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Cooperative Learning Model on Atomic Structure Material and It's Influence on the Scientific Attitude of Class X Students at Senior High School

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ABSTRAK

Purpose of the study: This study aims to analyze the implementation of the *Think Pair Share* cooperative learning model on atomic structure material and its effect on students' scientific attitudes which aims to see the effect of implementing this model on the scientific attitudes of students class X at Senior High School 1.

Methodology: This study included *a quasi - experiment* with by design *one shot case study*. The sample is determined by *simple random sampling technique.* The research instrument was in the form of an observation sheet consisting of an observation sheet on the implementation of the TPS type cooperative model and a scientific attitude. The data were analyzed to see the effect of the implementation of the TPS model on students' scientific attitudes by means of a linear regression test and a significance test with a t test.

Main findings: The implementation of the PjBL model is categorized as good, in terms of teachers and students with an average of 81.25% and 74.78 % respectively. The scientific attitude of students is categorized as good with an average of 73.97% for three meetings. The results of the correlation test between the implementation of the TPS model by students and students' scientific attitudes were obtained $r_{x\,y} = 0.707$. The results of hypothesis testing with the t-test obtained $t_{count} = 6.16$ and $t_{table} = 2.02$ with dk =3 8 and $\alpha = 0.05$. The hypothesis test shows $t_{count} > t_{table}$ (6.16 > 2.02) at the 95% confidence level . The results of the study proved that the implementation of the TPS type cooperative learning model went well and there was an influence between the implementation of the TPS type cooperative learning model and the scientific attitude of students on atomic structure material for class X at Senior High School 1.

Novelty/Originality of this study: The update in research is to complement previous research by proving that the TPS type cooperative learning model has an effect on students' scientific attitudes. Where the scientific attitude of students is very important to be developed in the current era of globalization.

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1. INTRODUCTION

Education is a need that every human being needs in order to develop his abilities, talents and potential [1]-[3]. There are several factors that influence the success of education including: teachers, students, facilities, infrastructure, educational environment, and curriculum [4], [5]. The teacher occupies a very important position

without neglecting other supporting factors. Teachers are required to have creativity in terms of educating and teaching their students in order to achieve learning objectives [6]-[8].

Bloom's taxonomy divides learning objectives into three areas: (1) *cognitive field,* namely with regard to mental activities such as: memory, understanding, application, analysis, evaluation, and creating; (2) the *affective field* , which is related to attitudes and self-secrets; and (3) the *psychomotor area,* which deals with physical activities, such as life skills [9]. These three fields have different characteristics, but in a learning situation all become one. So far, the *affective field* still requires attention from the teacher, because so far teachers tend to pay more attention to the *cognitive field* [10]. If traced, almost all *cognitive objectives* have an *affective component* [11]-[13]. In learning *science,* there is a scientific attitude component which is part of the *affective field.* So that the improvement of the learning process, especially *science* in the *affective field* , can be started by developing students' scientific attitudes [14]-[16]. Scientific attitude contains two meanings, the first refers to attitudes towards *science* while the second attitude refers to attitudes that are inherent after studying *science* [17]-[18].

Chemistry is part of natural science which studies the structure and properties of matter, changes in matter and energy that accompany these changes [19]. Learning in chemistry is a complex process, because students do not just receive and absorb the information provided by the teacher, but are involved in the process of acquiring the knowledge itself. The purpose of teaching chemistry itself is to obtain facts, the ability to recognize, solve problems, have skills, and have a scientific attitude in the learning process.

Based on the results of a preliminary study through interviews with teachers who teach in class X Senior high school 1 Mauro Jambi, the situation is as follows, electron configurations and understand the development of the atomic model. Understanding the wrong concept of material from the start makes students find it difficult to understand atomic structure material so that student learning outcomes are not as expected. Second, in the process of learning atomic structure material the teacher is more likely to use the lecture method by providing explanations, as well as providing practice questions related to the material presented. As a result, only students who focus on paying attention to the teacher understand the material. Third, in terms of *affective* only some students who have a scientific attitude in the learning process. For scientific attitudes such as: the attitude of curiosity and mutual respect for students is still lacking and cooperation between students is not yet visible.

In order to be able to develop students' scientific attitudes in the process of learning chemistry, an appropriate learning model is needed. Because one of the factors that influence the learning process is the learning model [20]. The success of the learning process is inseparable from the ability of a teacher to develop learning models that are oriented towards increasing the intensity of effective student involvement in the learning process. The development of appropriate learning processes basically aims to create learning conditions that enable students to learn actively and have fun [21].

One of the learning models is the cooperative learning model. The cooperative learning model is a learning model with small group *settings* taking into account the diversity of group members as a forum for students to work together and solve a problem through social interaction with peers, providing opportunities for students to learn something well at the same time and can become resource persons for his other friends [22]. Cooperative learning models consist of various types, one of which is the *Think Pair Share* (TPS) cooperative learning model. The TPS type cooperative learning model is a simple learning model with many advantages because it can increase student participation and the formation of knowledge by students [23]. By using a procedure, students learn from other students and try to express their opinions in non-competitive situations before finally being able to express them in front of the class.

In addition, the TPS-type cooperative learning model can be used to determine students' scientific attitudes during the learning process [24]. This scientific attitude can be seen from the steps of the TPS type cooperative learning model, namely: in the preliminary stage by giving problems by the teacher which can provoke students' curiosity so they enthusiastically seek answers (*Think stage*), then in the *Pair stage* students work together and discuss the best answer according to them. Next is the *Share stage* by presenting the answers in groups in front of the class, and at this step an attitude of open thinking and cooperation can emerge such as respect for the opinions or findings of others, an attitude of cooperation in groups.

From several researchers who have used the TPS type cooperative model in their research [25]-[26] they have not examined how the implementation of the learning model is viewed from both teachers and students. Meanwhile, the implementation of the learning model affects the activities studied. Therefore, it is necessary to carry out an analysis of the implementation of the TPS type cooperative learning model in terms of teachers and students. So that it will be seen whether the application of the TPS type cooperative model has an effect on students' scientific attitudes. This paper will reveal the effect of the implementation of the TPS learning model on atomic structure material and its influence on the scientific attitude of class X students at Senior high school 1 Muaro Jambi.

2. RESEARCH METHOD

This research is a Quasi-Experimental research. The design used in this study is the *One Shot-Case Study*, which is observing teachers and students at each meeting. This study uses one class to see the correlation of the implementation of the TPS type of cooperative learning model on students' scientific attitudes.

In this research, there are 2 types of data that will be collected, namely data on the implementation of the TPS type cooperative learning model by teachers and students and data on students' scientific attitudes. The data was collected by direct observation at each meeting during the learning process using observation sheets. Model implementation activity observation sheet analysis *TPS* by teachers and students

Table 1. Categories of TPS model implementation by teachers and students

No	Score (%)	Criteria
1	82.50 – 100.0	Very good
2	62.50 – 80.0	Well
3	42.50 – 60.0	Pretty good
4	25.0 – 40.0	Not good

Data from the results of the assessment of the implementation of *the TPS-type cooperative* learning model by teachers and students, the data obtained is then processed using the following formula:

$$Percentage = \frac{\Sigma skor\ hasil\ observasi}{skor\ maksimum} x\ 100\%$$

Analysis of the scientific attitude observation sheet

Table 2. Categories of students' scientific attitudes (student curiosity)

No	Score %	Criteria
1	81.87 - 100	Very good
2	63.12 - 81.25	Well
3	44.37 - 62.50	Pretty good
4	25 - 43.75	Not good

Table 3. Categories of scientific attitudes (open-mindedness and student cooperation)

No	Score %	Criteria
1	79.58 - 100	Very good
2	62.91 - 79.16	Well
3	46.25 - 62.25	Pretty good
4	25 - 45.83	Not good

Table 4. Overall scientific attitude categories

No	Score %	Criteria
1	82.50 - 100	Very good
2	62.50 - 80	Well
3	42.50 - 60	Pretty good
4	25 - 40	Not good

On the scientific attitude observation sheet students use a formula to find the average percentage as follows:

$$Percentage = \frac{\Sigma skor\ hasil\ observasi}{skor\ maksimum} x\ 100\%$$

The statistical hypothesis in this study is:
H0 : $\mu = 0$ (no relationship)
Ha : $\mu \neq 0$ (there is a relationship)

The relationship that will be seen is the implementation of the TPS type cooperative learning model with a scientific attitude. The implementation of the TPS type cooperative learning model should be reviewed from the teacher and students, but it can be represented from the model implementation data by students, because the activities carried out by students during the teaching and learning process are the result of activities carried out by the teacher. However, to ensure this, it is necessary to test the similarity of the average implementation in terms of both the teacher and the students in terms of using the formula:

$$t_{count} = \frac{X_1 - X_2}{Sgab\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}} \text{with}$$

$$S^2 = \frac{(n_1 - 1)S_1^2 + (n_1 - 1)S_2^2}{n_1 + n_2 - 2}$$

where:

X_1 = Average implementation of the model by the teacher
X_2 = average implementation of the model by students
n_1 = Number of teacher meetings
n_2 = Number of student meetings
S = N value of combined standard deviation
S_1 = Standard deviation value of model implementation by the teacher
S_2 = Standard deviation value of model implementation by students

According to the sampling distribution theory, the t statistic has a student distribution with dk = ($n_1 + n_2 - 2$). The test criteria are $X_1 = X_2$, if $-t_{table} < t < t_{table}$. Where the t_{table} is obtained from the t distribution list with dk = ($n_1 + n_2 - 2$) and probability ($1 - {}_{1/2\acute{a}}$) for α = 0.05. The hypothesis testing was continued by looking for a correlation between the implementation of the TPS-type cooperative learning model by students and students' scientific attitudes using the product moment correlation formula. The formula is as follows [27] :

$$r_{xy} = \frac{n\sum xy - \sum x \sum y}{\sqrt{\left(n\sum x^2 - \left(\sum x\right)^2\right)\left(n\sum y^2 - \left(\sum y\right)^2\right)}}$$

Information:

r_{xy} = Correlation coefficient
X = independent variable, namely the TPS type cooperative learning model
Y = The dependent variable is the scientific attitude of students
N = Amount
Σxy = The sum of the scores multiplied by the scores x and the pairs
Σx = Sum of scores in the x distribution
Σy = Total scores in the y distribution
Σx^2 = Sum of scores squared in the x distribution
Σy^2 = Sum of scores squared in the y distribution

To see the significance of the influence of the X and Y variables, a further test was carried out with the t test. But before the t test is carried out, the data must be tested for normality and homogeneity first. The formula for the t test is as follows [27] :

$$t = \frac{r\sqrt{n - 2}}{\sqrt{1 - r^2}}$$

Information:

n = Number of trial respondents
r = Coefficient of correlation

The calculated t value is then compared with the t table price (attachment), for α = 5% with dk = n – 2. Criteria for accepting the hypothesis, accept H_0 if t_{count} is smaller than t_{table} ($t_{count} < t_{table}$), otherwise reject H_0 and accept Ha.

3. RESULTS AND DISCUSSION

Implementation of TPS Type Cooperative Learning Model by Teachers

Based on the observation sheet data on the implementation of the TPS model by the teacher, it can be seen that the resulting percentages are different and have increased at each meeting. This can be seen at the first meeting, only a percentage of 75% was obtained in the Good category, at the second meeting the percentage obtained increased to 85% with a very good category, this is because the teacher studied deficiencies in teaching at the first meeting by looking at the teacher's activity observation sheet. observed by the observer, for the third meeting the teacher was getting used to and correcting deficiencies in teaching methods when applying the TPS type cooperative learning model in the first and second meetings so that the percentage obtained increased to 87.5% with a very good category. with an average percentage of 82.5% in the very good category. The percentage shows that the implementation of the TPS type cooperative learning model applied by teachers in class $X_{1\ of}$ SMAN 1 Muaro Jambi has been carried out very well.

Implementation of TPS Type Cooperative Learning Model by Students

Based on the observation sheet data on the implementation of the TPS model by students, the percentage increased at each meeting. At the first meeting the percentage obtained was 68.87%, at the second meeting it was 75.5% and at the third meeting it was 79.97%. From the data per category, it can be seen that some students who were in the good category at the first meeting got an increase in scores at the second and third meetings, therefore some of them were included in the very good category so that the data for the percentage gain in the very good category increased. Meanwhile, in the moderate category good at each meeting decreased because some of the students entered the good category, while the unfavorable category at the first meeting to the third meeting was not occupied by a single student.

These findings indicate that the implementation of the TPS-type cooperative learning model by students is going very well and students are getting used to the implementation of the TPS-type cooperative learning model by the teacher. One of several principles of classroom management is that warmth and enthusiasm in teaching can create a pleasant classroom atmosphere [15]. This is in line with Aunurrahman [28] stated that the success of the learning process is inseparable from the ability of a teacher to develop learning models that are oriented towards increasing the intensity of effective student involvement in the learning process. The development of an appropriate learning process basically aims to create learning conditions that allow students to learn actively and have fun [5]. The implementation of the TPS type cooperative learning model can help students to develop understanding of concepts and subject matter, develop the ability to share information and draw conclusions, and develop the ability to consider other values of a subject matter. So that student participation in the learning process also increases [29].

The implementation of the model by students is the implementation of the model from the teacher, this is evidenced by the similarity test on the average of the two parties, between the model implementation data by the teacher and the model implementation data by students, the results obtained from the average similarity test are worth $t_{count} = 1, 85$ is then compared with $t_{table} = 2.78$ with dk = 4 and a significance level of 0.05 so that $-t_{table} < t_{count} < t_{table} = (-2.78 < 1.85 < 2.78)$. And it can be concluded that model implementation activity data by students can represent model implementation activity data by teachers to be correlated with data on students' scientific attitudes.

Student Scientific Attitude

It can be seen that the percentages obtained varied at each meeting, in an attitude of curiosity the average percentage at the first meeting was obtained at 63.44%, at the second meeting a percentage was obtained at 74.25%, and the percentage obtained at the third meeting was 77.94%. While the percentage obtained for open-mindedness and cooperation at the first meeting was 70.00%, the percentage obtained at the second meeting was 77.21% and the percentage obtained at the third meeting was 78.92%.

Both of these scientific attitudes have increased at each meeting, when compared between an attitude of curiosity and an attitude of open thinking and cooperation, the attitude of open thinking and cooperation has a greater percentage than the attitude of curiosity, this is because there are indicators of an attitude of curiosity that has the percentage is below 60%, on the enthusiastic indicator asking each step of the activity only a percentage of 42.66% of 40 students is obtained. This shows that only some students are enthusiastic about asking questions about learning activities to the teacher, while other students are more likely to be silent and prefer to ask friends.

Correlation of Model Implementation by Students and Students' Scientific Attitudes

Based on the moment product correlation formula, the $r_{xy\ value}$ is 0.707 which, if interpreted, has a strong relationship level. Then a t test was carried out, where previously the data was tested for normality and homogeneity. Based on calculations using *SPSS 16* , the data is normally distributed and homogeneous.

Then proceed with the t test, the t test here is carried out to see the significance between the implementation of the TPS type cooperative learning model by students and students' scientific attitudes. Based on the calculation, it is obtained that the $_{calculated\ value} > t_{table}$ (6.16> 2.02) at the 0.05 significance level means that $H_{0\ is}$ rejected and $_{Ha\ is}$ accepted. Thus this can test the correctness of the hypothesis, namely that there is an influence between the implementation of the TPS type cooperative learning model on students' scientific attitudes (curiosity and open-mindedness) on atomic structure material in class X SMAN 1 Muaro Jambi.

This is in line with research conducted by Ani [30] which stated that there was an effect of the TPS type cooperative learning model on increasing the curiosity of fifth grade students at SD Negeri 1 Karangtuli and research conducted by Isdianti [31] which stated that there was an effect of applying the model to students' social skills which included the attitude of expressing opinions, listening good, group collaboration on electrolyte and non-electrolyte solution materials at SMAN 1 Surabaya by applying the TPS learning model. The *Think, Pair, Share* learning model is an innovative learning model in the learning process. Through Think, Pair, Share it can increase student activity in teaching and learning activities, and can increase student curiosity, student cooperation and student achievement. Thus, students will be more enthusiastic in learning and obtain good results [32]-[35] .

4. CONCLUSION

Based on the results of the application that has been obtained, implementation of the TPS type cooperative learning model on atomic structure material towards the scientific attitudes of class X students at SMAN 1 Muaro Jambi went very well. *Think Pair Share (TPS)* cooperative learning model on Atomic Structure material on the scientific attitude of class X students at SMAN 1 Muaro Jambi.

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