International Journal of Research and Review
Volume 11; Issue: 6; June 2024
Website: www.ijrrjournal.com
Research Paper *E-ISSN: 2349-9788; P-ISSN: 2454-2237*

The Influence of the Problem Based Learning Model on Students' Problem Solving Ability at SMA Negeri 1 Bengkulu City

Elwan Stiadi

Department of Mathematics Education, University of Bengkulu, Bengkulu, Indonesia.,

DOI: https://doi.org/10.52403/ijrr.20240678

ABSTRACT

This research aims to determine the effect of the problem based learning model on the ability to solve problems at the Senior High School (SMA) level. This research was carried out quantitatively in the form of conventional classes and experimental classes through Pre test - Post test. The population of this study were students of SMA Negeri 1 Bengkulu City. The samples used in this research were students of SMA Negeri 1 Bengkulu City class X Science 1 using an experimental class consisting of 27 students and Class X Science 2 using a control class consisting of 27 students. From the data obtained from the Pre test - Post test results, analysis was carried out using the t-test. The results of the Pre test t count = 0.477 and the Post test t count = 3.781 with a significance level of 5% of . So the post test tcount=3.781 > ttable=1.71. During the post test, H0 was rejected, so it was concluded that the problem based learning model in the experimental class had a significant effect compared to the lecturing method in the control class.

Keywords: mathematics, problem based learning model, problem solving

INTRODUCTION

The development of human thought in providing boundaries regarding the meaning and meaning of education always shows changes at all times. These changes are based on various findings and changes in the field related to the increasing number of components of the existing education system. The development of the mindset of educational experts, educational managers and educational observers has resulted in new theories. Advances in technological tools have contributed to changes in the meaning and understanding of education. At the same time, the learning and education process always exists and continues. Therefore, it could be that someone's view of the meaning or meaning of education adopted by a particular country, at different times and in different places, is actually irrelevant. However, as long as there are no new theories and findings regarding the meaning and understanding of education, existing theories and findings are still relevant to be used as references [1].

Education is a conscious and planned effort to provide guidance or assistance in developing physical and spiritual potential given by adults to students to achieve maturity and achieve goals so that students are able to carry out their life tasks independently. Education is a fundamental or fundamental phenomenon in human life. Where there is life, there must be education. Education is both a symptom and an effort to humanize humans themselves. In development, there is a demand for better, more regular education to develop human potential, so that theoretical thinking about education emerges [2].

According to UU Number 20 concerning the National Education System of 2003, the curriculum is a set of plans and agreements regarding objectives, content and teaching materials as well as methods that guide the implementation of learning activities to achieve certain educational goals. Based on this, the curriculum is a method in which learning activities are carried out. The curriculum is the most important element for developing student potential.

Indonesia uses the 2013 curriculum as the newest curriculum in its education system. The 2013 curriculum is designed to strengthen active knowledge and skills-based learning models and critical learning models. The 2013 curriculum focuses on three areas of assessment of attitudes, knowledge and skills. Attitude is the most important assessment to produce creative, innovative and effective students.

The definition of learning according to Burton in his book The Guidance of Learning Activities, as quoted by Aunurrahman, is changes in behavior that occur in individuals due to interactions between individuals and individuals, and between individuals and the environment so that they are able to interact with their environment. Meanwhile, HC Witherington in the book Educational Psychology states that learning is a change in personality which expresses itself as a new pattern of reactions in the form of skills, attitudes, habits, personality or understanding [3].

Learning is a relatively permanent change in behavior or behavioral potential as a result of reinforced experience or practice. Learning is the result of the interaction between stimulus and response. Learning is an important activity for everyone, including learning how to learn. A survey shows that 82% of children who enter school at the age of 5 or 6 have a positive self-image about their own learning abilities. But this high figure dropped drastically to only 18% when they were 16 years old. Consequently, 4 out of 5 adolescents and adults begin their new learning experiences with feelings of discomfort.

In the context of learning there is also the term teaching. Teaching is defined as a directing activity, making it easy to find something (not give something) based on the teacher's abilities. Teaching is essentially a process of transferring or transferring knowledge, information, norms, values and so on from someone

According to Djamarah the characteristics of learning are as follows: 1) Changes that occur consciously. 2) Changes in learning are functional. 3) Changes in learning are positive and active. 4) Changes in learning are not temporary. 5) Changes in learning are purposeful and directed. 6) Changes cover all aspects [4].

Learning which is identified with the word "teaching" comes from the basic word "ajar" which means instructions given to people so that they know (follow) plus the prefix "pe" and the suffix "an" becomes "learning", which means process, action, way of teaching. or teach so that students want to learn. Learning is the process of student interaction with educators and learning resources in a learning environment. Learning is assistance provided by educators so that the process of acquiring science and knowledge, mastering skills and habits, as well as forming attitudes and beliefs in students can occur. In other words, learning is a process to help students learn well [5].

The learning process is experienced throughout a human's life and can occur anywhere and at any time. Learning has a similar meaning to teaching, although it has different connotations. In the educational context, teachers teach so that students can learn and master the content of the lesson until they achieve a specified objective (cognitive aspect), and can also influence changes in attitudes (affective aspect) and skills (psychomotor aspect) of a student. Teaching gives the impression of being only one party's job, namely the teacher's job. Meanwhile, learning also implies interaction between teachers and students. Learning is a

system that aims to assist the student learning process, which contains a series of events that are designed, arranged in such a way as to influence and support the internal student learning process.

Teacher to students. The key to educational success is the full involvement of students as learning citizens in the learning process. Effective and meaningful learning planning by choosing the right learning model requires teachers to be able to control the learning model used because it helps the learning process to be effective and meaningful. The success of the learning process can be seen from student learning outcomes. The value of learning outcomes is a measure of teacher effectiveness in learning and the value of learning outcomes for students is in accordance with learning success. In choosing a learning model, teachers must choose a creative and innovative learning model.

The learning model is fun and attracts students' attention in accordance with the learning objectives to be achieved by the material provided. A learning model is a conceptual framework that describes a systematic approach to organizing learning experiences to achieve certain learning goals and functions as a guide for learning designers and teachers when planning teaching and learning activities [6].

According to Shoimin, PBL emphasizes learning as a process that involves problem solving and critical thinking in real contexts. Shoimin further stated that PBL provides opportunities for students to learn broader things that focus on preparing students to become active and responsible citizens. Through PBL, students gain experience in dealing with realistic problems, and emphasize the use of communication, cooperation, and existing resources to formulate ideas and develop reasoning skills [6].

The research results of Tefera state that the PBL model can improve student learning outcomes in cognitive, affective and psychomotor aspects [7]. The research results of Oon-Seng Tan stated that PBL can lead students to solve life problems through the process of discovering, learning and thinking independently [8].

The problem based learning / problem solving method is a way of learning by exposing students to a problem/problem to be solved or solved conceptually as an open problem in learning. Problem solving is the use of methods in learning activities by training students to face various problems, whether personal or individual problems or group problems to be solved individually or together. The problem solving method is also known as the brainstorming method, because it is a method that stimulates and uses insight without looking at the quality of the opinions expressed by students. Teachers are advised not to be oriented towards this method, but rather teachers only see the way of thinking being conveyed

Hotimah In PBL, the teacher acts as a facilitator which includes forming groups, providing or explaining problems, giving open questions, avoiding lecturing, providing guidance to needed resources, asking open questions, avoiding teaching, managing interpersonal relationships in the group to minimize conflicts and misunderstandings that interfere with learning, encourage students to be independent by encouraging students to explore the knowledge they already have and determine the knowledge needed [9]. Next, encourage group functioning by assisting the group to determine goals and create plans, recognize group problems and reach solutions, teacher also acts as an evaluator of student performance. Apart from that, teachers can also become evaluators, which can be demonstrated by evaluating group processes by becoming a model or example for providing feedback, evaluating the implementation of discussions and making immediate improvements, if necessary, both in terms of content and process.

Meanwhile, the role of learners in PBL includes being able to learn independently, by searching for, selecting, and being able

to use the best and most appropriate sources for solving problems and gaining new ideas or knowledge. Can think proactively, not only be a follower but can contribute ideas and provide critical reasons for each idea put forward, can communicate clearly and professionally both orally and in writing, can collaborate with other members in groups and team environments [10].

The application of the Problem Based Learning (PBL) learning model arises from the concept that students will be better able to explore their critical thinking skills if they are actively involved in solving a problem related to Biology subjects. Teachers can help this process, by providing feedback to students to work together to find or apply their own ideas in analyzing and solving a problem [11].

MATERIALS & METHODS

This type of research is Quasi Experimental Design Research by looking at the results of a pretest before treatment or treatment in the form of problem based learning and a posttest after treatment. This research was conducted at SMA Negeri 1 Bengkulu City.

Inferential data analysis is used to prove the proposed hypothesis statistically and help answer the problem formulation that has been set. To determine the effectiveness of the learning approach in improving students' mathematics learning outcomes, use the two independent samples t test which compares the means of two different samples.

The hypothesis is:

H0 : $\mu 1 \leq \mu 2$

H1 : $\mu 1 > \mu 2$

Information :

$\mu 1$: average learning outcomes of classes taught using problem based learning models

$\mu 2$: average learning outcomes of classes taught using conventional method

The basis for decision making to measure whether there is a difference in the averages of the two groups being tested is by comparing the calculated t with the t table. If the calculated t value > t table then *H*0 is rejected, but if the calculated t value < t table then *H*0 is accepted.

RESULT

Inferential Data Analysis Test assumptions

Pretest data

The pretest data that has been obtained must first be tested for normality and homogeneity. Normality and homogeneity tests were carried out on the pretest learning result test data in both classes. The normality test on this data uses the Kolmogorov-Smirnov test. Normality test results can be seen in table 1.

Table 1. Pretest Normality Test Results for Problem Solving Skill

Kolmogorof	Pretest		Information
	Experiment	Control	
Sig.	0.200	0.200	Normal

Based on Table 3, the sig value is 0.200 for the experimental class pretest and the control class pretest. Because the sig value is greater than 0.05, the pretest data on problem solving skill for both classes is normally distributed.

The homogeneity test on this data uses the F test. The homogeneity test results can be seen in table 2.

Table 2. Pretest Homogeneity Test Results for Problem Solving Skill

Statistics	Pretest	
	Experiment	Control
Variance	94.09	70,413
F_{count}	1.34	
F_{table}	4.70	

Based on Table 2, the Fcount is obtained calculated, namely 1.34 which is obtained by dividing the largest variance value by the smallest variance of the data. The Ftable value obtained is 4.70. Because the Fcount value is smaller than the Ftable, the pretest data for both classes is homogeneous.

Posttest Data

The posttest data that has been obtained, before testing the hypothesis, first carries

out a normality test and a homogeneity test, then a t test for two independent samples. Normality, homogeneity and two independent sample t tests were carried out on the posttest Problem Solving Skill test data in both classes.

The normality test on this data uses the Kolmogorof-Smirnov test. Normality test results can be seen in table 3.

Table 3. Posttest Normality Test Results of Problem Solving Skill

Kolmogorov	Posttest		
	Experiment	Control	Information
Sig.	0.073	0.200	Normal

Based on Table 3, the sig value is 0.073 for the experimental class pretest and 0.200 for the control class pretest. Because the sig value is greater than 0.05, the pretest data on problem soving skill for both classes is normally distributed.

The homogeneity test on this data uses the F test. The homogeneity test results can be seen in the table 4.

Table 4. Posttest Homogeneity Test Results of Problem Solving Skill

Statistics	Posttest	
	Experiment	Control
Variance	102,208	148.72
F_{count}	3.93	
F_{table}	4.36	

Based on Table 4, the Fcount is obtained The calculation is 3.93 which is obtained by dividing the largest variance value by the smallest variance of the data from both classes. The Ftable value obtained is 4.36. Because the calculated Fcount is smaller than the F table, the pretest data for both classes is homogeneous. Because the normality and homogeneity tests have been fulfilled, the conditions for conducting hypothesis testing using the two independent samples t test can be carried out.

The two independent samples t test is an assumption test used in this research to see the effectiveness of the learning approach taken. The results of this hypothesis test analysis can be seen in table 5.

Table 5. Results of the t test for two independent samples

Mark Information		
df	t count	t table
		Effective
26	2.35	1.70

Based on data in table 5, it can be seen that the value for t calculated is 2.35. Meanwhile, the t table value itself is 1.70. Because the calculated t value > t table, H0 is rejected and H1 is accepted or the problem based learning is effective in improving the Problem Solving Skill of students at SMA Negeri 1 Bengkulu City.

DISCUSSION

The Problem based learning Model, when viewed based on student' Problem Solving Skill, is more effective when compared to direct or conventional learning. This happens because the class is taught using steps in the problem based learning model.

The problem based learning model used problem to made student being active in the class. The teacher provides problem, which can be in the form of reading, or pictures, or situations, according to the learning material/topic/theme to be discussed, so that students gain learning experience observing conceptual knowledge through reading activities, observing situations or looking at pictures. Oon-Seng Tan stated that PBL can lead students to solve life problems through the process of discovering, learning and thinking independently [8].

CONCLUSION

The results of the research show that the problem based learning is effective in improving the Problem Solving Skill of students at SMA Negeri 1 Bengkulu City.

Declaration by Authors

Acknowledgement: None

Source of Funding: None

Conflict of Interest: The authors declare no conflict of interest.

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How to cite this article: Elwan Stiadi. The influence of the problem based learning model on students' problem solving ability at SMA Negeri 1 Bengkulu City. *International Journal of Research and Review*. 2024; 11(6): 713-718. DOI: *https://doi.org/10.52403/ijrr.20240678*

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