
Analysis of Scientific Attitudes of Students and Learning Outcomes of Middle School Students

Zulkan¹, Yennita^(1,2), Zulirfan^(1,2)

¹Master of Science Education Study Program, University of Riau

²Physics Education Study Program, University of Riau

zulkan6977@grad.unri.ac.id

Abstract The purpose of this study was to determine the relationship of students' scientific attitudes with the science learning outcomes of Kampar District's. This research was conducted in Jati Mulya One Roof Junior High School Sei Agung Tapung, involving 21 class VII students. The research instrument was in the form of a student's scientific attitude questionnaire and science learning achievement test. Data analysis was performed using descriptive statistics and product moment Pearson correlation test. Based on the results of the study found that there is a correlation between scientific attitudes and student learning outcomes of 0.463 with the medium category. So it can be concluded that if students have a good scientific attitude it will affect the learning outcomes.

Keywords: Scientific attitude, learning outcomes, science learning

1. Introduction

One of the important subjects in junior high school is science. Through science actually has provided provisions in solving problems of everyday life. Science is the science that seeks answers to what questions, refutes, and how to discuss justice which questions the composition, structure and nature, changes and dynamics of nature (Widiadnyana, et al. 2014). Next is Revati (2017). When humans are aware of their environment, begin to wonder about natural phenomena in which they play an important role. He began to look for nature's secrets. This not only changed his view but also changed the way he solved the problems of daily life. Therefore it is very necessary for someone to master knowledge in his life with increasingly complex interests

The depiction of student achievement after going through learning can reveal aspects of the thought process (cognitive domain) can also reveal other psychological, namely aspects of values or attitudes (affective domains) and aspects of skills (psychomotor domain) inherent in each individual student (Sudijono, 2012). (Sanjaya, 2019) The learning process created in an interesting and fun atmosphere, makes students feel they have a role in the learning process. Therefore, in learning chemistry the teacher's active role is key in the success of students in receiving chemistry subject matter. (Yenita, 2019) By using computer-based learning media students directly interact with the computer individually, so that what particular students experience will be different from what is experienced by other students. This ability will accommodate students with the heterogeneous ability to learn in a different climate of effective learning which is individualized by computer-based learning media.

For the knowledge domain, Bloom classifies on several levels or known as taxonomies. Bloom's taxonomy for cognitive is: knowledge labeled as C1, comprehension labeled as C2, application labeled as C3, analysis with label C4, synthesis synthesized labeled with C5, and evaluations labeled as C6. Anderson and Krathwohl (2010) explain that the purpose of education in the cognitive domain is more to the dimensions of cognitive processes. The categories of cognitive dimensions are: remembering, understanding, applying, analyzing, evaluating and creating. (Silvi, 2019) The atmosphere of the

successful learning process is one of the determinants of success in learning. The successful learning process is influenced by the accuracy in the selection of learning models applied by the teacher.

Not only thinking skills are needed by students, but scientific attitudes must also oppose, during the learning process (Davies et al., 2013; Duran & Dökme, 2016; Genç, 2015). Because scientific attitude is very important in facing big challenges in the era of globalization (Kaur, 2013). Furthermore, scientific attitudes can be considered as values and norms that are considered binding on scientists (Pitafi & Farooq, 2012). A teacher must be able to make teaching materials to provide students with tools to help students on the path to higher achievement in their reading comprehension. Development of teaching materials to create a learning atmosphere for students (Suarman, et., al, 2018).

In learning science naturally students must have a scientific attitude and a scientific attitude. Scientific attitudes can be considered values and norms that are considered binding on scientists (Pitafi & Farooq, 2012; Spronken-Smith, 2009). Scientific attitude has three basic components, namely beliefs, feelings, and actions (Mukhopadhyay, 2014). Scientific attitude is ownership of skills and attitudes needed in the scientific process and ownership of knowledge obtained through processes that make a person a scientist. Scientific attitude is the most important thing in learning science so it is not allowed to leave it alone. Some characteristics of scientific attitudes in an individual's curiosity, honest and right in recording and validating data (respect for evidence), open mindedness (willingness to change ideas) Critical thinking (critical reflection) (Pifati, AI & Farooq, M., 2012, Kaur G, 2013, Lacap, 2015).

A scientific attitude is very necessary in learning, with a good scientific attitude, it is indicated that you will get good learning outcomes as well. This was also welcomed by Rijal (2015) the attitude of students supporting as a support in achieving learning outcomes, and this attitude supports or does not support towards something.

2. Methodology

2.1. Data and Instruments

This type of research is a survey research involving 21 students of One Roof Jati Mulya Sei Agung Middle School. The instruments used in this study are: 1) Questionnaire, which is used to obtain student scientific attitude data, as many as 31 items reliability index of 0.68 (Zulirfan, 2018), (2) Learning outcomes test, is used to obtain the value of science learning outcomes based on tests national. Data collection on students' scientific attitudes is carried out through questionnaires to students. Previously this questionnaire was valid and reliable.

2.2. Data Analysis

The data that has been collected is analyzed using a) Descriptive statistics by means of percentages, means and standard deviations. b) inferential statistical analysis with product moment correlation test assisted with SPSS 16.0 software for windows, performed at a significance level of 0.05 ($p < 0.05$). Before the correlation test is performed, a prerequisite test is the normality test using the Kolmogorov-Smirnov One-Sample test. Correlation coefficient is a number that shows the level of closeness of the relationship between the independent variable (scientific attitude) with the dependent variable (learning outcomes). The correlation coefficient can be calculated using the Pearson Product Moment formula (Sugiyono, 2011). If the probability value is Sig. ($0.05 \leq \text{Sig}$). That is, there is no relationship between scientific attitude and student learning outcomes. If the probability value is Sig. ($0.05 \geq \text{Sig}$),

it means that there is a relationship between scientific attitude and student learning outcomes (Sarjono, 2011). The categories of students' scientific attitudes can be seen in Table 1 below

Table 1. Categories of Student Scientific Attitudes

Categories	Range of scores
Strongly Agree	$3,25 \leq x < 4,02$
Agree	$2,50 \leq x < 3,25$
Not Agree	$1,75 \leq x < 2,5$
Strongly not Agree	$1,00 \leq x < 1,75$

If the average attitude of students (x) is in the $3,25 \leq x < 4,02$ category, then this student is said to have a very good scientific attitude. If $3,25 \leq x < 4,02$ is said to have a good scientific attitude, $1,75 \leq x < 2,5$ is said to have a not good scientific attitude and $1,00 \leq x < 1,75$ is said to have a very not good scientific attitude.

3. Result and Discussion

3.1. Results

Based on research conducted at Jati Mulya One Roof Junior High School, Sei Agung, Kampar District, the results of the scientific attitude and student learning outcomes are presented in Table 2 as follows:

Table 2. Scientific Attitude Data and Student Learning Outcomes

Variable	Number students	Mean	Standard Deviation	Variance	Minimum Score	Maximal Score
Scientific Attitud	21	2,95	0,21	0,05	2,53	3,25
Learning Outcomes	21	84	4	13	76	90

Based on Table 2, it can be seen that the average scientific attitude of all students in one class is 2.95 with a positive category, meaning that students in this school have a good scientific attitude. While the average student learning outcomes are 84 with the category of 'good' learning outcomes. If you see student learning outcomes for the range of each predetermined category, it can be seen in Table 3. Based on Table 3, 42.8% of students had very good absorption, 47.6% had good absorbency and 9.6% had quite good absorption.

Table 3. Categories of Student Learning Outcomes

interval of learning outcomes (%)	Percentage of Students (%)	Categories
85-100	42,8 %	Very Good
70-84	47,6 %	Good
50-69	9,6 %	quite Good
0-49	0 %	Not Good

After obtaining the above data, then the data normality test is performed. Based on the calculation obtained sig values above 0.05 (sig > 0.05), this means that the data are normally distributed, so that the data analysis process can be continued, namely determining the correlation between scientific attitudes and learning outcomes. From the results of calculations using SPSS 16.0 for windows software obtained correlation data as shown in Table 3 below

Table 4. Correlation Between Scientific Attitudes and Learning Outcomes

		Scientific attitudes	Learning outcomes
scientific attitudes	Pearson Correlation	1	.480*
	Sig.		.028
	N	21	21
learning outcomes	Pearson Correlation	.480*	1
	Sig.	.028	
	N	21	21

*. Correlation is significant at the 0.05 level.

In Table 4 the correlation between scientific attitude and learning outcomes results in a probability value of sig 0.028 ($p < 0.05$), so there is a correlation. To find out the degree of correlation we can see from the number r of 0.480 with the correlated category.

3.2. Discussion

When reviewed the students' scientific attitude for each indicator of scientific attitudes namely Humility, rational, objective, suspended judgment, critical thinking, open mindedness, honesty and curiosity can be seen in Figure 1 below

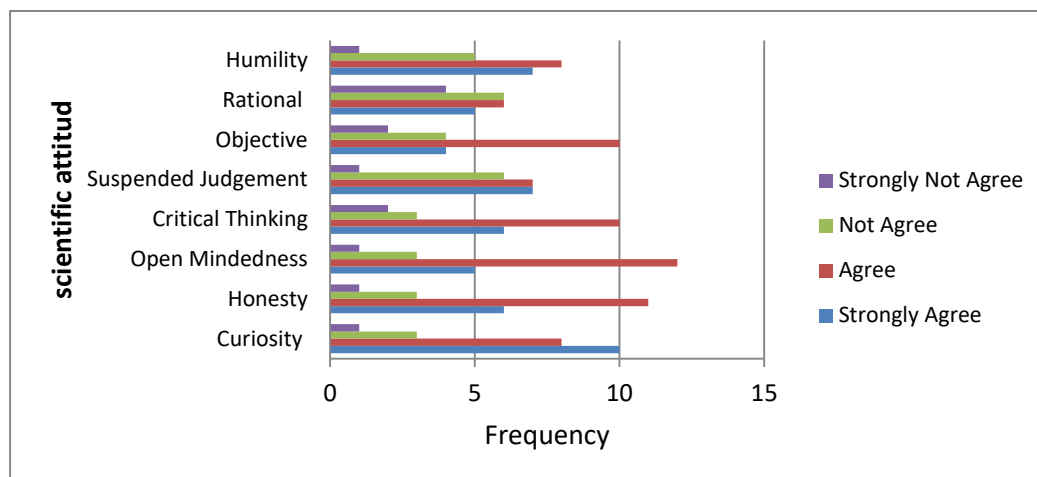


Figure 1. Scientific Attitude of Middle School Students

Scientific attitude with indicators of curiosity has shown a very good scientific attitude, this is seen from the habits of students to explore about things that are around them that are often asked questions, find out about something good information through reading, seeing or hearing something that attracts attention, initiative to start and investigate. In this study the highest attitude aspect obtained is curiosity. This study has similarities with the study of Mukhopadhyay (2014) that the scientific attitude which is very prominent towards positive is the presence of curiosity. Curiosity can be equated with a basic desire to know. Students who want to know asking questions, read more learning resources to find meaningful information and prepare to investigate. Curiosity is a stimulus for inquiry because each discovery raises new questions and suggests new ventures. To foster student curiosity is through inquiry learning (Erdogan, 2017).

An open-minded indicator is characterized by honest attitude in recording data and data validation. This attitude is characterized by the attitude of students who act consciously and honestly in reporting the results of observations and the desire to report results based on evidence. The scientific attitude to the honest aspects of students in Figure 1 is still lower than curiosity. These are some of the characteristics of honest people related to scientific attitudes, namely conscious and full honesty in reporting the results of observations, reporting data in accordance with the results of observations, although not in accordance with the initial hypothesis (Pifati, A.I & Farooq, M., 2012; Kaur, G., 2013, Zulirfan, 2018). In this indicator students are in the good category and there are still students who have not shown a good scientific attitude.

Scientific attitude for open minded indicators (willingness to change ideas), suspended judgments, critical reflection, objective and rational, rationality based on the results of the survey shows results that are not different, where attitudes need to be improved for the better. Examples of open-mindedness are a willingness to accept that a fact or concept is tentative and he always believes that science is dynamic and not constant, suspended judgment is a belief that a conclusion is tentative, tends to refer to those who are more experts in making a decision, the desire to examine or investigate all the facts related to a conclusion or opinion given and not quickly blame others (Zulirfan, 2018).

In the indicator of critical thinking (critical reflection), the scientific attitude of students is relatively good, but it still needs to be improved again. The hallmark of this indicator is that they look for empirical evidence from a fact or statement that is stated based on various sources. Objective means interpreting ideas and being fair in communicating findings (Anderson, 2010; Dudo & Besley, 2016; Pitafi & Farooq, 2012). Rationality is seen when someone looks for the cause of an event rationally and tries to explain a phenomenon scientifically. Humility according to Pifati, A.I & Farooq, M (2012) do not look at your own property better than someone else's Respect the opinions of others, Proud to help others

Based on data analysis using the correlation test, it was found that the scientific attitude and student learning outcomes correlated significantly, this means that a good scientific attitude of students will affect the student learning outcomes. According to P M Sari et.al, (2018) states that there is a correlation between concept understanding and scientific attitude. Other studies also reveal that academic achievement is positively and significantly correlated with scientific attitude. This means that with increasing academic achievement, scientific attitude also increases (Vinod, 2016). The findings show that attitudes toward science and scientific attitudes together account for 0.7% of the total in science achievement. There were no significant differences between male and female students in scientific attitudes, attitudes toward science and scientific achievement (Olasehinde and Olatoye, 2014).

4. Conclusion

Based on the results of research students' scientific attitudes and student learning outcomes there is a moderate correlation. These results can be seen from the Pearson correlation test results with a significance value of 5% is 0.028 and Pearson correlation is 0.463. This shows that there is a significant relationship between students' scientific attitudes with science learning outcomes.

References

- Anderson, C. (2010). Presenting and evaluating qualitative research. *American Journal of Pharmaceutical Education*, 74(8). [https:// doi.org/10.5688/aj7408141](https://doi.org/10.5688/aj7408141)

-
- Davies, D., Jindal-Snape, D., Collier, C., Digby, R., Hay, P., & Howe, A. (2013). Creative learning environments in education-A systematic literature review. *Thinking Skills and Creativity*, 8(1), 80–91. <https://doi.org/10.1016/j.tsc.2012.07.004>
- Dudo, A., & Besley, J. C. (2016). Scientists' prioritization of communication objectives for public engagement. *PLoS ONE*, 11(2), 1–18. <https://doi.org/10.1371/journal.pone.0148867>
- Duran, M., & Dökme, I. (2016). The effect of the inquiry-based learning approach on student's critical-thinking skills. *Eurasia Journal of Mathematics, Science and Technology Education*, 12(12), 2887–2908. <https://doi.org/10.12973/eurasia.2016.02311a>
- Erdogan, S. C. (2017). Science teaching attitudes and scientific attitudes of pre-service teachers of gifted students. *Journal of Education and Practice*, 8(6), 164–170. Retrieved from <http://libproxy.library.wmich.edu/login?url=https://search.proquest.com/docview/189597045?accountid=15099>
- Gençi, M. (2015). The effect of scientific studies on students' scientific literacy and attitude. *Ondokuz Mayıs University Journal of Faculty of Education*, 34(1), 141–152. <https://doi.org/10.7822/omuefd.34.1>
- Kaur, Ms. G. 2013. Scientific in relation to critical thinking among teachers. *Educationia Confab* 2(8): 24-29.
- Lacap, M. P. (2015). The scientific attitudes of students major in science in the new teacher education curriculum. *Asia Pacific Journal of Multidisciplinary Research*, 3(5), 7–15. Retrieved from <http://www.>
- Mukhopadhyay, R. (2014). Scientific attitude-some psychometric considerations. *IOSR Journal Of Humanities And Social Science (IOSR-JHSS)*, 19(1), 98–100. Retrieved from www.iosrjournals.org
- P M Sari, F Sudargo and D Priyandoko, 2018. Correlation among science process skill, concept comprehension, and scientific attitude on regulation system materials. *Journal of Physics: Conference Series*. volume 948 conference 1. J. Phys.: Conf Ser.948 01200
- Pitafi, A,I & Farooq, M. 2012. Measurement of scientific attitude of secondary school students in Pakistan. *Academic Research International* 2(2): 379-392.
- Revati, N. 2017. An Investigation of Scientific Attitude among Secondary School Students in Kottayam District of Kerala. *IOSR Journal of Research & Method in Education (IOSR-JRME)*. 7(1/III), 63-66.
- Rijal, Syamsu., Suhaedir Bachtiar. 2015. Relationship between Attitude, Learning Independence, and Learning Style with Student Cognitive Learning Outcomes. *Jurnal BIOEDUKATIKA*. 3 (2), 15-20.
- Sanjaya M A, Asmadi M. N and Linda R (2019) The Influence of Learning Model on Chemical Learning Outcomes Viewed from Goal Orientation Participants in Senior High School. *Journal of Educational Sciences Vol. 3 No. 3 (Sept, 2019) 423–432*
- Scientific Attitude, Attitude to Science and Science Achievement of Senior Secondary School Students in Katsina State, Nigeria. *Journal of Educational and Social Research MCSER Publishing, Rome-Italy*. Vol. 4 No.1. SSN 2239-978X ISSN 2240-0524. Doi:10.5901/jesr.2014.v4n1p445
- Silvi S R, Suarman, Rr Sri Kartikowati (2019) The Development of Articulation Learning Model Oriented to Student Activity in Economic Subjects at Pekanbaru Plus Binabangsa High School. *Journal of Educational Sciences Vol. 3 No. 3 (Sept, 2019) 401–411*
- Suarman, Hendripides, & Hikmah, N. (2018). Development of Innovative Teaching Materials through Scientific Approach. *Journal of Educational Sciences*, 2(2), 14-22.
- Sudijono, A.(2012). Introduction to education evaluation. Jakarta: PT. RajaGrafindo Persada.
- Sugiono, 2011. Education Statistics. Alfabeta. Bandung
- Vinod Kumar Singh, Ajay Kumar Singh, Anita Giri. 2016. A study of the relationship between scientific attitude and academic achievement of rural area's intermediate college girls
-

(science stream only). *International Journal of Applied Research*, 2(4): 46-49. SSN Print: 2394-7500 ISSN Online: 2394-5869

Widiadnyana, I. W. 2014. The Influence of Discovery Learning Model on Understanding of Science Concepts and Scientific Attitudes of Middle School Students. *e-Journal Program Pascasarjana Universitas Pendidikan Ganesha* Volume 4.

Zulirfan, Zanaton H Iksan, Kamisah Osman, Sayyidah N Mohd S, 2018. Take-home-Experiment Enhancing Students' scientific attitude *Journal of Baltic Science Of Education*. 17(5), 828-837.