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Assessment of students' attitudes towards natural sciences in junior high school

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Abstract

Assessment of Students' Attitudes towards Natural Sciences in Muaro Jambi District Junior High School. This study aims to determine the attitudes of junior high school students towards natural science subjects with three indicators adopted from TOSRA, namely 1) the normality of science scientists, 2) adoption of scientific attitudes, and 3) pleasure in learning science. The type of research used in this study is a type of survey research using quantitative research designs. This study was conducted in several junior high schools in Muaro Jambi Regency with a sample of 2815 students. The research sample was taken from 2 classes of class VII and VIII using total sampling technique in questionnaire distribution and purposive sampling for interviews. The results of the study of the three indicators show the dominant attitude in the good category. The normality of science scientists is in good category with a percentage of 52%. Adoption of scientific attitudes shows a good category with a percentage of categories 58.4%. The pleasure of learning science is well categorized with a percentage of 65.4%.

Keywords: *adoption of scientific attitudes; attitude; natural sciences; normality of scientists; pleasure in learning science.*

Introduction

Education is one of the most important things in human life. Because through education according to (Dinata and Laksana, 2017) humans can develop their insights, so that they will be able to deal with every problem and change through an open attitude with a creative approach without losing their identity. The government has carried out various efforts and policies in order to improve the quality of education, including: perfecting the curriculum, freeing school fees for elementary and junior high school students, conducting activities that can improve thinking skills, complementing facilities and infrastructure such as: science laboratories, computer laboratories, libraries and more facilities and infrastructure that support student learning, update learning models and methods, and hold teacher certification, upgrading and seminars (Afrizon et al., 2012).

Science subjects according to the 2013 Curriculum, emphasize that students are encouraged to learn through active involvement with skills, concepts, and principles in each science lesson. Learning will be increasingly difficult to adjust to the level. In Elementary School, science lessons are only limited to the introduction of Nature and the environment, while at the junior high school level science lessons are more focused. Scope in science subjects in junior high schools focuses on observing natural phenomena and their application

in daily life, besides issues concerning natural phenomena that are related to productive competencies and expansion of abstract concepts. Learning on abstract concepts gives students difficulties in understanding science lessons. Therefore, students are required to have an attitude towards science subjects. Which attitude according to (Sobur, 2010) is the tendency of individuals to act, think, perceive, and feel in the face of an object, idea, situation, or value. In addition, Anwar and Iqbal (2012) say that attitudes toward science show that students will be interested or have feelings for science. The statement explains whether students like or dislike science. In order to find out students' attitudes towards the natural science, attitudes were measured based on Fraser's (1981) TOSRA (Test of Science-Related Attitudes). The attitude dimensions used are: the normality of science scientists, the adoption of scientific attitudes, and the pleasure in learning science.

The normality of science scientists is defined as students' views about science scientists when conducting activities and abilities possessed by science scientists. Kuukkanen (2012) argues that Nature and natural phenomena are undoubtedly the determinants of knowledge, but scientists have the freedom and responsibility to act in accordance with good scientific practice to find and produce reliable scientific knowledge. However, a scientist is one of the people who have high spirits or influence in conducting experiments and experiments on the development of knowledge and technology from the past to the present. As scientists, they pay attention and engage in non-linearity, chaos, risk-taking, evolution over time, and the complexity of science and at both the level of scientific activity, theory and data, and their interactions (Varelas et al., 2005). As in the study conducted by Jalil (2009) who conducted research using a direct experimental approach in teaching several science topics, from grades 1 to 4 involving students, as a means to improve attitudes towards science learning, improve student understanding and achievement, and their confidence to be inventors. The study explains how a science scientist provides teaching and learning methods as they do with science to students, by not leaving a scientific attitude in each experiment or experiment.

Scientific attitudes in science have been taught early on through the discovery of existing concepts. Natural Sciences is not a lesson that focuses on the explanation of the theory because it is likely that there will be many differences of opinion according to individual observations so that it requires direct practice. Science according to Istikomah, Hendratto, & Bambang (2010) is one of the lessons aimed at developing knowledge by taking action so that students are able to gain an in-depth understanding of the natural environment,

one of the functions and objectives of science learning is so that students gain experience as the application of scientific methods by conducting experiments and experiments so that students can be trained in scientific behaviour. The results of this investigation will give students the desire to learn, and with learning, students can improve the ability to think critically and objectively in science subjects. Artemis and Yenice (2010) explain that Currently students are expected to be individuals who question, wonder why, recognize conflicts and contradictions, make good observations and make conclusions right through observation, scientific thinking, criticism, produce , being aware of finding ways to gain knowledge, creativity, decision making, responsibility, self-expression, not memorizing information, but aware of ways to achieve, use, share, and produce knowledge, in words, scientific processes and critical thinking skills in acting.

Lee (2018) states that Perception or misperception about science is the intermediary between the relationship of knowledge and attitude (scientific knowledge → perception of science → attitude toward science). Scientific attitude is one indicator of the formation of positive attitudes of students towards science. Attitudes toward scientific attitudes and scientific attitudes are two elements that cannot be separated. The synergy of developing this scientific attitude can realize that every student has the ability to understand scientific knowledge about life in science (Erdogan, 2017). Lacap (2015) emphasized that scientific attitude has a major role in science education and in the lives of students to continue their education in science. This understanding can be done if students have pleasure in learning science, which includes science subjects.

Fun in learning science will have a positive influence on student learning and intellectual development in science subjects. Chopra and Chabra (2013) say that the positive influence on subjects is obtained from the material taught, the methods and media used in learning, the teacher's ability to teach, as well as the physical and social environment of students who support these students to enjoy a learning. In addition, Levine (2012) argues that this interaction creates pleasant emotions when students acquire new knowledge and understand an object of knowledge. The pleasure in learning science is also able to provide a good focus on students when learning is underway so that the expected learning goals will be achieved. Improving the quality of student learning can be influenced by the success of the learning process related to involvement, understanding, and appreciation of learning about the material being studied (Merta, 2013). However, the pleasure of learning science will not be directly favored by students without any influence from the subject teacher. Teachers

should try to make science learning a fun lesson, which students will remember for their lives even though the student has finished school (Narmadha and Chamundeswari, 2013). However, if the teacher is unable to influence students to enjoy natural science learning, it will result in students' dislike of the subject so that it affects the final results and student achievement.

Lack of knowledge from the teacher regarding the weak attitudes of students in natural science subjects that cause students to dislike in science subjects exacerbates the situation where students' negative attitudes towards science will increase. According to Guido (2013), the negative attitude towards science possessed by students will influence students' dislike of science subjects and also teachers who teach science. While a positive attitude towards science subjects is required to be owned by each student because attitudes toward science can affect students 'feelings, students' understanding, and behavior and behavior of students towards natural science subjects. This opinion is explained by Veloo, Nor, and Khalid (2015) who say that attitude is a description of every type of human reaction that is in the main components of which are emotions, knowledge, and behavior of a person towards a matter. Furthermore, Godwin and Okoronka (2015) argued that individual attitudes that lead to the affective domain can be changed to find out whether the cognitive component can produce optimal results after the change. So, this opinion shows how important a teacher is to be able to observe and analyze and evaluate students' attitudes toward natural science subjects so that students can be enthusiastic and actively involved in every lesson.

Based on the description that has been explained, the researcher argues that the assessment of students' attitudes toward science subjects on indicators of scientific normality, adoption of scientific attitudes, and pleasure in learning science needs to be done, especially in junior high schools in Muaro Jambi district. The lack of tools to conduct experiments gives students learning difficulties in accepting and understanding science lessons that have abstract concepts. In addition, the evaluation of students' attitudes toward science subjects by the teacher has caused unknown obstacles and problems faced by students when learning science. Therefore, researchers conducted research on students' attitudes toward science subjects in Muaro Jambi District Junior High School.

The research objective is expected to facilitate the teacher in knowing the problems and constraints of students' attitudes faced when learning science so that the teacher is able to make students like science lessons without having difficulty learning them. In addition, the

findings of this study can contribute to improving the positive attitude of students towards natural science subjects in junior high school educational institutions. This can be seen in junior high school in Muaro Jambi District which has problems with students, namely a negative attitude towards science subjects. In addition, this research will be aimed at helping teachers to improve student activity, students' understanding and behavior of students in natural sciences at school and outside of school.

Materials and Methods

The type of research used is the type of survey research with research design is a quantitative design. The main objective of this research design is to improve the quality of teaching in achieving the goals of learning. The design of this study was also carried out in accordance with the purpose of the study as a measure of students' attitudes toward natural science subjects. This research was carried out in the Muaro Jambi District Junior High School in March - May 2018.

The research subjects were all seventh (VII) and eight (VIII) junior high school students in Muaro Jambi Regency. This study uses two sampling techniques, namely total sampling and purposive sampling. Where the number of samples for filling out the questionnaire as a total sampling technique was 2815 students consisting of 1560 female students and 1255 male students of the total. While the purposive sampling data retrieval technique is by conducting an interview of 36 students as a result of questionnaire data reinforcement.

Data collection is done through the provision of research instruments namely questionnaires. This questionnaire has 22 statements of attitude, which are divided into positive statements total 12 items and negative statements total 10 items see Table.1. The dimensions of students' attitudes toward the science subjects studied were based on the indicators that were determined, namely the Normality of Science Scientists, adoption of scientific attitudes, enjoyment of science lessons. Students' attitudes toward science subjects in the study were measured using a Likert scale. Five-choice Likert Scale (Five scale) including Very Agree (SS), Agree (S), Neutral (N), Disagree (TS) and Strongly Disagree (STS) scales. Each positive item in the instrument has values: SS = 5, S = 4, N = 3, TS = 2, and STS = 1. The score is reversed for negative items. This questionnaire data is given to students in grades VII and VIII of Junior High Schools in Muaro Jambi Regency.

Table 1. Final Results of Research Instruments

No	Variable	Indicator	Statement		Amount Item
			Positive (+)	Negative (-)	
1	Students' attitudes towards science subjects	Scientific Normality	2, 9, 30	16,23	5
2		Adoption of a scientific attitude	4, 11, 25, 37	18, 32, 42	7
3		Enjoyment of science lessons	5, 19, 33, 43, 51	12, 26, 38, 47, 53	10

This type of interview is more free than structured interviews. This interview aims to obtain information about students' attitudes toward science subjects. The procedure of this research was carried out starting from distributing questionnaires, then analyzing the attitude questionnaire data then conducting interviews and finally continued by transcribing all the results data that had been obtained during the study.

The data of this study are quantitative data and analyzed using descriptive statistics. The results of the questionnaire data were processed using the SPSS application in the form of mean, mode, median, standard deviation. As for the analysis of data from interviews using the Miles and Huberman model. This processing aims to look at the attitudes of junior high school students towards science subjects in Muaro Jambi District Junior High School based on the determined attitude dimensions.

Results and Discussion

Scientific Normality

The indicator of the normality of scientists is an analysis of the daily activities of science scientists. This analysis can be seen from how students act like a scientist, or the way a student conducts experiments or experiments like science scientists. The results of descriptive statistical analysis of the indicators of the normality of natural science of scientists can be seen in table 2.

Table 2. Results of descriptive statistics from indicators of normality of science scientists

No	Range	Attitude classification	Total	Standard Deviation	Mean	Modus	Median	Min	Max	Percent
1	21-25	Very good	413							15%
2	17-21	Good	1045							37%
3	13-17	Passable	863	1.02	3.45	4	4	1	5	31%
4	9-13	Not good	384							14%
5	5-9	Very bad	110							3%

Based on Table 2, the results of descriptive statistical analysis on indicators of normality of science scientists in Muaro Jambi Public Junior High School, it is known that students are more likely to have a good attitude as many as 1,045 students with the highest score of 21 and 37%. Students who have a very good attitude with the highest score of 25 are 413 students and 15%. Students who have enough or moderate attitude with a score of 863

students and one percent of 31%. Students who have a bad attitude with a score of 13 are 384 students and the percentage is 14%. While students who have the lowest score is 9 as many as 110 students and 4% are classified into very bad attitudes. These results indicate that students tend to have a good attitude on indicators of normality in science because they think scientists care about their working conditions. As for students who tend to have a bad attitude and attitude is not good because students feel bored and have less attitude like a scientist.

Adoption of a scientific attitude

The indicator of adoption of scientific attitudes is the analysis of student activities and activities while learning. This analysis can be seen from how students respond to or interact with peers when discussing, or the way a student understands scientific knowledge about science in his daily life. The results of the analysis of descriptive statistics on the adoption indicators of scientific attitudes can be seen in Table 3.

Table 3. Results of descriptive statistics on Adoption indicators from scientific attitudes

No	Range	Attitude classification	Total	Standard Deviation	Mean	Modus	Median	Min	Max	Percent
1	29.5-35.0	Very good	259							9.2%
2	23.9-29.4	Good	1386							49.2%
3	18.3-23.8	Passable	1080	0.691	3.64	4.0	4,0	2	5	38.4%
4	12.7-18.2	Not good	90							3.2%
5	7.0-12.6	Very bad	0							0%

Based on table 3 the results of descriptive statistical analysis on the adoption indicators of scientific attitudes in Muaro Jambi Public Junior High School, the results showed that students tended to choose good attitude categories as many as 1386 students with the highest range of 29.4 and a percentage of 49.2%. Followed by a pretty good category of 1080 students with the highest range of 23.8 and a percentage of 38.4%. In the very good category a total of 259 students with the highest range of 35.0 and a percentage of 9.2%. Furthermore, the category of bad behaviour was 90 students with the highest range of 18.2 and a percentage of 3.2%, while in the category of attitude was not very good as many as 0 students with the highest range of 12.6 and the percentage of 0%, which means there were no students included very bad category or choose the option. These results indicate that students' attitudes toward science on indicators of adoption of scientific attitudes, students have a positive attitude in the good category. This is supported by the results of the data above which shows 49.2% of students or 1386 students from 2815 total students in the good range and supported by the mode value or the dominant attitude scale chosen is 4 "good".

Enjoyment of science lessons

The indicator of pleasure in learning science is the analysis of student activity in learning science, persistence of students in learning science, as well as students' understanding of science subjects. The results of descriptive statistical analysis of the indicators of normality of natural science scientists can be seen in table 4.

Table 4. Results of descriptive statistics indicator of pleasure in learning science

No	Range	Attitude classification	Total	Standard Deviation	Mean	Modus	Median	Min	Max	Percent
1	43-50	Very good	513							17.40%
2	35-42	Good	1350							48%
3	27-34	Passable	835	0.5887	3.69	3.7	3.8	1	5	30%
4	19-26	Not good	109							4.32%
5	10-18	Very bad	8							0.28%

Based on table 4 the results of descriptive statistical analysis on the indicators of pleasure in learning science in Muaro Jambi Public Junior High School, the results showed that students tend to choose good attitude categories as many as 1350 students with the highest range of 42 and a percentage of 48%. Followed by a pretty good category of 835 students with the highest range of 34 and a percentage of 30%. In the very good category a total of 513 students with the highest range of 50 and a percentage of 17.40%. Furthermore, the category of bad attitude was 109 students with the highest range of 26 and the percentage of 4.32%, while in the category of very bad behaviour as many as 8 students with the highest range of 18 and the percentage of 0.28%. These results indicate that students' attitudes toward science on indicators of pleasure in learning science, students have a positive attitude in the good category. This is supported by the results of the data above which shows that 48% of students or 1350 students out of 2815 total students are in a good range and supported by the mode value or the dominant attitude scale chosen is 3.7 and 3.8 "good".

Obstacles to student attitudes

Based on the results of the three indicators, there were some obstacles found in students with a sample of 2815 students, taken through questionnaires the existence of a negative attitude evidenced by their disapproval of the statement given. The constraints can be identified based on Table 5.

Table 5. Obstacles to Student Attitudes

No	Indicator	Obstacles
1	Scientific Normality	17 %
2	Adoption of a scientific attitude	3.2 %
3	Enjoyment of science lessons	4.6 %

Based on Table 5, it can be seen that there are still obstacles to the three indicators of student attitudes toward the measured science subjects. The measurement results indicate that the indicator of scientific normality has a problem of 17% with a total of 494 out of 2815 students. Adoption indicators of scientific attitudes are 3.2% (90 out of 2815 students). The pleasure indicator in Learning Science shows a constraint value of 4.6% (117 of 2815 students). From these results it appears that the biggest obstacle is in the indicator of the normality of scientists in the science field.

Attitude is a form of expression or response of students to learning objects. Attitudes are shown in the form of expressions of liking or dislike, refusing or accepting an object. Attitude measurement is done to see an individual's ability to object. Sakariyau (2016) revealed that the attitude of an individual will usually have a personal effect on behavior and how to act in large situations. In this study, researchers measured students' attitudes toward science as their object. (Sethi, 2015), argues that the attitude "to science" is used to show everything a person thinks and feels about science. Hacieminoglu (2016) says Attitudes toward science involve the effective behavior of students; for example preferences, acceptance, appreciation, and commitment. Based on this, the measurement of attitudes towards science uses the attitude dimensions adopted from TOSRA including Science normalization, Adoption of scientific attitudes, and pleasure in learning science.

The importance of indicators of normality of science scientists is to better know and understand about the life of science scientists both in terms of knowledge and abilities. At the same time, people will highlight the collectivity of scientists, besides that scientists also spread individual freedom and their own contributions and responsibilities that they want to share with society as part of their scientific identity (Varelas, House, & Wenzel, 2005). Furthermore, the attitude of students in science subjects, especially on the normality of scientists have various categories of students who have a good attitude of 1,045 students with a percentage of 37% more dominant. While students who have a bad attitude amounted to 384 students with a percentage of 14% and students classified into a very bad attitude that is

equal to 110 with a percentage of 3%. On the indicator of normality, scientists get a good attitude. Explanation The results are reinforced by interviews with several students by asking questions about students' attitudes towards natural science subjects on the indicators of normality of science, which are as follows:

Question : Do you know science scientists? If so, what do you think about the life of the science scientists?

Answer : Yes, I know science scientists. I think the lives of science scientists are very unique. When scientists find new discoveries sometimes like to be alone in the laboratory or other places, but if the experiment or experiment fails they will try again, their curiosity about the science is so great and the results they get can become knowledge and teaching for others.

Based on the interview, it can be seen that students know the lives of scientists and the behavior of scientists. For example, a scientist in studying science is more trying and thinking scientifically in understanding the object to be studied. Scientists always want to try new things in their lives. Scientists also always try various experiments when the experiment fails so they will try again. This is what distinguishes scientists from non-scientists. This positive attitude that students must take to be a guide in everyday life both in the school and community.

Adoption of the Scientific Attitude is used to see a person's willingness or desire to assess and revise opinions based on experiments and empirical data (Joyce & Farenga, 2010). Table 1 shows that students 'attitudes based on the adoption of scientific attitudes have good categories with Mean 3.64 and Mode 4. From the results of the mean and this mode, it is revealed that students' attitudes toward the adoption indicators of dominant scientific attitudes are in the good category. Furthermore, also supported by the results of data analysis in Table 1 shows that 49.2% or 1386 of the 2815 students in the good category and 9.2% or 259 of the 2815 students in the excellent category.

Question : Do you like differences of opinion in the learning process? If so why and if not why?

Answer : yes, I like differences of opinion especially in discussion forums that discuss natural phenomena, because from different opinions I can understand and know the various views of each friend so that I can consider which one is the best.

From the results of the interview, the attitude of the dominant student is good,

meaning that students are willing to seek their own learning experience. So that it can be concluded that the adoption indicators of scientific attitudes show that students 'attitudes belong to the good category by showing students' positive attitudes toward science. Good attitude categories from the results of data analysis are also supported by the main factors, first students have a happy reading attitude towards new things even though it is not in accordance with their thinking. In line with Akpinar, Yildiz, Tatar, and Ergin (2009: 2804-2808), a more positive attitude toward science is related to a positive attitude about the benefits of science.

Fun in learning science for students can be seen from their positive attitude towards the science lesson itself. Learning pleasure in science explains students 'responses to science lessons, which is shown by the students' enjoyment of learning science and how strong students desire to learn science. based on the results of descriptive statistical data with a total of 2815 students, data showing the attitudes of junior high school students in Mauro Jambi had the dominant percentage in the good category of 48% (1350 of 2815 students). The good category found in this indicator is because the teacher who teaches explains the theory well without making it difficult for students so that students are able to understand the lesson well. Besides that teachers also provide a lot of motivation that encourages students' creativity and activeness in learning science. This opinion is supported by the results of the interview below:

Question : Do you like science lessons at school?

Answer : Yes, I like science lessons at school and outside school

Question : What is the reason you like science lessons?

Answer : Because science lessons are unique, many tell about the phenomena that occur in nature and everyday life. In addition, science lessons also focus us on understanding the concept rather than memorizing so that the science material taught is not easy to forget.

Question : When learning how do teachers teach science in class?

Answer : Teachers who teach science are creative, even though at school we lack laboratory facilities for science experiments, but our teacher invites us to experiment with things that are happening around us. What we don't realize includes science lessons.

The results of the interviews that have been carried out show that students' attitudes toward science subjects are in good category. This is because the science lessons are

interesting, many tell about nature and everyday life. Based on students' answers, the current science subject teacher teaches science well and is not monotonous. Pell (1985) argues that every teacher must try well to increase the learning pleasure of students in order to produce the best value by building a learning environment that is fun learning. the activity can be done if the teacher can change the way the teacher teaches students. Antara (2014) said learning must be changed from the method of transferring knowledge by teachers to students who learn and seek their own knowledge so that it will be easy to understand about what is learned.

Overall the results of this study show a positive attitude towards the normality of science scientists, the adoption of scientific attitudes, and the pleasure of learning science. Despite showing a positive attitude there are still some obstacles. Constraints on the indicators of normality of science scientists occupy the highest position based on table 5 by 17% with a total of 494 out of 2815 students. This result is due to the lack of interest and desire of students to follow the way of life of scientists both personal life and the way scientists obtain their knowledge. Constraints on indicators of adoption of scientific attitudes are shown from the analysis of the results of table 1 data, the results of the data show 3.2% or 90 students who show negative attitudes. The causes caused by students on the adoption indicators of scientific attitudes have problems if students are not interested in exploring more understanding of the science around them. Besides, the student has an indifference about the new thing he got about science. The explanation was expressed by students who chose neutral and refused from several statements regarding the adoption of a scientific attitude

The results of table 1 also show that 4.6% or 117 out of 2815 students show their dislike in science learning. This number concludes the number of students who show a negative attitude on the indicator of pleasure in learning science. The main factor of students 'displeasure when learning science is based on students' learning experiences.

Learning pleasure is related to student experience (Joyce & Farenga, 2010). It was proven that from a number of students disagreeing about the discourse of adding the allocation of natural science learning in the classroom, and students were not happy to wait for science lessons in the study hours, because students tended to think that science was a less interesting and boring lesson. In addition, according to students, things that are not liked from science lessons because there are too many concepts and formulas that must be understood so that students do not like science lessons. Hofstein and Naman (2012) states that if students do not like lessons, students do not try to understand the meaning of the concepts taught.

Conclusion

Based on the results of the study and the discussion can be drawn the following conclusions: First, it can be seen that the indicator of the Science Normalness of science is categorized as good. Both adoptions of scientific attitudes belong to good categories. And the third pleasure of learning science is also categorized as good. Overall the attitude of students towards science in Muaro Jambi is quite good. Thus, it can be said that the attitude of junior high school students towards science in Muaro Jambi Regency has a positive attitude. This illustrates that acceptance of science in the eyes of students gets positive attention, because it can optimize learning outcomes. However, in each indicator there is still a negative attitude of students with a percentage of the indicator of normality of science scientists by 17%, adoption of scientific attitudes by 3.2% and the pleasure of learning science by 4.6%. To change the attitudes and views of students in natural science subjects, students must have balanced attitudes and abilities. In other words, if you want to improve students' positive attitudes then increase the ability of students in science subjects first. In addition, teachers are also required to have skills, creative, and good teaching skills, so that students' desire to learn science is higher.

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