



Problem Based Learning (PBL) - A tool to improve the academic performance.

KEYWORDS

Problem based learning, methodology, student centered.

Dr Manas Ranjan Rout

M.S (ENT), Associate Professor of ENT, Alluri Sitarama Raju Academy of Medical sciences, Eluru, A.P, India.

Dr K Chandra Sekhar

MD (Community medicine), Professor at Al Fayziaah Post Graduation centre for family medicine, Saudi Arabia.

Dr K Uma Maheswar Rao

MD, DCH (Pediatrics), Principal and Professor of Pediatrics, ASRAMS, Eluru, India.

ABSTRACT

Problem-based learning (PBL) is a student-centered pedagogy in which students learn about a subject through the experience of solving an open-ended problem. It was developed at the McMaster University Medical School in Canada in the 1960s and has since spread around the world.

Present study has been conducted in the department of ENT, Alluri Sitarama Raju Academy of Medical Sciences, Eluru, A.P, India.

Thirty poor performing students from 6th semester MBBS batch were selected and PBL was applied. Examination was conducted before and after the PBL session. Pre and post PBL marks were compared by paired t'test.

There occurred significant improvement in the students performance, which is also statistically significant ie t' value 4.9 and p' value < 0.01 in paired t' test. So our study concludes that PBL definitely improves the students' academic performance.

Introduction

Problem-based learning (PBL) is a student-centered pedagogy in which students learn about a subject through the experience of solving an open-ended problem. Students learn both thinking strategies and domain knowledge. The PBL format originated from the medical school of thought, and is now used in other schools of thought too. It was developed at the McMaster University Medical School in Canada in the 1960s and has since spread around the world. The goals of PBL are to help students develop flexible knowledge, effective problem solving skills, self-directed learning, effective collaboration skills and intrinsic motivation.[1] Problem-based learning is a style of active learning.

Problem-based learning is recognized as an inquiry approach because it prompts student's curiosity to solve problems, but also since questioning and research are at the core of the development of the process of learning. Furthermore, an inquiry approach also relates to activities in which students develop knowledge and the understanding of scientific ideas, as well as catch on how scientists study the natural world (NRC, 2008)¹.

PBL consists of a student-centred learning methodology that starts off by addressing a real-world problem, and whose resolution is deemed to be personally, socially and environmentally important. After creating an invitational scenario that presents the problem (Torres et al., 2013), the teacher has to foster students during the investigation helping them to become a more self-directed learner (Barrel, 2007). This methodology requires a shift in the educational paradigm, as students become active constructors of their knowledge and the role of the teacher shifts from presenter of information to facilitator of a problem-solving process (Allen et al., 2011).

Materials and Methods

Study has been conducted in the department of ENT, Alluri Sitarama Raju Academy of Medical Sciences, Eluru, A.P. Study was done over a group of poorly performing 6th semester students. Students are selected as per their 1st internal marks. Bottom 30 students are selected for PBL intervention. The group includes most of the referred batch students and some of the main batch students.

Approval from the ethical committee as well as the students connect

was taken for the intervention. Three faculty members were taken for the session.

First pre test was done by giving three questions from three important topics and marking was done. Nine PBL sessions were conducted for these three topics. Each session include 1 hour didactic lecture and another 1 hour self directed learning by different methods. Faculty member is to guide them only. For each session a case scenario was given, then with a common problem. Student will have to solve the problem in groups.

After nine PBL sessions post test was conducted by the questions from the same topics. The both pre and post test marks were compared by using z' test and paired t'test.

This methodology aims to develop communication skills, critical thinking, scientific reasoning and knowledge, decision-making, assessment and self-evaluation. These competences are considered to be essential for a lifelong learning process

The study followed a quasi-experimental research methodology with a non-random selection of participants.

Observation

We have selected 30 poor performing students from 6th semester MBBS batch. Out of 30 students, 20 were male and 10 were females.

Pre test was done for all the students with 20 mark questions, from three topics. Table - 1 shows the mark of the students in the form of percentage.

Out of 30 students, 20 secured less than 31% marks. 9 students secured 31 - 50% marks and only one student secured 51 - 60% marks.

Table - 1 (Pretest)

Percentage of mark	Number of students
<31% marks	20
31 - 50% marks	9
51 - 60% marks	1
> 60% marks	0

Table - 2 shows the post test marks of the same students after intervention with PBL. Out of 30 students, 4 secured less than 31% marks and 10 secured 31 -50% marks. 4 students secured mark between 51 - 60% and 12 students secured more than 60% marks.

Table - 2 (Post test)

Percentage of mark	Number of students
< 31% marks	4
31 - 50% marks	10
51 - 60% marks	4
> 60% marks	12

Three chapters were selected for PBL. Those are Anatomy of middle ear, Allergic rhinitis and Lesions of oral cavity.

Table - 3 shows comparison of the pre and post test marks and paired 't' test was applied. There occurred significant improvement in the student's marks, which is also statistically significant.

Table - 3 (Comparison of pre and post test marks)

Percentage of marks	Pre test, number of students	Post test number of students
< 31% marks	20	4
31 - 50% marks	9	10
51 - 60 % marks	1	4
> 60% marks	0	12

(t' value - 4.9 and p' value - < 0.01 - significant)

Discussion and Conclusion

PBL consists of a student-centred learning methodology that starts off by addressing a real-world problem, and whose resolution is deemed to be personally, socially and environmentally important. After creating an invitational scenario that presents the problem (Torres et al., 2013)², the teacher has to foster students during the investigation helping them to become a more self-directed learner (Barrel, 2007)³. This methodology requires a shift in the educational paradigm, as students become active constructors of their knowledge and the role of the teacher shifts from presenter of information to facilitator of a problem-solving process (Allen et al., 2011)⁴.

This methodology is characterized by students' working in small groups so as to improve knowledge construction and to develop different competences (Wong & Day, 2009)⁷. Although it is difficult to implement collaborative work, this methodology also presents advantages since it allows both students to share points of view and teachers to better guide the development of the different tasks. The more or less well-structured problems (scenarios) act as a stimulus for the students' learning processes (Wong & Day, 2009)⁷. This PBL scenario should motivate students to raise issues and look for solutions through inquiry activities.

Although the PBL process calls on students to become self-directed learners, teachers must guide them by monitoring discussion, asking questions and fostering participation (Allen et al., 2011). One of the barriers that arise in the use of PBL is the lack of teachers qualified to play the role of facilitators and mediate the process (Hmelo-Silver, 2004)⁵. Moreover, most students' evaluations do not contemplate teamwork or the collaboration developed with PBL (Savin-Baden, 2004)⁶, rather considering only the more conceptual issues.

According to Diana F Wood (2003)⁸, PBL is an effective way of delivering medical education in a coherent, integrated program and offer several advantages over traditional teaching methods.

Considering the main objective of this study, which consisted in analysing the benefits of using PBL, we notice that students showed improvements in cognitive terms. Although these were more positive

in the experimental group of PBL, they prove to be more significant than the results achieved with the didactic lecture. The relevance of the results arises, nonetheless, since we found that students also have academic success with PBL.

This work has proven that the introduction of this new teaching methodology (in the midst of an educational system characterized by a predominantly traditional one), did not cause a drop in knowledge acquisition. Notice that this concern is cause for criticism, confusion and conflict between teachers whenever one wants to implement new teaching methodologies. The present study has demonstrated that such concerns are groundless – students not only maintained (or increased slightly) the cognitive gains as they had the opportunity to research and perform tasks that benefit the development of scientific reasoning.

Despite the methodological advantages of PBL, the weak acquaintance of students with the process hindered the classroom dynamics, thus demanding for a wider and more frequent resort to PBL in science classes, so as to reassert its educational potential.

Other studies can and should also be developed so as to verify if PBL promotes knowledge retainment to a larger extends than more traditional methodologies. As a result, more evidence will back and sustain the advantages of favoring of PBL.

In our study we have seen clearly there is improvement in the performance of the students with PBL intervention. So PBL definitely improves the students' academic performance.

Acknowledgement

Department of ENT, ASRAMS.

Department of Community medicine, ASRAMS

Department of Medical Education, ASRAMS.

References

1. National Research Council (2008). Inquiry and the National Science Education Standards: A guide for teaching and learning. Washington: National Academic Press.
2. Torres, J., Preto, C. & Vasconcelos, C. (2013). PBL Environmental Scenarios: An Analysis of Science Students and Teachers Questioning. Journal of Science Education, 14 (2), 71-74.
3. Barrel, J. (2007). Problem-Based Learning: An inquiry approach. Thousand Oaks: Corwin Press.
4. Allen, D. E., Donham, R. S. & Bernhardt, S. A. (2011). Problem-based learning. New Directions for Teaching and Learning, 128, 21–29.
5. Hmelo-Silver, C. E. (2004). Problem-Based Learning: What and How do Students Learn? Educational Psychology Review, 16 (3), 235-266.
6. Savin-Baden, M. (2004). Understanding the impact of assessment on students in Problem-Based Learning. Innovations in Education and Teaching International, 41 (2), 221 – 233.
7. Wong, K. K. H. & Day, J. R. (2009). A Comparative Study of Problem-Based and Lecture-Based Learning in Junior Secondary School Science. Research in Science Education, 39, 625–642.
8. Diana F Wood, ABC of learning and teaching in medicine problem based learning; BJM Vol 326, 8 Feb, 2003: 328- 330