

# The Attitudes of Medical Students towards Problem-Based Learning during the Clinical Years

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## Abstract

**Introduction:** Multiple learning tools have been used in education during the clinical years. Problem-based learning (PBL) is one of the learning strategies that has currently been introduced into curricula. The success of PBL in the preclinical years has been reported on globally.

**Objective:** This study's aim was to assess the attitudes and knowledge of the students in their clinical year of PBL.

**Methods:** The study was conducted among 387 clinical year medical students at the Faculty of Medicine, Srinakharinwirot University, Thailand. Self-administered questionnaires were used to determine the attitudes and knowledge that had resulted.

**Results:** The overall response rate was 76.0%. Regarding the opinion of medical students toward PBL, the majority of them agree that PBL develops their communication skills (91.4%), skills necessary for working as a team (91.0%), competence in self-directed learning (91.4%), and enhances the information inquiry skills (89.0%). The majority of the students (76.8%) indicated that they appreciated PBL although it was time consuming (48.9%) and stressful (44.8%). Regarding the comprehension of PBL, 76.5% of the medical students had the misunderstanding that PBL requires knowledge obtained from conventional lectures. In comparison to other learning tools, the students have agreed that PBL is better than conventional lectures (41.8%) and report writing (62.8%).

**Conclusion:** The results indicate that clinical students have positive attitudes toward PBL and that the curriculum should integrate PBL with other learning strategies.

**Key Words:** Attitude, Medical student, Problem-based learning, Clinical year

## Introduction

Problem-based learning (PBL) is a student-centered approach that challenges learners to apply basic knowledge to expand an interchangeable solution through a problem (Albanese & Mitchell, 1993).

PBL not only provides learners more opportunities for the application of knowledge for problem solving but also facilitates a wide range of skills and attitudes. Some of these are communication, listening, presentation, team work, taking responsibility, self-directed learning and the critical evaluation of literature (Wood, 2003). Meanwhile, PBL also has limitations as experienced facilitators are needed (Lin, 2005), it is time consuming and requires large numbers of staff and learning resources (Wood, 2003). Although there are many studies that have reported on the achievements of PBL as compared to conventional teaching (Schmidt *et al.*, 2006; Nandi *et al.*, 2000; Preeti *et al.*, 2013), there are reports of controversies in the results (Hartling *et al.*, 2010; Colliver, 2000).

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Twenty-two years of outcome research in preclinical medical education had shown evidence that PBL does not provide explicit support for enhanced learning (Hartling *et al.*, 2010). There are many factors that have impacted the accomplishments of PBL. The role played by the facilitator, the learning process and environment, scenario writing, the structures of small groups and an appropriate assessment process (Newman, 2005). The attitude of the learners and the tutors were also important factors in the keys for success (Wood, 2003; Hatthachote *et al.*, 2008). The report of the attitude and knowledge of medical instructors toward PBL in Thailand show that 53.1% had the correct knowledge of PBL and the knowledge of PBL concepts were significantly associated with a favourable attitude (Hatthachote *et al.*, 2008). Likewise, an acceptance of PBL among medical students is crucial in regards to successful learning (Ratzmann *et al.*, 2013).

Recently, PBL has been widely implemented into the undergraduate curriculum. PBL has been endorsed by medical schools, especially in the preclinical years, here in Thailand. In the clinical year curriculum, there is a wide range of teaching tools that are utilized. Some of these are such as lecture-based learning, case-based learning, self-directed learning, report writing, teaching rounds and clinical ward rounds. At our Faculty, PBL is also one of the learning strategies that has been adopted into the curriculum for both the preclinical and clinical years. With the conflicting evidence and limitations of PBL (in particular, that it is time-consuming) (Hartling *et al.*, 2010), the appropriateness of PBL for teaching in the clinical years is questionable. Only a few studies conducted on clinical year education have been done in regards to PBL. Therefore this study's aim is to assess the attitudes and knowledge of clinical year students on the method of PBL.

## Methods

The study was conducted among 387 clinical year medical students at the Faculty of Medicine, Srinakharinwirot University, Thailand. This study was reviewed and approved by the appropriate institutional review boards and the ethics committee of Srinakharinwirot University.

According to the existing teaching approach, PBL has been implemented into the curriculum for clinical years along with conventional teaching. Problem-based scenarios have been

selected based on actual clinical cases, and vary on learning objectives and the background knowledge of the students. PBL tutorial was held as a group study, divided into 3 sessions in the period of 2 consecutive weeks. The learning process starts with the scenario (problem) which serves as a trigger for learning. The students elaborate on each stimulus for problem identification, hypothesis generation and came out with a list of learning issues in the first session. During the second session, students will be spending time for review of learning topics identified in the previous session, present their findings, discuss supplementary resources, and refine the hypothesis. In this session, an inquiry plan and information gathering skills will be encouraged to identify the specific clinical information needed about the patient in order to reach a diagnosis. The last session is conducted for summarizing the whole process of proper diagnosis based on evidence and opening to discuss the difficulties issues and clear any remaining uncertainties. During each session the students will be spending time for searching data and meet the expert to solving the problem.

Self-administered questionnaires were used to determine attitudes and knowledge regarding PBL. The research questionnaire collected the following data, demographic information [age, gender, grade point average (GPA), study year] and a five-point Likert scale (strongly agree, agree, neither agree nor disagree, disagree, strongly disagree) on the students attitudes toward PBL. Aspects of the attitudes of PBL consisted of an opinion survey that covered academic performance, time effectiveness, the impact on the learner, interpersonal skills, communication skills, and the students' overall attitude toward PBL.

A 10 item questionnaire with a three-point scale per question (agree, undecided, disagree) was used to assess the knowledge of PBL. Each item was scored as 1 point if the students' answer matched with the correct answer. The total score obtainable for knowledge of PBL is 10. Statistical analysis was performed using SPSS from IBM Singapore Pte Ltd (Registration No. 1975-01566-C).

The findings were analyzed using descriptive statistics. The relationship between the attitude, the knowledge of PBL and each potential variable was explored. A p-value of less than 0.05 would be considered statistically significant.

## Results

A total of 387 medical students participated in the study. The overall response rate was 76.0%. The majority of them were female (59.5%). The average age of respondents was 22.7 years (18-30 years of age). The average grade point average was 3.31 (2.21-3.98). The respondents were fourth, fifth and sixth year medical students with rates of 33.7%, 35.7% and 30.6% respectively.

In regards to the attitudes of medical students toward the PBL (Table1), most of them agreed that the knowledge according to the standards of medical competency were achieved

(83.7%), there was better knowledge retention than with conventional lectures (74.2%), it has improved information inquiry skills (89.1%), improved critical thinking skills (80.3%), improved active learning (77.5%) and promoted self-directed learning (91.5%).

Furthermore, regarding the impact of PBL to the learner, the respondents have agreed that PBL improves the ability to express opinions (77.2%), increases individual responsibility (78.5%), increases self-study skills (88.4%), improves listening skills (91.4%) and improves leadership skills (78.9%). However, 44.9% of the medical students are in disagreement that PBL reduces stress.

**Table 1: The attitude of medical students toward PBL**

	1(%)	2(%)	3(%)	4(%)	5(%)
<b>Academic performance</b>					
The learner achieves the knowledge according to the standard medical competency	30 (10.2)	216 (73.5)	25 (8.5)	21 (7.1)	2 (0.7)
Better retention of knowledge	54 (18.4)	164 (55.4)	40 (13.6)	33 (11.2)	3 (1.0)
Develops information inquiry skills	56 (19.0)	206 (70.1)	26 (8.8)	5 (1.7)	1 (0.3)
Develops the critical thinking skills	57 (19.4)	179 (60.9)	41 (13.9)	16 (5.4)	1 (0.3)
Improve the active learning	44 (15.0)	184 (62.6)	42 (14.3)	22 (7.5)	2 (0.7)
Develops the self-directed learning skills	64 (21.8)	205 (69.7)	18 (6.1)	7 (2.4)	0 (0)
<b>Time efficiency</b>					
Using time effectively for knowledge gained	22 (7.5)	176 (59.9)	58 (19.7)	36 (12.2)	2 (0.7)
The self-study is time consuming process	21 (7.1)	123 (41.8)	69 (23.5)	74 (25.2)	7 (2.4)
Decreases the time for patients care	12 (4.1)	75 (25.5)	61 (20.7)	125 (42.5)	21 (7.1)
<b>The impact on the learner</b>					
Reduce stress	13 (4.4)	75 (25.5)	74 (25.2)	113 (38.4)	19 (6.5)
Improves the ability to express opinions	40 (13.6)	187 (63.6)	38 (12.9)	26 (8.8)	3 (1.0)
Increases the individual responsibility	46 (15.6)	185 (62.9)	41 (13.9)	19 (6.5)	3 (1.0)
Make the learner more confident	20 (6.8)	84 (28.6)	73 (24.8)	106 (36.1)	11 (3.7)
Increases the self-study skills	56 (19.0)	204 (69.4)	29 (9.9)	5 (1.7)	0 (0)
Develops the listening skills	51 (17.3)	218 (74.1)	19 (6.5)	4 (1.4)	2 (0.7)
Develops the leadership skills	36 (12.2)	196 (66.7)	45 (15.3)	16 (5.4)	1 (0.3)
<b>Interpersonal skills and communication skills</b>					
Decreases learner-teacher interpersonal relationship	17 (5.8)	36 (12.2)	58 (19.7)	159 (54.1)	24 (8.2)
Decreases the teacher role	17 (5.8)	44 (15.0)	54 (18.4)	147 (50.0)	32 (10.9)
Develops the team working skills	54 (18.4)	214 (72.8)	16 (5.4)	8 (2.7)	2 (0.7)
Develops the communication skills	48 (16.3)	221 (75.2)	17 (5.8)	7 (2.4)	1 (0.3)
Develops the unity in working group	34 (11.6)	198 (67.3)	44 (15.0)	15 (5.1)	3 (1.0)
Increases the presentation skills	44 (15.0)	227 (77.2)	21 (7.1)	2 (0.7)	0 (0)
<b>Overall attitude toward PBL</b>					
Should implement PBL into clinical year	68 (23.1)	161 (54.8)	43 (14.6)	21 (7.1)	1 (0.3)
PBL is better than conventional	25 (8.5)	98 (33.3)	93 (31.6)	67 (22.8)	11 (3.7)
PBL is better than report writing	77 (26.2)	108 (36.7)	58 (19.7)	43 (14.6)	8 (2.7)

1 = Strongly Agree, 2 = Agree, 3 = Neither agree nor disagree, 4 = Disagree, 5 = Strongly Disagree

Regarding interpersonal and communication skills, the medical students have agreed that PBL develops team working skills (91.2%), develops communication skills (91.8%), develops unity in working groups (91.2%) and increases presentation skills (92.2%). The respondents also have disagreed that the PBL decreases learner/teacher interpersonal relationships (62.3%) and the teacher's role (60.9%). In regards to time effectiveness, they have agreed that PBL is time-efficient for the knowledge gained (67.4%), although self-study is a time consuming process (48.9%). They have disagreed that PBL sessions reduce the time for patient care (56.7%).

When students have compared PBL with other learning tools, the medical students have agreed that PBL is better than conventional lectures (41.5%) and report writing (62.9%). They agreed that PBL should be implemented into clinical year curriculum with rate 77.9%.

Concerning the understanding of PBL, 9.9% of the medical students scored 10 on a scale of 10 (Table 2) and 76.5% were under the misunderstanding that PBL requires knowledge from conventional lectures (Table 3). There were no statistical correlations between the students' gender, the year of study, and GPA in regards to the attitudes and the understanding of PBL.

**Table 2: The understanding scores of medical students toward PBL**

Scored	Medical students (%)
10	29 (9.9)
9	164 (55.8)
8	56 (19.0)
7	25 (8.5)
6	8 (2.7)
5	5 (1.7)
4	1 (0.3)
3	3 (1.0)
2	1 (0.3)
1	2 (0.7)
Total	294 (100)

**Table 3: The understanding of medical students toward PBL**

	Agree (%)	Disagree (%)	Undecided (%)
PBL is using a problem as a trigger to solve the problem by seeking relevant knowledge	284 (96.6)	5 (1.7)	5 (1.7)
PBL develops the life-long learning skills	232 (78.9)	36 (12.2)	26 (8.8)
PBL is small group learning	274 (93.2)	12 (4.1)	8 (2.7)
PBL is student centered learning	266 (90.5)	12 (4.1)	16 (5.4)
PBL is the learning strategy that focus on critical thinking process	280 (95.2)	4 (1.4)	10 (3.4)
PBL is the learning strategies that required prior knowledge from conventional lecture	225 (76.5)	54 (18.4)	15 (5.1)
PBL is the learning strategy that is multi-disciplinary integration	262 (89.1)	12 (4.1)	20 (6.8)
PBL is self-directed learning	255 (86.7)	21 (7.1)	18 (6.1)
PBL is the learning strategy that requires listening skills	282 (95.9)	5 (1.7)	7 (2.4)
PBL is the self-study	284 (96.6)	4 (1.4)	6 (2.0)

## Discussion

This study has demonstrated that most of the medical students in their clinical year had a positive attitude toward the PBL strategy. They agreed that this instructional approach was effective for providing the knowledge and skills required for critical thinking, problem solving and self-directed learning. However, the general consensus was that PBL was time consuming. Furthermore, PBL also encourages a broad variety of abilities such as communication, team work, listening skills, presentations, information inquiry skills and responsibility. However, only 9.9% of the medical students were well informed about PBL concepts with a resulting score of 10/10. Most of the medical students have misunderstood that PBL requires knowledge from conventional lectures. Given the fact that these medical students have had experiences in PBL sessions during their preclinical years, it may be interesting to further explore what they actually did in those PBL sessions.

Many factors are needed to facilitate a successful PBL program. There needs to be prior knowledge of the concept of PBL, the cooperation by the learners, proper resources and trained tutors (Newman, 2005). The positive attitudes and group effort are the most frequent factors which influence performance and learning in PBL (Morales-Mann & Kaitell, 2001). The acceptance of the PBL philosophy is also associated with the motivation for using the PBL strategy which is crucial to successful learning (Ratzmann *et al.*, 2013). Many reports have shown that the success of PBL requires a positive attitude and experience of the tutors (Hatthachote *et al.*, 2008; Bernstein *et al.*, 1995). Thus, the implementation of PBL pedagogy should be considered together in the light of the attitudes and knowledge of the learners and the faculty.

The PBL pedagogy has been implemented in the medical education curriculum for a few decades. It is usually used in the preclinical years to promote early clinical exposure.

Recently, modified PBL methods have been integrated into clinical education with the use of actual patients (Dammers *et al.*, 2001). It is also used for students in their preclinical years with excellent results (Takkunen *et al.*, 2011). Although the curriculum trends in medical education seem to be moving in the direction of self-directed learning and outcome-based learning, most medical student still appreciate conventional lectures. There are no good or

bad techniques but some think there are thus making them so. Conventional lectures can be a vastly effective tool in the classroom, allowing the lecturer to provide interaction with their students, talking through difficult theories and refining difficult clinical decision-making choices.

Technological advances will replace higher education practices in use today (Sadeghi *et al.*, 2014; Woo & Kimmick, 2000). The integration of online lectures with PBL provides a new role for the instructor and will have a positive impact on student learning. This will allow the students to work with peers and instructors to apply and appraise a wealth of information that is readily accessible. PBL is not the total solution for education during the clinical year.

Few studies have reported on the effects of PBL strategies for in the attainment of the goals of education during the clinical years. The combination of PBL strategies with other methods such as lecture-based learning, patient-based learning, report writing and clinical ward rounds could be augmenting the quality of the education. The provisions of critical reasoning and encouraging self-directed learning skills necessary for lifelong learning are also important tactics to be utilized. A systematic review has shown that PBL has advantages in the development of physician's competency after graduation. Some of these in particular are competencies in interpersonal dimension, cognitive domain and the development of more general, work-related skills (Koh *et al.*, 2008; Schmidt *et al.*, 2006).

In conclusion, medical students in their clinical years have positive attitudes toward PBL and the curriculums should combine PBL with other learning strategies. Knowledge of PBL, which is one of the key success factors, should prepare future physicians to help encourage their performance.

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**Conflict of Interest:** None declared.

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