, and Dr. Anne Ng'eno for her guidance on how to present my work. They both inspired and nurtured me throughout this work.

Finally, I am grateful to the Almighty God for his protection and good health amidst the 2020 COVID-19 pandemic disruptions. May God bless you all.

ABSTRACT

Background: Evidence from evaluations of Problems Based Learning (PBL) strategy in medical schools has shown that its adoption can be affected by resource limitation. Studies across Europe and parts of Africa have described challenges related to PBL curriculum strategy in medical schools but specific literature on perceived challenges on PBL implementation by Faculty members is scanty and disproportionately represents institutions in developed countries.

Objectives: To assess challenges perceived by faculty members in the implementation of PBL strategy at Moi University School of Medicine (MUSOM) and examine strategies to overcome the identified challenges.

Method: This was a cross-sectional study that targeted 132 teaching staff from 18 departments at MUSOM and was conducted between April and June 2016. A self-administered questionnaire comprising a mix of both quantitative and qualitative questions was distributed to the eligible respondents in both online and paper formats. Qualitative data were grouped into themes for analysis. We present proportions for quantitative data and themes that arose from the qualitative data.

Results: The identified faculty challenges included; teaching staff shortage (47%), inadequate tutorial rooms (74%), inadequate internet facility (76%), lack of well-equipped tutorial rooms (66.7%), inadequate skills and basic science laboratory (66.7%), and inadequately equipped computer lab (66.7%). Sixty-five point two percent (65.2%) cited financial challenges that is scarce at the departmental level. Although the majority of respondents (%) perceived PBL to be functional, many (%) cited a lack of PBL guidelines as a bottleneck, especially when orienting young faculty. Other challenges identified were limited training opportunities and time-demanding nature of the PBL curriculum. Suggested strategies to overcome the identified challenges included; increase in staffing (87.9%), regular training on PBL implementation (87.9%), increasing financial support to departments to facilitate smooth teaching operations (83.3%) and construction (89.4%) and equipping of tutorial rooms (90.9%).

Conclusion: Results from this study illuminate the challenges faced by MUSOM faculty in the implementation of the PBL system with a focus on staffing, infrastructure, financial and curriculum that require consideration and addressing to improve teaching staff perceptions of PBL implementation.

Recommendation: This study recommends planning and stakeholder engagement in addressing the challenges identified by this study. Potential areas of focus identifies include increasing the number of faculty members, allocating finances to MUSOM to support PBL activities, improving the existing physical infrastructure and periodic review of the curriculum.

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OPERATIONAL DEFINITION OF TERMS

Evaluation: A wide-ranging term used to explain a systematic approach to the analysis of a given activity

PBL Challenges: Factors that inhibit the implementation process of problem-based curriculum

PBL Strategies: Factors that facilitate the implementation process of problem-based curriculum

Problem Based Learning (PBL): It is an innovative instructional learner-centered approach that empowers learners to conduct research, integrate theory and practice, and apply knowledge and skills to develop a viable solution to a defined problem (Savery, 2015). It can also be described as a process whereby a query leads to learning through a distinct series of developmental stages.

Teaching staff: Any member of staff engaged in active teaching and learning process.

ABBREVIATIONS

COBES   Community Based Education and Service

CSV   Comma-separated Values

LDL   Lecture-Directed Learning

MUCHS   Moi University College of Health Sciences

MUSOM   Moi University School of Medicine

PBL   Problem Based Learning

SDL   Self-directed Learning

SPICES   Student-Centered Problem Based Integrated Community Oriented Elective
             and Systematic

WHO   World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Background

Problem-based learning (PBL) is the most innovative instructional method conceived in education history (Amoako-Sakyi, 2015; Hung et al., 2008). PBL was initially designed to respond to the criticism that traditional conventional teaching and learning methods fail to prepare novice medical students to solve problems in clinical settings. It is the preferred pedagogical strategy in tertiary institutions worldwide. Many universities around the world have resorted to adopting PBL because of its student-centered approach to learning, multidisciplinary and professional relevance (Hmelo-Silver, 2004; Lim, 2012).

Don Woods from McMaster University defines Problem Based Learning (PBL) as any learning environment in which the problem drives the learning (Wood, 2003). That is, before students learn some knowledge, they are given a problem. Through the given problem, the students undertaken self directed learning to identify probable solutions to the problem. Thereafter, the students come together to dissect and discuss the problem or case in small groups usually supervised by one or more expert tutor or instructor (Chang, 2016).

In PBL, students are given a case or a problem related to some course topic at the beginning of a tutorial session which triggers a discussion about the subject. Based on this discussion, students brainstorm to clarify what they already know about the subject and what they still need to learn to understand the case/problem better. The problem is posed so that the students discover that they need to learn some new knowledge before they can solve it (Wood, 2003).

After that, the students set learning goals for themselves. These steps are done in an opening session, which is followed by self-directed learning (SDL). During the self-directed learning (typically 1–2 weeks) each student studies to meet the agreed learning goals. Thereafter the small group meets again for the closing session, where the students discuss what they have learned from SDL. They make a synthesis of all knowledge they have gathered and thus try to better understand the case/problem (Kinnunen *et al.*, 2005).

The problems that students are given are ill-structured and cannot be solved by using just a prescribed formula or one-way conventional teacher-centered approach to teaching. Instead, the students must use investigative thinking, questioning, and reasoning. The main emphasis of this teaching method is to place the student at the heart of the teaching/learning process and place the responsibility for learning on the learner (Lonka, 2013). PBL has been used as an instructional model in the development of the curriculum structure. As such, students are placed in the active role of problem-solver that resemble real-world problems (Savery & Duffy, 1995).

PBL curricula generally rely on the premise that students can learn the concepts pertinent to each PBL session independently outside of class time, thereby freeing up time for critical analysis and group discussion (Chang, 2016). Previous research indicates that PBL students are more likely to study for meaning and less likely to study for the reproduction of information, which may be one of the reasons why PBL has spread into an increasing number of medical schools, including older and more traditional universities (Albanese & Mitchell, 1993).

Even though there are differences in how problem-based models are practiced worldwide, they are founded on the same theoretical basis and thus have the same principles of

learning. The idea of problem-based learning came to light in the mid-1960s at McMaster University and a medical school in University in Rochester (Loyens *et al*., 2011). Since then, PBL has spread widely in the U.S.A, Europe, South America, Australia and even in Africa.

In Kenya, Moi University School of Medicine (MUSOM) was the first university to implement a PBL curriculum. Moi University College of Health Sciences (MUCHS) became a World Health Organization (WHO) Problem-Based Learning collaboration center in 1994. WHO generally contributed to the establishment of innovative medical education programs, supporting the establishment of a network of community-oriented educational institutions for health sciences in 1979 (Gwele, 1997). Since its adoption in Moi, MUSOM has since graduated several batches of medical doctors. As each university in the Kenya sets its exam, it has been impossible to comparatively measure the level of performance of medical graduates across the country. However, a study by Owino *et al*. on medical interns showed that Moi University graduates felt and are perceived as better prepared for their role as interns (Owino, 2010).

Although there are many advantages of the PBL curriculum, studies have identified that PBL curriculum implementation is resource-intensive and, if not addressed, can pose a big challenge in PBL implementation and its maintenance (Amoako-Sakyi, 2015; Deo, 2014). To medical institutions in low and middle-income countries, provision of well-equipped facilities, recruitment of adequately trained teaching staff, periodic faculty development, and a myriad of various requirements put PBL out of reach for institutions in these countries.

1.2 Problem Statement

Although many studies across Europe and parts of Africa have described issues related to problem-based curriculum implementation challenges in medical education, specific literature on faculty's PBL curriculum implementation challenges is still scanty and disproportionately represents institutions in lower and middle-income countries.

Despite the successful implementation of PBL in MUSOM, no literature has described PBL implementation challenges from the faculty's point of view. In this research, we identified and described challenges faced in the implementation of PBL as perceived by teaching staff and further discussed the suggested strategies for overcoming the identified challenges.

1.3 Study Purpose

To appreciate a new curriculum approach, implementers need to be aware of its pros and cons. Findings from this study will be helpful not only to MUSOM and the college of health sciences at large but also to many other medical schools in low and middle-income countries implementing or plan to implement the PBL curriculum.

1.4 Study Objectives

    i. The broad objective of this study was:

- To explore the perspectives of teaching staff in implementing the PBL approach MUSOM.

    ii. The specific objectives were:

        a. To assess the challenges faced by faculty members in the implementation of PBL strategy in MUSOM

b. To examine strategies that can be applied to overcome the identified challenges in the implementation of PBL strategy in MUSOM

1.5 Research Question

1. What are the challenges faced by faculty members in the use of the PBL curriculum approach?

2. What are the possible solutions to the existing PBL implementation challenges?

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

In this chapter, we explore existing literature on challenges and solutions for PBL implementation.

2.2 PBL Implementation challenges and solutions

Various studies in parts of Europe and the Middle East have underscored the importance of faculty training to deliver the PBL approach holistically. It is important for the implementers to first understand that PBL is a teaching strategy meant to spice up a curriculum. Faculty training on the PBL approach, regardless of rank or experience, should be done since this helps clarify misconceptions about the curriculum.

One big challenge, as highlighted above, is the issues of identity crises as a result of the change from lecturer to a tutor, which takes time to adjust to. A regular training workshop should address such a challenge. Having a regular exchange program with universities in developed countries – who have had long-term experience in implementing PBL can help mitigate the knowledge and skills gap as the experience of visiting such institutions results in an energized team (Amoako-Sakyi, 2015).

The training simply imparts the skills that are relevant for a medical teacher in directing the students during the tutorial session (Salam et al., 2009; Yeo & Chang, 2017).

In addition to training, the challenge of getting the right tutors with knowledge of the content being discussed in tutorial groups may arise from time to time, considering the shortage of tutors. A study done in Calgary Faculty of Medicine in 1991 found that across 35 simulated-patient case encounters (24 with non-experts and 11 with experts) when the groups had tutors

with expertise in the clinical cases studied, the groups generated approximately twice as many learning issues per case, and these issues were approximately three times more congruent with the case objectives. Besides, when the groups had expert tutors, they spent approximately twice as much time per case in overcoming identified learning deficiencies. It is, therefore, important for tutors to have an in-depth understanding of the cases and case objectives as well as be well versed in the PBL tutoring process (Cj *et al.*, 1992).

Davis and Harden (1999), found that students' evaluation and performance were higher in groups led by content experts than in groups led by non-experts. Their findings suggest that students with more directive tutors enjoyed the PBL groups more, rated PBL as an efficient structural method, were more able to identify gaps in their knowledge, and apply relevant information to the problem.

In the PBL approach, there is an increase in the demand for human resources compared to traditional teaching methods such as lectures; for example, a class of 30 students will need at least three facilitators (lecturers) instead of one. This contributes to the high cost of running PBL compared to a lecture-based method (Wood, 2003).

Time is an important resource that should be utilized effectively, considering that students in medical schools are required to read extensively. In the PBL approach, studies show that tutorials are time-consuming, meaning that compared to traditional teaching methods, it takes more time to accomplish teaching or deliver a session. These can lead to overstretched staffing hence poor productivity. The fact that one will take more time to teach the same amount of content would probably be challenging for those who are contemplating the implementation of PBL in their curriculum (Albanese & Mitchell, 1993; Deo, 2014).

In addition to time-related challenges in delivering tutorial sessions, a three-year longitudinal case study that monitored the development of staff concerns during the implementation of a PBL program in a nursing department in the University of Natal in Durban, South Africa found that staff also expressed concerns relating to; inadequacy of staff support, stress related to work overload and lack of time for doing research and publishing (Gwele, 1997).

Institution's infrastructural resources such as the library, well build classrooms and breakout rooms, teaching and basic science laboratory, internet connectivity, social amenities are considered essential in every educational institution. Teaching and learning on campus take place within specific physical settings that are integral to the process of learning. Directly related to tutorial groups is the need for well build tutorial rooms. Poorly constructed tutorial rooms could make both the students and the facilitator uncomfortable and eager to end tutorial sessions before the required time (McLaughlin & Faulkner, 2012).

Looking at the PBL structure, more rooms are needed for PBL compared to the traditional lecture-based learning method (LBL). Even though the rooms might be many, the student population may surpass the number of rooms forcing tutorials to be scheduled at different times to allow multiple tutorial groups to use a single tutorial room. Adequate learning resources including; well-resourced libraries, reliable internet connectivity, functional clinical skills laboratories facilitate the process of SDL in the PBL curriculum. The lack of or limited nature of the infrastructure is likely to threaten and impede the implementation of more student-centered and flexible learning approaches being introduced in higher education worldwide (Amoako-Sakyi, 2015; Jamieson, 2003). Various studies on the use of the library by students in PBL settings show that the PBL method itself directs students to make maximum use of the library resources compared to the medical institutions using a conventional curriculum.

A well-equipped library enables students to access materials that are necessary for Self-Directed Learning (SDL) (Marshall, 1993; Rankin, 1992; Watkins, 1993).

Despite being vital to a PBL curriculum, the provision of appropriate and adequate infrastructural resources to facilitate effective teaching and learning in a PBL setting is an uphill task in medical institutions in low and middle-income countries with a struggling economy. Lack of good infrastructure, therefore, may force some medical schools with PBL-based curricula to revert to traditional learning methods (Johnson *et al*., 1999).

As PBL becomes widely used in many medical schools around the world, some courses remain hard to teach using the PBL approach, and medical institutions are likely to face difficulties in the integration of certain types of courses into a PBL curriculum approach. Studies from the University of Maastricht in the Netherlands, which uses a PBL approach, has given rise to concern. In a qualitative study, students reported that they felt deficient in basic science knowledge, particularly in anatomy, when entering clerkships (Prince *et al*., 2000).

The integration of courses into the PBL structure is not an easy task and requires a multi-stakeholder approach - the cooperation and collaboration of faculty members, students and non-academic staff, and the wide university community. In addition to cooperation and collaboration, a positive attitude towards PBL by both the students and the faculty is key to the success of PBL curriculum implementation. A study at the University of Toronto Faculty of Medicine demonstrated that experiences with PBL led to more favorable attitudes among the students and faculty (Bernstein *et al.,* 1995).

Separate from the tutor and infrastructural resources, the curricular integration challenges is an issue of politics within the institutions and has been cited to impede the

implementation of curriculums in institutions. Implementation of educational strategy and the level at which the decision to implement is made, depends on the internal and external political context of the educational system – for any innovation to gain the right of passage, it is essential to recognize the greater relevant power (Adams & Chen, 1981). Internally, the implementation of a PBL curriculum represents a change of mindset. The change from traditional teaching methods to innovative methods like PBL is felt to be a difficult task that involves the questioning of long-held beliefs about teaching and learning(Aldred *et al*., 1998).

Financing tertiary education in low and middle-income countries is a challenge. One of the problems, which is also the cause of a few other resource challenges, relates to finances (Tilak, 2011). According to the World Bank report of 2010, the size of the financing gap suggests that alternative methods of financing and other models of expansion or organization of the supply of education services should be considered. In many countries, however, there is little financing leeway. Higher education competes with other education levels for the appropriation of public resources, and even in countries where higher education enjoys a relatively high priority, the needs generated by progress toward universal primary school enrollment are expected to undermine that priority (World Bank, 2010).

Most of the institutions depend entirely on government funding to finance their operations. In Kenya, higher education is characterized by students' preference for public universities due to government financial support associated with such an admission. This demand for university education has significantly increased and continues to swell against a backdrop of decreasing ratio of financial allocation to universities from the Government (Gudo,

2014). As such, universities are forced to work with little finances allocated by the government in addition to the capped tuition fees paid by the students.

People can see change as additional work, and a lack of both students' and tutors' buy-in may impede PBL adoption (Wondie *et al*., 2020). An adjustment period is required when changing the curriculum, which can sometimes be a genuinely life-changing experience. Knowledge of what to expect and how to adjust may be necessary to allay any fears. The challenges faced in PBL should not be considered as reasons for opposing the PBL curriculum but rather as significant issues that need close attention and further research (Azer, 2001). These challenges should be addressed by institutions attempting to implement Problem-based Learning according to their unique situations.
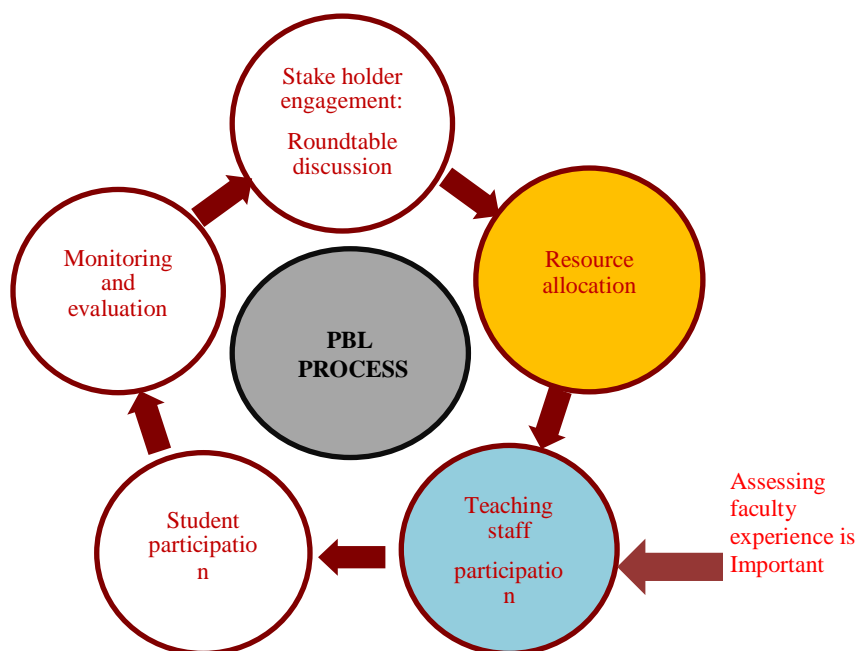
Conceptual framework

Figure 1 Conceptual Framework for PBL Curriculum Implementation Process

In an attempt to understand the challenges faced in the implementation of a PBL curriculum, we identified key areas to assess. These key areas, described in reviewed

literature were determined to have an impact in the implementation of the PBL curriculum. To successfully implement a PBL curriculum, a multi-stakeholder approach, involving the tutors/teaching staff, the non-teaching staff support, the learners participation and the institutional leadership. As such, adequate resource allocation with continuous monitoring and evaluation on PBL implementation ensures continuous improvement and overall success of the curriculum.

The success of PBL is often measured in the theoretical conception and the learning outcomes of the students, with implementation often left out of the picture. However, in a review conducted by Hung, suggests that human factors are confounders that influence the process of delivery and learning for students and consequently the implementation of the PBL curriculum (Hung, 2011). The tutor's factors, including their perceptions are therefore key in understanding the implementation and better ways of improvement of PBL curriculum.

As a component of the PBL implementation process, educational development for tutors is as important, although much of it has been left to insitutions(Gibbon & Marcangelo, 2012). Clear strategies are therefore needed to support the tutors in their development, including group reflective practices that are deemed to support both new and not so new tutors (Johnston & Tinning, 2001).

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the method used in this study to arrive at the results.

3.2 Study Design

This was a cross-sectional study that was conducted between May and July 2016.

3.3 Study Area

The study was conducted at the MUSOM located in Eldoret Town and hosted within the College of Health Sciences and Moi Teaching and Referral Hospital complex. It is the second medical school to be established in Kenya in 1988 after the Nairobi University School of Medicine. MUSOM admitted the first intake of medical students in 1990 and graduated its first cohort of doctors in 1997. At the time of this study, the school had 18 departments (see Table 1 below) and over 200 teaching and non-teaching staff, directly and indirectly implementing PBL as an innovative method of teaching and learning. PBL was introduced in the institution in 1994.

MUSOM PBL curriculum is hybridized and integrates various teaching and learning methodologies such as; practical sessions including anatomy dissections, laboratory work, and simulations; structured clinical skills training; lectures; and community fieldwork (community orientation). The course overview is usually given as lectures and delivered in the first few hours of the tutorial day, and this constitutes about 10% of the available teaching time per week. The remaining 90% of available teaching time is used for non-lecture-based teaching and learning activities, including tutorials (small group discussions) and student-directed learning (SDL). In MUSOM, the PBL program is organized into a

step-based format. Step 1 is regarded as TUTORIAL ONE (1); here, the tutorial group, together with the tutor, read through the problem, define terms, clarify the concept and analyze problems (if possible at this point) usually on the first day of the week like Monday.

The number of PBL scenarios per module depends on the length of the module. Step 2 entails a self-study process commonly referred to as Self Directed learning (SDL), which lasts approximately three days for example; Tuesday, Wednesday, and Thursday (students look for information on their own), this is usually not a free time but intense information searching, reading, consulting, discussion and notes taking. Step 3 is devoted to getting feedback, in the respective tutorial groups, on what the students have learned from the research they have undertaken between the meetings, providing solutions to problems, and synthesizing this information in the presence of a tutor. A new problem(s) is read after solving the previous problem.

As part of PBL implementation, MUSOM has incorporated Community-Based Education and Service (COBES) as an important feature of the curriculum. The objectives of the COBES program are to provide broad-based people-centered education that trains medical students to have a strong community orientation. COBES program runs from year 1 to year 5 of the undergraduate medical degree program. The COBES program follow a similar set of problem-solving steps but focused on the field-based activities at the community or as part of research proposal and implementation process.

3.4 Study Population

The study population comprised 132 teaching staff from the 18 departments in the MUSOM. Table 1 below provides details of the number of teaching staff disctributed per department.

Table 1: Number of teaching staff in MUSOM (2015)

#	Department	The total population of Teaching Staff N= 132
1.	Behavioral sciences	5
2.	Child Health and Paediatrics	13
3.	Family Medicine	4
4.	Hematology and B/Transfusion	6
5.	Human Anatomy	10
6.	Human pathology	5
7.	Immunology	10
8.	Internal medicine	7
9.	Medical Biochemistry	7
10.	Medical Education	5
11.	Medical Physiology	10
12.	Mental Health	5
13.	Microbiology and Parasitology	9
14.	Orthopedics and rehabilitation	4
15.	Pharmacology and toxicology	7
16.	Radiology and Imaging	6
17.	Reproductive health	7
18.	Surgery and Anesthesiology	12
Totals		132

3.5 Sampling and Sampling Procedures

Due to the small number of teaching staff at MUSOM, this study employed a census method in its sampling where all members of teaching staff were targeted for this study. By so doing, sampling error was eliminated hence providing an opportunity to interview the entire population of the teaching staff also known as faculty.

3.6 Inclusion and Exclusion Criteria

3.6.1 Inclusion

To be included as a participant in the study, one had to meet the following inclusion criteria; actively involved in teaching students at MUSOM and must have a status of a full-time employee at the university.

3.6.2 Exclusion

We excluded the following teaching staff in our study; teaching staff who was on sabbatical leave at the time of the study and those staff who had less than 1-year experience teaching at MUSOM.

3.7 Data Collection Procedures

Data was collected using a ten-item self-administered questionnaire comprising; both qualitative and quantitative questions (mixed method) to ensure a counter-balancing strength of the other. The questionnaire was divided into three parts; A, B, and C.

Part A (demographic section) comprised; background information about the respondents, such as; age, gender, years of experience, and department of work. Part B comprised; 5 points Likert scale table with pre-generated statements skewed towards the common challenges experienced in PBL implementation as informed by various literature. In this section, respondents were to rate on a scale of 1-5 (where 1 = strongly disagree and 5= strongly agree) the challenge-related statement they felt was a challenge to the PBL implementation in their department. An open ended question was included in part B that provided the respondent with the opportunity to identify additional challenges they felt were affecting PBL in their department and the school at large that were not covered in the Likert scale table.

Similar to Part B, Part C also comprised of; 5 points Likert Scale with pre-generated statements where respondents were to rate on a scale of 1-5 the strategy for countering or addressing PBL implementation challenges in their department (s). Additionally, an open ended question was added to give an opportunity for information that was likely missed out on the table.

The questionnaires were distributed to the 18 departments in the school. Each questionnaire was placed in the respective Faculty's pigeonhole to be completed by consenting respondents. The departmental secretaries were instrumental in collecting the questionnaires back for the researcher. An online survey was also used in addition to the paper-forms. The questionnaire and consent form was programmed into Google doc forms, and an online link sent to participants who were either on leave or out on other official duties ans were not in school at the time of the survey. The survey period lasted for 3 months from April to June 2016.

3.8 Data Analysis

Quantitative data analysis*:* Data on the questionnaires were reviewed for completeness by the research assistants and were entered into the Microsoft Access database. After the data entry, data cleaning was performed to eliminate any case of repeated and incomplete data set in readiness for analysis. After cleaning, data was then extracted from the database as a CSV file for analysis using Microsoft Excel. In the analysis process, both demographic and Likert scale data was plotted into frequency distribution tables using the "IF function" and tabulated into frequency distribution to determine the patterns of analysis and display the proportion of respondent's responses to various categories of questions. Data collected

through the online survey was incorporated with the paper-based data entered in Ms Access before final analysis was conducted.

Qualitative data analysis: Qualitative responses to respective questions were typed out in the access database. We pulled out the free text and exported it to a word document before importing it to into NVivo version 10 for analysis. Responses to open ended questions from the online survey were also added to those imported from access database to word before analysis. The analytical codebook was developed after reading through the text and inductively generating the themes. This method borrows from the iterative approach of grounded theory (Auerbach & Silverstein, 2003). The codebook was then used in coding the transcripts exported to NVIVO where other codes/themes were identified and included in the final code book.

3.9 Pilot

To test the reliability and validity of the questionnaire, we conducted a pilot test among 10 teaching staff at Moi University, School of Tourism, which also uses the PBL approach or strategy in the delivery of teaching and learning and was also within a reachable geographical distance. Permission to carry out the pilot was approved by the Dean School of Tourism. After pilot testing of the tool we made modifications to some of the questions and added some of the challenges and strategies to the likert scale table identified during the pilot.

3.10 Ethical Considerations

IREC approval (IREC Approval number 0001490) was obtained before the study commenced, and written consent was also obtained from participants who participated in the study. For those who undertook the online survey, an informed consent was placed at

the first page before the survey began and participant had to agree to participating before continuing to the next page that contained the survey questions. Participants privacy and confidentiality was maintained during interview and after the completion of the questionnaires in several ways:

- Participants were assigned unique IDs. No information that could identify the participant was recorded. As such, no names, identification numbers, dates of birth, or address were collected from the participant.

- Data from the questionnaires were entered into an excel spreadsheet and password protected.

- Data was stored in an encrypted format in password-protected computer and passwords were reviewed regularly to ensure quality and completeness

- Data in this report is presented in an aggregate format and in areas where extracts of the qualitative data is provided, no identifying information is included.

CHAPTER FOUR

RESULTS

4.1 Introduction

In this chapter, we describe the study findings as guided by study objectives

4.2 Demographic Characteristics:

Of 132 respondents, 66 (50%) agreed and consented to participate in the survey. Most of

the respondents, 47(71.2%), were males, with 29 (43.9%) aged 50 years and above. Half

33(50%) had attained a master's degree as their highest level of education, with 25 (37.9%)

holding a doctoral degree and the remaining having a bachelor's degree. The majority (49,

74.2%) had over five years of teaching experience at the school of medicine. Table 2 below

provides further details on the demographic characteristics of the participants.

Table 2: Socio-Demographic Characteristics of Participants

	n	(n/132*100)
Respondets (Faculty)	66	50
Age		
30-34	6	9.1
35-39	8	12.1
40-44	16	24.2
45-49	7	10.6
50 and above	29	43.9
Gender		
Male	47	71.2
Female	19	28.8
Educational Level		
Certificate	1	0.7
Diploma	1	0.7
Degree	6	3.0
Masters	33	50.0
Doctorate	25	37.9
Work Experience		
1-2 years	9	13.6
3-4 years	8	12.1
≥Five years	49	74.2

As shown in Table 3 below, majority of the respondents, 25(37.9%), held the position of

a Lecturer while Professors, Tutorial Fellows and Assistant Lecturers were each

represented by 2(3%).

Table 3: Category of Teaching Staff Respondents

Title	n	%
Lab Technician	6	9.1
Tutorial Fellow	2	3
Assistant Lecturer	2	3
Lecturer	25	37.9
Senior Lecturer	20	30.3
Associate Professor	9	13.6
Professor	2	3
Total	66	99.9

4.3 Challenges facing PBL in MUSOM

4.3.1 Human Resource and Training Challenges

As shown in figure 2 below, almost half of the respondents, 31(47%), agreed that there is

inadequate staffing to facilitate effective teaching and learning in the PBL approach.
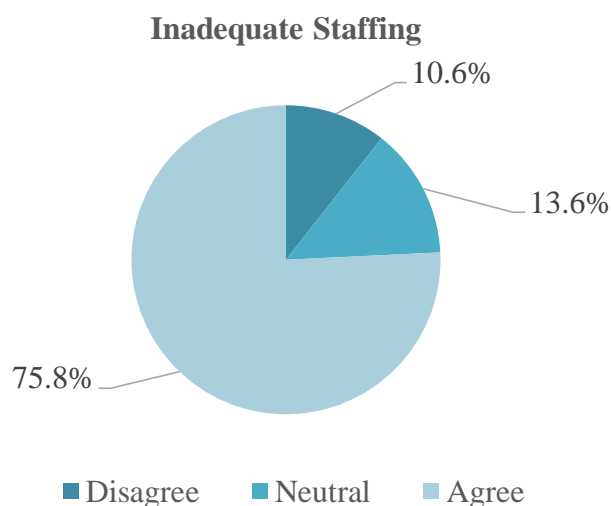

Figure 2: Staffing Challenges

Further, the qualitative results indicate that the staff shortage may lead to burnt-out as a result of work load. Below statement exemplifies this.

"The inadequate number of faculty members in some departments is straining and therefore, stressful for the few faculties."

As shown in figure 3 below, most of the respondents, 20 (30%), do not perceive a lack of knowledge on PBL as a challenge.

Knowkedge on PBL
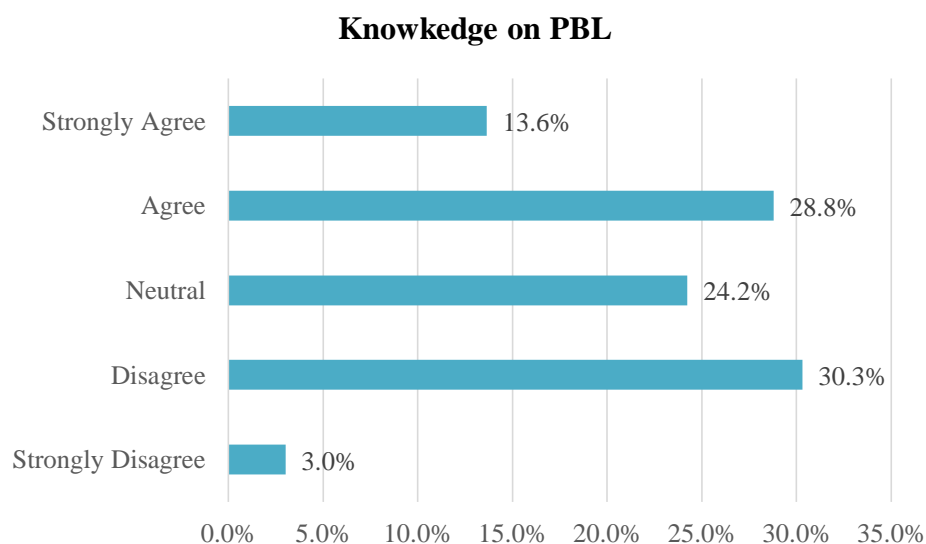
Figure 3: PBL Knowledge Challenge

The qualitative data pointed out a couple of training gaps including limited training opportunities, lack of mentorship and inadequate onboarding of the members to the PBL curriculum. These are exemplified in the following statements;

"PBL training opportunities are available but limited and, therefore, does not meet the learning needs of faculty."

"Lack of PBL mentorship structure for junior faculty by senior faculties. In addition to limited training opportunities and lack of mentorship for new and junior staff, the few available training opportunities are not widely advertised; hence not all departments were aware of such opportunities".

"Some faculty members are not even aware of any induction opportunity, and if there is, some departments are highly favored depending on the top leadership."

4.3.2 Infrastructural Challenges

Inadequate tutorial rooms and limited internet access were the most commonly cited challenges affecting PBL implementation. More than three quarters, 50 (75.8%) of the respondents also agreed that there is limited internet access within the school, hence challenging for faculty who need to access the internet for teaching & learning materials. Almost three quarters, 49 (74.2%) of the respondents agreed to the statement that tutorial rooms are inadequate to cater for the school-wide tutorial activities. Although the tutorial rooms are inadequate, slightly more than half, 36 (45.5%) of the respondents agreed with the statement that the few available tutorial rooms are well lit and ventilated, making them appropriate for teaching activities.

More than half, 44 (66.7%) of the respondents agreed with the statement, "few available tutorial rooms are not well equipped." More than half, 37 (56.1%) of the respondents agreed with the statement that tutorial rooms were inadequately equipped with audio-visual equipment for teaching. A large proportion, 40 (60.6%) of respondents agreed to the statement that both skills and basic science laboratories are inadequate to support PBL teaching. More than half, 37 (56.1%) of the respondents agree that the library available in the college is not sufficient and not equipped with reading resources for effective teaching. Access to reading materials such as Journals and books by both faculty and students is a key element of teaching and learning, and in PBL, a review of journals, for example, would aid a deep understanding of topics being discussed. Most, 44 (66.7%) respondents agreed that the computer laboratories are not equipped to facilitate teaching. Figure 4 below

provide more details on the infrastructural challenges faced by MUSOM faculty in implementation of the PBL curriculum.

Infrastructural Challenges

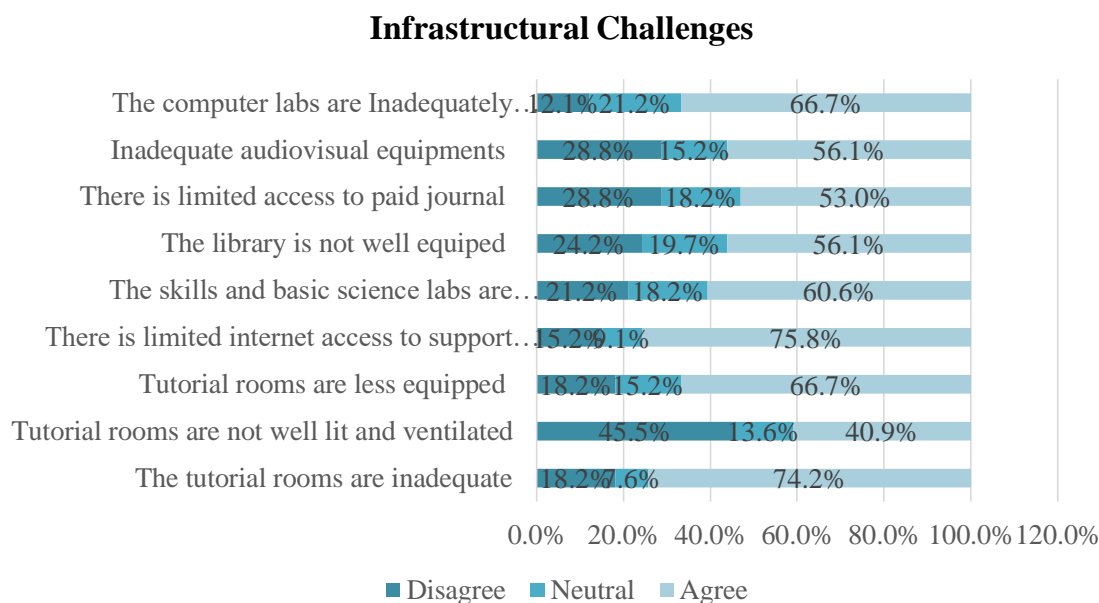|	Disagree	Neutral	Agree
The computer labs are Inadequately...	12.1%	21.2%	66.7%
Inadequate audiovisual equipments	28.8%	15.2%	56.1%
There is limited access to paid journal	28.8%	18.2%	53.0%
The library is not well equiped	24.2%	19.7%	56.1%
The skills and basic science labs are...	21.2%	18.2%	60.6%
There is limited internet access to support...	15.2%	9.1%	75.8%
Tutorial rooms are less equipped	18.2%	15.2%	66.7%
Tutorial rooms are not well lit and ventilated	45.5%	13.6%	40.9%
The tutorial rooms are inadequate	18.2%	7.6%	74.2%

Figure 4: Physical Resource Challenges

From the qualitative responses, physical resource challenges were also cited. The lack of maintenance of tutorial rooms that were described as being dirty, lacked lockable doors, and with electricity ports that were not functional. Other basic amenities necessary for implementing PBL were noted to be either lacking or inadequate – whiteboards and necessary teaching materials, poor internet connectivity and poorly equipped learning laboratories. The following statements exemplify the challenges faced related to the physical infrastructure;

> *"It is sometimes hard to find clean furniture, doors that lock and power sockets in a good working condition, making it challenging for tutorial classes."*

> *"Tutorial rooms lack basic teaching materials such as whiteboards, marker pens, and flipcharts."*

> *"Lack of reliable internet connectivity makes it challenging for both faculty and students to access current reading material."*

"There is a lack of good internet connectivity to facilitate the acquisition of teaching and learning materials."

"The school does not have reliable internet for both the tutors and the students to access journals."

"The students have to access the internet in the corridor during Self Directed Learning (SDL) sessions."

"The teaching laboratories are inadequate, and the existing ones are not responsive to the current teaching and learning needs. The laboratories lack key equipment that is essential for teaching."

"The printing services within the schools charge money which departments don't have; hence they are forced to utilize very old handouts to deliver teaching."

4.3.3 Financial Challenges

More than half, 43 (65.2%) of the respondents agreed to the statement that the finances are limited. From the qualitative response, one respondent mentioned that it is hard to access funds from the university to aid in the purchasing of materials and equipment. *"We don't see the university investing in teaching equipment."*

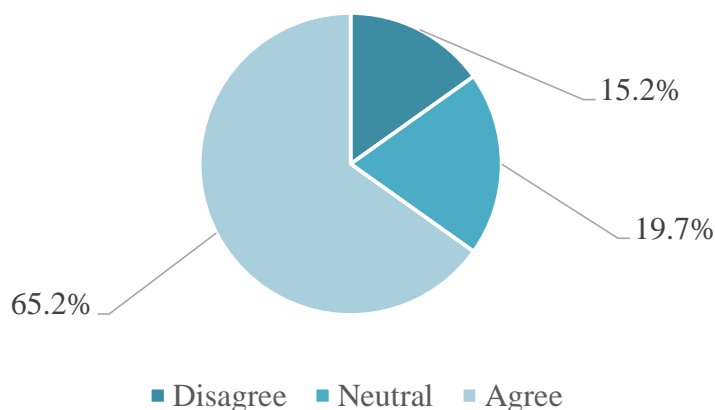**There is Inadequate funding to support PBL**

15.2%

19.7%

65.2%

■ Disagree ■ Neutral ■ Agree

Figure 5: Financial Challenges

4.3.4 Curriculum Challenges

The study looked at four areas of curriculum challenges that are likely to affect PBL implementation. These included; time-demanding nature of the PBL curriculum, dysfunctional curriculum (curriculum that deviates from ideal e.g., using lectures in place of tutorials), the nature of the course not flexible for PBL and lack of guidelines to facilitate PBL. As shown in figure 6 below, less than half, 26 (39.4%) of the respondents agreed with the statement that the PBL curriculum in MUSOM is time demanding. More than half, 36 (54.5%) disagreed with the statement that the PBL curriculum in the school is dysfunctional. More than half, 38 (57.6%) of the respondents also disagreed with the statement that the nature of the courses being taught in their respective departments are not flexible for the PBL curriculum. Most 29 (43.9%) respondents agreed with the statement, "there is a lack of PBL guideline to facilitate PBL curriculum".

Curriculum Challenges

Category	Disagree	Neutral	Agree
Lack of guidelines to facilitate PBL	42.4%	13.6%	43.9%
Nature of the course not flexible for PBL	57.6%	18.2%	24.2%
Dysfunctional PBL curriculum i.e. curriculum that deviates from ideal	54.5%	13.6%	31.8%
Time demanding nature of the PBL curriculum	31.8%	28.8%	39.4%

0.0% 20.0% 40.0% 60.0% 80.0% 100.0% 120.0%
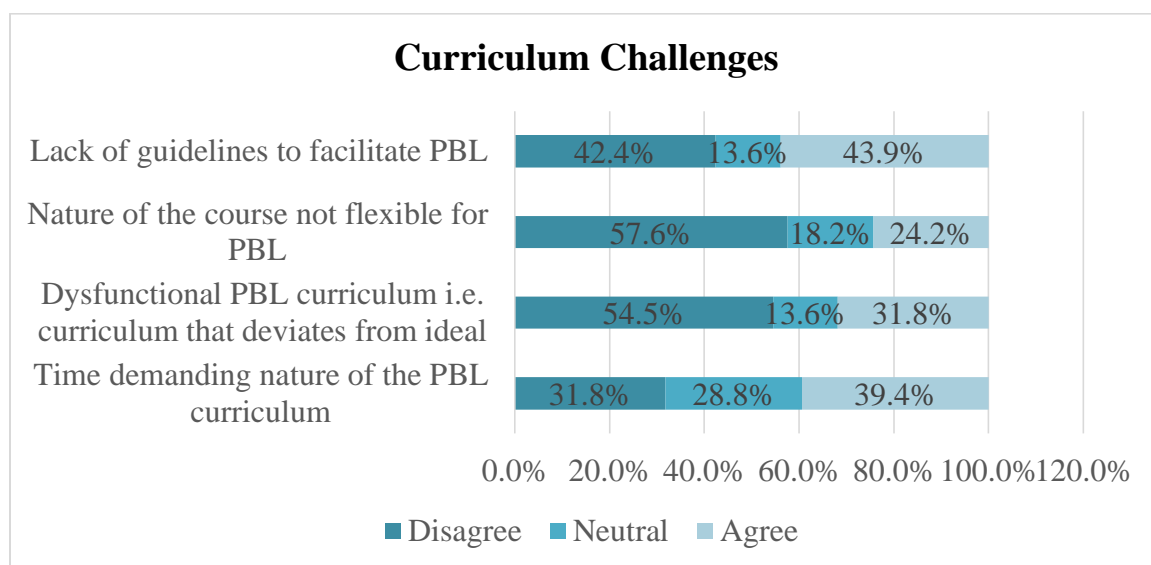
■ Disagree ■ Neutral ■ Agree

Figure 6: Curriculum Challenges

From the qualitative responses, the PBL curriculum was identified to lack a monitoring and evaluation system to assess it impact. Additionally, responses indicated the lack of

innovation in development of tutorial problems resulting in reuse of existing problems for several years. of the following statements intimated by the participants exemplify the curriculum challenges;

> *"Recycling of the same tutorial problems every year is boring and not motivating for tutors."*

> *"Lack of assessment system in place to enable the school to know the overall impact of PBL and whether it is implemented in the right way."*

> *"We cannot tell whether the PBL is working better since there is no system to assess its overall impact."*

Although the majority, 35.9 (54.5%) of the respondents disagreed with the statement that the curriculum is dysfunctional (deviates from ideal), one participant mentioned that the PBL approach is exhausting to tutor the students on large modules and most tutors would revert to traditional lecture methods in such situations. This is exemplified by the statement below;

> *"Some modules for specific courses are too overcrowded, requiring more time to complete, hence forcing tutors to deviate to lecture method since it is easy to cover more."*

Some respondents also mentioned that there is inadequate time and opportunity for student orientation on the PBL strategy; hence there is minimal understanding of the PBL concept and practice by the students. This is a challenge because the students do not understand the concept of PBL in their early years of their joining medical school.

> *"Students are not prepared well, and they do not know their role in small group teaching in their junior year. There is limited time for inducting the students on the requirements for PBL. Many of them do not understand PBL processes and, as a result, do not put enough efforts as required by the PBL curriculum approach.*

4.4 Suggested Strategies to Overcome PBL Implementation Challenges

4.4.1 Addressing human resource shortage and provision of training to existing faculty

As shown in figure 7 below, the majority of the respondents, 58 (87.9%), agreed that there is a need for the school to provide training to teaching staff on PBL. In addition, participants identified the need for more teaching staff to be employed to fill the staffing gap as we as well as to address tutor shortage.
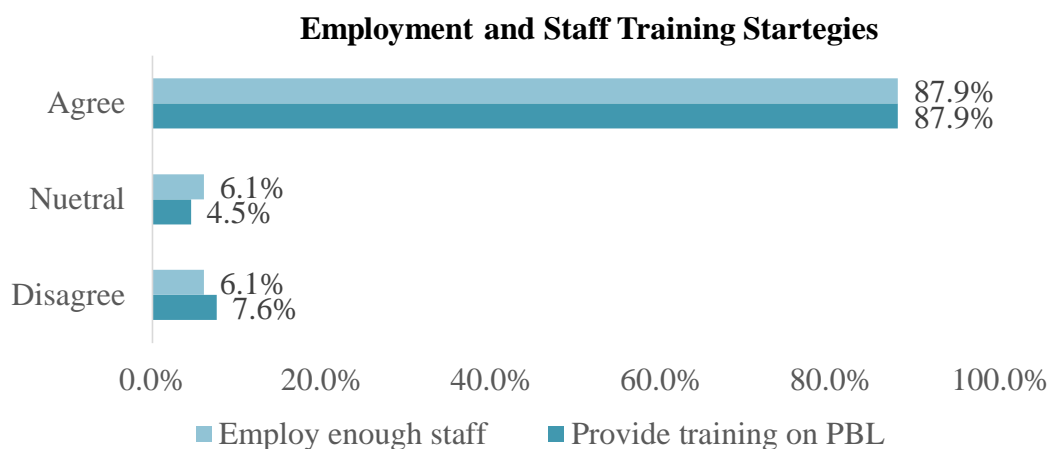
Employment and Staff Training Startegies

Figure 7: Employment and Staff Training Strategies

From the qualitative response, some respondents suggested that there is need to have regular training opportunities for all faculty staff to fill the knowledge gap that exists in PBL implementation and reiterated the need to employ more teaching staff as exemplified by citations below.

> *"Regularize and making re-orientation (of staff) mandatory."*

> *"There is a need to orient all staff who join the university on the PBL program (enhance staff induction program for new staff)."*

"Increase the time/period for inducting the students on the requirements for PBL. Many of them do not understand PBL processes and, as a result, do not put enough effort as required by the PBL curriculum".

"The school should lobby for more teaching staff to be employed and support staff to be deployed to departments with a shortage."

"There is a need for benchmarking opportunities with consortium universities that utilize the PBL curriculum, training opportunities to be advertised widely for departments to be aware of them, put in place a structure mentorship system for junior faculty to ensure PBL is fully adhered to."

One respondent mentioned that there is a need to increase the remuneration of the faculty members to motivate staff in the delivery of teaching instead of having some go for other money-making opportunities such as seeing patients during university's time. This is exemplified in the quote below;

"Pay staff well to motivate them. Poor pay equals less effort".

4.4.2 Improvement of School Infrastructure

As shown in Figure 8 below, the majority of the respondents agreed that there is a need to improve the school infrastructure. The majority, 59.9 (90.9%), identified the need for equipping the library, followed by equipping tutorial rooms 59.9 (90.9%) and construction of more teaching rooms 59 (89.4%).
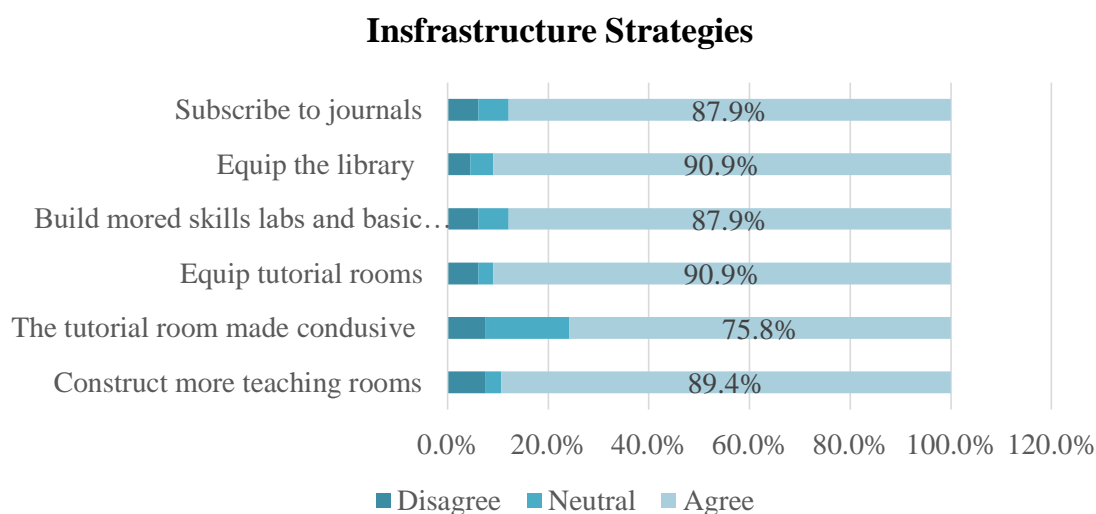
Insfrastructure Strategies

Figure 8: Infrastructural Strategies

Similar to quantitative, the qualitative responses were in line with the above results. The respondents cited the need for an equipped library and more tutorial rooms. The views are exemplified in these quotes;

> *"The library facilities should be expanded to serve student's SDL needs and ensure the provision of wireless internet."*

> *"The university should consider constructing more tutorial rooms that are well lit, ventilated, with blinders that protect excess light and fully equipped with teaching resources to create a conducive environment for both learners and tutors in PBL."*

> *"The university to create satellite teaching centers to ease congestion of students within the school. Apart from the library, there should be rooms open to students for private, quiet study and also others for discussions-outside class hours or over weekends."*

> *"Encourage the utilization of modern e-teaching platform to mitigate resource challenges."*

> *"Construct more skills and basic science laboratories to meet the demands of tutors and learners."*

4.4.3 Financial Strategies

The majority, 55 (83.3%) of the respondents agreed that there is the need for departments to be allocated funds to support PBL activities, for example; procurement of teaching resources like flip charts, marker pens, projectors and to cater for an in-house workshop on curriculum review meetings. A majority, 47 (71.2%), also agreed to statement that the school should try to mobilize additional funds to fill the financial gap affecting the implimentation of the PBL curriculum. Although a larger proportion of the respondents agreed that financial challenges existed and that there is a need for additional funding to support PBL implementation, more than half 40 (60.6%) of the respondents disagreed with

the statement that fees should be increased to respond to the financial gap. Figure 9 below provides more details on strategies to overcome financial challenges.
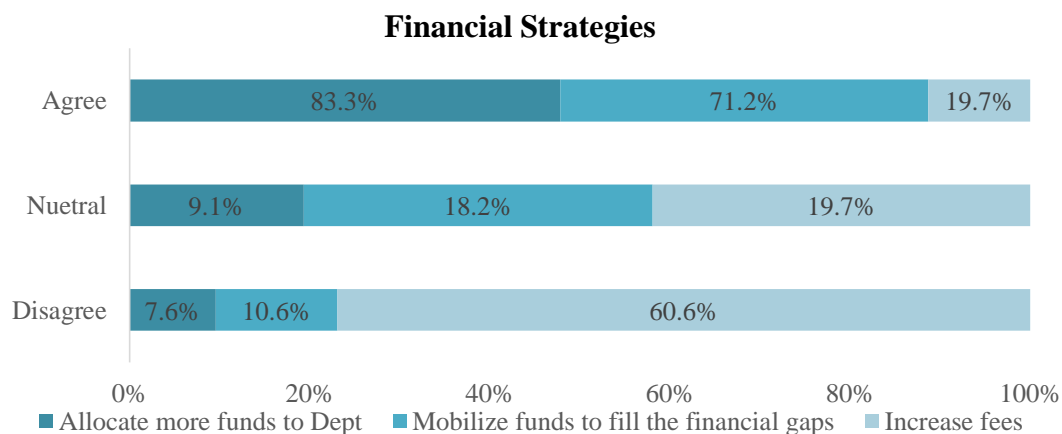
Financial Strategies

Figure 9: Financial Strategies

4.4.4 Curriculum Improvement Strategies

Figure 10 below summarises the strategies to overcome curriculum related challenges. The majority of respondents, 59 (89.4%), agreed that there is a need for regular PBL curriculum evaluation to measure whether every step of the processes is being adhered to as well as gauge its impact on medical graduates. The majority of the respondents, 55.9 (84.8%), also agreed that there is a need to develop PBL guidelines and avail them in all departments for the teaching staff to refer to as a PBL implementation guide
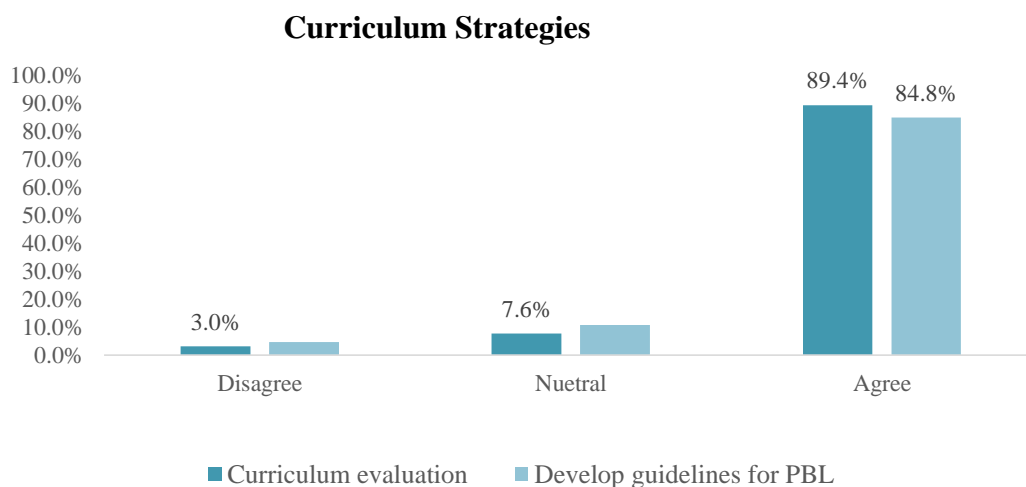
Curriculum Strategies

Figure 10:Curriculum Strategies

The qualitative responses were in line with the quantitative findings, reiterating the need for evaluation of the curriculum and having feedback sessions for improvement. These are exemplified in the following sentiments;

> *"There is a need to share results from curriculum evaluation to inform the state of the PBL curriculum system and improve on the standard of teaching."*
>
> *"Use of data collected from surveys (courses & PBL evaluations etc.) to improve standards.*
>
> *"Regular curriculum review will enable the department to amend key areas of the curriculum that need improvement."*
>
> *"Tutors to ensure overview session precedes over tutorials to avoid a situation where students engage in the tutorial without some foundation knowledge on the topic."*
>
> *"Tutorial timetables should be distributed in advance, not at the beginning of the course."*
>
> *"The curriculum document should incorporate the roles both the learners and the tutors to avoid wrong expectations."*
>
> *"Tutors should be assigned topics based on their expertise rather than depending on process expertise."*
>
> *"Teaching should be structured in a manner that gives room for enough breaks and holidays for staff and students in order to avoid burnout."*
>
> *"The timetable circulated on time to avoid last-minute processes."*
>
> *"There is a need for tutors to adhere to timetable allocated time to avoid confusion in the teaching process."*

CHAPTER FIVE

DISCUSSION

5.1 Introduction

In this chapter, we discuss the relevance of the study findings and compare the results with other studies.

5.2 Human Resource Challenges & Strategies

This study, conducted at the Moi University school of medicine, showed that PBL curriculum is faced with human resources, infrastructural, financial and curriculum-related challenges and suggests strategies to covercoming these challenges to successfully implement the curriculum. The majority of the participants agreed with the statement that there is limited staff in the department to facilitate teaching and learning. Similar to Mullan *et al*., most institutions in sub-Saharan African face ubiquitous faculty shortages in basic and clinical sciences. (Mullan *et al*., 2011).

In a PBL curriculum, students study in small groups of about 6 – 10 members, and each of these groups is assigned a faculty member (facilitator) whose role is to facilitate the learning process at the tutorial group meetings. The human resource implication of this setting is massive and calls for adequate staffing to ensure all PBL processes are covered (Amoako-Sakyi, 2015).

In addition to the human resource challenges, there is a challenge of finding a medical teacher "tutor" with the expertise to deliver learning in PBL format. The availability of well-trained medical teachers who understand the entire process of PBL and those who have acquired skills in facilitation and management of group dynamics is scarce in a

resource-limited setting. For tutorial groups to function effectively, the facilitator (tutor) must be familiar with teaching techniques of facilitating small groups (Barrows, 1983).

Results from this study also show that MUSOM faculty perceive themselves to be knowledgeable about PBL. However, from the qualitative survey, some participants mentioned that although they know PBL, continuing professional development opportunities are necessary. Similar to these study findings, otherstudies have shown that continuous training of faculty is important in PBL implementation(Baral *et al.*, 2010; Hitchcock & Mylona, 2000). These studies suggest that PBL implementation is reliant on both availabilities of faculty that are acquainted with PBL knowledge and skills and suggest the needs for institution utilizing the PBL approach or wishing to adopt the PBL approach to consider setting aside adequate staffing and training budget.

5.3 Infrastructural Challenges & Strategies

The overall result from this study found out that MUSOM faces a myriad of challenges in terms of infrastructure establishment that is likely to interfere with the smooth implementation of PBL. The availability of physical resources is a key element in PBL implementation. Other studies have also demonstrated that both faculty and students in medical schools utilizing the PBL approach would prefer a well-established infrastructure such as; well-equipped library, adequate, well-built, and equipped tutorial rooms, and reliable internet connection within the campus. Such an environment is flexible learning spaces that can adapt to both individual and collaborative work with a strong emphasis on social learning (Amoako-Sakyi, 2015; Walker & Leary, 2009).

5.4 Financial Challenges & Strategies

Like any other program, PBL demands are cost-intensive, and therefore the institution is likely to suffer if financial aspects are ignored. In this study, financial challenges were perceived as a major hindrance to the successful implementation of the PBL curriculum by a large proportion of faculty. The cost of a PBL approach and traditional teaching based on lectures and labs tends to show that PBL is twice as costly as the traditional approach (Ribaud & Saliou, 2013)

Previous studies also suggest that cost determinants on PBL curriculum implementation and maintenance need to be considered and balanced against affordability; greater expenditure cannot be assumed to translate into better outcomes (Walsh, 2010). A study done in China by Fan *et al*. shows that many schools are interested in increasing the number of curricular hours devoted to PBL but are constrained by resources (Fan *et al*., 2014). This suggests that to implement PBL, the institution should be prepared financially.

5.5 Curriculum Challenges and Strategies

The current expansion in medical education renders the evaluation of the effectiveness of the innovations, together with the established modes of curriculum delivery, very important. In this study, several curriculum-related challenges were identified, key among them being; irregular review of curriculum, lack of PBL guideline, lack of assessment system of PBL to measure its impact, overcrowded modules, curriculum deviation, and shortage of tutorial cases/problems. Other similar findings have been demonstrated by studies that have looked at PBL curriculum challenges (Abdelkarim *et al*., 2018; Azer, 2001; Lonka, 2013; Salam *et al*., 2009; Yeo & Chang, 2017).

5.6 Study Limitation

This study utilized a survey method that was limiting in nature compared to the use of the in-depth interview. However, the result of this study still highlights the challenges that affect the PBL approach.

5.7 Conclusion

The findings from this study suggest that the PBL approach in MUSOM faces a myriad of challenges with regards to; human resources and training, infrastructure, finance, and curriculum. These challenges included; shortage of teaching staff and limited training opportunities on PBL for the few existing staff, limited internet connection, inadequate tutorial rooms to cater for PBL tutorial activities, less equipped and poorly maintained tutorial rooms, inadequate basic sciences and skills laboratories, poorly equipped library, and computer laboratories.

Curriculum related challenges included; lack of PBL guidelines to guide the PBL implementation, recycling of PBL problems, lack of an assessment system to measure the expected outcome of the PBL strategy and deviation to lecture methods.

5.8 Recommendation

To address human resource and training challenges, the study recommends that the school of medicine should establish positions for more teaching staff to meet the demand for PBL. That all teaching staff should undergo training on PBL and this should be established as a continuous training to the existing staff as well as the newly hired staff.

To address infrastructural challenges, the study recommends that MUSOM should build additional tutorial rooms to meet the demand of PBL, invest in reliable and adequate

internet connectivity, equip tutorial rooms with audio-visual equipment and other teaching resources, construct more skills and basic science laboratories to meet the demand for teaching and learning, equip the library with more reading resources, establish private reading and discussions rooms, and equip computer laboratories with modern computers.

To address financial challenges, the study recommends that the Moi University should allocate more funds to the departments to facilitate the procurement of teaching resources and mobilize finances to cushion the expenditure on the acquisition of teaching resources.

To address curriculum challenges, the study recommends that school should develop PBL guidelines for reference at the departmental level and make them available to every teaching staff, develop more tutorial problems to avoid recycling the existing problems, establish a PBL assessment system to gauge whether the PBL strategy is making the desired impact and carry out regularly orientation of students on the PBL strategy.

Given the above recommendation, the process of adoption requires planning, departmental support, and stakeholder engagement.

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   education in Korea. *Korean Journal of Medical Education*, 29(4), 271–282.

   https://doi.org/10.3946/kjme.2017.73

APPENDICES

Appendix 1: Consent Form

Study Title: Challenges and Barriers in Implementation of Problem-based Learning (PBL) in Moi University School of Medicine (MUSOM)

Investigator

Joseph Kipkoech Kirui

MUSOM, Department of Medical Education

Tel:0720393547

Purpose and background: The purpose of this study is to identify and describe the challenges and barriers to the implementation of Problem Based Learning as a continuum of innovative teaching and learning method as perceived by the faculty in MUS0M. I estimate that this interview will last about 15 -20 minutes to complete this questionnaire. It will involve questions that highlight the key domains in the implementation of PBL.

Procedure: The study targets teaching and non-teaching staff in the school of medicine as implementers of PBL. Being a census study, all participants that meet the inclusion criteria are expected to participate in this study by consent.

Benefits and Risks: There will be no direct benefits for those participating in the study. However, your participation will contribute to knowledge, which will contribute to improved standards of PBL as an innovative teaching and learning method

Confidentiality: All information will be used only for the purpose of the study. The study finding will be kept under lock and key and shall only be available for those who are directly involved in the research.

Voluntary participation: The participation in the study is voluntary and participants are free to accept or not accept to take part in the study and to withdraw at any time

Consent: I have read the above information/ I have been explained to in details about the study. I have asked questions and received answers and I agree to participate in the study.

Signature _____   Date _____

Appendix 2: Study Questionnaire – Teaching Staff

This questionnaire is designed to solicit information from the teaching staff at Moi University School of Medicine (MUSOM) regarding the perceived challenges and barriers in the implementation of PBL.

Form Number _____   Date _____

Hello, my name is Joseph Kipkoech a student from MUSOM, Department of Medical Education. I am conducting a study to assess the challenges in the implementation of Problem-based Learning as perceived by faculty as implementers of PBL in MUSOM.
The answers you will give us in this session will enable the school to improve the PBL approach as well as contribute to a large pool of knowledge in Medical education that will be beneficial to curriculum and instructional design.

p
Thank you for agreeing to participate in this study.

Part A: Demographic Information (Tick Where Appropriate)

1. Which age bracket do you belong to?

    ☐ 25-29   ☐ 40-44

    ☐ 30-34   ☐ 45-49

    ☐ 35-39   ☐ 50 and above: _____

1. What is your gender:

    ☐ Male   ☐ Female

2. The highest level of education:

    ☐ Degree   ☐ Masters   ☐ PhD

3. What is your position at the university:

    ☐ Tutorial Fellow   ☐ Senior Lecturer

    ☐ Assistant Lecturer   ☐ Associate Professor

    ☐ Lecturer   ☐ Professor

4. For how long have you been teaching at MUSoM:

    ☐ 1-2 years

☐   3-4 years

☐   ≥5 years

5. Which department in the school do you belong to? (*Circle where appropriate*)

a. Human Anatomy	k. Microbiology and
b. Surgery and Anesthesiology	Parasitology
	l. Pharmacology and toxicology
c. Internal Medicine	
d. Behavioral Sciences	m. Orthopaedics and
e. Child Health and Paediatrics	Rehabilitation
f. Haematology and B/Transfusion	n. Medical Biochemistry
g. Immunology	o. Human Pathology
h. Radiology and Imaging	p. Medical Physiology
i. Reproductive Health	q. Medical Education
j. Mental Health	r. Family Medicine

Part B: PBL Challenges and Barriers

6. Using a five-point scale, please indicate the closest response to the factors you personally feel are a challenge to PBL implementation in your department: 1= strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

Factors	1	2	3	4	5
Human resources					
Inadequate staffing in the department					
Limited knowledge and skills on PBL by the teaching staff					
Infrastructural resources					
Inadequate meeting rooms for tutorial sessions					
Poorly constructed rooms with less ventilation and lighting					
Poorly equipped rooms to support PBL					
Inadequate ICT infrastructure to support self-directed learning					

Inadequate skills and basic science labs					
Lack of capacity for the learning resources e.g. library to meet student needs					
Lack of access to journals to support Self Directed Learning					
Inadequate audio-visual equipment e.g Projector					
Inadequately equipped computer Labs					
Financial Resource					
Limited funding to facilitate implementation of PBL					
Inability to mobilize resources to facilitate implementation of PBL					
Lack of commitment by the university administration to allocate funds to the department for PBL implementation					
Other Factors					
Time demanding nature of the PBL curriculum					
Dysfunctional PBL curriculum i.e curriculum that deviates from ideal					
Nature of the course not flexible for PBL					
Unavailability of guidelines to facilitate PBL					

7. Would you kindly list other challenges to PBL implementation?

_____

_____

_____

_____

_____

C: Perceived Strategies to Overcome Challenges

8. What strategies do you think can be employed in overcoming the above challenges? Using a five-point scale, please indicate your closest response to the strategy you personally feel can be employed in overcoming the challenges above.

1= strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

Strategies to Overcome the challenges	1	2	3	4	5
Human resources					
Provide training on PBL to staff in the department					
Employ enough staff to meet the shortage and teaching demands					
Infrastructural resources					
Construct more facilities (e.g. tutorial rooms, learning resource Centre) to facilitate PBL					
The tutorial room should be well lit and ventilated					
Tutorial rooms should be well equipped with teaching aid, equipment and supplies					
Build and establish more skills lab and basic science lab					
Equip the library with the latest learning resources for effective SDL					
Increase subscription to journals to support SDL					
Financial Resource					
The department/ school should lobby for funding at a departmental level from the university's finance and administration to meet the demand of PBL					
The department/school should mobilize more resource to fill the financial gaps					
Increase fees to meet the demand for money					
Other Factors					
Ensure all staff participate in evaluating the curriculum to identify bottlenecks for PBL implementation					
Provide guidelines to facilitate PBL curriculum					

9. What other strategies would you recommend for effective implementation of PBL?

_____

_____

_____

_____

Appendix 3: IREC Approval

INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE (IREC)

MOI TEACHING AND REFERRAL HOSPITAL
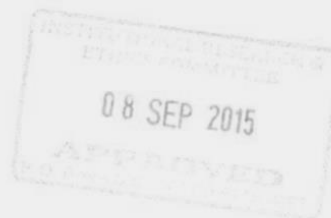P.O. BOX 3
ELDORET
Tel: 33471//2/3

MOI UNIVERSITY
SCHOOL OF MEDICINE
P.O. BOX 4606
ELDORET

Reference: IREC/2015/57
Approval Number: 0001490

8th September, 2015

Mr. Joseph Kipkoech Kirui,
Moi University,
School of Medicine,
P.O. Box 4606-30100,
ELDORET-KENYA.

0 8 SEP 2015

Dear Mr. Kirui,

RE: FORMAL APPROVAL

The Institutional Research and Ethics Committee has reviewed your research proposal titled:-
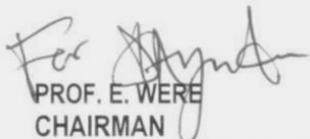
"Challenges and Barriers in Implementation of Problem Based Learning (PBL) in Moi University School of Medicine."

Your proposal has been granted a Formal Approval Number: *FAN: IREC 1490* on 8th September, 2015. You are therefore permitted to begin your investigations.

Note that this approval is for 1 year; it will thus expire on 7th September, 2016. If it is necessary to continue with this research beyond the expiry date, a request for continuation should be made in writing to IREC Secretariat two months prior to the expiry date.

You are required to submit progress report(s) regularly as dictated by your proposal. Furthermore, you must notify the Committee of any proposal change (s) or amendment (s), serious or unexpected outcomes related to the conduct of the study, or study termination for any reason. The Committee expects to receive a final report at the end of the study.

Sincerely,

PROF. E. WERE
CHAIRMAN
INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE

cc   Director - MTRH   Dean - SOP   Dean - SOM
      Principal - CHS   Dean - SON   Dean - SOD

Appendix 4: Certificate Of Correction

Tel: 254-053-61562
Fax: 254-053-33041
Telex: 35047 MOIVARSITY
E-mail: muths@net2000ke.com

School of Medicine
Moi Teaching & Referral Building
Nandi Road
P O Box 4606
ELDORET, Kenya

MOI UNIVERSITY
College of Health Sciences
School of Medicine

DATE: 15|2|2021

<u>CERTIFICATE OF CORRECTIONS</u>

This is to certify that all corrections proposed at the Board of Examiners meeting held on _____ in respect of MPhil / MSc / MMed / DPhil thesis of

Reg. No. PGME /02/14

Entitled: Challenges in Implementation of Problem-based Learning (PBL) Approach In Moi University School of Medicine Kenya: Perspective of faculty Members.

have been effected to my / our satisfaction and the thesis can now be prepared for binding.

DR. ANNE KOSKE NGENO — LECTURER
NAME — TITLES / STAMP

SIGNATURE — 15/2/2021 DATE

DR. OSOTSI FRANKLIN BOIBANDA — LECTURER
NAME — TITLES / STAMP

SIGNATURE — 15/2/2021 DATE

APPROVED BY THE DEAN, SCHOOL OF MEDICINE

SIGNATURE — DATE 17/2/21

Appendix 5: Plagiarism Check

PBL Challenges in Moi SOM_FINAL DRAFT_31.1.2021v4 for plagiarism check

by Joseph Kipkoech

General metrics

78,406	11,364	917	45 min 27 sec	1 hr 27 min
characters	words	sentences	reading time	speaking time

Score

86

This text scores better than 86% of all texts checked by Grammarly

Writing Issues

503	135	368
Issues left	Critical	Advanced

Plagiarism
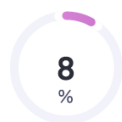
8 %

68 sources

8% of your text matches 68 sources on the web or in archives of academic publications