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ANALYZING THE EFFECT OF SOCIETY TECHNOLOGY SCIENCE APPROACH TOWARD STUDENTS' SCIENTIFIC ATTITUDES FOR 5TH GRADE ELEMENTARY SCHOOL IN SCIENCE LEARNING

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Abstract

This study aims to describe the students' scientific attitude between students who followed science learning by applying the society technology science approach and conventional learning approach. This type of research included quasi-experimental research with a non-equivalent post-test only control group design. In this research paper involved 52 students of 5th grade of SD Inpres Andi Tonro in the academic year 2018/2019. Sample were chosen by using technic of simple random sampling and determination of the sample is based on the use of the formula Slovin. Data on scientific attitudes of students were collected by questionnaire. The data obtained were analyzed using descriptive and inferential statistical analysis techniques (separated variance t-test). The results of this study described that the students' scientific attitude of the experimental class (using the society technology science approach) with an average score of 123.00 is classified as a very high category while the students' scientific attitude of the control class (conventional learning approach) with an average score of 108.73 is classified as high category. There was significant difference in students' scientific attitudes in the group of students who learned using society technology science approach compared to the group of students who learned using the conventional learning..

Keywords: *Problem Based Learning and Scientific Reasoning*

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INTRODUCTION

National education does not only emphasize intellectual ability, but also emphasize the formation of students' attitudes. Regarding students' attitudes, the thing that is not less important is that educators or teachers are expected to be able to explore and develop the scientific attitudes that students have. This is in line with the results of research by Nuryati et al (2014), Jasin (2010) and Santika (2008) which state that one of the learning goals of science lesson in elementary school is that students are expected to have scientific attitudes. In developing students' scientific attitudes, teachers have very important roles and responsibilities. Harlen (1996) states that the four main roles of teachers in developing scientific attitudes are showing examples of scientific attitudes, providing positive reinforcement of scientific attitudes, providing opportunities to develop scientific attitudes, and discussing various behaviors related to scientific attitudes.

Efforts to develop scientific attitudes are carried out continuously by the government. One of them is to make science subject as the basis of behavior at every school level starting from elementary school to senior high school. Suastra (2009) suggests that science learning at schools consists of three components, namely scientific process, scientific attitude, and scientific product that are accommodated in the process of learning science. Barlia (2008) argues that science is one of the main subjects that need to be nurtured as early as possible at the elementary school level in order to be able to produce young generation who has better scientific attitudes so that they can make a decision, have insightful future, and be able to solve problems. The scientific attitudes referred to by the National Curriculum Council (Bundu, 2006) are the desire to be curious, respect reality, have critical attitude, caution, diligent, tenacious, steadfast, creative for new inventions, open-minded, and collaborate with others.

Furthermore, Wisudawati and Sulistyowati (2017) states that teachers must be able to integrate the elements of attitudes in the science learning process in which science can bring students' curiosity towards objects, natural phenomena, living things and causal relationships. Science is a conscious effort to uncover the symptoms of nature by applying scientific steps and shaping the personality or behavior of students to a better direction (Anwar, 2009). Thus, students can have a conscious attitude towards the surrounding environment (Brossard et al, 2012).

However, in reality, there is no optimal effort from teachers to instill scientific attitudes in science learning. This statement is reinforced by the results of preliminary observation that has been carried out as well as an interview with the science subject teacher of SD Inpres Andi Tonro. Problems that appeared were: (1) students did not have the diligent nature to solve the practice questions both given by the teacher and the questions in the textbook; (2) during the learning process, students were still embarrassed to express ideas. This happened because sometimes students got reproach from their friends when they revealed ideas or opinions that deviated from the material; (3) when learning took place, students lacked of curiosity. This was indicated by only a few students who wanted to ask questions related to material that they did not understand; (4) students used to ignore the homework given by the teacher; (5) learning carried out by the teacher still used the lecture method and was only based on textbooks. Such learning activities made students less active in the learning process because all the materials had been explained fully by the teacher.

Based on the problems above, researcher chose Society Technology Science approach (STM) as an alternative approach that can be applied in science learning because this approach can foster students' scientific attitudes (Sudana, et al, 2011). In addition, this approach adheres to constructivism that focuses on student's activity (student centred) to construct knowledge based on the prior knowledge that has been possessed and can be used as a vehicle for the application of STM approach in the classroom (Riyanto, 2010). Thus, the application of constructivism in learning is expected to help students translate the knowledge gained through solving real, complex, and meaningful problems for students.

The use of science issues in the student environment can be used as science learning material through process and science products to apply STM approach (Poedjiadi, 2005). Thus, STM approach can be applied by presenting social problems in science learning, so students can identify problems related to science, technology and society. In addition, students are expected to be able to solve problems by raising students' curiosity which is the main key to scientific attitudes without seeing the differences that exist from each student (Lacap, 2015). Therefore, the application of STM approach is expected to be able to give a rise the scientific attitudes of students in the science learning process in the classroom.

METHOD

This research was a quasi-experimental study with a non-equivalent post-test only control group design. This study involved the fifth-grade students of Andi Tonro Inpres Elementary School

in Makassar. To determine the sample, the equality test was conducted on the population of studies. The result of the equality test using the t-test showed that the population was equal or homogeneous, which meant that the academic year tended to be the same. Furthermore, the researcher used the Slovin formula (Sugiyono, 2011) with the following explanation.

$$n = \frac{N}{1 + N\alpha^2}$$

Information:
N = Total population
n = sample size
α = significant level

By applying the formula above, the samples obtained were 52 students. The samples that had been obtained were then drawn again to determine the experimental and control groups. The drawing result obtained that class Vb consisting of 26 students was as the experimental group and class Va consisting of 26 students also was as the control group. The experimental group followed the STM approach learning while the control group followed the conventional learning.

The data collection method in this study was a non-test method. The scientific attitudes data were obtained through a questionnaire that aimed at measuring students' scientific attitudes. The data analysis technique used was descriptive and inferential statistic. Descriptive statistics was carried out by calculating the mean, median, mode, standard deviation, and variance for each group. Mean, median, mode of student's scientific attitudes data were presented into polygon. The determination of the quality of research variables could be determined from the average score of each variable converted into a Five-Scale PAP. The following is a table of five-scale PAP conversion guidelines on scientific attitudes and criteria (Agung, 2016).

Table 1. Conversion guidelines of five-scale pap on scientific attitudes level in learning science

Average Score of Scientific Attitude	Criteria of Scientific Attitude
118-140	Very high
95-117	High
72-94	Enough
49-71	Less

Furthermore, inferential statistic aimed to test the hypothesis. Before testing the hypothesis on null hypothesis (H_0), several prerequisite tests of data analysis were performed, namely the normality test and the variance homogeneity test. Hypothesis testing used was an independent (uncorrelated) t-test with a *separated variance* formula.

RESULTS AND DISCUSSION

The data results of this study were the students' scientific attitudes scores as a result of the implementation of STM approach to the experimental group and conventional learning in the control group. Recapitulation of data calculation results of students' scientific attitudes is presented in Table 2 below.

Table 2. Recapitulation of data calculation results of students' scientific attitudes

Statistics	Experimental group	Control group
Mean (M)	123.00	108.73
Median (Md)	123.17	109.08
Mode (Mo)	123.21	109.00
Standard Deviation (S)	3.833	1.232

Based on the table above, it is known that the mean of students' scientific attitudes of the experimental group was 123.00 while the mean of students' scientific attitudes in the control group was 108.73. In detail, the following figures present the mean, median and mode of scientific attitudes data of the two groups in the form of histograms.

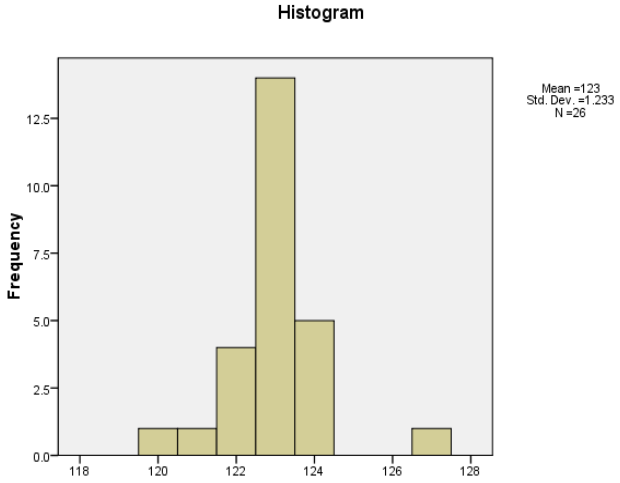

Figure 1. Polygon data of students' scientific attitudes of experimental group

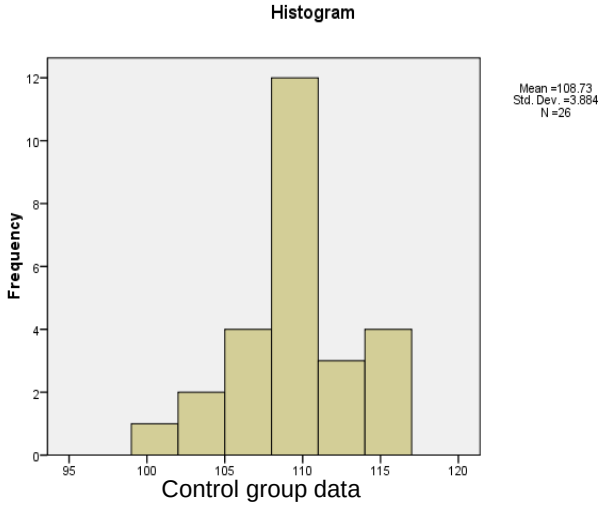

Figure 2. Polygon data of students' scientific attitudes of control group

Based on the Figure 1, it can be explained that the distribution curve of students' scientific attitudes data in the experimental group formed a negative crossing curve which meant that most scores of students' scientific attitudes tended to be high. If the average scores of students' scientific attitude data who took the learning approach was converted into the Five-Scale PAP, then it was in the very high category. Furthermore, for the control group data in Figure 2, it can be seen that the data distribution curve of students' scientific attitudes formed a positive crossing curve, which meant that most scores on students' scientific attitudes tended to be low. If the average scores of students' scientific attitudes who took conventional learning was converted into Five-Scale PAP, then it was in the high category. Based on the results of the data analysis prerequisite test, it was found that the students' scientific attitudes data of the experimental and control groups were normally distributed and the variance of the two groups was homogeneous, then the test was continued by testing the hypothesis against the null hypothesis. Hypothesis testing used was *independent* (uncorrelated) t-test with *separated variance* formula. The summary of the hypothesis test results is presented in Table 3.

Table 3. Summary of Hypothesis Test Results

Sample	Number of students	Mean	Standard Deviation	Variance	Db	t-count	t-table
Experiment	26	123.00	3.833	59.94	78	8.472	1.990
Control	26	108.73	1.232	57.74			

Based on Table 3, it is known that the t-count is greater than the t-table, namely (8.472> 1.990) so that H_0 was rejected and H_a was accepted. The result of the hypothesis test can be interpreted that there was significant difference in students' scientific attitudes in the group of students who learned using STM approach compared to the group of students who learned using the conventional learning. The significant difference showed that the application of STM approach has a positive effect on the scientific attitudes of the fourth-grade students of Andi Tonro Inpres Elementary School in Makassar 2018/2019. Based on the results of the previous descriptive analysis, the data showed that the students' scientific attitude scores in the experimental group were higher than the scores of students in the control group. It explained that there was significant difference in students' scientific attitudes between group of students who learned using STM approach and that of who learned using conventional one. The difference of the average score of both can be explained theoretically and empiric operationally.

Theoretically, STM approach is an innovative approach and in line with the constructivism view. The view of constructivism provides opportunities for students to build their own knowledge (Winataputra, 2007). It indicates that students actively explore or construct their own knowledge based on their prior knowledge to solve problems so that they have high curiosity.

Learning with STM approach can build conducive learning atmosphere that is active, creative, challenging, and fun. It is different from the conventional learning that leads to behavioristic view. Behavioristic learning theory emphasizes on student's learning outcomes regardless of the learning process. In learning process teachers tend to consider students as white papers that are ready to be written so that learning activities are regulated by the teacher or always centered on the teacher (Winataputra, 2007). This explanation illustrates that conventional learning provide less opportunity for students to explore their own knowledge based on their prior one, whereas in STM approach the students' prior knowledge is an essential bridge to instill the scientific attitudes.

Empiric operationally, the difference in the average score of students' scientific attitudes is caused by students' learning activities and differences in work steps in completing practice questions or problems given by the teacher. Learning activities in STM approach always begin with the submission of problems related to teaching material assisted by traditional tools as learning media so that it can bring out students' curiosity. In addition to being curious, critical thinking is also practiced when students search various alternative answers to the problems posed at the beginning of learning.

In addition to presenting social problems at the beginning of learning, teachers also give problem exercise questions to each group. The problems that are given in the experimental group are designed to bring up the students' scientific attitude. These problems present those that exist around the student environment. Students are given the freedom to do practical work and prove hypotheses, while teachers only act as facilitators. Such learning activities make students get more opportunities to develop their learning activities and construct their knowledge so that they can indirectly generate and develop scientific attitudes. This is in line with the view of constructivism which states that learning is an active process of students to construct knowledge, not the process of receiving knowledge (Winataputra, 2007).

Conventional learning provides less opportunity to generate and develop students' scientific attitudes because scientific attitudes are only informed declaratively. In addition, the material discussed is only limited to the theory in the textbook then followed by question and answer and practice questions. In doing practical work, students must be assisted by the teacher. Without the teacher the learning activities cannot run. Often the teacher does the practical work while the students are only busy observing. Such condition gives less opportunity for students to emerge and develop their scientific attitudes. Curios, meeting, critical, diligent, and open are less trained during the learning process because of lack of activities that students must do. The fact that can be seen in the control group, students only act as recipients of information while the teacher acts as a source of information. This is in line with the opinion of Yeni (2011) that in the process of conventional learning activities teachers tend to be more active as a source of information for students.

Based on the explanation above, it can be stated that STM approach can generate and develop scientific attitudes of the fifth-grade students of Andi Tonro SD Inpres Makassar City so that students have a positive attitude after learning science with this approach. The same thing is stated by Myers (Sudana, *et al*, 2013) that students have a more positive attitude towards science learning which has an impact on improving students' learning outcomes. In addition, by showing examples of scientific attitudes in the learning process in the classroom and giving awards to students who can show scientific attitudes will provide opportunities for students to have a great curiosity, open minded and have sensitivity to the environment around them.

CONCLUSION

The results of this study illustrate that the scientific attitude of the experimental group students with an average score of 123.00 is classified as a very high category while the scientific attitude of the control group students with an average score of 108.73 is classified as high. Thus, it can be stated that there is a significant difference of students' scientific attitudes in group of students who are taught using society technology science (STM) approach and those who are taught using conventional learning. Although the finding in this study is in line with several previous studies and the supporting theories, there are several factors that lead to the achievement of students' scientific attitudes that are not fully optimal due to the unique characteristics of STM approach, so students are not familiar with the approach yet. In addition, students are not used to expressing various problems that they encounter in their daily lives.

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