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The effects of Pictorial Riddle Type Inquiry Learning and Reciprocal Teaching Learning on Students' Learning Outcomes

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Abstrak

Tujuan penelitian quasi experiment ini adalah untuk mengetahui apakah hasil belajar matematika siswa yang diajar dengan pembelajaran Inquiry tipe Pictorial Riddle lebih tinggi daripada hasil belajar matematika siswa yang diajar dengan pembelajaran Reciprocal Teaching di Kelas VII SMPN 11 Kota Bengkulu. Sampel penelitian ditentukan secara cluster sampling sehingga diperoleh kelas VII A sebagai kelas eksperimen dan kelas VII B sebagai kelas kontrol. Kelas eksperimen pembelajarannya dilaksanakan dengan model pembelajaran Inquiry tipe Pictorial Riddle sedangkan kelas kontrol pembelajarannya dilaksanakan dengan model pembelajaran Reciprocal Teaching. Data hasil penelitian dianalisis dengan menggunakan uji t. Berdasarkan analisis data, disimpulkan bahwa hasil belajar matematika siswa yang diajar dengan pembelajaran Inquiry tipe Pictorial Riddle lebih tinggi daripada hasil belajar matematika siswa yang diajar dengan pembelajaran Reciprocal Teaching. Selain itu, hasil analisis deskriptif juga menunjukkan bahwa nilai rata-rata posttest pada kelas eksperimen (77.00) lebih tinggi dari rata-rata nilai posttest yang diperoleh pada kelas kontrol (70.3).
Kata Kunci: Antusiasme belajar; Berpikir kritis; Reciprocal teaching.

Abstract

The purpose of this quasi-experimental research was to determine whether the mathematics learning outcomes of students taught by Pictorial Riddle type Inquiry learning were higher than the mathematics learning outcomes of students taught by Reciprocal Teaching learning in Class VII SMPN 11 Bengkulu City. The research sample was determined by cluster sampling in order to obtain class VII A as the experimental class and class VII B as the control class. The experimental class of learning was taught with the Pictorial Riddle Inquiry learning model, while the control class was taught with the Reciprocal Teaching learning model. The research data were analyzed using the t test. Based on the data analysis, it's concluded that the mathematics learning outcomes of students taught by Pictorial Riddle type Inquiry learning are higher than the mathematics learning outcomes of students taught by Reciprocal Teaching learning. In addition, the results of the descriptive analysis also show that the posttest mean score in the experimental class (77.00) is higher than the mean score of posttests obtained in the control class (70.3).
***Keywords*:** *Enthusiasm for learning; Critical thinking; Reciprocal teaching*

A. Introduction

Education is a conscious effort made by families, communities and governments through guidance or teaching activities. This conscious effort is carried out in the form of learning so that improving the quality of learning is one of the bases for improving the overall quality of education (Sagala, 2009). The education process in Indonesia, in particular, always undergoes improvements which in the end it is hoped that it will produce quality human resources.

According to Kunandar (2007) quality human resources will later face various challenges and competitive demands.

According to Soedjadi (1999), mathematics as one of the basic sciences, both its applied aspects and its reasoning aspects, has an important role in efforts to master science and technology. This means that to a certain extent mathematics needs to be mastered by all Indonesian citizens, both in its application and in its mindset. Mathematics is a branch of science that plays an important role in human life, and becomes the basis for other sciences. Mathematics plays an important role in education

Given the importance of mathematics, there are many ways that have been taken to improve mathematics learning at the elementary, junior high, high school and tertiary levels. However, in reality the efforts that have been made have not achieved the desired results. There are still some obstacles, both those originating from the students and those originating from the extent of the students in the learning process. Factors that come from students (internal) include ability, motivation, interest, creative thinking and so on. External factors include inaccurate learning models, unfavorable class conditions, family conditions and so on. The existence of these obstacles can cause students to learn not optimally (Sudjana & Wari, 1991).

Problems and obstacles faced in the process of learning mathematics in class VII students of SMP Negeri 11 Bengkulu City include: 1) students feel mathematics is a boring subject, 2) students feel ashamed to express their opinions in class, 3) students are afraid of answering questions wrongly. teacher, 4) students have not been able to find the appropriate concept in working on math problems. In addition, there are still some students whose scores do not meet the minimum completeness standards for mathematics.

Another factor that needs to be considered by the teacher is that the teacher has the skills and abilities in using the appropriate learning model for the subject matter presented. The teacher's ability to understand and implement this learning model in the classroom greatly influences the learning outcomes that will be achieved by students. Therefore, another problem in the spotlight is the way teachers teach. Teachers still hold the view of the old definition of teaching, namely the handover of culture in the form of experiences and skills to our students or efforts to pass on the culture of society to the next generation as the next generation (Slameto, 2010). It can be observed that the activity lies with the teacher. The teacher teaches by lecturing and expects students to sit, be quiet, listen, take notes and memorize. The point is that the learning process is teacher-centered. Even though the demands of the world of education have changed. That knowledge is actively discovered, shaped, and developed by students themselves.

Based on an interview with a mathematics subject teacher at SMP N 11 Bengkulu, learning is still teacher-centered. The teacher delivers the material in front of the class, and provides exercises. During the lesson, students sit to hear the teacher's explanation, take notes and do the exercises the teacher gives, but even then, not all students do the exercises given. This causes students to be passive in learning and teachers to dominate the learning process.

Based on these problems, the teachers need to switch to student-centered learning models and make students active in learning, students are motivated to learn so that they can improve student mathematics learning outcomes. Currently, there are many student-centered learning models developed. According to Trianto (2010), there is no one learning model that is the best among the others, because every learning model is good. However, from several existing learning models it is necessary to select which one is better applied to teach a material.

Reciprocal Teaching Learning Model is a model that applies an independent understanding strategy, namely collecting teaching materials, compiling questions and

solving them, re-explaining the knowledge gained, then predicting what questions will be next from the problems given to students. The principle of reciprocal teaching learning is almost the same as teaching others, students deliver material as if the teacher taught the material. Teachers are very instrumental in providing direction, understanding students about the material and providing motivation to students. A study conducted by Afdhal (2020) found that reciprocal teaching can improve students' enthusiasm in learning mathematics. This learning model can make students active and of course learning is more student-centered. Reciprocal Teaching learning model can improve student learning outcomes because students find themselves, summarize, and issue opinions and improve students' thinking skills.

In addition to the Reciprocal Teaching learning model, the Pictorial Riddle type Inquiry learning model is also a student-centered learning model and can increase student activity in learning. Inquiry learning model is a learning model that involves students in an experimental activity to answer problems in order to develop scientific thinking. Approach using the Pictorial Riddle is a technique to develop student motivation and interest in learning situations in small or large groups. Pictures or demonstrations or situations that can actually be used to improve students' critical and creative thinking. A Riddle can be a picture on a blackboard, a poster board, or projected from a transparency, then the teacher asks questions related to the Riddle. Pictorial Riddle can increase students' learning activity and creativity. The application of the Pictorial Riddle type Inquiry learning model can improve student learning outcomes.

Pictorial Riddle-type Inquiry Learning and Reciprocal Teaching learning are both constructivist paradigm learning which states that students must discover and transform complex information by themselves, check new information with old rules and revise it if the rules are no longer appropriate (Trianto, 2010). However, the Pictorial Riddle type Inquiry learning model has several advantages when compared to Reciprocal Teaching learning, among others, the Pictorial Riddle type Inquiry learning model can improve memory, avoid memorizing learning processes, increase children's creativity and provide more opportunities for students to accommodate and understand. information (Slameto, 2010).

The two learning models that have been described can be applied in mathematics learning, therefore in this study we want to see the comparison of students' mathematics learning outcomes between Pictorial Riddle Type Inquiry Learning and Reciprocal Teaching Learning in Class VII SMPN 11 Bengkulu City.

Based on the above background, the formulation of the problem in this study is whether there is a significant difference in mathematics learning outcomes between students who are taught with Pictorial Riddle type Inquiry learning and those taught with Reciprocal Teaching learning in Class VII SMPN 11 Bengkulu City.

B. Methods

This research is a quasi-experimental study by applying post-test only research design.

Table 1. Research Design

Group	Treatment	*Posttest*
Experiment (E)	X_1	Y
Control (C)	X_2	Y

Experimental research aims to test the hypothesis with a research design in which the two samples are given different treatment. According to Arikunto (2006), basically, research work aims to test hypotheses with a research design in which the two samples are given different treatment.

In the first sample class (experimental class) learning was carried out using the Pictorial Riddle Inquiry learning model and in the second sample class (control class) learning was carried out using the Reciprocal Teaching learning model.

This research activity as a whole was carried out for 6 months from January to June 2019. Implementation of research in schools is planned to be carried out in April - May 2019 at SMP Negeri 11 Bengkulu City.

The sample in this study was determined using cluster sampling, which is a sampling technique by taking a group or class from members of the population among homogeneous classes. Researchers will choose two classes from 4 existing classes that have almost the same average value, namely class VII A (Experiment Class) and VII B (Control Class).

C. Results and Discussion

Before conducting the research, we first made preliminary observations to the school. The initial observation was in the form of an interview with a teacher in the field of mathematics studies who taught in class VIII B SMP Negeri 24 Bengkulu City. This interview was conducted to determine the level of enthusiasm in learning mathematics from students, the teacher's responses to the reciprocal teaching learning model and the problems faced by the teacher in learning mathematics.

Based on the results of the interview, the following information was obtained: 1) The level of students' academic ability in mathematics class VIII B tends to be low; 2) Teachers still use conventional methods, lectures, question and answer, assignments and have never implemented group learning; 3) Students generally pay attention to the teacher's explanation, but sometimes there are still some who chat with their friends, depending on the teacher's condition at that time; 4) Students are rarely seen discussing with their friends, if there are problems they usually ask the teacher directly, and even then they are still shy; 5) The enthusiasm of students in learning is mediocre, no one is actively expressing opinions, in fact most students are indifferent to mathematics; 6) The teacher often gives written notes about the material to be studied, rarely asks students to make notes in their own language; 7) There are still many students who often do not attend school; 8) The existing learning media facilities at SMP Negeri 24 Bengkulu City are still limited.

Furthermore, the researchers conducted observations of mathematics learning in class VIII B. This activity aims to determine how the mathematics learning process in the class is and the students' enthusiasm for learning mathematics. The results of classroom observations are: 1) The methods used by the teacher are expository, lectures, simulations and assignments. The teacher explains the material, provides a little simulation, and uses more time for assignments (practice questions); 2) During the learning process, students seem to be less listening and paying attention to the teacher's explanation, many students are still chatting with their peers or behind them; 3) Students still feel afraid to ask questions and submit opinions about learning materials that are not understood or not understood, many are just silent; 4) The ability to answer teacher questions related to the material for some students is good enough; 5) The ability of students in answering the previous material is still lacking because it is not evenly distributed among all students; 6) Many students gave permission to leave during the learning process; 7) The learning interaction takes place in one direction, namely the teacher only delivers information and students receive information, so students tend to be passive; 8) There is less variation in the learning process which makes students bored; 9) Students often do not provide responses / answers to questions posed by the teacher; 10) The results of the percentage of observations of student and teacher learning implementation are still less than 50%.

This research was conducted in 6 learning activities. Before the implementation of the action, it begins with observation to determine the initial conditions and then pre-test was given. After the sixth meeting, a test posttest and questionnaire were given. The achievement of improving the quality of learning for class VIII B students of SMPN 24 Bengkulu City using the reciprocal teaching model in this classroom action research can be seen in table 2.

Table 2. The post-test results

Variable	Interval	Criteria	Initial Conditions	Target	Control Class	Experimental Class
Enthusiasm for Learning	$105 < X$	Very high	0.00%	17.00%	13.79%	20.69%
	$85 < X \leq 105$	High	48.00%	66.00%	62.07%	62.07%
	$65 < X \leq 85$	Moderate	52.13%	17.00%	24.14%	17.24%
	$45 < X \leq 65$	Low	0.00%	0.00%	0.00%	0.00%
	$X \leq 45$	Very low	0.00%	0.00%	0.00%	0.00%
	Mean	24	77.17	86.55	84.67	87.17
Critical Thinking Ability	Pass ≥ 75%	Standard score achieved	0%	75.86%	72.41%	79.31%
	Mean		28.97	75	73.62%	76.38%
Learning Process	Implemented ≥ 85%	Successful Learning	0%	85%	82.46%	92.98%
			0%	85%	82.46%	92.98%

As presented in Table 2, the implementation of reciprocal teaching learning activities can help the students get better achievement compared to pictorial riddle type inquiry learning. Reciprocal teaching in mathematics learning is actually the same as the application in English language learning but there is a change in the flow of strategies, as stated by Garderen (2004), reciprocal teaching in mathematics learning focuses on building student understanding in order to solve math problems. The four important cognitive strategies of reciprocal teaching include: clarifying (clarifying), predicting (predicting), questioning (making questions / questions) and summarizing (summarizing). After the 4 important components are carried out, students are given practice questions that contain problem solving. The explanation regarding reciprocal teaching strategies in mathematics learning according to Garderen (2004) as follows: a. Clarifying: Students are required to read the learning material sheet provided by the teacher and then clarify / explain unfamiliar / unfamiliar words or sentences; b. Predicting: At this stage, students are invited to predict the relationship between one learning concept and another. The relationship between these learning concepts can be in the form of a relationship between the concepts that have been studied and the concepts being studied as well as the relationships between concepts in the material being studied; c. Questioning: The questioning strategy is used to monitor and evaluate the extent to which students understand the material. Students make their own questions / make questions that are asked of themselves and then answer them (this process is called metacognitive); d. Summarizing: Summarizing is a process carried out by students by taking and selecting the most important piece of information after students have read and understood a material then restated the collections of information briefly. After summarizing, the teacher gives the questions as a problem-solving exercise.

After the two classes have finished implementing the learning, the final tests are given to both classes. The final test of student mathematics learning outcomes in the control class was attended by 32 students, as well as the experimental class was also attended by 32

students. From the data on the final test results of the two classes, the following results are obtained.

Table 3. Posttest results

Class	Experiment	Control
N	32 students	32 students
$\bar{x}$	77	70,03
x_{max}	99	94
x_{min}	57	52
s^2	67,69	75,28
s	8,23	8,68
Median	75,5	70

As presented in Table 3, the results of the descriptive analysis show that the mean score of students taught with the Pictorial Riddle Inquiry model is higher than the average value of students taught with the Reciprocal Teaching model, namely 77 for the experimental class and 70.03 for the control class. There is also a difference in the maximum and minimum value acquisition in the two classes, namely the maximum and minimum values in the experimental class are 99 and 57 respectively, while the maximum and minimum values in the control class are 94 and 52, respectively. almost close to 100, higher than the control class. The minimum score obtained in the control class is lower than in the experimental class. Therefore, it can be assumed that the value obtained in the experimental class is higher than the value obtained in the control class.

Based on the median value of the two classes. In the experimental class the median value is 75.5, while in the control class the value is 70. From this value, it can be seen that in the experimental class 50% of students get a score above 75.5 which is better than the values in the control class. In addition, if it is seen in the frequency distribution table of learning outcomes in each class, it can be seen that in the experimental class the highest student frequency was 13 people (41% students) in the value range 74 to 82 while in the control class the highest student frequency was 14 (44%). students) are in the range of values 68 to 75. Through this data it can be concluded that students who get higher scores in the experimental class than in the control class. Based on the descriptive analysis that has been obtained, it can be concluded that the mathematics learning outcomes of students taught with the Pictorial Riddle Inquiry model are higher than the mathematics learning outcomes of students taught with the Reciprocal Teaching learning model.

This result is in accordance with the theory put forward by Roestiyah (2008) that applying the pictorial riddle type inquiry learning model in learning can increase students' motivation to learn and increase student attention to learning. Learning through pictures can improve students' critical and creative thinking, students can use different ways of thinking to investigate so that they can solve problems through the pictures given. With the increase in some of these aspects will have an effect on student learning outcomes which can also improve. In addition, the application of this inquiry class can develop and form a "self-concept" in students so that students can instill concepts that students have been able to do well in students, encouraging students to think and work on their own initiative to investigate a given problem. The situation of the learning process becomes more stimulating for students to do, besides that students can avoid memorizing ways of thinking and of course this class

gives students the freedom to study on their own which can increase student creativity in solving a given problem in their own way.

Based on Trianto's theory (2010) which states that inquiry learning activities can involve students maximally in the process of learning activities, students learn systematically so that the goals achieved will be more focused and develop students' confident attitudes about what students find in the inquiry process. These activities lead students to the confidence and courage of oneself to learn and investigate a problem. Self-confidence is like the courage of students to present the results they get when learning to their friends. If students already have confidence in the results that students have obtained, then even when solving problems students will be more confident so that students will get good learning outcomes as well.

After making observations during learning in this study, it can be seen that in classes whose learning uses the pictorial riddle type inquiry model the activeness of students directly involved in learning is higher than the activeness of students in classes whose learning uses the reciprocal teaching model, the intended activity is like activeness in asking questions, explain, and discuss. In a class whose learning uses the pictorial riddle type inquiry model, the class atmosphere feels more alive because many students ask questions and more students dare to convey the results obtained without any selection by the teacher, these students have the courage to explain. When other students explained the results obtained, there was more discussion between students but the teacher still directed the discussion in order to achieve the expected learning objectives. In a class whose learning uses the reciprocal teaching model, students look calmer and more silent, but with this condition the teacher cannot see that the student understands the material described or vice versa. Students who are more active in learning, of course, the level of understanding will be better, because if something is not understood, the student will ask questions or discuss with their peers. This can increase student understanding which will have implications for better student learning outcomes than students who are less active.

However, the weakness of the Pictorial Riddle type Inquiry learning model in this study is that not all materials are suitable to be taught using this learning model. In addition, if the Pictorial Riddle type Inquiry learning model is a new learning model, it is likely that students will be confused and can eliminate students' self-confidence so that the teacher must play a good role at the time of its implementation. Likewise, with the learning tools used during the learning process, it is necessary to develop learning tools.

D. Conclusion

From the results of the research that has been done, it can be concluded that the mathematics learning outcomes of students whose learning uses the Pictorial Riddle type Inquiry learning model are higher than the learning outcomes of students whose learning is carried out with the Reciprocal Teaching learning model.

Suggestions that can be made based on the results of the research that have been carried out are: For the teacher, the teacher can apply the pictorial riddle type Inquiry learning model to the flat shape material, especially rhombus and kites; Prospective researchers should then try to apply the Pictorial Riddle Inquiry learning model for other materials besides rhombus and kites.

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