The Effect Of Picture And Picture Learning Strategy With Technology Towards Students Science Achievement

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Abstract: This research aims to know effect of Picture and Picture Learning Strategy with Technology Towards Students Science Achievements. This research is a quasi experiment which is carried out at the 4th Grade State Elementary School of Kabanjahe, North Sumatera. Hypothesis testing was done using ANCOVA at a significance level of 0.05. Normality and homogeneity testing using Lilliefors and Fisher test. Based on the results of the F-test of 8.068 with F-table is 3.968. This test results are greater than the F-table (7.88 > 2.73). H0 is rejected and H1 is accepted, which shows that there are differences in science learning achievements between students who taught using the picture and picture learning model and the direct learning model.

Index Terms: Picture and Picture Learning Strategy, Technology, Student Science Achievements

1 INTRODUCTION

Nowadays, era of industrial revolution 4.0 demands use of technology in all fields, especially education field that develop rapidly. The presence of the era of the industrial revolution 4.0, even now the world is going into the era of industrial revolution 5.0, requires the Indonesian government to continuously improve the quality of education. The government continues to improve physical and non-physical facilities that can support the optimal learning process. Increase the optimization of assistance to students and to schools. The government has repeatedly made improvements to the curriculum to improve the quality of education in Indonesia. Discussion on curriculum development, Esfahani & Tabrizi [1] suggest that the nature and development of curriculum comes from ideas that come from educational concepts sourced from experts so as to help policy makers to plan a complete comprehensive curriculum that will provide stakeholders with an overview and direction which is clear on the curriculum that will be made. This is done so that the curriculum applied at each level of education accordance with the demands of student development. The demands of student development today show an increasingly complex space and movement due to the development of global life which is marked by more open information about the ideology of various countries, teamwork and competition between countries [2]. So that teaching is not only transmission of knowledge to students, but an activity that allows students to construct their own knowledge. Developing learning that builds thought construction should be done since the elementary school level. Students are taught, instilled, and developed the concept of thinking from an early age. The most important subject that can strengthen the concept of logical and systematic thinking of elementary school students is Natural Sciences. current condition, students view this lesson as not interesting and unpleasant because students who are in elementary school, especially grades II to V, tend to be still at the concrete operational stage. The importance of developing learning that builds the construction of students' thinking in 4th grade Elementary School 040446 Kabanjahe, North Sumatera, Indonesia is not carried out in science learning activities. Science learning practice is based on observations by teacher science subject teachers and ignoring the development of students' thinking ability factors. The learning above must improve with better innovative learning strategies to improve student learning achievements in schools. One of the active learning strategies that can improve student learning achievements in accordance with the character of fourth grade elementary school students is the picture and picture learning strategy. Picture and Picture strategy is a learning strategy that uses pictures and is paired or sorted into a logical sequence. [3] Implementation of picture and picture learning strategy to make it easier for students to understand science subject. Students are required to be responsible for everything that is done in the group. In addition, students must also convey their perceptions about the images presented, so that each group member has the same goal. This must be considered in this learning strategy that students must be able to divide tasks and responsibilities into groups and be able to provide evaluation to each group member by appointing a spokesperson or group leader and this can be done alternately. From concrete images and various discussions on the results of observations between students, their groups and the teacher's conclusions, it is hoped that it can provide stronger understanding and knowledge and a more enjoyable learning experience for students. So that it is expected to be able to improve student learning achievements. However, each learning strategy has advantages and disadvantages. The drawback of the picture and picture learning strategy is that it is difficult to find quality pictures that are in accordance with the students' reasoning or competence; less accustomed to using pictures as the main material for learning; and the unavailability of funds for the desired images. [4] To solve this problem, later this picture and picture learning strategy can be optimized using a touch of technology. Later, the teacher will search for all the necessary and feasible images from internet sources and pack them into presentation slides. So, the picture and picture learning strategy supported technology is expected to be a solution to improve student science learning achievements.

2 LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

2.1 Science Achievements
Learning achievements are the most important part of learning. Sudjana [5] defines student learning achievements in essence as changes in behavior as learning in a broader
sense covering the cognitive, affective, and psychomotor fields. Dimyati and Mudjiono [6] also state that learning achievements are the result of an interaction of learning actions and actions. From the teacher's side, the teaching act ends with the process of evaluating learning achievements, while from the student's side, learning achievements end from the top of the learning process. Bloom as quoted by Sudjana [5] divides learning achievements into 3 (three) parts, namely: (a) cognitive domains, with regard to intellectual learning achievements which consists of six aspects (knowledge or memory, understanding, application, analysis, synthesis, and evaluation); (b) the affective domain, with regard to attitudes, which consists of five aspects, namely acceptance, response or reaction, assessment, organization, and internalization; (c) the psychomotor domain, with respect to learning achievements of skills and ability to act. There are six aspects of the psychomotor domain, namely: reflex movements, basic movement skills, perceptual abilities, harmony or accuracy, complex skill movements, and repressive and interpretive movements. According Trianto [7] states that in essence science subject is built on the basis of scientific products, scientific processes, and scientific attitudes and a systematic collection of theories, its application is generally limited to natural phenomena, born and develops through scientific methods such as observation and experiments, and demand scientific attitudes such as curiosity, openness, honesty, and so on. In general, science subject includes three, namely biology, physics and chemistry. Science subject essentially links the material-logic aspect with the soul-spiritual aspect, which for the time being is considered an empty horizon, because an assumption between science and religion is two different sides and it is impossible to unite with each other in one field of research. In the management of science learning in schools, teachers must be able to provide students with knowledge of the concepts contained in the science material. In addition to concepts, teachers should be able to instill a scientific attitude through the learning strategies they do. In the Curriculum Center [8] integrated science learning has objectives, namely, to increase efficiency and effectiveness; Increase interest and motivation and some basic competencies can be achieved at once. Based on the explanation above, it can be concluded that science learning achievements are changes in students' natural science abilities in the affective, cognitive and psychomotor domains that students have after experiencing the learning process in a certain period of time, based on predetermined instructional objectives.

2.2 Picture and Picture Strategy with Technology

The learning strategy contains an action plan and a series of learning activities including the use of methods, the use of learning resources with well-structured learning activities in order to achieve learning objectives effectively and efficiently [9]. Same opinion with Dick & Carey [10] that learning strategies are general components of a collection of learning materials and procedures that will be used with learning materials to produce certain learning achievements. The learning strategy is a blueprint that contains different components of learning in order to be able to achieve the desired learning achievements optimally through planned conditions. When connected with the conditions of science learning, that the objective of learning science in elementary schools is to develop habits and attitudes of scientific thinking. So that, we need a learning strategy that further stimulates creativity and student activity with attractive learning media and increases student knowledge and understanding. The picture and picture learning strategy is a series of teaching material delivery by showing concrete pictures to students so that students can clearly understand the true meaning and teaching material presented to them. [4] The pictures of related learning material are the main factors in the learning process, so that before the learning process the teacher has prepared a picture that will be displayed either in card form or in card form or in large card chart form. Without a picture, it is impossible to do the teaching and learning process using the picture and picture strategy. The picture and picture learning strategy has advantages and disadvantages. The strengths according to Shoimin [11] are: (1) it makes it easier for students to understand what is meant by the teacher when delivering learning material: (2) students are responsive to the material presented because it is accompanied by pictures; (3) students can read one by one according to the instructions in the pictures given; (4) students concentrate more and feel interest because the task given by the teacher is related to their daily games, namely playing pictures; (5) there is mutual competence between groups in the preparation of pictures that have been prepared by the teacher so that the classroom feels alive; (6) students remember the concepts. Meanwhile, lack of picture and picture learning strategies, namely: a) it is difficult to find good or quality pictures; b) it is difficult to find pictures that match the reasoning power or competence of the students they already have; c) the unavailability of special funds to find or procure the desired pictures; and d) adequate support for facilities, equipment and costs is needed, especially for the images to be shown. [4] [12] Therefore, to solve this problem, a solution is needed to make it easier for teachers to provide pictures more easily according to learning needs, namely the use of technology in learning. Through this technology, it is hoped that teachers will find it easier to find the pictures needed using a computer or laptop via internet, then present the images in classroom learning using LCD projector. This has attracted students' interest because the use of technology media is relatively rare for elementary school teachers.

According Huda [13], the picture and picture strategy stages are as follows:

Stage 1: Delivering Competence. At this stage the teacher is expected to convey the basic competencies of the subjects concerned.

Stage 2: Presentation of Materials. In the presentation stage of the material, the teacher has created the initial momentum of learning. The success of the learning process can be seen from here.

Stage 3: Presentation of the Image. At this stage, the teacher presents a picture and invites students to be actively involved in the learning process by observing each picture shown.

Stage 4: Image Installation. At this stage, the teacher points / calls students in turn to pair the pictures in a logical and orderly manner.

Stage 5: Scoping. This stage requires the teacher to ask students about the reasons / rationale behind the sequence to find the concept of logical thinking, reasoning and storyline or basic competency demands based on the indicators to be achieved.

Stage 6: Presentation of competencies. Based on the
competence or explanation of the sequence of the teacher's picture, it can explain further according to the competence to be achieved.

Stage 7: Closing. At the end of the lesson the teacher and students reflect on what has been achieved and done.

So far, the picture and picture learning strategy is generally carried out by collecting relevant pictures from various sources, can be from magazines, newspapers, etc., then another problem is that teachers often have a hard time or find it difficult to find the source of the image material, so an idea arose to use the internet to find the pictures needed to strengthen the subject matter. Furthermore, the display of these images can be presented either as a power point slide using LCD projector media or it can also be printed on the required cards.

Based on the explanation above, it can be concluded that the picture and picture learning strategy is a learning strategy that combines the delivery of teaching material by showing concrete pictures to students either paired or logically arranged using technology-based media (computer, internet, & LCD projector) so that students can clearly understand the true meaning and teaching material presented.

3 METHODOLOGY
This research aims to provide empirical evidence of differences in science learning achievements in students who are taught using the picture and picture learning strategy and those taught using direct learning strategies. This research was a Quasi Experiment which is carried out at the State Elementary School of Kabanjahe District, Karo City, in the odd semester of academic year 2019/2020 which start on January to March 2020. The population was all 4th grade students consisting of 390. The experimental class was a class group that taught the picture and picture learning strategy, and the control group was a class group that would teach a direct learning strategy. Hypothesis of this research as below:

\[ H_0 : \mu_{A1} = \mu_{A2} \]
\[ H_a : \mu_{A1} \neq \mu_{A2} \]

Where:
\( \mu_{A1} \) : Science learning achievements of students who are taught picture and picture strategy
\( \mu_{A2} \) : Science learning achievements of students who are taught direct strategy

4 RESULT AND DISCUSSION
4.1 Normality and Homogeneity Test
The normality test of the sample data was carried out using the Lilliefors test. The hypothesis that will be tested for normality is
\( H_0 \): data comes from populations that are normally distributed
\( H_a \): data comes from populations that are not normally distributed

Meanwhile, the homogeneity test used the Fisher test, the hypothesis of the homogeneity test was
\( H_0 \): variance in each group is the same (homogeneous)
\( H_a \): variance in each group is not the same (not homogeneous)

<table>
<thead>
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<th>L_{test}</th>
<th>L_{table}</th>
<th>Description</th>
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<tr>
<td>A_1</td>
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<td>0.0942</td>
<td>0.1401</td>
<td>Normal Distribution</td>
</tr>
<tr>
<td>A_2</td>
<td>40</td>
<td>0.0804</td>
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### Normality Test

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A_1 is class group that taught picture and picture learning strategy,
A_2 is class group that taught direct learning strategy

Test criterion for normality test is \( L_{test} \leq L_{table} \) to accept the null hypothesis (\( H_0 \)). The data in Table 1 above, shows that all groups of science learning achievements provide a \( L_{test} \) value smaller than the \( L_{table} \) value at \( \alpha = 0.05 \). So that \( A_1 \) and \( A_2 \) data comes from populations that are normally distributed.

Homogeneity test obtained the value of \( F_{test} = 0.86 \) and \( F_{table} (\alpha = 0.05) = 39.39 \) = 1.704. The test criterion is to accept \( H_0 \) if \( F_{test} \leq F_{table} \) to reject \( H_0 \) if \( F_{test} > F_{table} \). The Fisher test for groups \( A_1 \) and \( A_2 \) shows that \( F_{test} \) is smaller than \( F_{table} \), we concluded that between groups \( A_1 \) and \( A_2 \) have the same or homogeneous variance.

4.2 Hypothesis Test
Hypothesis testing on this research using ANACOVA test. this test results on the source of variance between \( A \) show that \( F_{test} = 8.068 \) while \( F_{table} = 3.968 \). It is show that \( F_{test} > F_{table} \). The null hypothesis is rejected or there are differences in science learning achievements between students who are taught using the picture and picture learning model and the direct learning model. Thus, the learning model affects students’ science learning achievements after controlling for initial knowledge.

Furthermore, the average score of student learning achievements taught with the picture and picture learning model is 77.53 and average score of students who are taught using the direct learning model are 73.80. Learning achievements of students who are taught using the picture and picture learning model are higher than those taught using the direct learning model. This means that the picture and picture learning model is proven to have a more effective influence on students’ science learning achievements so it can be concluded that the science learning achievements of students using the picture and picture learning model better than students using the direct learning model is verified.

4.3 Discussion
This research contributed to differences in science learning achievements between groups of students taught using the picture and picture learning model (\( A_1 \)) and groups of students taught using the direct learning model (\( A_2 \)) after controlling for initial knowledge. Science learning achievements of the group of students who were taught with the picture and picture learning strategy with an average correction of 77.53, while the group of students who were taught with a direct learning strategy with an average correction of 73.80. The results of these calculations indicate that the science learning achievements among groups of students taught with picture and picture learning strategies are higher than those who are taught using direct learning strategies after controlling for initial knowledge. Thus, picture and picture learning strategy carried out in this research can improve science learning achievements better than learning with direct learning strategies. This information also answers the research hypothesis that the learning achievements of students who are taught with picture and picture learning strategies are better...
than students who are taught using direct learning strategies. The results of this study support previous research, Handayani et al. [14] concluded that the application of the picture and picture model has an effect on the competence of science knowledge of fifth grade elementary school students. Furthermore, Putra et al [15] concluded that there were significant differences in learning achievements in the application of the picture and picture learning model and the conventional learning model on integrated thematic learning achievements in grade IV SD students. The advantages of the picture and picture learning strategy compared to the learning achievements of conventional learning strategies are reinforced by the opinion, Slavin [16] explains that the picture and picture type of cooperative learning model is able to train students to think at higher levels, train students to develop independent thinking skills, involvement students can actively be seen from the first stage to the final stage of learning. The picture and picture learning strategy is one of the learning strategies that have the aim of increasing students 'understanding of the material being studied and can increase students' learning motivation, develop students 'courage, and students' social skills. The benefits of the picture and picture learning strategy are stimulating the work of the left and right brain synergistically, freeing oneself from all the rules when starting learning, developing an idea, being able to focus (concentrate) on varied pictures, and be fun and easy to remember. Furthermore, it is confirmed by Purwanto [17] who explains that there is an increase in learning achievements, as well as proving that there is a change in behavior due to learning because students master a number of abilities given during the learning process. This achievement is based on the learning objectives set. One of the results is a change in the cognitive aspect. According to Rusman [18] explains that during the learning process using the picture and picture strategy students are asked to make the learning condition more enjoyable and students' interest in the learning process. Students are encouraged to use their imagination and knowledge to arrange a sequence of images according to the material being taught and activate the whole brain to focus on the subject and remember the material that has been taught. Furthermore, students communicate with each other and also present the results of their discussion in front of the class. Students are emphasized to work together in learning the material. This activity will increase the interaction of students with group friends and with teachers, so that students become more interested, do not feel bored, and learning becomes more meaningful. During the learning process using the picture and picture model has a high posttest score compared to the post-test direct learning strategy class. This shows that the use of picture and picture learning strategies has an effect and can improve student learning achievements. Students' understanding of the material is quite good because during the learning process using picture and picture learning strategies, students play an active role in finding their own concepts so that when posttest is carried out students get better scores. Therefore, learning in the experimental class which is treated using the picture and picture learning strategy can influence student learning achievements better because in the learning process students are given the opportunity to construct and develop their own knowledge.

5 Conclusion

Based on the results of the research, data analysis, hypothesis testing, and discussion of the results of research on the effect of learning strategies and the ability to think on students' science learning achievements by controlling preliminary knowledge, it was concluded that the results of students' science learning who were taught with picture and picture learning strategy were higher than students who are taught with direct learning strategy. This research is inseparable from various limitations and weaknesses. Therefore, to be able to obtain empirical data and broader knowledge, further research is needed by controlling other variables, for example: (1) other covariate variables outside this research; (2) variable differences in individual characteristics; (3) the types of learning achievements tests that are relevant to student characteristics

References


