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The Effect of Learning Strategy and Thinking Style on the Students Achievement in Biology

(Grade XI of SMA Negeri 1 LimapuluhAcademic year 2017/2018)

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Abstract -**This study aims firstly to find out the difference of biology learning achievement of students applied problem based learning strategy and expository learning strategy, secondly to discover the differences of learning achievement between the students with abstract sequential thinking style and students with abstract random thinking style, thirdly to determine the presence or absence of interaction between learning strategies and thinking styles in influencing students biology learning achievement. The population in the study was all students of grade XI IPA (science program) consisted of 108 students. The sample in this study was taken by cluster random sampling. The research method was experimental method with 2x2 factorial design. The data analysis technique used was a two way analysis of variance. The research findings showed, first, the biology learning achievement of the students by using problem based learning strategy was higher than the students biology learning achievement by using expository learning strategy. Second, the biology achievement of students with abstract sequential thinking style were higher than students with abstract random thinking style. Third, there was interaction between learning strategy and thinking style in influencing student biology learning achievement.**

Keywords: Learning strategy, thinking style, biology learning achievement

I. INTRODUCTION

As one of the top education institutions, SMA Negeri 1 Limapuluh has a vision and mission that is used as a reference in conducting teaching and learning activities in schools. One mission that is the target of learning activities in schools is to equip students with the ability and skills in the field of science through the development of the ability to think logically and analytically. To answer the challenges contained in the mission, a form of learning is needed that can train, improve and develop the intellectual potential of students to achieve the intended goals. One area of learning that is expected to answer the challenges contained in the school's vision and mission is learning biology. Biology which is one of the clusters of science is expected to equip students with critical, logical and analytical thinking skills. But in practice, the success rate of biology learning is still not satisfactory.

Based on the results of observations it is known that the general learning patterns held by teachers tend to be one-way, where the teacher fully controls the learning activities so that learning runs monotonically and makes students bored quickly. In addition, teachers generally only use the lecture method in carrying out the learning process without regard to differences in student learning characteristics so that students are more directed to the process of memorizing the material no longer understand the subject matter of the material being studied. By referring to the above problems, it is necessary to design a learning activity that can facilitate the learning needs of students. One solution is to implement an effective learning strategy that is appropriate to the characteristics of the subject matter, student characteristics and characteristics of the learning objectives. Learning strategy is a plan of learning activities in the form of a combination of phase activities, organizing material, methods, and learning media that will be delivered to students so that learning objectives are achieved effectively and efficiently.

One learning strategy that can be used in biology learning is a problem based learning strategy (*PBL*). PBL are developed to assist students in developing thinking, problem solving, and intellectual skills. Sanjaya (2006: 214) explains that there are 3 main characteristics of PBL. First, PBL is a series of learning activities, meaning that in the implementation of PBL there are a number of activities that students must do. PBL does not expect students to just listen, record, then memorize subject matter, but through PBL students actively think, communicate, search and process data, and finally conclude. Second, learning activities are directed to solving problems. PBL places the

problem as a key word from the learning process. This means that without problems there is no possible learning process. Third, problem solving is done using a scientific thinking approach. Thinking using scientific methods is a process of deductive and inductive thinking. This thinking process is carried out systematically and empirically.

The thinking style that is owned by students is one of the factors that must be considered by the teacher before implementing the learning. Marzoan (2016: 11) explains that each student basically has different characteristics of thinking style so that a teacher must give different treatment. The introduction of students' thinking style will help the teacher in determining the habits, tendencies and characteristics possessed by students so that the teacher can determine the learning process according to the characteristics of the student's thinking style. The level of students' ability to think is inseparable from the variety of information and experiences they have gained in life.

Based on the background above, in general the purpose of this study was to get an overview of the influence of learning strategies and thinking styles on the results of biology learning for Class XI students of SMA Negeri 1 Limapuluh Academic Years 2017/2018.

II. RESEARCH METHODS

The research was carried out at SMA Negeri 1 Limapuluh. The population in this study were all students of class XI Science totaling 108 people.The sampling technique in this study was carried out in a cluster random sampling (random sample group) by taking 2 selected classes to learn using different learning strategies. This study uses an experimental method with 2x2 factorial design. The research data analysis technique used was the 2x2 Analysis Of Variance (ANOVA) technique. Hypothesis testing was carried out at a significant level of $\alpha = 0.05$. If in ANOVA testing it turns out there is an interaction of learning strategies and thinking styles on students' biology learning outcomes that are significant, then further testing is done using the Scheffe.

III. Results And Discussion

TABLE 1.Results of Data Analysis Tests

Source	df	Sum of Square	Mean Square	F	Sig.	
					p = 0,05	p = 0,01
Learning Strategy (A)	1	478,40	478,40	8,20**	3,99	7,03
Thinking Style (B)	1	341,85	341,85	5,86*	3,99	7,03
Interaction (AB)	1	1213,18	1213,18	20,78**	3,99	7,03
Error	67	3910,93	58,37	-	-	-
Total	**70**	**5944,37**	-	-	-	-

Differences in Student Biology Learning Outcomes Learned Using Problem Learning Strategies (A1) with those taught using Expository Learning Strategies (A2).
The statistical hypothesis tested is as follows:
$H_0 : \mu_{A1} \leq \mu_{A2}$
$H_a : \mu_{A1} > \mu_{A2}$

Based on the results of the analysis of research data obtained the average score of student learning outcomes that were learned using problem based learning strategies of 82.17 and the average score of students' learning outcomes that were learned using expository learning strategies of 75.90. The results of hypothesis testing obtained by the Fcount price of 8.20. While the price of Ftable at the significance level $\alpha = 0.05$ was obtained $F_{0.05}$ (1.67) = 3.99. Because Fcount > Ftable (8.20 > 3.99), it can be concluded that H_0 is rejected which means that students' biology learning outcomes that are taught using problembased learning strategies are higher than the learning outcomes of students who are taught using expository learning strategies.

Differences in Biological Learning Outcomes of Students Who Have Abstract Sequential Thinking Style (B1) with Those Who Have Abstract Random Thinking Style (B2).
The statistical hypothesis tested is as follows:
$H_0 : \mu_{B1} \leq \mu_{B2}$
$H_a : \mu_{B1} > \mu_{B2}$

Based on the results of the analysis of research data obtained the average score of learning outcomes of students who have abstract sequential thinking style of 81.08 and the average score of learning outcomes of students who have abstract random thinking style of 76.29. Hypothesis test results obtained by the Fcount price of 5.86, while the Ftable price at the significance level $\alpha = 0.05$ obtained F0.05 (1.67) = 3.99. Because Fcount > Ftable (5.86 > 3.99) it can be concluded that H0 is rejected which means that students' biology learning outcomes have a higher abstract sequential thinking style compared to student learning outcomes that have abstract random thinking styles.

Interaction Between Learning Strategies and Learning Styles in Influencing Student Learning Outcomes
The statistical hypothesis tested is as follows:

$H_0 : \mu_{BI} >< \mu_{B2} = 0$
$H_a : \mu_{B1} > \mu_{B2} \neq 0$

Based on the results of the analysis of research data obtained the average score of learning outcomes of students who have abstract sequential thinking styles that are learned using a problem-based learning strategy of 86.90. The average score of learning outcomes of students who have abstract random thinking styles that are taught using problem-based learning strategies is 74.25. The average score of learning outcomes of students who have abstract sequential thinking styles learned using expository learning strategies is 74.40. The average score of learning outcomes of students who have abstract random thinking styles that are taught using expository learning strategies is 78.33. Hypothesis test results obtained by the Fcount price of 20.78, while the Ftable price at the significance level α = 0.05 obtained F0.05 (1.67) = 3.99. Because Fcount > Ftable (20.78 > 3.99) can be concluded that H0 is rejected which means that there is an interaction between learning strategies and thinking styles in influencing students' learning outcomes.

Based on the results of the third hypothesis testing shows the interaction between learning strategies and thinking styles in influencing student learning outcomes, it is necessary to do further tests to determine the average value of which groups give a higher influence on the results of student biology learning. Further tests were carried out using the Scheffe test shown in Table 2.

TABLE 2. Summary of Scheffe Test Results

No	Comparison Of Mean Group Values	F_{Count}	$F_{0,05(3,67)}$
1	A_1B_1 with A_2B_1	26,77	2,75
2	A_1B_2 with A_2B_2	2,21	2,75
3	A_1B_1 with A_1B_2	24,37	2,75
4	A_2B_1 with A_2B_2	2,27	2,75

a. The Scheffe test results for the difference in average scores between A1B1 and A2B1 obtained by the price of Fcount > Ftable (26.77 > 2.75) so that it can be concluded that there are significant differences between students' biology learning outcomes who have abstract sequential thinking styles that are learned using strategy problem-based learning with students' biology learning outcomes who have abstract sequential thinking styles that are taught using expository learning strategies. From the results of the Scheffe test, it can be concluded that students 'biology learning outcomes who have abstract sequential thinking styles that are taught using problem-based learning strategies are higher than students' biology learning outcomes who have abstract sequential thinking styles learned using expository learning strategies.

b. Scheffe test results for the difference in average scores between A1B2 and A2B2 obtained by the price of Fcount < Ftable (2.21 < 2.75) so that it can be concluded that there is no significant difference between students' biology learning outcomes that have abstract random thinking styles that are taught using problem-based learning strategies with students' biology learning outcomes that have abstract random thinking styles that are taught using expository learning strategies. From the results of the Scheffe test, it can be concluded that students 'biology learning outcomes who have abstract random thinking styles that are taught using problem based learning strategies are not higher (equal) than students' biology learning outcomes that have abstract random thinking styles that are taught using expository learning strategies. .

c. Scheffe test results for the difference in average scores between A1B1 and A1B2 obtained by the price of Fcount > Ftable (24.37 > 2.75) so that it can be concluded that there is a significant difference between students' biology learning outcomes who have abstract sequential thinking styles that are learned using strategy problem-based learning with students' biology learning outcomes who have abstract random thinking styles that are taught using problem based learning strategies. From the results of the Scheffe test, it can be concluded that students' biology learning outcomes who have abstract sequential thinking styles that are taught using problem-based learning strategies are higher than those of students who have abstract random thinking styles that are learned using problem based learning strategies.

d. The Scheffe test results for the average score difference between A2B1 and A2B2 obtained by the price of Fcount < Ftable (2.27 < 2.75) so that it can be concluded that there is no significant difference between students' biology learning outcomes who have abstract sequential thinking that is taught using Expository learning strategies with students' biology learning outcomes that have abstract random thinking styles that are taught using expository learning strategies. From the results of the Scheffe test, it can be concluded that students 'biology learning outcomes who have abstract sequential thinking styles that are taught using expository learning strategies are not higher (equal) than students' biology learning outcomes that have abstract random thinking styles that are taught using expository learning strategies.

To visualize the interaction between learning strategies and thinking styles in influencing students' learning outcomes, the average score of each research group is described as follows:

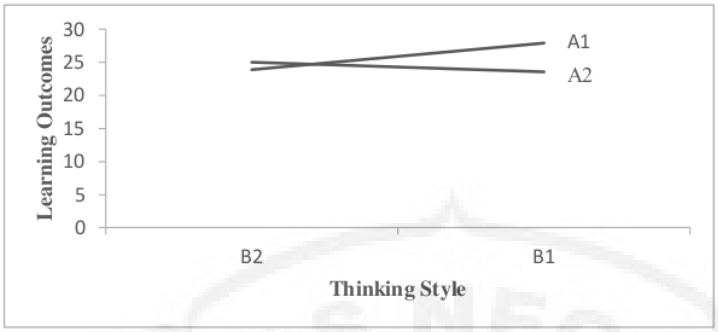

Fig. 1.Interaction of Learning Strategies and Thinking Style in Influencing Student Biology Learning Outcomes

IV. CONCLUSION

Based on the results of the research and discussion previously stated, it can be concluded:

1. The results of biology learning for Grade XI Science students at SMA Negeri 1 Limapuluh which were taught using a problem based learning strategy was higher than the learning outcomes of students who were taught using expository learning strategies.
2. Biology learning outcomes of Grade XI Science students at SMA Negeri 1 Limapuluh who have a higher abstract sequential thinking style compared to students' biology learning outcomes that have abstract random thinking styles.
3. The application of problem based learning strategies is more appropriate to be used to teach students who have abstract sequential thinking. While the application of expository learning strategies is more appropriately used to teach students who have abstract random thinking styles.

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