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Comparison of Student Learning Outcomes with PBL and CTL Models

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ABSTRACT

The lack of student learning outcomes is caused by the learning model that is usually taught by teachers tends to be monotonous, therefore this research was conducted as an alternative for teachers in implementing an effective model. This study was a quasi experiment research which purposed to know the differences of student learning outcomes on concept environment changes who taught by problem based learning and contextual teaching and learning at grade X student SMA Negeri 8 Pinrang. The population of this study was whole grade X students of SMA Negeri 8 Pinrang as many as eight classes and the sample was X MIPA 1 class as experiment group I and X MIPA 2 class as experiment group II where each group consist of 30 students. The data was got by givent pretest and posttest. The descriptive statistic analysis showed the average grade of experiment group I was 0,587 with categorized medium and the average grade of experiment group II was 0,402 with categorized medium. The grades showed that student who were thought by problem based learning was better in comparasion than the student who were though with model contextual teaching and learning. The inferensial statistical analysis result through t-test showed sig. (2-tailed) score as 0,000 which less than α (0,05) so that, the researcher make conclucion like there is the differences of students learning outcomes on concept of environment changes who taught by problem based learning with contextual teaching and learning at grade X students of SMA Negeri 8 Pinrang.

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INTRODUCTION

Education is an effort made to educate the nation, foster personality, instill moral and religious values, teach knowledge, train skills, and provide guidance and direction (Gulo, 2022). Education is always connected with the process of learning activities which intend to clarify all the potential that exists in humans to the fullest in cognitive, affective, and psychomotor aspects (Yohanardiansyah, 2022). Education can be said to be good or of good quality if education can bring students to achieve the goals and functions of education

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(Muhsam, *et al.,* 2021). We certainly realize that education is now only focused on the extent to which students are able to remember the events they see, so that students only remember theory without understanding the meaning behind the existing theory (Muhsam, *et al.,* 2021). So education is basically an interaction relationship between educators and students in learning activities in achieving predetermined goals (Sujana, 2019).

Learning is a process in which a person tries to obtain a result in the form of a permanent change in behavior (Zebua, *et al.,* 2022). Learning is an activity capable of influencing a person's understanding (Hakiki, 2020). Learning is the interaction of educators with students through a systematic design of activities to produce quality output. Therefore learning is a determining factor for the success of education (Muhsam, *et al.,* 2021).

Based on observations that have been made, in general, teachers only provide information to students theoretically without looking at the attitudes or skills of students in learning activities, which causes students to become passive. The learning process like this does not involve students interacting with each other, this results in students not thinking critically and not understanding the material presented. Teachers must involve students in the process of learning activities so that students can find meaningfulness in learning which will ultimately achieve the predetermined learning goals (Zagoto, *et al.,* 2019). Therefore, teachers are required to be innovative in applying the art of teaching in situations or conditions by frequently changing teaching styles, applying learning media or changing interaction patterns in order to create an interesting and fun learning atmosphere (Masril, *et al.,* 2020).

Learning outcomes are an important issue to pay attention to (Telaumbanua, 2022). In this study, learning outcomes were in the form of students' abilities which were previously obtained through the process of teaching and learning activities. Learning outcomes are also patterns of behavior, notions, values, appreciation, attitudes, appreciation, and skills (Hulu & Telaumbanua, 2022; Lase & Ndruru, 2022; Nurqaidah & Hendra, 2020; Laoli, *et al.,* 2022; Novalinda, *et al.,* 2020; Riyadi & Adilah, 2022; Tyera, *et al.,* 2022; Muh & Muhsam, 2022); Zebua, 2021; Zebua, *et al.,* 2022).

The creation of learning models is expected to direct us in designing learning to help students achieve learning objectives according to existing conditions. In choosing a learning model, there are several things that must be considered, namely as follows: 1) Learning objectives to be achieved, 2) learning materials, 3) considerations from the student's or students' point of view, and 4) considering other things that are non-technical (Yohanardiansyah, 2022).

According to Surya, *et al.,* (2017) argued that PBL learning is learning that emphasizes the problem-solving process carried out by students. Problem-based learning (Problem Based Learning) is a series of learning activities that focus on the emphasis on solving problems using the scientific method. According to Vendiagrys & Junaedi (2014) Problem Based Learning (PBL) is a learning model that can improve problem solving abilities.

Contextual teaching and learning has advantages in presenting the real world that is relevant to the lives of students into learning activities so that students are close to their environment in the process of learning activities so that students can easily understand the concept of the material discussed including the problems or problems studied inside it (Winarti, 2016). Through the contextual learning model, teaching is not the transportation of knowledge from the teacher to students by memorizing a number of concepts that seem detached from real life, but more emphasis is placed on facilitating students to seek life skills from what they learned previously. Therefore, the learning process will be more meaningful if schools can apply learning that emphasizes the

relationship between material and the surrounding community that is related to all the problems that occur in the community.

If Contextual Teaching and Learning (CTL) learning is an effort to bring the real world into the process of learning activities while in Problem Based Learning (PBL) learning presents problems to be solved by students then integrates various concepts and skills from various disciplines. This strategy includes gathering and collating information, and presenting findings. Therefore, based on the description above, the author wants to apply the PBL and CTL models in learning activities through this research to compare the learning outcomes of environmental change material biology between students who are taught by applying the PBL model and students who are taught by the CTL model in class X SMA Negeri 8 Pinrang.

METHOD

Types of research

This research is a quasi-experimental. The design of this study is the Pretest-Postest Comparison Group Design.

Research subject

This research was conducted at SMA Negeri 8 Pinrang in May 2019. The population of this research was all students of class X in the even semester of SMA Negeri 8 Pinrang who were active during the 2018/2019 academic year, while the sample was taken by purposive sampling and 2 classes were selected, namely class X MIPA 1 as the experimental group 1 which was taught by the PBL model and class X MIPA 2 as the experimental group 2 which was taught by the CTL model. The independent variables in this study are the PBL and CTL models and the dependent variable is learning outcomes.

Data collection technique

The data was obtained using an instrument, namely a biology learning achievement test in the form of an objective test consisting of two types of questions, namely multiple choice questions and short answer questions. The data analysis technique used was descriptive statistical analysis and inferential statistics using a paired sample t-test type t-test in the SPSS 24.0 program.

RESULTS AND DISCUSSION

The results of the description of the pretest and posttest scores of students in the PBL and CTL groups for learning outcomes show that the average score of student learning outcomes in the PBL group with CTL has increased. However, when viewed from the two study groups, the group that was taught using the PBL model had a higher improvement value.

Table 1. Distribution of Frequency and Percentage of Students' Pretest-Posttest Scores in the PBL Group and the CTL Group

Category	PBL group				CTL group			
	Pretest		Posttest		Pretest		Posttest	
	F	%	F	%	F	%	F	%
Very good	0	0	13	43,33	0	0	4	13,33
Good	5	16,66	12	40	1	3,33	13	43,33
Enough	15	50	5	16,66	14	46,66	8	26,66
Not enough	10	33,33	0	0	8	26,66	5	16,66
Very less	0	0	0	0	7	23,33	0	0

Table 1 shows the frequency distribution and percentage of student learning outcomes categories. The pretest results obtained by the PBL group and the CTL group were

dominated by the sufficient category and the less category. Meanwhile, the posttest showed that the learning outcomes of the PBL and CTL groups were dominated by the good category. Although the two groups were equally dominated by the good category on the posttest, the very good category in the class taught using the PBL model had a higher frequency than the class using the CTL model. The results of these data indicate that students who are taught with the PBL model obtain higher learning outcomes compared to the CTL model.

Analysis of the average N-gain showed that the average N-gain value for the PBL group was 0.587 in the medium category, while the average N-gain value for the CTL group was 0.402 which was in the medium category. The results of this data analysis showed that changes in improving the learning abilities of students in the PBL group were better than the CTL group.

Normality test

In the SPSS output the normality test for learning outcomes in the PBL group was 0.133 and in the CTL group was 0.200. Data that is normally distributed has a significance value greater than 0.050 ($\alpha > 0.050$) so it can be concluded that all data for Learning Outcomes in the PBL and CTL groups are normally distributed.

Homogeneity Test

In the SPSS output of the homogeneity test, a significance value of 0.963 was obtained. Data that has the same variance or is homogeneous has a significance value greater than 0.050 ($\alpha > 0.050$) so it can be concluded that the two groups of data, namely the group taught with the PBL model and the group taught with the CTL model, have the same or homogeneous variance.

Hypothesis testing

Based on the results of the independent sample T test in table 2, it shows the sig. (2-tailed) obtained from the hypothesis test is $0.000 < \alpha$ (0.05). Based on these criteria, H_0 is rejected and H_1 is accepted, so it can be concluded that the hypothesis is accepted so that there are differences in learning outcomes in biology material of environmental change between students who are taught by applying the PBL model and those who are taught by applying the CTL model in class X SMAN 8 Pinrang.

Table 2. Independent Sample T Test

	Df	Mean Differens	F	Sig. (2-tailed)
Learning outcomes	58	0,18500	0,002	0,000

Based on the data obtained in this study related to the hypothesis testing that has been carried out, it shows a significance value of (0.000) less than 0.05 ($\alpha < 0.05$) which means there are differences in learning outcomes between students who are taught the PBL model and the CTL model . The group that was taught using the PBL model had a higher average value than the group that used the CTL model.

One of the differences in learning outcomes is due to differences in students' initial abilities seen from the pretest scores of each group. If the pretest scores of the two groups are different, in the sense that the initial abilities are different, then to see differences in improving learning outcomes the N-Gain test is used, because the N-Gain test has taken into account factors that can cause research bias such as differences in abilities early learners. The N-Gain test can provide an overview of the increase in learning outcomes scores between before and after the model is applied (Prilliza, *at al.,* 2020).

The group taught using the PBL model had a higher average N-Gain value than the group using the CTL model. This difference in learning outcomes can occur because the PBL model is a model developed to assist students in developing thinking skills, problem solving and intellectual skills through giving problems at the beginning of learning. This is in accordance with the results of research that has been carried out by Sutarsa & Puspitasari (2021) that with the initial problems given to students, the PBL model can improve students' critical thinking and problem solving skills so that they can also improve student learning outcomes. This learning model provides conditions to improve critical and analytical thinking skills and solve complex problems in real life so that it will bring out a culture of thinking in students.

The PBL model is used because there is a problem to be solved. With this model students will also be able to find solutions to existing problems with the characteristics of learning syntax where students are able to solve problems based on problems that have been presented in the form of questions listed in student worksheets. This is in line with the statement of Degeng & Hidayah (2015) PBL is a learning process in which students learn through facilitating problem solving, in PBL learning students are centered on real complex problems and related to the experiences possessed by students.

The design of questions in the PBL model can make it easier for students to find answers to questions from a problem that has been presented and be able to make questions from the identification results so that students who have low skills will also slowly find problems that must be solved. This is according to what Nyoman Sudana Degeng & N. Hidayah (2015) stated, PBL is learning that is designed by providing problems to be solved. PBL can train students in solving problems using their own abilities and knowledge so that students can form new, more meaningful knowledge constructs.

The increased value of the learning outcomes of students who are taught with the PBL model cannot be separated from the advantages of this model. PBL can develop and improve student learning outcomes. In addition, PBL allows students to participate in learning and deal with problem-solving situations in small group work during the learning process. According to Rerung, *et al.,* (2017) PBL provides a learning alternative that really gives hope for improving the quality of education so that students work together with one another, work together to provide motivation and are continuously involved in complex tasks and increase opportunities for inquiry, dialogue and developing social and thinking skills.

The syntax of this PBL model consists of five phases that can be influential in facilitating students to improve student learning outcomes. This is in line with the opinion Darmadi (2016) which says that PBL can improve student learning outcomes, critical thinking skills, foster student initiative in work, internal motivation for learning and can also develop interpersonal relationships in group work. The first step in learning in a class that is taught with the PBL model is the orientation of students to problems. In this phase students are faced with real problem orientation so that they are able to lead students to find their initial skills. This is influenced because giving problems at the beginning of learning makes it a challenge for students to solve these problems so that they can trigger questions, make conjectures, and bring up various ideas and opinions.

The step of organizing students to study, where students are divided into groups to complete LKPD. At the stage of guiding individual and group investigations. At this stage, students identify the problems that have been presented in the LKPD by making problem formulations and hypotheses in groups, discussing answers to problem solutions and being guided to collect data to prove hypotheses that have been prepared

previously as a form of problem solving from the problems obtained. At the stage of developing and presenting the work of students where each group of students presented the results of their discussions and held questions and answers in each group. The last stage is to analyze and evaluate the process of problem solving activities. At this stage, students analyze and evaluate some of the problem solving described by other students and then draw conclusions from problem solving to problems.

In contrast to the CTL model which can provide opportunities for students to encourage and use their understanding in solving various problems they face in their daily lives. This is in line with Furroyda, *et al.,* (2022) contextual learning is a process of holistic learning activities that aims to encourage students to understand subject matter in a meaningful way by associating the material they are learning with the context of their lives in society. So that students have knowledge and skills that can be flexibly applied from one problem to another.

The learning outcomes in the PBL group were higher than the CTL because the PBL model used problems at the beginning of learning activities, thus motivating students to solve the problems given. This will make it easier for students to think at a higher level and get used to solving problems. Through problem solving given at the beginning of learning, it provides a learning experience for students to understand new material. Problem processes that do not emphasize procedures help students to think independently in planning and solving problems, evaluating the results of solutions and preparing other alternative solutions. This model clearly looks effective in being able to make students more motivated, active, enthusiastic, and confident when explaining the results of discussion of solving LKPD questions in front of the class.

According to Putri & Sundayana (2021) the advantage of the PBL model is that it can encourage students to be more active in discussing and collaborating during group discussions. In group work, students with weak understanding can be assisted by their peers in understanding the concept of learning material. In these groups students try to solve common problems that will encourage children's creative thinking patterns in solving problems that occur in the environment around them.

The ideas found by students independently make students younger in solving the problems given. Activities in the PBL model that involve students directly in finding the concept of solving problems independently will make students able to find knowledge more easily and last a long time in their memories (Nur & Dinnullah, 2018).

The learning outcomes of students in the CTL group were lower than those of PBL because in the application of CTL the teacher's role was only as a director and mentor because it required students to be active and try to find information on their own, observe facts and find new knowledge, so that the knowledge that each participant got students will be different and uneven. In the learning process with this model it will be clear between students who have a high understanding and students who have a low understanding, for students who have a low understanding and are left behind in the learning process will continue to be left behind and it is difficult to catch up because in this learning model success students depending on the activity and effort of the students themselves.

CONCLUSION

Based on the results of data analysis and discussion that has been put forward in the previous chapter, it is concluded that the learning outcomes of students who are taught with the PBL learning model are better than students who are taught with the CTL learning model because the PBL learning model places more emphasis on problem solving. The learning outcomes of students who are taught

with the PBL learning model on environmental change material are in the medium category, while the learning outcomes of students who are taught with the CTL learning model on environmental change material are also in the medium category so that there are differences in the learning outcomes of students who are taught with the PBL learning model and CTL on environmental change.

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