

THE EFFECTIVENESS OF PROBLEM-BASED LEARNING ON STUDENTS' CRITICAL THINKING

Bernadetha Nadeak^{1*)}, Lamhot Naibaho²⁾

^{1,2} Universitas Kristen Indonesia, Jakarta, Indonesia

*)Corresponding author, e-mail: bernadetha.nadeak@uki.ac.id

Abstract

This article is about the effectiveness of Problem-Based Learning (PBL) on students' critical thinking, the purpose of which is to find out how PBL and students' critical thinking are related. The study was conducted at Educational Administration / Management Study Program of Universitas Kristen Indonesia Jakarta. This article was developed through a library study making use of books, journals and other documents related to the topics as the source information. The result shows that the PBL improves the students' critical thinking. PBL forms a teaching method that encourages the students to identify problems, explore interpretation, determine alternatives as solutions, communicate conclusions and integrate, monitor, as well as refine strategies to remedy the problems. It can be concluded that students will have good critical thinking, if they are taught using PBL. It is, therefore, recommended that lecturers apply this method in their teaching.

Keywords: critical thinking, effectiveness, problem-based learning

Abstrak

Dalam artikel ini dibahas tentang keefektifan metode *Problem-Based Learning (PBL)* atas kemampuan berpikir mahasiswa dengan tujuan penulisan untuk mengetahui bagaimana *PBL* dan kemampuan berpikir mahasiswa saling berhubungan. Artikel ini dikembangkan dengan menggunakan metode penulisan kajian pustaka. Buku-buku, jurnal-jurnal dan dokumen lainnya yang berhubungan dengan topik tulisan ini digunakan sebagai sumber informasi untuk membangun artikel ini. Hasil kajian menunjukkan bahwa *PBL* dapat meningkatkan kemampuan berpikir kritis mahasiswa. Hal itu dapat terjadi karena *PBL* dalam tahapan implementasinya dapat mendorong mahasiswa untuk berpikir kritis dalam hal mengidentifikasi masalah, mengembangkan interpretasi/hipotesis terhadap masalah, menentukan alternatif sebagai solusi terhadap masalah, menginformasikan temuan, dan mengintegrasikan, memonitoring, dan menyusun strategi untuk memperbaiki masalah. Dapat disimpulkan bahwa mahasiswa akan memiliki kemampuan berpikir yang baik jika mereka diajar dengan metode *PBL*. Oleh karena itu, dosen disarankan untuk mengimplementasikan metode *PBL* dalam mengajar.

Katakunci: berpikir kritis, keefektifan, Problem-Based Learning

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Introduction

It is undeniable that education is a way on improving the quality and potential of each individual in order to improve the life standard. In other words, increasing and developing human resources are very important in a sustainable manner, especially in the current era of globalization. High quality of human resources are needed to develop the potential and way to solve problems in the future. Higher education has a real role in realizing the quality improvement of human resources seen through the implementation of the *Tri Dharma Perguruan Tinggi* - (the university's three main responsibilities of education, research, and community service) - of the lecturers. The conditions of teaching and learning in higher education in Indonesia have not significantly changed, insight and the academic behaviour.

This can be seen from the point of view that the students or the alumnis' paradigm or way of thinking does not show differences with that of people who are not educated at higher education. The efforts on improving the quality of human resources are the burden for universities. Ideally, the teaching and learning at higher education should be focused to develop the hard skills and soft skills of each student. Unfortunately, teaching and learning are still strengthened or focused on hard skills only. The hard skills referred to here are related to setting up lecture material (theory), while soft skills are more towards hard skills reinforcement, which include critical thinking skill and problem-solving¹. The ability to think critically cannot develop along with the physical development of each individual. This ability is related to the ability to identify, analyze, and solve problems creatively and think logically so as to produce the right considerations and decisions.^{2,3,4} The ability to think critically for each individual is different, depending on the regular practice carried out to develop critical thinking⁵.

The fact found at Educational Administration / Management Study Program of *Univesitas Kristen Indonesia* shows that when learning science, students are still focused on theoretical aspects and there is lack of effort to improve the cognitive abilities. Their enthusiasm in answering the questions posed by lecturers is still limited to theory; it has not shown a development that is in accordance with their potential and abilities. In addition, there are some students who find it difficult to work in a team, to communicate, solve problems, and they have no ability to make decisions as the right solution to a problem.

Critical thinking ability is very important to be instilled in students, especially in medical students whose profession are going to be medicians later. This needs to be done so that they can see, examine and resolve various problems that they are going to face specially at their future profession. For this, students should be accustomed to learning rather than just listening to the information explained by the lecturer without them knowing the actual conditions that occur in the field. Learning in higher education should be focused more on understanding the material that is realized by applying the material in accordance with the work environment students will meet.

The problem-based learning (PBL) is a learning model that uses real problems encountered in the environment as a basis for gaining knowledge and concepts through the ability to think critically and solve problems. PBL is a collaborative process⁶. Learners will compile knowledge by building the reasoning of all knowledge they have and from all that is obtained as a result of activities interacting with fellow individuals. With PBL, students are expected to be able to solve problems with a variety of alternative solutions and to identify the causes of existing problems.

The implementation of the PBL model can help create learning conditions that originally only transfer information from lecturers to students to the learning process that

emphasizes constructing knowledge based on understanding and experience gained both individually and in groups. The problems raised in PBL are real problems in the field. The problem that is raised in PBL learning does not have a single answer, meaning that students must be involved in exploration with several solution paths.⁷ The involvement of students in PBL can help them to develop the critical thinking skills because the students in PBL will automatically be involved in the learning process through problem-solving skills. In this problem-solving activity students are required to develop critical thinking skills as a step to solve the problems discussed and to draw conclusions based on their understanding.

This chapter will specifically elaborate the implementation of PBL on improving the students' critical thinking ability. This chapter is written based on the result of a study conducted to medical students and on teaching learning experiences and evaluation gained by the writer in a critical thinking course.

Method

The method of the study used to develop this article was a library study. Books, journals and other documents related to the topics were used as the source information on this article to find out how PBL and students' critical thinking are related.

Discussion

Problem Based Learning (PBL) model is a learning model where students work on authentic problems with the intention to develop their own knowledge, develop inquiry and high level thinking skills, develop self-reliance and confidence.^{8,9} PBL learning features include: (a) submitting questions / problems, (b) focusing on interdisciplinary linkages, (c) authentic inquiry, (d) producing products and exhibiting them, and (e) collaboration. In PBL students are free to obtain key issues from their problems, defining their knowledge gaps and pursuing lost knowledge.¹⁰ For this reason, PBL is seen as a model of learning that can improve high-level thinking skills or critical thinking skills. Critical thinking ability is influenced by intrinsic and extrinsic impulses. The background of one's personality and culture can influence one's efforts to think critically about a problem in life.¹¹

The implementation of PBL on teaching learning process covers several steps, namely 1) preparation conducted by lecturer by providing learning activity plan and student activity sheet; 2) improving students' critical thinking skills through problem based learning; 3) evaluation and reflection with research subjects about obstacles encountered in implementing PBL in an effort to develop critical thinking skills. The planning of learning activities have been carried out well by lecturers during the teaching learning process. The implementation of the PBL model supports active, creative, effective and enjoyable learning. Students will be fully involved in the learning process because students act as student-centred learning.

The teaching and learning process with the implementation of PBL includes selecting the content/material and skills to be learned, determining the learning resources used, writing the problem statement, determining motivation, determining the focus of the question and how to evaluate.¹² PBL's learning design focuses on developing students' critical thinking skills. During the teaching learning process, the lecturers only play the role as a facilitator, who plan the activities and support the learning process taking place. This is in accordance with the opinion which states that in PBL the teacher or lecturer as a tutor or facilitator is tasked with developing the knowledge and skills of the community members (students).¹³

The learning steps taking place include a) lecturers provide an active, creative, effective, and enjoyable learning. This is needed so that the learning objectives can be achieved; b) lecturers provide opportunities for students in groups to observe the field; c)

students compile the results of the observation by answering the questions given to them to help them do the observation; d) obtaining the real problems about the implementation of critical thinking experienced by the lecturer from the results of the observations; e) solving problems encountered in groups; f) discussing, exchanging knowledge, exchanging learning resources to determine the right solutions to existing problems; g) drawing conclusions; and h) evaluation.

Giving the teaching and learning material by lecturers is prior knowledge of students when carrying out the observations, and the observations are carried out in groups. Then the results of the observation were analyzed, the problems found out during the observation were examined and reported in the form of activity reports. The report of observation contains the results and the problem identification, referring to the learning resources, steps to determining problem-solving solutions and drawing conclusions.

Furthermore, reports that have been done by students are presented in groups; in this activity the development of critical thinking skills of each individual is seen. The method used refers to the opinion of Lynch and Wolcott stating that to develop thinking skills in the context of problem-solving can be carried out in several steps, namely; 1) identifying the problem to obtain the suitability of the information; 2) exploring interpretation; 3) determining alternatives as solutions; 4) communicating conclusions; and 5) integrating, monitoring, and refining strategies to remedy problems. These steps are in line with the steps of PBL conducted by researchers.

The problems found based on observations are very relevant to the lecture material. Students learn not only based on what is obtained theoretically but directly related to the reality that occurs in the field. This prepares students to carry out doing their activities during their study at university and later after they have finished their study at university. The higher the relevance of the problem, the higher their desire to work to solve the problem. When students present their observations, the lecturer acts as a facilitator and helps students identify problems and relate them to the knowledge they have acquired. In problem-based learning, the teacher acts as a facilitator and assists students in reminding knowledge theoretically that is relevant to the problem encountered, and led students to identify their own misconceptions.¹⁴

The process of solving this problem helps students integrate the knowledge they have acquired before with problems or information obtained enabling them to offer various alternative solutions. PBL is designed by confronting learning with contextual problems related to learning material so that learners know why they learn. They then identify problems and gather information from learning sources, then discuss them with friends in their groups to find solutions of problems while achieving learning goals. PBL is a learning approach that uses real world problems by applying critical thinking processes and problem-solving skills to obtain essential knowledge and concepts from learning material.

Critical thinking skills need to be developed and customized to each individual. These critical thinking habits will be carried out by students until they enter the workforce. This is what distinguishes higher education graduates from those not being highly educated. The ability to think critically will help students in solving various problems they face either those encountered now or in the future. Critical thinking ability starts from the ability to read critically. Thinking is asking, so when people are silent it does not mean that they do not ask. So in the activity of asking whether it is in heart or raising a question at the time of learning, then someone is said to have used his thinking skills. Optimizing students' critical thinking skills on a subject matter, using of language, using logical structures of logical thinking, testing the truth of science, and experiencing from various aspects will reward the students for

being independent students. This intellectual independence is important to have together with courage, politeness, and faith, which will bring students to become moral and responsible adults in community life.^{15,16}

The ability to think critically has certain characteristics. According to Ennis (1991), they are: (1) Looking for clear statements from each statement; (2) Looking for reasons; (3) Trying to know information well; (4) Using sources that have credibility and mention them; (5) Noting the overall situation and conditions; (6) Trying to remain relevant to the main idea; (7) Giving original and fundamental interests; (8) Looking for alternatives; (9) Be alert and think openly; (10) Taking a position when there is sufficient evidence to do something; (11) Looking for as many explanations as possible if possible; (12) Acting systematically and regularly with parts of the overall problem; and (13) Being sensitive to the level of knowledge and expertise of others.

Critical thinking skills developed by applying PBL learning in this study include the ability to identify, analyze, solve problems creatively, the ability to determine the right solution in solving problems, the ability to ask questions or criticize problems from other groups, the ability to answer questions and express opinions when presentations appropriately based on appropriate learning resources. This critical thinking ability can develop well, but there are some students who are classified as having low critical thinking skills. Difficulties in expressing opinions due to being shy and not having had enough opportunity. Almost all students have been able to analyze and identify problems encountered at critical thinking course, but some of them still cannot determine the right alternative solution to a problem. The description above shows that the implementation of PBL learning can help students develop critical thinking skills. This is consistent with the opinion stating that through PBL students are supported to increase positive performance in the learning process among others; a) organizing their own learning; b) becoming active, reactive and critical learning; c) thinking deeply and thoroughly; d) allowing learning that is in a way the problem occurs.¹⁷

The evaluation in PBL learning was carried out in an integrated manner. Assessment not only assesses the final results of the knowledge they have learned but includes all activities that include the implementation of each PBL step which involves students' critical thinking abilities. The ability to think critically is assessed by a critical thinking ability observation sheet. This sheet contains indicators showing the ability to think critically including; 1) ability to formulate the subject matter; 2) ability to provide logical and relevant reasons; 3) ability to reveal facts based on observations; 4) ability to use relevant credibility learning resources and mention them; 5) ability to determine solutions to existing problems; 6) ability to answer and be open to friends' opinions; 7) ability to determine the consequences of making a decision.

Reflection is carried out at the end of the lesson. This reflection is used to obtain data about responses, obstacles that students feel in learning. The challenges experienced by students include the limitation of relevant learning resources so that in the discussion process to obtain a problem-solving solution sometimes there exists lack of time; and constraints encountered in small groups are that there are some students who are not proactive in observation activities because they are passive in communicating.

Some advantages of implementing PBL include a very broad discussion of the material, discussions that are very active and capable of developing critical thinking skills. Whereas PBL weaknesses found in this research include learning steps that cannot be implemented in a short time. The implementation of PBL requires a long time; learning requires bathing-learning activities for each student, and sometimes there are still some students who rely on their group mates.

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not having enough the opportunity. Almost all students have been able to analyze and identify problems encountered in critical thinking course, but some of them still cannot determine the right alternative solution to a problem.

Conclusion

The implementation of problem-based learning can help to develop students' critical thinking skills. Critical thinking skills need to be developed by students as an effort to prepare them to face challenges and problems that they will encounter now and later. The steps of the PBL learning model used are; 1) identifying the problem, the suitability of the information obtained; 2) exploring interpretation; 3) determining alternatives as solutions; 4) communicating conclusions; and 5) integrating, monitoring, and refining strategies to remedy problems.

The implementation of learning with PBL includes; 1) Preparation made by the lecturer by preparing the Learning Activity Plan (RPS) and Student Activity; 2) Implementation of learning by implementing PBL in an effort to develop critical thinking skills; 3) Evaluation and Reflection with research subjects about obstacles encountered in implementing PBL in an effort to develop critical thinking skills. Then, it is suggested that this method should be applied by other lecturer when they teach their students.

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