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Implementation of Problem-Based Learning to Develop Students Creative Thinking Ability

Budi Utomo
Universitas Esa Unggul, Indonesia | butomo@esaunggul.ac.id

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Abstract

This study aims to describe the application of problem-based learning to develop the creative thinking skills of PGSD. One of the advantages of the problem-based learning model is being able to train students in using the various concepts, principles, and skills they have learned to solve the problems they are facing. With the application of problem-based learning, the ability to think creatively can develop, because the creative thinking skills observed in this study are in the form of the ability to identify, analyze, solve problems, think logically, and make decisions correctly. Because the results of the verification process show that it is significant. There are many types of creative thinking-based learning models used to address educational problems, but one of the most effective is the problem-based learning model, which requires each child to have a unique set of beliefs and values. Complement one another, enabling teachers to think creatively for each student as they tackle a given problem.

Keywords: problem-based learning, creative thinking, develop student

Introduction

Education The problem of attitude cannot be separated from environmental influences, both the physical environment and the social environment. Students who come from harmonious families and an adequate economy tend to show good attitudes and behavior. Vice versa, students who receive less attention or come from underprivileged families tend to experience many problems in learning. Therefore the teacher as an educator must be able to provide a way out for students to reduce learning difficulties. Related to the 2013 curriculum, the problem of student attitudes can be seen in the first and second core competencies.(Kim et al., 2022)

In the first Core Competency which contains spiritual attitudes, students are expected to have a religious attitude and be able to tolerate each other among religious people. Whereas in

the second competency (Kl ll) students are expected to have good social attitudes such as cooperation, respect, discipline, and so on. These two competencies show the characteristics of students because character education is needed so that students become individuals who are intelligent and have character. Based on Presidential Regulation Number 87 of 2017 prioritizing character education is called PPK. PPK is an educational movement under the responsibility of the education unit to strengthen the character of students through the harmonization of the heart, taste, mind, and sports by involving and collaborating between educational units, families, and the community as part of the National Mental Revolution Movement. Strengthening character education needs to be done in learning so that the knowledge and skills possessed by students are balanced with their character. The knowledge possessed can be misused if students do not have good character.(Lonergan et al., 2022)

Education is one of the efforts to improve the quality and potential of each individual. In other words, continuous improvement and development of human resources are very important, especially in this era of globalization as it is today. The need for high-quality human resources, able to develop their potential and be able to solve problems in the future. Universities have a real role in realizing an increase in the quality of human resources which can be seen in the implementation of the Tri Dharma of Higher Education. In the opinion of states that the conditions for teaching and learning in tertiary institutions in Indonesia, in general, have not significantly changed academic insights and behavior. This can be seen from the point of view, the way of thinking of students or college graduates who show no difference from people who do not have higher education.(Trullàs et al., 2022)

Efforts to improve the quality of human resources are a challenge for universities. Ideally, learning in tertiary institutions develops *the hard skills* and *soft skills* that each student has. But the reality so far, the lectures that occur sometimes still only reinforce hard *skills. Hard skills* referred to here are related to mastery of lecture material (theory), while *soft skills* are more towards strengthening *hard skills*. Which includes *soft skills*, one of which is the ability to think creatively and solve problems. The ability to think creatively 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 to produce the right considerations and decisions.(Allert et al., 2022)

The ability to think creatively for each individual is different, depending on the exercises that are often done to develop creative thinking. The fact that was found in PGSD FKlP students at Esa Unggul University, shows that in studying Mathematics they are still theoretical and do not develop critical thinking skills. Their enthusiasm in answering questions asked by lecturers is still limited in theory and has not shown development that is following their potential and abilities. In addition, some students still find it difficult to work in groups, communicate, and solve problems when examples of a real problem are presented and have not been able to make decisions about the right solution to a problem.(Tong et al., 2022)

Mathematics Learning Course is a compulsory subject in the Elementary School Teacher Education (PGSD) study program. The material in mathematics learning lectures is the basic provision for students to be able to teach mathematics later in Elementary Schools (SD). In elementary mathematics learning courses, students learn about strategies, approaches, models,

and methods for teaching mathematics, how to convey mathematical material appropriately, how to create media and teaching materials that interest students in learning, can help students understand, know and identify problems encountered in the teaching and learning process in elementary schools, discuss ways/solutions to solving problems found. (Bains et al., 2022)

The ability to think creatively is very important to be instilled in students, especially PGSD students who are prospective elementary school teachers. This needs to be done so that they can see, examine and solve various problems that they will encounter in the school environment appropriately. So far, students are used to learning only by listening to information explained by lecturers without them knowing the actual conditions that occur in the field. Even though they will later enter the field during practical field experiences and enter the real world of work. Learning in tertiary institutions should focus more on understanding the material which is manifested by applying the material according to the work environment they will encounter.(Sousa & Costa, 2022)

Literature Review

The problem-based learning (PBL) learning model, also known as the problem-based learning model, is a learning model that uses real problems encountered in the environment as a basis for acquiring knowledge and concepts through the ability to think critically and solve problems. According to (Widiastuti & Kurniasih, 2021) states that the basis of PBL is a collaborative process. Learners will construct knowledge by building reasoning from all the knowledge they have and from all that is obtained as a result of interacting with fellow individuals. With PBL, students are expected to be able to solve problems with a variety of alternative solutions and be able to identify the causes of existing problems.

The application of the PBL model can help create learning conditions that were originally just transfers of information from lecturers to students to a 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. (Argaw, 2017) states that the problems raised in PBL learning do not have a single answer, meaning that students must be involved in exploration with several paths of solutions. Student involvement in PBL can help develop critical thinking skills because in PBL learning students are fully involved in the learning process through problem-solving activities. It is in this problem-solving activity that students are required to be able to develop critical thinking skills as a step to solving the problems discussed and being able to draw conclusions based on their understanding.

The problem examined in this study is how to apply *problem-based learning* to develop critical thinking skills in the learning process in mathematics learning courses.

Research Methods

This research is included in the qualitative descriptive research because the data obtained is more concerned with the process than the results. This type of research can capture a variety

of qualitative information with careful descriptions, the data collected is in the form of words in sentences or pictures that have more meaning than just statements of amount or frequency in the form of numbers. The data obtained in this study is in the form of a learning process that occurs in the application of *problem-based learning* to develop creative thinking skills.(Silva et al., 2022)

The research was conducted in September-October 2022. The subjects of this research were fifth-semester students of the PGSD FKlP study program at Esa Unggul University who were enrolled in the Elementary Mathematics Learning course. Data collection was carried out by researchers by interacting directly with research subjects. By interacting directly researchers can obtain data in the form of views/opinions of students with the application of *problem-based learning* to develop creative thinking skills.

Data collection techniques are used in the form of a) method of observation or observation. b) interview method, interviews were conducted as a way to obtain the information needed by researchers by interviewing several students. c) the documentation method, this method is used to obtain data about lecturer learning tools in the form of lesson plans and PBL activity steps carried out by students in the form of photos.

Qualitative research relies on descriptive data analysis, emphasizes process rather than results, limits studies with a focus, and has a set of criteria to check the validity of the data, and the results are agreed upon by both parties, namely the researcher and the research subject. The data analysis technique used in this study is the process of seeking information and systematically compiling information and data that has been obtained from observations, interviews, and documentation. Then the researcher carried out data reduction (activities that refer to the process of selecting, focusing attention, simplifying, abstracting, and transforming data), explaining the data (classifying data and identifying data), drawing conclusions, and verifying these conclusions.

Result and Discussion

Based Learning (PBL) is where students work on authentic problems to construct their knowledge, develop inquiry and higher-order thinking skills, developing independence and self-confidence. The characteristics of PBL learning include: (a) asking questions/problems, (b) focusing on interdisciplinary interrelationships, (c) authentic investigations, (d) producing products and showing them off, and (e) collaboration. In PBL students are freed to obtain key issues from the problems they face, define their knowledge gaps, and pursue lost knowledge. For this reason, PBL is seen as a learning model that can improve higher-order thinking skills or creative thinking skills. The ability to think creatively is influenced by intrinsic and extrinsic encouragement. A person's personality and cultural background can influence a person's efforts to be able to think creatively about a problem in life.(Aulia & Budiarti, 2022)

Implementation of learning by implementing PBL in this study includes several steps, namely 1) Preparation by lecturers by preparing Semester Learning Plans (RPS) and Student Activity Sheets (LKM); 2) Implementation of learning with the application of PBL to develop

creative thinking skills; 3) Evaluation and reflection with research subjects about the obstacles encountered in implementing PBL to develop creative thinking skills.

The planning of learning activities has been carried out by the lecturers in the Mathematics Learning course well. This can be seen from the existence of RPS and LKM. In the plan that has been prepared by the lecturer, there is a written lesson plan that uses the PBL model. The application of the PBL model supports active, creative, effective, and enjoyable learning (PAKEM). Students will be fully involved in the learning process because students act as learning subjects (student-*centered learning*).(Syafrial et al., 2022)

Implementation of learning with the application of PBL includes; selecting content/material and skills to be learned, determining the learning resources used, writing problem formulations, determining motivation, determining the focus of questions, and how to evaluate. The PBL learning design in the Elementary Mathematics learning course focuses on developing students' critical thinking skills. Lecturers in this case are more involved only as facilitators, who plan activities and support the learning process taking place. This is following the opinion which states that in PBL the task of the teacher or lecturer is as a tutor or facilitator whose job is to develop the knowledge and *skills* of community members (students). The learning steps carried out include; (Dwi Ferdiani et al., 2022)

1. Lecturers provide lecture material based on active, creative, effective, and fun learning in elementary school, ideal for learning to be carried out according to theory. This is necessary so that learning objectives can be achieved.
2. Provide opportunities for students in groups to observe in the field (SD closest to campus or where they live.
3. Compile the results of observations by answering questions in the MFI.
4. The results of observations obtained real problems regarding the implementation of elementary mathematics learning experienced by teachers.
5. Solving problems encountered in groups.
6. Discuss, exchange knowledge, and exchange learning resources to determine the right solution to existing problems.
7. Draw conclusions
8. Evaluation

Giving lecture material by lecturers becomes a provision for students when carrying out observations at the nearest elementary school. Observations were carried out in groups and at different SDs. From the results of the observations found, they are then analyzed. What problems exist in the field are then studied and reported in the form of an activity report. The report contains the results of observations, identification of problems, referring to learning resources, steps to determine solutions to solving problems and drawing conclusions.(Syafrial et al., 2022)

Furthermore, the reports that have been done by students are presented in groups, this activity shows the development of each individual's creative thinking abilities. The steps used refer to the opinion that states that developing thinking skills in the context of problem-solving

can be carried out in several steps, namely; 1) identifying problems, and appropriateness of the information obtained; 2) exploring interpretation; 3) determining alternatives as solutions; 4) communicating conclusions; and 5) integrate, monitor, and refine strategies for resolving problems. These steps are in line with the PBL implementation steps carried out by the researcher.(Mursid et al., 2022)

The problems found based on the results of observations are very relevant to the lecture material. Students do not only learn based on what is obtained theoretically but are directly related to the reality that occurs in the field (SD). This prepares students when they will carry out Field Experience Practice (PPL) as well as in the world of work later. In line with the opinion that states that the higher the relevance of the problem, the higher their desire to work to solve the problem. When students present the results of observations from elementary schools, the lecturer acts as a facilitator and assists students in identifying problems and relating them to the knowledge they have acquired. According to the state in problem-based learning, the teacher acts as a facilitator and assists students in reminding students of theoretical knowledge that is relevant to the problems encountered and leads students in identifying their misconceptions.(Schut et al., 2022)

The process of solving this problem helps students integrate the knowledge they previously acquired with existing problems or information obtained to be able to offer a variety of alternative solutions. revealed that PBL is designed by confronting learning with contextual problems related to learning material so that students know why they are learning then identify problems and collect information from learning resources, then discuss them with friends in their groups to get solutions to problems while achieving learning objectives. This is also in line with the opinion that PBL is a learning approach that uses real-world problems by applying critical thinking processes and problem-solving skills to acquire essential knowledge and concepts from the learning material.(Rahyuningsih et al., 2022)

The ability to think creatively needs to be developed and accustomed to by each individual. The habit of creative thinking will be carried by students until they enter the world of work. This is what distinguishes graduates with higher education and those who do not have higher education. The ability to think creatively will help students in solving various problems that will be faced both now and in the future. According to the ability to think creatively starts with the ability to read creatively. Thinking is asking, it doesn't mean that silent people don't ask. So in the activity of asking whether in the heart or issuing questions while studying, then someone is said to be using his thinking ability. How optimize students' creative thinking skills regarding subject matter, using language, using logical thinking structures, testing the truth of science, and experience from various aspects will reward them to become independent learners. It is important to have intellectual independence, coupled with courage, decency, and faith, which will lead students to become adults who are moral and responsible in social life.(Unger Madar & BenDavid-Hadar, 2022)

The ability to think creatively has certain characteristics. Namely: (1) Look for clear statements from each statement; (2) Look for reasons; (3) try to know the information well; (4) Use sources that have credibility and mention them; (5) Take into account the overall situation and condition; (6) Trying to stay relevant to the main idea; (7) Bearing in mind the original and

fundamental interests; (8) Looking for alternatives; (9) Be open-minded and open-minded; (10) Taking a position when there is sufficient evidence to do something; (11) Seek as much explanation as possible whenever possible; (12) Behave systematically and regularly with the parts of the whole problem; and (13) Sensitive to the level of knowledge and expertise of others.

The results of this study are to develop student's critical thinking skills by implementing learning by implementing PBL which includes several steps, namely 1) Preparation by lecturers by preparing Semester Learning Activity Program Plans (RPKPS) and Student Activity Sheet (LKM); 2) Implementation of learning with the application of PBL to develop critical thinking skills; 3) Evaluation and reflection with research subjects about the obstacles encountered in implementing PBL to develop critical thinking skills. Planning of learning activities has been carried out by lecturers in science learning courses properly. This can be seen from the existing RPKPS and LKM. In the plan that has been prepared by the lecturer, there is a written lesson plan that uses the PBL model. The application of the PBL model supports active, creative, effective and enjoyable learning (PAKEM). Students will be fully involved in the learning process, because students act as learning subjects (student *centered learning)*. The implementation of learning with the application of PBL includes; selecting content/material and skills to be learned, determining the learning resources used, writing problem formulations, determining motivation, determining the focus of questions and how to evaluate. The PBL learning design in science learning courses focuses on developing students' critical thinking skills. Lecturers in this case are more involved only as facilitators, who plan activities and support the learning process taking place. This is in accordance with the opinion which states that in PBL the task of the teacher or lecturer is as a tutor or facilitator whose job is to develop the knowledge and *skills* of community members (students).(Shofty et al., 2022)

Creative thinking abilities 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 still some students who are classified as having low critical thinking skills. Difficulty in expressing opinions because they are still shy and have not had the opportunity to be the reason. Almost all students have been able to analyze and identify the problems encountered in elementary schools, but some of them have not been able to determine the right alternative solutions to a problem.(Setiyani et al., 2022)

From the description above, it shows that the application of PBL learning can help students develop creative thinking skills. This is in accordance with the opinion of stating that through PBL students are supported to increase positive performance in the learning process, including; a) organize their own learning; b) to be active, reactive, and critical learning; c) think deeply and thoroughly; d) enable learning with problem situations that occur.(Sujono et al., 2022)

The evaluation carried out in PBL learning is carried out in an integrated manner. Assessment does not only assess the final result of the knowledge they learn, but includes all activities that include the implementation of each PBL step which involves students' creative

thinking abilities. The ability to think creatively is assessed by an observation sheet for the ability to think creatively. This sheet contains indicators that show the level of ability to think creatively including; 1) able to formulate the main issues; 2) able to provide logical and relevant reasons; 3) able to reveal facts based on observations; 4) use credibility-relevant learning resources and mention them; 5) able to determine solutions to existing problems; 6) able to answer and be open to friends' opinions; 7) able to determine the consequences of making a decision.(Niu et al., 2022)

Reflection is carried out at the end of learning. This reflection is used to obtain data regarding responses, barriers that students feel in learning. Barriers experienced from the student side include; limitations of relevant learning resources so that in the process of discussion to obtain a problem solving solution it is sometimes less sharp, and the constraints encountered in small groups are that there are some students who are not proactive in observation activities because they are passive in communicating.(Lorenz & Bush, 2022)

Some of the advantages of implementing PBL include discussing material that is very broad, discussions that are very active and being able to develop creative thinking skills. While the PBL weaknesses found in this study; learning steps that cannot be implemented in a short time. The application of PBL takes quite a long time, learning requires independent learning activities for each student, and sometimes there are still some students who rely on their group mates.

Conclusion

The application of *problem based learning* can help in developing students' creative thinking skills. The ability to think creatively needs to be developed by students as an effort to prepare themselves to face challenges and problems that will be encountered now and in the future. The steps of the PBL learning model used; 1) identifying problems, appropriateness of the information obtained; 2) explore interpretation; 3) determine alternatives as solutions; 4) communicating conclusions; and 5) integrate, monitor, and refine strategies for resolving problems.

The implementation of learning with PBL includes; 1) Preparation by lecturers by preparing Semester Learning Plans (RPS) and Student Activity Sheets (LKM); 2) Implementation of learning with the application of PBL in an effort to develop creative thinking skills; 3) Evaluation and reflection with research subjects about the obstacles encountered in implementing PBL in an effort to develop creative thinking skills. Critical thinking skills are assessed with an observation sheet for creative thinking skills.

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