Original Research Article

Impacts of Problem-Based-Learning on Academic Learning Process of Pre-Clinical Medical Students in Nile University of Nigeria

ABSTRACT

Aim: The aim of this study is to assess the impact of Problem-Based Learning (PBL) on the academic learning process of 2nd and 3rd year medical students in their pre-clinical years.

Study design: A descriptive cross-sectional study

Place and Duration of Study: Faculty of Basic Medical Sciences, Nile University of Nigeria, Abuja, between May 2018 and July 2018.

Methodology: Using a standardized semi-structured questionnaire, both quantitative and qualitative methods were used to obtain data from 53 undergraduate medical students (8 males, 45 females; age range 17-25 years), which were collated and analyzed using SPSS version 23.0 statistical package.

Results: The mean age of respondents was 15±2 SD. There are more females n=45 (84.9%) than males n=8 (15.1%). Out of the respondents, 50.9% agreed that PBL has helped them in learning and understanding basic medical science courses, 17.1% disagreed, while 28.6% were uncertain. When asked if PBL helped them in preparing for pre-clinical examinations, 38.2% disagree, while 32.4% said it helped them. Evidence from the in-depth interview (IDI) shows that some of the stated usefulness includes; making studying for examinations easier, boosting confidence level, better understanding of lectures and clinical cases, among others. However, a few of them responded that it was not helpful.

Conclusion: Findings showed that the use of PBL has a significant and positive impact on the academic learning processes of pre-clinical medical students of Nile University of Nigeria, Abuja.

Keywords: Problem-based learning, medical education, medical students, Nile University, Nigeria

1. INTRODUCTION

Problem-based learning (PBL) is a pedagogical strategy that allows students to learn when actively involved with significant challenges. In this learning style, learners are usually afforded the privileges to be a problem-solver and a convergent thinker in a cooperative context, develop mental frameworks for learning, and also create self-reliant learning behaviors via application and rumination [1], [2], [3].

Problem-based learning is largely embraced in various disciples and educational settings in the world. It is usually used in promoting the act of problem-solving and critical thinking in real-life learning conditions. The use of PBL spans through many fields outside the conventional medical and clinical education [4], due to its association with interdisciplinary learning and collaborative team work. Other fields of study that implores the use of PBL includes, engineering, business education, allied and health sciences.

This ever-increasing demand and quality of PBL in diverse organizational, managerial and educational contexts [5], [6], has necessitated growing number of inquiries to determine its potency, especially on the quality of student academic learning process. Also worthy of evaluation is the degree to which its perceived hope of growing self-reliant and autonomous learning cultures, problem-solving skills, thought processes, cognitive psychology and rich disciplinary know-how [7], [8], accomplish its proposed outcomes. A good number of previous studies on PBL were able to elucidate its effects on the curriculum used in medical education, however new studies are now been designed to determine how the various processes associated with PBL contribute to irrefutable and incontrovertible academic learning results.

PBL is believed to be attractive to several educators because it provides an educational model which affirms active and group learning, which is prefaced on the notion that a learning is said to be effective when learners are able to build and co-build thoughts by mutual transfer and self-targeted learning [9], [10]. Advocators of PBL assert that it assists in improving the standard of learning through building the meditative, climacteric and cooperative skills.

One of the major objectives of education is to assist students become effective learners. Problem-based learning (PBL) has emerged as a prevalent teaching technique in medical schools, especially during the preclinical years. However, the use of PBL in undergraduate medical education in Nigeria has been sporadic and limited.

The aim of this study is to assess the impact of problem-based learning (PBL) on the academic learning process of 2nd and 3rd year medical students in their pre-clinical years.

2. METHODOLOGY

Study design:

A descriptive cross-sectional study was carried out among second and third year undergraduate medical students in Nile University of Nigeria, a privately owned university based in Abuja. Abuja is the capital city of Nigeria and is centrally and strategically situated within the heart of the Federal Capital Territory (FCT). Abuja is renowned as one of the fastest growing city in Africa, and its current population of the city is estimated to be about 6,000,000.

A multi stage sampling technique was used to select participants for the study. Interviews were carried out with randomly selected respondents (2^{nd} and 3^{rd} year medical students, n=53), using structured questionnaires alongside an in-depth interview (IDI) to obtain useful information. The questions focused on various sub-themes like socio-demographic information, impact of PBL on their learning process, usefulness of PBL in understanding their basic medical science courses and whether PBL helped them perform well in their examinations.

The questionnaire used in the study was constructed in English language and was self-administered. It was served after thorough explanation of the aim of the study alongside the criteria employed in selecting respondents. Permission to carry out the survey was officially requested and obtained from the University ethical review board. Informed verbal and written consent was obtained from all participants. The confidentiality of all information was strictly maintained all through the study.

Statistical analysis:

The data retrieved was manually sorted out, collated and organized. It was then imputed into the computer system for statistical analysis using SPSS version 23.0 statistical package. Frequency tables were created for demographic characteristics of the respondents. Qualitative variables were summarized by proportions. Statistical significance for association was tested using chi-square, with P-value less than 0.05 considered statistically significant.

3. RESULTS

An overall number of fifty three (53) records of second and third year medical students of Nile University of Nigeria, Abuja were obtained and subjected to statistical analysis. The age range of the participants was between 15-25 years, and their mean age was 15±2 SD. The age group of most respondents (94.3%) settles within the 15-20 years; and while 96.2% of the total participants are single, only 3.8% are married. More so, there are more females n=45 (84.9%) than males n=8 (15.1%). The number and percentage of the students who are Muslims is greater than Christians. The socio-demographic characteristic of the respondents is shown in Table 1.

When the respondents were asked if PBL is useful to their medical training and education in the Basic Medical Sciences (which comprises of the second and third year), 50.9% (n=27) of the students agreed that it was useful and beneficial to their academic learning process, 30.2% (n=16) disagreed, while 18.9% (n=10) were uncertain of its usefulness, as shown in Figure 1.

Following an in-depth interview (IDI), some of the usefulness of PBL, as stated by the respondents is presented in Table 2.

Figure 2 showed the responses of the students when asked whether PBL has helped them to understand the basic medical sciences (BMS) courses taught in their pre-clinical years. The major courses taught during this period are Physiology (PHS), Anatomy (ANA) and Biochemistry (BCM). 56.6% (n=30) of the students agreed that PBL has helped them in learning and understanding basic medical science courses, 17.0% (n=9) disagreed, while 26.4% (n=14) were uncertain.

Furthermore, the respondents stated during the in-depth interview (IDI) that PBL helped them in understanding BMS courses (Anatomy, Physiology and Biochemistry) in a number of ways as shown in Table 2.

More so, the students were asked if PBL helped them in any way to prepare for modular and promotional examinations of the BMS courses taught in their pre-clinical year, 52.8% (n=28) of the students agreed that PBL has helped them significantly to prepare for various examinations they sat for during the course of their pre-clinical training. These examinations range from theory (essays), multiple choice questions (MCQ), practical and viva voce. However, 24.5% (n=13) disagreed,

while 22.6% (n=12) were uncertain if PBL played any meaningful role in assisting them prepare for their examinations, as shown in Figure 3.

Evidence from the in-depth interview (IDI) conducted indicated some of the ways by which PBL helped the respondents prepare for their examinations, which is displayed in Table 2.

Table 1: Socio-demographic characteristics of respondents

Age Group	Frequency (N = 53)	Percentage
15 – 20	50	94.3
21 – 25	3	5.7
Gender		
Male	8	15.1
Female	45	84.9
Marital Status		
Married	2	3.8
Single	51	96.2
Religion		
Christian	10	18.9
Muslim	43	81.1
Ethnicity		
Igbo	8	15.1
Hausa	42	79.2
Yoruba	3	5.7

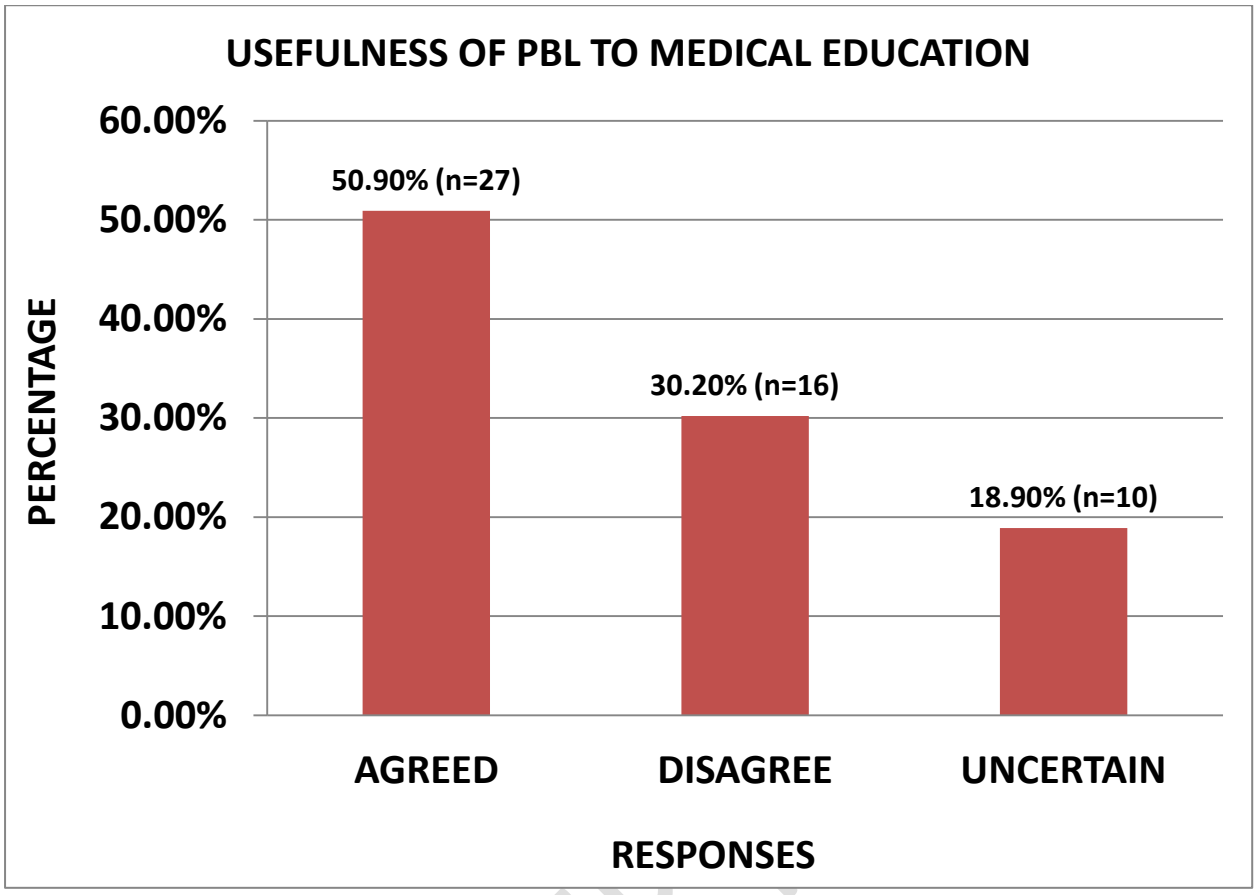

Figure 1: Participant's responses to the usefulness of PBL to their education

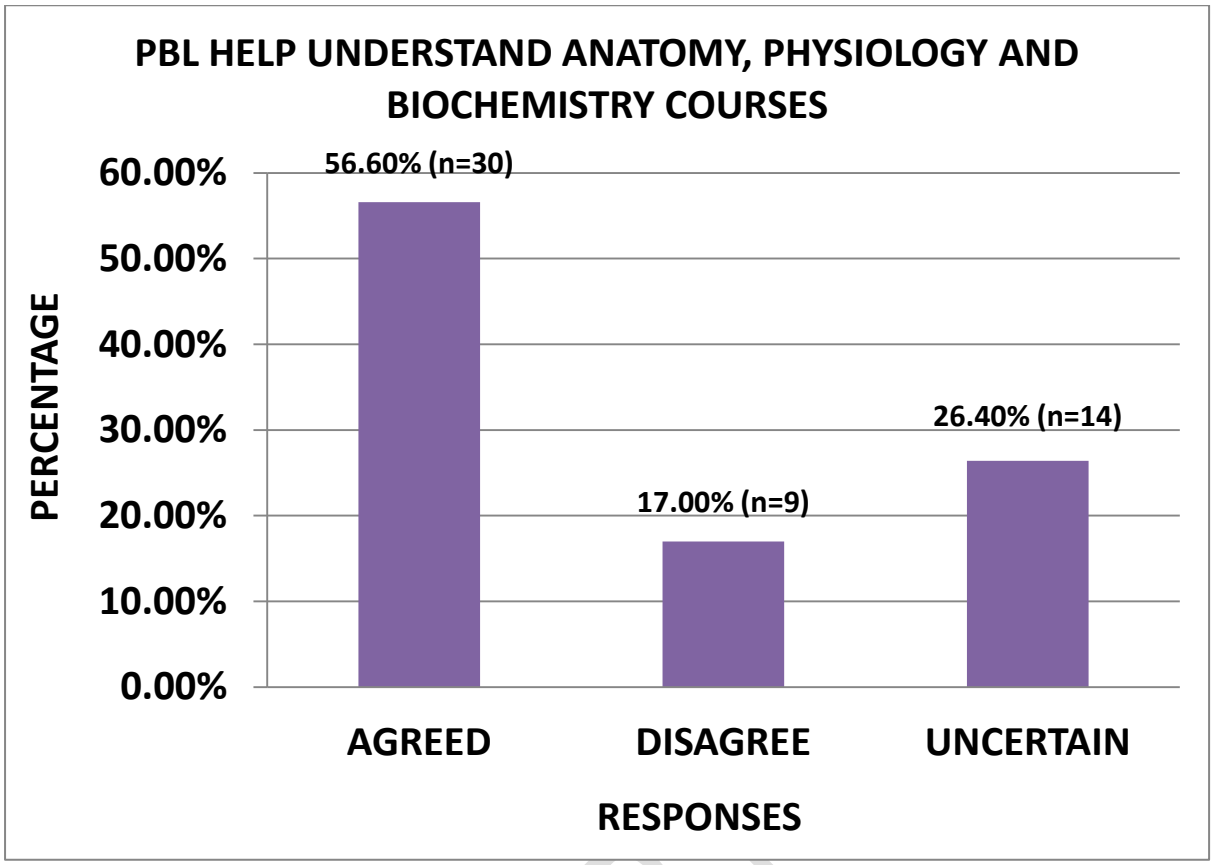

Figure 2: Participant's responses to whether PBL helped them understand basic medical science courses (Anatomy, Physiology and Biochemistry)

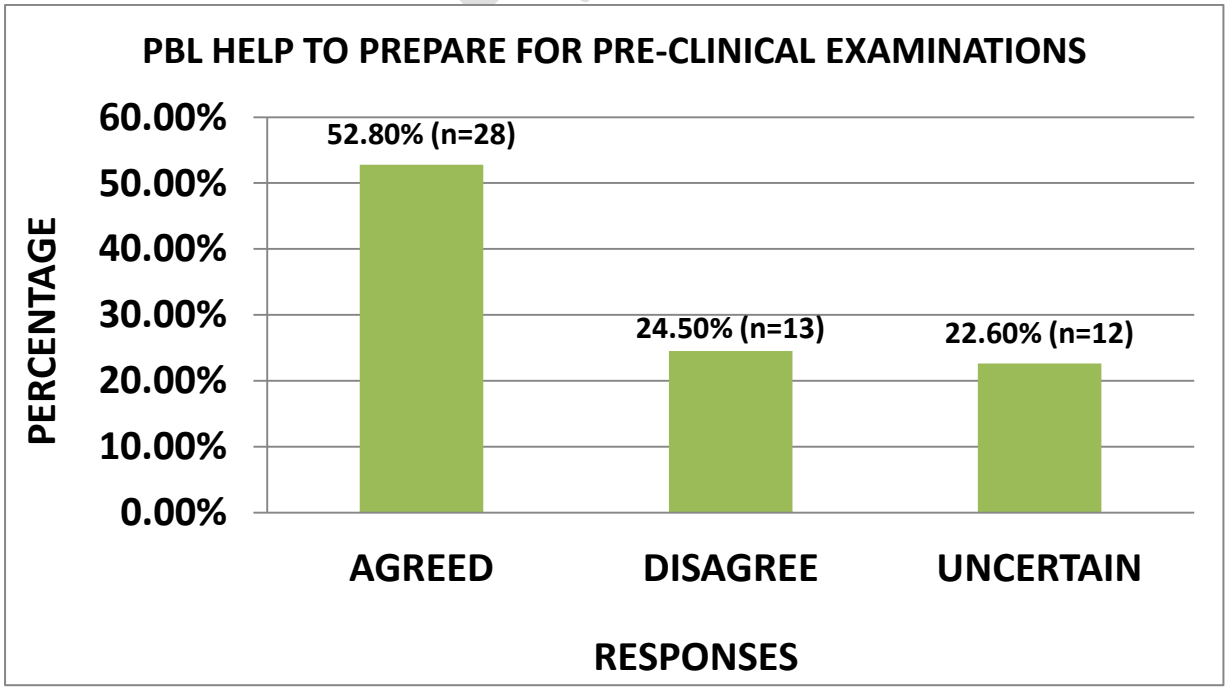

Figure 3: Participant's responses to whether PBL helped them prepare for pre-clinical examinations.

Table 2. Impacts of PBL on Academic Learning Process of Respondents

Learning Processes	Frequency	Percentage
Usefulness to Medical education	(N = 27)	
Application of learnt knowledge	10	37.1
To understand theoretical lessons	5	18.5
Expose students to clinical cases	5	18.5
Build speaking and presentation skills	4	14.8
It boost self-confidence and critical thinking	3	11.1
Understanding of Pre-clinical courses/subjects	(N = 30)	
Broaden students' horizon in various courses/lessons	10	33.3
Provide correlations between various topics	10	33.3
To learn relationships that exist between all courses	10	33.3
Help in preparing for Pre-clinical examinations	(N = 28)	
Makes studying for examinations easier	12	42.9
Serves as revision notes and slides for study	10	35.7
Serves as guide towards understanding some examination questions	6	21.4

4. DISCUSSION

This study focused on the impacts of PBL on the academic learning process of undergraduate medical students in their pre-clinical year, taking into account three major themes or areas of interest which includes; usefulness to medical education, understanding of basic medical sciences courses and preparation and performances in examinations.

4.1. Usefulness to Medical Education/Training

This study confirmed that PBL is useful and beneficial to undergraduate medical students in the pre-clinical year of their medical education. This finding agrees with earlier studies carried out to determine the effectiveness of PBL in nursing and medical education [11], [12], [13]. A total number of 27 students representing 50.90% of the respondents attested to its importance in the course of their training.

Furthermore, more than half of the respondents also stated some of the ways in which PBL has been of immense value to their education and training, ranging from application of learnt theoretical knowledge, development of speaking, analytical and presentation skills to enhancing of critical thinking. The above benefits derived from PBL by the respondents were similar to the ones reported in these studies [14], [15], [16].

4.2. Understanding Basic Medical Sciences courses/subjects

With respect to understanding the content of the subjects taught in the pre-clinical year, the findings in this study suggest that PBL helped students to better understand and integrate the various topics and courses taught in Anatomy, Physiology and Biochemistry [12], [13]. An outstanding number of students (n=30; 56.60%) agreed to the role and influence PBL played in their comprehension of BMS subjects.

In addition, the respondents highlighted how PBL was instrumental in helping them better understand the courses taught in the pre-clinical year, which includes; providing meaningful correlations between various topics, learning the relationships that exist between all courses and broadening the students' horizon in these courses.

4.3. Preparation and performances in Pre-clinical examinations

Findings from this study suggest that students taught with PBL approaches in their pre-clinical year perform better in their examinations. More so, it was observed that PBL assisted students in preparing adequately for examinations, which in turn culminates into better performances in their examinations and academic scores [12], [13]. Out of the total respondents in this study, 28 students representing 52.80% agreed that PBL had a positive impact in their preparedness for examinations, and in the long run boosted their outcomes in their examinations.

This results conforms with a study carried out by Loyens *et al.,*[11], where they investigated the ability of PBL to effect conceptual change on students' performance in a test. In their study, the PBL-group outweighed both the lecture and self-study group. Similarly, the effect of PBL in examination outcomes was also reported in a study carried out by Shin and Kim [12], where they evaluated the impact of PBL on the academic performances of nursing students.

Furthermore, observations from our study highlighted some of the ways PBL helped the students, which were as follows; it makes studying for examinations easier, serves as revision notes and slides for studying, and also serves as guide towards understanding some examination questions.

5. CONCLUSION

From this study, it was observed that PBL was useful and beneficial to the various learning processes of the students in their pre-clinical years, which suggests that PBL could be an effective teaching and learning method, most importantly when it is used on a long-term basis [18].

In conclusion, the use of PBL had a significant positive impact on the academic learning processes of pre-clinical medical students of Nile University of Nigeria, Abuja.

However, we recommend that it is necessary to carry out additional controlled experimental research, so as to further unravel the dynamics that governs how PBL works. This will in no small way enhance the application and implementation of PBL in medical education and other allied disciplines globally.

COMPETING INTERESTS

Authors have declared that no competing interests exist

CONSENT

All authors declare that written informed consent was obtained from the respondents for publication of this study. A copy of the written consent is available for review by the Editorial office of this journal.

ETHICAL APPROVAL

All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

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