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THE EFFECT OF *PROBLEM BASED LEARNING* (PBL) STRATEGY ASSISTED WITH LINKTREE ON COMPUTER SYSTEM LEARNING RESULTS IN STUDENTS OF MTsN 3 LANGKAT

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ABSTRACT

This research aims to determine whether the learning outcomes of computer systems for students taught with the Problem-based Learning (PBL) learning strategy assisted by Linktree are better than the learning outcomes of students taught with the Expository learning strategy in class IX MTsN 3 Langkat. The research was a quasi-experiment, involving two classes that were given different treatments. The research design used in this research is Pre-test Post-test control group design, namely by looking at the differences in influence on post-test learning outcomes between the experimental and control groups. Statistically, using the t-test, it was concluded that the learning outcomes of students who were taught using the Linktree-assisted Problem Based Learning (PBL) Learning Strategy were better than the learning outcomes of students who were taught using the expository strategy in informatics subjects at MTsN 3 Langkat in systems material. computer, this is proven from the results of hypothesis testing where $t_{count} > t_{table}$, namely 13.77>1.666 **.**

Keyword : Problem-based Learning (PBL), Linktree, Expository, Computer System

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1. INTRODUCTION

Changes in the way of learning that used to be more teacher-centered, now shifted and centered on students with the existence of learning strategies. Now teachers or educators have been more emphasized to master pedagogical competence (the science of educating / education), but in fact there are still many educators who have not or are less successful in applying their educational knowledge to teach students, so they use methods such as as lectures or questions and answers. That way now there is still a lot of learning that is centered on the teacher or educator rather than the students. By using a classic way of learning or a teacher-centered learning process, namely by using the lecture or question and answer method, of course, it will make the class situation monotonous and tend to be boring, especially if it continues to be applied repeatedly for one semester. Therefore, with the learning strategy, it is hoped that the situation during the learning process in the classroom will be more varied and not monotonous. Of course, the learning process applied by teachers or educators will affect the learning outcomes of students. Therefore, in the implementation of the teaching and learning process the teacher must be able to actively involve students. Thus the teacher is required to find alternatives that must be taken in the learning process in order to achieve the learning objectives themselves. One way to achieve these goals is the need for a learning strategy, because without an appropriate strategy it is impossible for learning objectives to be achieved optimally. Madrasah Tsanawiyah Negeri 3 Langkat or MTsN 3 Langkat is one of the schools that applies the independent curriculum and there are informatics subjects. From the survey conducted in the field by hearing the opinion of the subject teachers that the learning outcomes of class IX students for Informatics subjects are considered low with an average score of 65 while for the standard competency value set is above 70. By

asking questions to teachers at MTsN 3 Langkat about learning problems faced by students in the classroom in Informatics subjects, several problems were found, one of which was the lack of student learning activities so that learning did not run smoothly and optimally. This is what causes low student learning outcomes. Low student learning outcomes are often associated with the way teachers teach. Where informatics teachers deliver lessons still use conventional learning strategies. In conventional learning strategies, teachers stand in front of the class dominating all teaching and learning activities at school. Students are the only recipients of lessons in a passive way. In terms of teachers, many teachers teach only with lecture strategies so that students become bored, sleepy, passive and only take notes (Slameto, 2003). This process only emphasizes the achievement of curriculum demands and textual delivery rather than developing students' learning abilities. The involvement of students during learning is not optimal so that the results in the acquisition of student learning outcomes are not optimal either. Here the role of students is no longer as learning subjects but as objects of learning. Students' responsibility for their learning tasks such as in terms of the ability to develop, find, investigate, and reveal their knowledge is still very lacking. This learning process has an impact on the learning achievement of some students in informatics subjects who have not reached the ideal criteria for completeness as set. The non-achievement of learning completeness is because students are less able to solve problems according to the stages of solving problem-shaped problems. The teaching pattern that has been used by teachers has not been able to help students solve problem-shaped problems, activate students in learning, motivate students to express their ideas and opinions and even students are still reluctant to ask the teacher if they do not understand the material presented by the teacher. In addition, teachers are always pursued by time targets to complete each subject matter without paying attention to the competencies of their students. To anticipate this problem, teachers need to implement learning strategies that can help students in their learning, grow students' motivation and interest in learning.

This definition implies that teachers should be able to implement a learning strategy that can improve students' ability to develop, discover, investigate, and uncover students' own ideas and carry out a continuous assessment process to obtain optimal student learning outcomes. In other words, it is hoped that teachers will be able to improve students' thinking and problem-solving skills in informatics lessons and conduct ongoing research. For relevant research using the Problem-based Learning Strategy (PBL), researchers get references from scientific papers or research conducted by Gustav Simangunsong (2010) in learning using the Problem-based Learning learning strategy (PBL). The research results obtained by obtaining the average learning outcomes in students taught with Problem-based Learning (PBL) is 72.17 and the average learning outcomes of students taught with Expository Learning Strategy is 62.08. The results of this study indicate that the learning outcomes of students taught with Problem-based Learning (PBL) are better than with Expository.

The problem in this study is whether the learning outcomes of computer systems in students taught with Problem-based Learning (PBL) learning strategies assisted by Linktree are better than the learning outcomes of students taught with Expository learning strategies in class IX MTsN 3 Langkat. The results of this study aim to determine the learning outcomes of computer systems in students taught with Problem-based Learning (PBL) learning strategies assisted students by Linktree whether it is better than the learning outcomes of taught with Expository learning strategies in class IX MTsN 3 Step up.

2. RESEARCH METHOD

The population in this study was class IX students consisting of 2 classes with a total of 74 students. Sampling using *Cluster Random* Sampling technique from 10 classes, 2 classes were taken which finally became the research sample, namely the experimental class (IX-1) applied by using Problem-based Learning (PBL) learning strategy assisted by Linktree. The control class (IX-2) applied learning using an expository learning strategy with each class totaling 37 people. This research is a Quasi-experimental research, which involves two classes that are given different treatments. The research design used in this study was *Pre-test Post-test control Group Design* , namely by looking at differences in the effect on *post-test* learning outcomes between experimental and control groups. In the experimental class, learning was applied using the Problem-based Learning (PBL) learning strategy assisted by Linktree and the control class used the Expository learning strategy. The end of this experiment is expected to get information about the effect on learning outcomes on computer system material in class IX MTsN 3 Langkat.

3. RESULTS AND DISCUSSION

Based on the results of the initial ability test given before being given treatment in the experimental class, the following data were obtained. Average score = 7.83; variance = 5.63; highest score = 14; and lowest score = 4 with a sample size of 37 people. After the calculation, it is obtained that the number of classes is 6, the length of the class is 2, and the lower end of the first class starts from 4, then the frequency distribution regarding the initial ability test results of the experimental class can be seen in the table below.

Table 1 . Frequency Distribution of Pretest Data Class IX-1

No.	Interval	Fi	f(%)
1	4-5	9	24.32%
2	6-7	7	18.92%
3	8-9	12	32.44%
4	10-11	7	18.92%
5	12-13	1	2.70%
6	14-15	1	2.70%
	Total	**37**	**100%**

Based on the results of the initial ability test given before being given treatment in the control class, the following data were obtained. Average score = 7.16; variance = 6.08; highest score = 13; and lowest score = 3 with a sample size of 37 people. After the calculation, it is obtained that the number of classes is 6, the length of the class is 2, and the lower end of the first class starts from 3, then the frequency distribution of the control class initial ability test results can be seen in the table below.

Table 2: Frequency Distribution of Pretest Data of Class IX-2

No	Interval	Fi	f(%)
1	3-4	4	10.81%
2	5-6	12	32.43%
3	7-8	10	27.03%
4	9-10	8	21.62%
5	11-12	2	5.41%
6	13-14	1	2.70%
	Total	37	100%

To prove that the two research classes are not much different, a homogeneity test was carried out using the two variant test. The calculation results are summarized in the table below.

Table 3. Pretest Data of Class IX-1 and Class IX-2

Statistics	Class	
	IX-1	**IX-2**
N	37	37
Highest Score	14	13
Lowest Score	4	3
Average	7.83	7.16
$\sum X$	290	265
$\sum X^2$	2476	2117
SD	2.37	2.46

S^2	5.63	6.08

Homogeneous variance is tested by comparing the largest variance with the smallest variance. If $F_{Count} \geq F_{Table}$ then H_0 is rejected and if $F_{Count} < F_{Table}$ then H_0 is accepted. With the degree of freedom of the numerator = (n_1 -1) and the degree of freedom of the denominator = (n_2 - 1) with the significance level α = 0.05

Table 4. Pre-test Homogeneity Test

Statistics	Class	
	IX-1	*IX-2*
Variance	5.63	6.08
F Count	1.08	
F Table	1.74	
Status	**HOMOGENEOUS**	

From the table above the calculation of the pre-test homogeneity test, it is known that F count = 1.08. Furthermore, F count is confirmed with the F distribution table at the 5% significance level with dk = 36:36, which is 1.74, then F count = 1.08 < F table = 1.74. Thus it can be concluded that the pre-test of students in classes IX-1 and IX-2 is homogeneous. Based on the learning outcomes test given after the treatment process, the scores obtained by students in the experimental class taught using the *Problem Based Learning* Strategy (PBL) assisted by Linktree can be seen in the following table.

Table 5. Summary of System Learning Outcome Data

Statistical Value	**X PBL**
N	**37**
Total Value	**889**
Average (M)	**24,027**
Highest Score	**27**
Lowest Score	**17**
Standard Deviation (SD)	**2,254**
Variance	**5,082**

Based on the data obtained from the results of the study with a total of 37 student respondents, there was the highest score = 27 and the lowest score = 17, with an average (M) = 24.027 and standard deviation (SD) = 2.254. By using the Sturges technique, there were many 6th grades with a class length of 2, and starting with the lower end of the first class, namely 17, then the frequency distribution list of learning outcomes taught using the Problem Based Learning (PBL) Learning Strategy assisted by Linktree can be seen in the following table.

Table 6. Frequency Distribution of Outcome Scores Learning of Students Taught with *Problem Based* Learning Strategy *Learning* (PBL)

No.	Interval	Fi	f(%)
1	17-18	1	2.70%
2	19-20	1	2.70%
3	21-22	6	16.22%
4	23-24	13	35.14%
5	25-26	11	29.73%
6	27-28	5	13.51%
	Total	**37**	**100%**

Based on the learning outcomes test given after the treatment process, the scores obtained by students in the control class taught using the Expository Learning Strategy can be seen in the following table.

Table 7. Summary of System Learning Outcome DataComputer in Control Class

Statistical Value	**X EX**
N	**37**
Total Value	**616**
Average (M)	**16,648**
Highest Score	**25**
Lowest Score	**13**
Standard Deviation (SD)	**2,359**
Variance	**5.56**

By using the Sturges technique, the number of classes is obtained 6, the length of the class is 2, and starting with the lower end of the first class 13, the frequency distribution list of the learning outcomes of the student group taught using the Expository learning strategy is shown in the following table.

Table 8. Frequency Distribution of Outcome Scores Learning of Students Taught with Expository Learning Strategy

No.	**Interval**	**Fi**	**f(%)**
1	13-14	6	16.22%
2	15-16	13	35.14%
3	17-18	12	32.43%
4	19-20	4	10.81%
5	21-22	1	2.70%

This normality test is used to determine whether the sample used comes from a normally distributed population or not. Testing is done using the Lilliefors Test on the sample group, as for the criteria for testing this normality is if $L_o < L_{table}$ then the sample is normally distributed and if $L_o > L_{table}$ then the sample is not

normally distributed. The results of the calculation of the normality test of student learning outcomes taught with the *Problem Based Learning* Strategy (PBL) at the significance level α= 5% with the number of samples (dk) = 37 obtained $L_{table} = 0.145$ while $L_o = 0.117$. Thus it is evident that $L_o = 0.117 < L_{table} = 0.145$, so that the test data with the *Problem Based Learning* Strategy (PBL) assisted by Linktree comes from a normally distributed population. The results of the calculation of the normality test of student learning outcomes taught using the Expository Learning Strategy at the significance level α = 5% with the number of samples (dk) = 37 obtained $L_{table} = 0.145$ while $L_o = 0.133$. Thus it is evident that $L_o = 0.133 < L_{table} = 0.145$, so that the test data using the Expository Learning Strategy comes from a normally distributed population. The homogeneity test serves to determine whether the Computer System Learning Outcomes data from the two classes have similar variances (Homogeneous). This variance homogeneity is tested by comparing the largest variance with the smallest variance. If $F_{count} \geq F_{table}$ then H_0 is rejected and if $F_{count} < F_{Table}$ then H_0 is accepted. With degrees of freedom of the numerator = $(n_1 - 1)$ and degrees of freedom of the denominator = $(n_2 - 1)$ with real levels α = 0.05.

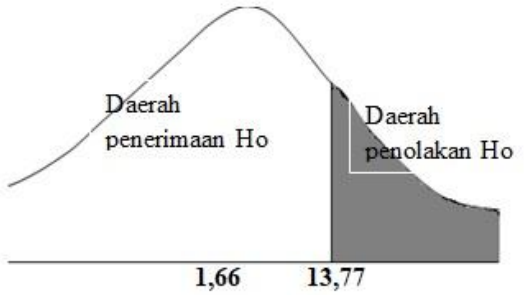
The calculation of the homogeneity test of the Computer System learning outcomes test, it is known that the learning outcomes have F count= 1.09. Furthermore, F count is confirmed with the F distribution table at the 5% significance level with dk = 36:36, which is 1.74, then F count= 1.09 < F table = 1.74. Thus it can be concluded that the student test results in the class taught with the *Problem Based Learning* (PBL) Learning Strategy assisted by Linktree and in the class taught with the Expository Learning Strategy have homogeneous variances. After it is known that the data for the learning outcomes of the two samples are normally distributed and homogeneous, hypothesis testing is then carried out. Hypothesis testing for learning outcomes is carried out on posttest data and tested through the two mean difference tests , namely the independent t-test. The test results at the level of α = 0.05 obtained $t_{count} > t_{table}$, namely 13.77> 1.66. With the following hypothesis statement.

$$H_o : \mu_1 \leq \mu_2$$
$$H_a : \mu_1 > \mu_2$$

Information :

$\mu_1 \leq \mu_2 \Rightarrow$ The learning outcomes of students in the experimental class by implementing the Problem-based Learning (PBL) learning strategy are smaller or the same as the learning outcomes of students in the control class by implementing the expository learning strategy. This means that there is no influence of learning by implementing the Problem-based Learning (PBL) learning strategy.

$\mu_1 > \mu_2 \Rightarrow$ The learning outcomes of students in the experimental class by implementing the Problem-based Learning (PBL) learning strategy are greater than the learning outcomes of students in the control class by implementing the expository learning strategy. This means that there is an influence of learning by implementing the Problem-based Learning (PBL) learning strategy.



Picture 1. Acceptance and Rejection Curve of Ho Hypothesis Test Independent t Test

Thus H_0 is rejected and H_a is accepted, which means that the average value of student learning outcomes in the experimental class (*Problem Based Learning learning* strategy) assisted by Linktree is greater than the control class (*Expository* learning strategy), meaning that there is an effect of learning with the *Problem Based Learning learning* strategy assisted by Linktree on computer system learning. This means that the average learning outcomes of students taught with the *Problem Based Learning learning* strategy assisted by Linktree are higher than the average learning outcomes of students taught with Expository learning on computer system material class IX MTsN 3 Langkat. The learning outcomes of Computer

Systems using *Problem Based Learning* learning strategy *assisted by Linktree* for students of class IX-1 is an average of 24,027. The learning outcomes of Computer Systems using expository learning strategy for students of class IX-2 is an average of 16.648. Computer Systems learning outcomes in students taught using *Problem Based Learning* (PBL) learning strategies assisted by Linktree can be higher because through this learning students are encouraged to be active in finding their own difficulties in the concepts of the lesson. Through learning *Problem Based Learning* (PBL) assisted by Linktree, students have the widest possible opportunity to use their creativity in learning, so that with this opportunity student learning outcomes become better.

On the other hand, through expository learning, the interaction that occurs is only one-way, from teacher to student. This learning pattern does not require students to be active because the teaching and learning process runs descriptively and only explains and presents information to students. Such learning conditions are the cause of why the learning outcomes of Computer Systems in students with expository learning are lower than the learning outcomes of Computer Systems in students taught with *Problem Based Learning* (PBL) learning assisted by Linktree. Thus, it can be concluded that the advantage of *Problem Based Learning* (PBL) learning with Linktree over expository learning lies in the ability of this learning strategy to create more learning opportunities or experiences. The research conducted at MTsN 3 Langkat involved two classes, namely the experimental class and the control class. The experimental class was treated using the *Problem Based Learning* Strategy (PBL) assisted by Linktree and the control class was treated using the Expository Strategy. From the research conducted by applying the *Problem Based Learning* Strategy (PBL) which consists of 5 phases as follows.

1) Phase 1: Directing Learners to the Problem
   In this phase, the teacher explains the learning objectives and motivates students to participate in Problem-based Learning (PBL).
2) Phase 2: Organizing Learners to Learn
   In this phase the teacher helps students to define and organize learning tasks or activities related to the problem.
3) Phase 3: Assist with Problem Investigation
   In this phase the teacher encourages learners to gather relevant information, carry out experiments, and try to find explanations and solutions.
4) Phase 4: Developing and Presenting the Problem
   In this phase the teacher assists students in developing the results of their problem investigation, until a hypothesis is obtained which is then presented to be heard together and will be discussed together.
5) Phase 5: Evaluating the Problem Solving Process
   In this phase the teacher helps to reflect on the investigation they have done.

Judging from the results of this study, the learning outcomes of Computer Systems in student groups taught with *Problem Based Learning* (PBL) assisted by Linktree have higher learning outcomes compared to student groups taught with expository learning. So it is proven that there is a difference between *Problem Based Learning* (PBL) with Linktree assistance and expository learning on student learning outcomes. However, based on the findings in the field, the application of *Problem Based Learning* (PBL) with Linktree has advantages and limitations, among others.

1) The advantages include:
   a. Problem-based learning (PBL) is a great technique to better understand the content of a lesson.
   b. Problem-based learning (PBL) can challenge students' abilities and provide satisfaction to discover new knowledge for students.
   c. Problem-based learning (PBL) can improve student learning activities
   d. Problem-based learning (PBL) can help students transfer their knowledge to understand real-life problems
   e. Problem-based learning (PBL) can help students to develop new knowledge and take responsibility for their own learning
   f. Problem-based learning (PBL) can show students that learning is a way of thinking and something that students must understand
   g. Problem-based learning (PBL) can develop students' ability to think critically and adapt to new knowledge
   h. Problem-based learning (PBL) can provide opportunities for students to apply their knowledge in the real world
2) Limitations include:
   a. When students do not have an interest or do not believe that the problem at hand is difficult to

solve, then students will feel reluctant to try
b. Requires enough time for preparation
c. Without understanding why they are trying to solve the problem being studied, they will not learn what they want to learn

The results of the post-test results of the two classes are: the highest score of the experimental class is 27, the lowest score of the experimental class is 17. The highest score of the control class is 25, the lowest score of the control class is 13, the average post-test score of the experimental class is 24.027 and the average post-test score of the control class is 16.648. Then hypothesis testing was carried out for learning outcomes using the t-test. After testing the learning outcomes data, it was found that the test results at the ✔ ● 0.05 level obtained $t_{count} > t_{table}$, namely 13.77>1.666, then $H0_{was}$ rejected and Ha_{was} accepted. Thus it can be concluded that the learning outcomes of students taught using the Problem Based Learning (PBL) Learning Strategy aided by Linktree are higher than the learning outcomes of students taught using the Expository Strategy. Based on the research findings, it can be said that student learning outcomes using the Problem Based Learning Strategy (PBL) assisted by Linktree are better than student learning outcomes taught by the expository learning method. This proves that the use of Problem Based Learning Strategy (PBL) assisted by Linktree is needed in informatics learning on computer system material.

4. CONCLUSION

Based on the research results obtained from data analysis, several conclusions were obtained such as the results of learning computer systems in class IX MTsN 3 Langkat which were taught using the Problem Based Learning Strategy (PBL) assisted by Linktree higher than the Expository Learning Strategy by obtaining an average score of 24.027 with the highest score of 27 and the lowest score of 17 and an average score of 70.66 and has met the KKM standard, which is 70.00. The learning outcomes of computer systems in class IX MTsN 3 Langkat taught using the Expository Learning Strategy are lower than the Problem Based Learning Strategy (PBL) assisted by Linktree by obtaining an average score of 16.64 with the highest score of 25 and the lowest score of 13 and an average score of 48.94 and did not meet the KKM standard, which is 70.00. Statistically using the t-test, it is concluded that the learning outcomes of students taught using the Problem Based Learning (PBL) Learning Strategy assisted by Linktree are better than the learning outcomes of students taught using the expository strategy in informatics subjects at MTsN 3 Langkat on computer system material, this is proven by the results of hypothesis testing where $t_{count} > t_{table}$ which is 13.77>1.666.

1. Teachers who teach computer systems can use the Problem Based Learning (PBL) learning strategy assisted by Linktree as an alternative in choosing a learning strategy that is expected to improve student learning outcomes.
2. Teachers who teach computer systems can apply the Problem Based Learning (PBL) learning strategy assisted by Linktree as a learning strategy that is expected to make students more active in participating in lessons.
3. Teachers who teach computer systems and want to apply the Problem Based Learning (PBL) learning strategy assisted by Linktree should be able to utilize the time as well as possible so that the learning process can run well.
4. To the next prospective researchers to conduct the same research with different materials or grade levels so that the results of the study can be useful for the advancement of education.

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