

# Modified Problem Based Learning MPBL: A New Approach in Medical Education

Omer Abdelaziz Musa<sup>1</sup>, Ibrahim Abdelrhim Ali<sup>2\*</sup>, Magbola Mohammed Hussein<sup>3</sup>, Omer Alaadil Ahmed Hamid<sup>4</sup> and Bashir Hamad<sup>5</sup>

<sup>1</sup>Professor, Department of Physiology, Faculty of Medicine, The National Ribat University, Sudan

<sup>2</sup>Department of Physiology, Faculty of Medicine, The National Ribat University, Sudan

<sup>3</sup>Department of Physiology, Faculty of Medicine, International University of Africa, Sudan

<sup>4</sup>Department of Medicine, Dean Faculty of Medicine, International University of Africa, Sudan

<sup>5</sup>Professor, Consultant of Medical Education, WHO, Sudan

\*Corresponding author: Ibrahim Abdelrhim Ali, Email: Hemamedicine@gmail.com

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## Abstract

**Background:** The problems that face the Problem-Based Learning (PBL) are staff facilitation and availability of resources, students' anxiety of not attaining what is required and the language. To overcome some of these difficulties PBL has been modified by performing some of the activities with the whole class and having a final discussion with the whole class in the presence of senior staff to make sure that all the objectives have been covered.

**Methods:** This study was aimed to apply Modified Problem-Based Learning (MPBL) and assess it by feedback from the students and their results in the exams. The first-year class in Faculty of Medicine, International University of Africa was divided into small groups and a tutor was assigned for each group. A problem about a child with edema was presented to the whole class and the students were left in the class to practice the first four jumps together under the supervision of the senior staff. Then the class small groups were asked to sit with the tutors and work out learning objectives in one hour. The students gathered in the class and with the senior staff agreed on the learning objectives required from them. The students were given two weeks to study and discuss the objectives together and with the tutor and informed that a report from each of them is needed and in the discussion any one can be asked to present whole group. Before the discussion each group was assigned to one of the objectives to prepare and present to the whole class in the presence of the staff. A questionnaire was distributed to 200 students, 171 of them responded (94 males and 77 females).

**Results:** 32.2% of the students preferred lectures and 67.8% preferred MPBL. Those who prefer MBPL explained that because its more interesting (47.9%), easy to follow (22.9%) and contain more students participation (26%). The students' assessment of MPBL was: 40.5 % Excellent, 32.3% very good, 20.5% good, 6.2% acceptable and 0.5% very bad.

**Conclusion:** MPBL can tackle some problems of PBL and its overall student assessment was better than the lectures.

**Keywords:** Modified Problem-based learning; MPBL; Problem-based learning; PBL; lectures

## Abbreviations

MPBL: Modified Problem-Based Learning; PBL: Problem-Based Learning; TL: Traditional Lectures; LBP: lectures based on problems

## Introduction

Problem base learning (PBL) is a new method of teaching which focuses on changing the base of teaching from the teacher centred learning to the student centred-learning method, making a fundamental shift from a focus on teaching to a focus on learning, and the students assume a greater responsibility for their own learning and the presence of a teacher is much less frequent in problem-based learning [1,2].

It was originally developed in mid-1960s as an alternative method to the conventional approach and was first applied in the McMaster Medical Faculty in Canada in 1969 [3,4]. Then introduced and applied in Limber at Maastricht, Australia (Newcastle) in 1976 [5], Nigeria (Ilorin) [6], Egypt (Faculty of Medicine, Suez Canal University in Ismailia city) in 1978 [7] and Sudan (Faculty of Medicine, Gezira University) in 1980s [8].

PBL is student-centred, designated to form a connection and behaves like a bridge of solid integration between basic and clinical sciences [2].

PBL as a new method of gaining knowledge motivates the students to learn and let them not be disappointed by a very huge basic sciences curricula and references, especially, at their first three years of medical student's life.

The main idea of problem base learning lies in concept of student's motivation by encouraging them to approach and highlight the use of a conundrum adapted from real life as a stimulus for learning, students work on scenario-based problems in a small group comprised of 5-12 individuals [9].

Since then the use of PBL in medical education has been endorsed by the World Health Organization [10], the Association of American Medical Colleges and the World Federation of Medical Education [11,12].

## What is going on in a PBL tutorial?

Tutorials in the PBL fashion are conducted in a variety of ways. When describing a tutorial, we often describe a gathering of up to 10 students and their tutor. The job of the latter is to facilitate a smooth session. The amount of spent time per session depends on the teaching facility. The goal is creating a microenvironment for the group dynamics, but it can be changed according to new circumstances, such as dysfunctional behaviours.

The essential role of the tutor is to ease the process of information solidification, control the dynamics of the given task and to make sure that the group reaches the agreed upon learning objectives in accordance with the curriculum.

## In PBL a framework of learning is initiated through the presentation of authentic clinical problem; students then:

- evaluate and identify important aspects of the problem
- recognize deficiencies in their knowledge
- identify appropriate learning resources
- evaluate information, and (e) apply new knowledge to the original problem.

This learning process is supported through both instructor facilitation (rather than indirect presentations of content as in lectures) and meaningful collaboration with peers.

### **PBL has traditionally aimed to support the development of:**

- (a) knowledge for use in clinical contexts
- (b) Effective clinical reasoning processes, and (c) effective self-directed learning skills.

#### **PBL tutorial process [13]**

Step1: identify and clarify unfamiliar terms

Step 2: define the problem or problems to be discussed

Step3: brainstorming session

Step4: review step2,3 and arrange explanation.

Step5: formulate learning objectives

Step6: all students gather information related to each learning objective,

Step7: group share results and tutor check learning and may assess the group.

In practice, PBL is usually part of integrated curriculum using a system-based approach, with non-clinical material delivered in the context of clinical practice

The group as whole should be encouraged to reflect on it PBL performance including its adherence to the contributions. Peer pressure in group reduces the likelihood of students failing to keep up with workload, and the award of a group mark add to everyone's assessment schedule encourages students to achieve the generic goals associated with PBL.

#### **Why PBL?**

In problem-based learning (PBL) the learning issues is going to be elaborated by the students and they use "triggers" from the problem case or scenario to define their own learning objectives. For this reason, the students embark on the journey of self-study, going through the agonizing yet sweet trip of gaining information in an independent fashion. When this comes to end, they go back to their assigned groups and discuss.

The PBL sessions make the student enjoy by the process of learning and give them a good feeling of confidence as a problem solver.

The PBL sessions improve the communication skills, teamwork, problem solving, and independent responsibility for learning, sharing information, respect for others, how to work alone and when to work in group. It's also improve their problem-solving skills and increase their experiences to obtain knowledge [14].

PBL mainly aims to help students learn better, acquire and experience higher order of thinking skills which they are going to use throughout their medical lives [15].

PBL approach emphasize that individuals' ideas and behaviours that acquired later in the life are based on their previous ideas, and that learning is a process involving correlation between their existing knowledge and new ideas and experiences [16].

PBL sessions allow the students to improve their problem-solving, creative thinking and critical thinking skills [17]. Therefore, it is very important to establish learning environments based on active participation of the students in learning process [18].

In the traditional curricula lectures is not emphasize complete transmission of information to the students and the real problem facing them is irrelevance of some knowledge and data which they must acquire in the traditional curricula.

In a nutshell, students assume increasing responsibility and

awareness for their own learning. They identify and comprehend the objectives in the 'problem scenario' and, since the purpose of PBL is to develop understanding, rather than just memories students.

The PBL model as a novel method of teaching, which bears a lot of advantages and disadvantages, hopes and challenges, in this review highlights the most important critical incident in PBL tutorial groups.

The major advantages of PBL are the fact that it is student-focused, which allows for better understanding, retention of knowledge and active learning. It also helps to develop useful skills that are suitable and applicable to many domains [19,20]. It can be used to improve content knowledge while simultaneously fostering the development of communication, critical thinking, collaboration, and self-directed learning skills.

Students also report uncertainty with information overload and are unable to determine how much study is required and the relevance of information available. Students may not have access to teachers who serve as the inspirational role models that traditional curriculum offers [21].

When the PBL is introduced into a curriculum, several other academic and non-academic (financial) issues for curriculum design and implementation need to be tackled. PBL is practiced in the frame of specific core curriculum with integrating basic and clinical sciences. PBL has requirements for recruiting staff and allocating learning resources. Moreover, it proposes an alternative approach to setting timetables, workload, exams and other methods of assessment.

Another challenge for the PBL module is that it could be difficult for teachers and tutors to change their teaching traditional styles.

Another issue strikes in the face of the PBL, is the possibility that this would be a time-consuming endeavour as the students face problematic situations.

Solid research and rich material are considered the prerequisite for problem-based learning. Four studies were conducted at different times found PBL quite a difficult method to assess learning process [22-25].

Lack of interaction and motivation is also found to be one of the obstacles that face the tutor of the PBL group; tutors often talk about being "lucky" to have a good group or being "unlucky" and having a bad group.

There are variations in the distribution of the PBL groups, some tutorial groups work perfectly, but there are also some groups which could do much better or that don't work at all.

Other studies investigated the group dynamics of problem-based learning to explain unproductive tutorial groups. Previous studies addressed group dynamics of group functioning in tutorial. Tipping et al. (1995) [26] and Mpofu et al. (1998) [27] investigated the development of group dynamics in tutorial groups but limited their research to the introduction phase of problem-based learning. Students with greater experience in problem-based learning might differ in the way they handle problem-based learning in the tutorial group.

Tipping (1995) observed low awareness of effective group dynamics among students and tutors and a discrepancy between self-reported behaviour and observed behaviour in relation to group dynamics [26].

Difference in what is perceived and gender variation were also noticed by Mpofu et al. (1998) who found that differences exist in what students and tutors perceived as important, thus demonstrating a staff-student perception gaps, hence, first of all, the teachers should be prepared to deal with critical incidents, for example, tutors must know how to stimulate elaboration, thinking, motivation and how to deal with difficult personalities in tutorial group. Mpofu also reported gender differences in perceptions [27].

## Methods

The study was conducted in the Faculty of Medicine, International University of Africa, Khartoum, Sudan. This study was aimed to apply Modified Problem-Based Learning (MPBL) and assess it by feedback from the students and their results in the exams.

To overcome some of these difficulties PBL has been modified by performing some of the activities with the whole class and having a final discussion with the whole class in the presence of senior staff to make sure that all the objectives have been covered. We used this modified method of PBL since 1990s, but it has not been examined before. In this paper we present our experience in applying a modified version of PBL (MPBL) such that needs less tutoring resources and applicable for large classes of students.

A problem about a child with oedema was presented to the whole class in an introductory course in the first semester and the students were left in the class to practice the first four jumps together and with the senior staff (Clarifying whatever is not clear in the problem. Defining the problem. Analyzing the problem, clues and keywords. Listing possible explanations). Then the class small groups were asked to sit with a tutor and work out learning objectives in one hour. The students gathered in the class and with the senior staff, agreed on the learning objectives required from them. The students were given two weeks to study and discuss the objectives together and with the tutor and informed that a report from each of them is needed and in the discussion any one can be asked to present one of the objective and he or she will represent the whole group.

Before the discussion each group was assigned to one of the objectives to prepare and present to the whole class in the presence of the staff.

By the end of course students were contacted by the investigator in the lecture hall. They were informed about the study and its objectives. To avoid measurement bias it was stated clearly that participation in the study will not affect their exam performance or grades by any means. Moreover, the data was collected using self-administered questionnaire that contains no names or identifiable information.

An informed consent form attached to questionnaire was distributed to 200 students, 171 of them responded and agreed to fill the questionnaire (94 males and 77 females) which covered three domains: students' preference of different learning methods (Traditional Lectures (TL) and MPBL), why they prefer this method and what was the reason for choosing that method. The data was analyzed using SPSS program version 25.

## Results

32.2 % of the students preferred traditional lectures (TL) and 67.8 % preferred MPBL. Those who prefer MBPL to lectures explained that because it is More interesting (47.9%), Easy to follow (22.9%) and contain more students participation (26%).

The perception of the students towards MPBL was significantly better than the lectures. The students provided valuable assessment information about the MPBL, 40.5 % Excellent, 32.3% very good, 20.5 good%, 6.2 acceptable % and 0.5% very bad. The success rate in the questions of the objectives taught by MPBL in the end of course exam was 63.6% compared to 56.8% in objectives taught by lectures.

## Discussion

This study was aimed to apply Modified Problem-Based Learning (MPBL) and assess it by feedback from the students and their results in the exams.

The results of this study showed that about two third of the class thinks that they have more active role and better attention in the MPBL compared to the traditional lectures (TL). We found that 47.9% of

students think that MPBL are more interesting, (22.9%) Easy to follow and (26%.) think it contain more student's participation.

The problems that face the Problem-Based Learning (PBL) are: staff facilitation and availability of resources, students' anxiety of not attaining what is required and the language [21-27]. To overcome some of these difficulties PBL has been modified by performing some of the activities with the whole class and having a final discussion with the whole class in the presence of senior staff to make sure that all the objectives have been covered. In MPBL the students gathered in the class and with the senior staff, agreed on the learning objectives required from them and this method solve one of the major disadvantage of PBL process which involves the tutor facilitation, utilization of resources and, requires more staff and more physical space. For this reasons some educators find PBL facilitation difficult and frustrating [21]. The humongous issue in the face of such process is to provide tutors, the allocation of resources and, the need for more staff and availability of the facility. This is why some educators regard PBL overwhelming from the implementation point of view [21]. In addition to these problems local issues related to the language, the references, the limited resources with large number of students in each class (up to three hundreds), tutors who are not interested, non-medical tutors who cannot grasp all the details of other specialties. In one experience in a PBL workshop one student was saying wrong facts about a subject which was not the specialty of the tutor and the tutor continued listening! Even more, instead of students sleeping in lectures some tutors do in student sessions.

The perception of the students towards MPBL was significantly better than the lectures. The students provided valuable assessment information about the MPBL, 40.5 % Excellent, 32.3% very good, 20.5 good%, 6.2 acceptable % and 0.5% very bad. The success rate in the questions of the objectives taught by MPBL in the end of course exam was 63.6% compared to 56.8% in objectives taught by lectures. This results agree with studies of Armbruster P et al [28] and Preszler RW, et al. [29]. In which they concluded that the use of student-centered active-learning instructional approaches, such as active- and inquiry oriented learning in the classroom, improved student attitudes and increased learning outcomes relative to a standard lecture format. Although TL permits to share a large body of content with a large number of students, they often promote passive and superficial learning. In TL the objectives of the lecture are shown at the start of the lecture and they are covered adequately by the teacher. However, students sitting passively may find difficulty in paying attention throughout the lecture. Also a study performed by Alaagib, et al. show that the lectures based on problems (LBP) improved students' understanding of physiology concepts and increased students' satisfaction about physiology learning. LBP achieved some of the objectives of PBL with the minimum resources and it can be used to improve the effectiveness of the lectures.

In this study 32.2 % of the students preferred traditional lectures (TL) rather than MPBL, these results support the idea that the culture of the lecture is still acceptable by the students and that it can be an effective learning mechanism given that the students are engaged actively within the lecture.

## Conclusion

MPBL can tackle a lot of academic and financial problems of PBL and its overall student assessment was better than the lectures.

## Limitations of the Study

Like most of the active learning approaches time management is a challenge for educators who wish to use LBP. For MPBL to be applied efficiently the teachers may need training on the steps of MPBL.

## Declarations

### Ethics approval and consent to participate

This study was approved by the Ethical Committee, Faculty of

Medicine, International University of Africa. All participants signed a written informed consent form.

### Consent for publication

Not applicable.

### Availability of data and material

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

### Competing interests

The authors declare that they have no competing interests.

### Funding

None.

### Authors' contributions

The MPBL sessions for students were performed by OM, MH and OA. IA and OM collected the data, did statistical analysis and wrote the manuscript. OM and BH formulated the research idea and critically edited the draft of the paper. OM supervised the whole work and revised the manuscript. All authors approved the final manuscript.

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