Analysis of the Application of the Discovery Learning Model to Students' Creative Thinking Ability in Reaction Rate Material

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Article Info

ABSTRACT

Purpose of the study: The purpose of this study was to describe and determine the relationship between the implementation of the discovery learning model in the matter of the rate of reaction with the students' creative thinking abilities.

Methodology: This research is a type of correlational descriptive research. The sampling technique used in this study is Simple Random Sampling. The instrument used in this research is the observation sheet. Data analysis techniques using normality and homogeneity tests. After the prerequisite test is carried out, the hypothesis test is then carried out.

Main Findings: The results of this research are that the application of the Discovery Learning model to reaction rate material can be carried out very well. This is because the teacher corrects errors in applying the model at the next meeting and there is a relationship between the application of the Discovery Learning model and students' creative thinking abilities in the reaction rate material in class XI in the medium category.

Novelty/Originality of this study: Provide information about the implementation of discovery learning learning models and their correlation with students' creative thinking abilities.

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1. INTRODUCTION

The development of the educational paradigm is faced with a number of increasingly difficult challenges. One of the real challenges is that education must be able to produce human resources who have complete competence [1]. The competencies in question are more focused on thinking and communication competencies [2]. Thinking competence means having broad knowledge, critical thinking skills, and creative thinking skills [3]. Communication competence means having the ability to communicate in order to work together and convey ideas. Demands for thinking competence are growing [4]. In the 21st century, there are at least four learning competencies that must be mastered, namely high comprehension skills, creative thinking skills, communication and collaboration skills, and critical thinking skills.

Improving the quality of human resources can be achieved through education. The learning process that occurs in the classroom is the core of the educational process in schools [5]. Improving the quality of education must begin by organizing and improving the quality of learning in the classroom. The quality of education is marked by graduates who have critical and creative thinking skills, strong affective development, and adequate psychomotor skills. Learning is a process of interaction between students and educators and learning resources in a learning environment [6].

Learning in chemistry must be able to meet the physical and psychological needs of students [7]. Because chemistry is a science that is obtained and developed based on experiments that seek answers to the questions what, why and how of natural phenomena, especially those related to the composition, structure, transformation, dynamics and energetics of substances.

Chemistry learning must pay attention to chemical characteristics as processes and products [8]. Chemistry as a process needs to pay attention to scientific processes or work, while chemistry as a product pays attention to facts, concepts, principles, laws and theories of the findings of scientists. Reaction rate is one of the materials in high school chemistry lessons, especially in class XI with material characteristics in the form of concepts that exist in the facts of everyday life. In order for students to understand the concept of reaction rate, it needs to be presented in an interesting form. Students do not only memorize concepts but are able to find and prove these concepts so that they can be remembered in the long term.

In this research, a preliminary study was carried out in the form of an open interview with a class XI chemistry teacher. The teacher stated that he had used several cooperative learning models, but had not fully developed students' creative thinking abilities. In the learning process, students still lack curiosity in searching for information themselves, are less active in finding or expressing various problem-solving ideas and are still less able to develop or enrich other people's ideas. Teachers sometimes still act as learning centers so that students' learning activities are less active.

Creative thinking can be interpreted as a mental activity related to sensitivity to problems, considering new information, and unusual ideas with an open mind, and being able to make connections in solving these problems [9]. Divergent thinking (also called creative thinking) is providing various possible answers based on the information provided with an emphasis on the variety of numbers and suitability [10]. Divergent thinking includes, among other things, fluency, flexibility, originality, the ability to elaborate (elaborate) in thinking. Creative thinking (creative thinking) in the form of compiling synthesis, imagining, and elaborating [11]. Creative abilities namely fluency, flexibility, originality, elaboration and transformation [12]. Creative thinking is the ability to see various possible solutions to a problem which until now has received little attention in education.

Overcoming existing problems, in teaching reaction rate material an appropriate learning model is needed so that it can improve students' creative thinking abilities. The alternative is the discovery learning model. Discovery learning is a learning theory that places students as active learners in building the expected knowledge. Discovery learning is a way of teaching that involves students in the process of mental activity through exchange of opinions, with discussions, seminars, self-reading and trying on their own, so that children can learn on their own, so that the implementation of the discovery learning model will be considered to have an effect on students' creative thinking abilities in learning chemistry. As for the purpose of this study was to describe and determine the relationship between the implementation of the discovery learning model in the matter of the rate of reaction with the students' creative thinking abilities.

2. RESEARCH METHOD

This research is a type of correlational descriptive research. This research is directed to explain the correlation between the implementation of the discovery learning model and students' creative thinking abilities. In this study, only one class was used as the experimental class and this class applied the discovery learning model.

The population in this study were class XI high school students. The sampling technique used in this research is Simple Random Sampling. Sampling was carried out by lottery and taken by class XI science 1 as the experimental class. The instrument used in this research was an observation sheet. This observation sheet is prepared by providing answer choices in the form of criteria with the highest score being 4 and the lowest score being 1, so that the participant can choose the answer they consider to be the most appropriate by providing a checklist for the selected answer.

The data analysis technique used is that after observing the implementation of the discovery learning model by teachers and students, this observation sheet is analyzed by adding up the scores of each statement. The observation sheet for teacher and student activities contains 15 statements with a minimum score of 15 and a maximum score of 60. The implementation of the discovery learning model should be viewed from the perspective of teachers and students, but can be represented from the model implementation data by students because the activities carried out by students during the learning process are the result of the activities carried out by the teacher. However, to ensure this, it is necessary to test the similarity of the two average implementation models in terms of teachers and students. Before carrying out the similarity test of the two averages, normality and homogeneity tests are first carried out. After the prerequisite test is carried out, the hypothesis test is then carried out.

3.   RESULTS AND DISCUSSION

Below is displayed research data obtained from the observation sheet instrument for the implementation of the discovery learning model and students' creative thinking abilities.
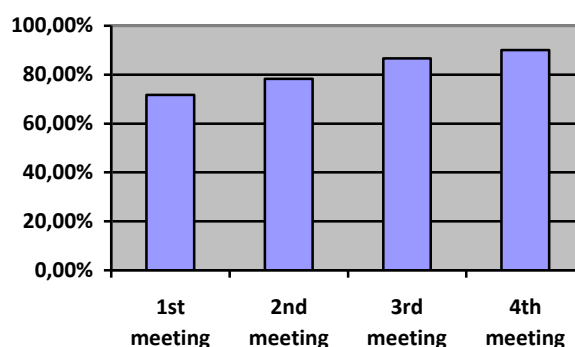
Picture 1. Diagram of the percentage of implementation of the discovery learning model by teachers

Based on the results of observations, the teacher has carried out the discovery learning model with an increase in the percentage. At the first meeting the discovery learning model was implemented by 71.67%. At the second meeting it was carried out at 78.33%. At the third meeting it was implemented at 86.67% and at the fourth meeting the discovery learning model was implemented at 90.00%. The average of the four meetings is 81.67% in the very good category. This is because the teacher has evaluated the deficiencies in the first lesson and corrected them in the second, third and fourth meetings by carrying out all activities in accordance with the learning plan that has been created.
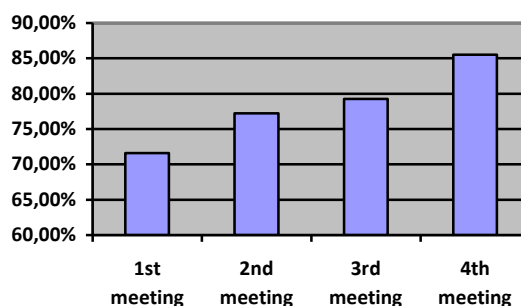
Picture 2. Diagram of the percentage of implementation of the discovery learning model by students

The implementation of the model by students also increased at each meeting, namely at the first meeting the percentage was 71.61%. At the second meeting the percentage was 77.22%. At the third meeting the percentage was 79.28% and at the fourth meeting the percentage was 85.50%. The increase in the percentage of implementation of the model by the teacher and students at each meeting was due to an increase in the number of scores obtained from the implementation of the learning model syntax.

At the second meeting the implementation of the model by the teacher and students experienced an increase, namely teacher activity was in the good category with a percentage of 78.33% and student activity was in the good category with a percentage of 77.22%, this was because the teacher had improved the implementation of the model in each syntax. In the first syntax, namely the preparation of the discovery learning model, the situation is still the same as the first meeting, the teacher has carried out well in terms of conveying learning objectives and providing motivation. Student activity at the second meeting increased with an average score in the good category, namely 3.43. This is because students are orderly and listen carefully to what is conveyed by the teacher and respond to questions from the teacher. In the stimulation syntax, the teacher's activity increased with a score of 3.33 in the good category because the teacher had carried out learning that aroused students' curiosity by asking questions related to everyday life.

At the third meeting the implementation of the model by the teacher and students experienced an increase from the previous meeting, namely the very good category with a percentage of 86.67% and 79.28% with a good category, this is because in the first syntax, namely the preparation of the discovery learning model,

it increased with a score average 4 is in very good category. The teacher conveys the learning objectives and provides motivation to students so that students also listen carefully to what is conveyed by the teacher. In the stimulation syntax, the teacher has carried out learning that arouses student curiosity by providing questions related to daily life and has increased from the previous meeting with an average score of 4.

At the fourth meeting the implementation of the model by the teacher and students experienced an increase from the previous meeting, namely 90.00% in the very good category and 85.50% in the very good category, this is because in the first syntax, namely the preparation of the discovery learning model has been carried out by the teacher well in terms of conveying learning objectives and giving motivation to students. However, teacher activity decreased from the previous meeting with an average score of 3. Implementation by students increased with an average score of 3.77. This is because students listen carefully to what is conveyed by the teacher. There are several factors that influence the teaching and learning process, one of which is the role of the teacher.

After data on the implementation of the model by teachers and students was obtained, a similarity test of the two averages was then carried out. Previously, normality and homogeneity tests were carried out. The normality test is carried out to determine whether the data obtained is normally distributed. In this discussion the Liliefors test will be used. The normality test of the teacher and student activity observation sheet data obtained $L_{count} < L_{table}$, namely $0.07 < 0.16$, so it can be concluded that the data is normally distributed. The homogeneity test is used to determine whether several data population variants are the same or not. Calculation of data homogeneity using Fisher's test. The homogeneity test from the teacher and student activity observation sheet data obtained $F_{count} < F_{table}$, namely $1.04 < 4.20$, so it can be concluded that the data has a homogeneous variance. Furthermore, from each student's observation sheet filled in by the observer, a category is obtained which is displayed in the following table:

Table 1. Observation results of students' creative thinking abilities

Category	1st meeting		2nd meeting		3rd meeting		4th meeting	
	Amount	%	Amount	%	Amount	%	Amount	%
Not good	-	-	-	-	-	-	-	-
Pretty good	7	23.33	1	3.33	-	-	-	-
Good	21	70.00	23	76.67	20	66.67	14	46.67
Very good	2	6.67	6	20.00	10	33.33	16	53.33

From the table it can be seen that the number of students who have the ability to think creatively at each meeting varies. The results of observations of creative thinking abilities will also be categorized into 4 categories, namely poor, quite good, good and very good. For the poor category, there were no students who got a total score between the range 9-15. Then for the quite good category, at the first meeting there were 7 students who got a total score between the range 16-22. So the percentage obtained is 23.33%. At the second meeting, there was 1 student with a percentage of 3.33%. At the third and fourth meetings there were no students in the good enough category.

Furthermore, for the good category with a score range between 23-29, at the first meeting there were 21 students with a percentage of 70%. At the second meeting there were 23 students with a percentage of 76.7%. At the third meeting there were 20 students with a percentage of 66.67%. Then at the fourth meeting there were 14 students with a percentage of 46.67%.

Finally, for the very good category, namely from the range of scores ≥36 at the first meeting, there were 2 students with a percentage of 6.67%. Meanwhile, at the second meeting, there were 6 students with a percentage of 20%. At the third meeting there were 10 students with a percentage of 33.33% and finally at the fourth meeting there were 16 students with a percentage of 53.33%. By looking at the decrease in the number of students in the fair category and the increase in the number of students in the good and very good categories, it can be concluded that students' creative thinking abilities have increased at each meeting.

The relationship that will be seen is the implementation of the discovery learning model with students' creative thinking abilities. Hypothesis testing is carried out by looking for correlations using the Pearson method or often called Pearson product moment between the implementation of the discovery learning model and students' creative thinking abilities. From the calculation of the correlation coefficient (r) of these two variables, a value (r) of 0.53 was obtained. Based on the interpretation guideline table, the correlation coefficient (r) of 0.53 is in the interval 0.40-0.59, thus the relationship between the implementation of the discovery learning model and students' creative thinking abilities in this study has a moderate level of relationship. The correlation value (r) ranges from 0 to 1, a value closer to 1 means the relationship between two variables is getting stronger, conversely a value approaching 0 means the relationship between 2 variables is getting weaker. This means that the H_a hypothesis is accepted because $0 < r \leq 1$ which shows that there is a relationship between the implementation of the discovery learning model and students' creative thinking abilities on reaction rate material.

4. CONCLUSION

Based on the results of the research that has been carried out, several research conclusions have been obtained, namely: The application of the Discovery Learning model to the material on reaction rates in class XI can be carried out very well. This is because the teacher corrects errors in applying the model at the next meeting and there is a relationship between the application of the Discovery Learning model and students' creative thinking abilities in the medium category. Further research is needed to determine the effect of the discovery learning model on students' creative thinking abilities in other materials, so that it can be seen and measured to what extent the implementation of the discovery learning model is used in the chemistry learning process.

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