

A study relationship attitude toward physics, motivation, and character discipline students senior high school, in Indonesia

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Abstract

This research to see students' attitude toward in physics learning, student motivation in physics learning, discipline student in physics learning, and the relationship between students' motivation and attitudes toward physics subject. Using correlational quantitative research with correlational design, the subjects of the study were students of 612 students in senior high school Batanghari and Muaro Jambi district Provence Jambi, Indonesia. Instruments research is questionnaires attitude, motivation, and discipline. Analytical techniques are using descriptive statistics and inferential. The results the three indicators of student attitudes show good results, and for motivation and discipline students also show good results, with these results, there is a relationship between attitudes, motivation, and student discipline. Recommendation, therefore, it is very important for teachers to implement learning that fosters attitudes, motivation, and discipline of students in learning.

Keywords: Attitude toward physics, motivation, discipline;

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1. Introduction

Physics is one of the most fundamental of the sciences (Young & Freedman, 2012). Physics is a natural science which investigates matter, energy, and interaction of matter. The objectives of physics teaching can be classified into four categories: Cognitive, metacognitive, emotional (or affective), and practical objectives (Seroglou & Koumaras, 2001). In Indonesia, the goal of learning physics in high school is that learners have the ability to master the concepts and principles of physics and the skills to develop the knowledge and attitude of self-confidence as a provision for continuing education at a higher level, and developing science and technology (Indonesia, 2006). Lucardie (2014) argued that learning physics aims to provide knowledge and understanding of the application of the concepts of physics and the scientific method that involves the process of skills to solve a range of problems in everyday life. Thus, physics is an important subject to be studied because it can help students have the ability to think and act scientifically. This capability is useful for students to support the development of the times and solving existing problems in everyday life.

The goal of the learning of physics will be reached if learning physics at school can be run well. The success of the studied physics can be predicted through the attitude of students toward the subjects of physics because attitudes are the best predictor for estimation of my student's success (Hendrickson, 1997). Attitude can be defined as the tendency to give learned consistent, positive, or negative reaction to an object (Fishbein & Ajzen, 1975). Nordin and Lin (2011) define attitudes as part of an individual's personality is influenced by the behavior of the group's relationship with it. The attitude can be also defined as the tendency to act against the people, things, events, or ideas. The attitude appears unnoticed, sustainable, and connected closely with the opinion. Attitudes are formed as a result of a learning experience. Seferoğlu (2004) attitudes are related to coping with, and management of the emotions occurring during the learning process and they play an important role in directing human behavior. Therefore, one that can influence student behavior during the learning process is how students' attitudes toward the subject.

The attitude of the students toward the subjects of physics, there are only two kinds, namely, a positive attitude and negative. Students who have a positive attitude toward certain lessons tend to be more diligent in learning so as to achieve satisfactory results. The most important competence that physics education students should have is skill competence, by having skills supported by scientific knowledge and students' abilities of a scientific approach, physics students can develop an understanding of scientific concepts (Darmaji, Kurniawan, Parasdila, & Irdianti, 2018; Darmaji, Kurniawan, & Irdianti, 2019). It was observed that the students who have a negative attitude toward physics have lack of motivation for class engagement and also the students who have positive attitudes toward physics have motivation for class engagement (Guido, 2013; Asrial, Syahrial, Kurniawan, Subandiyo, & Amalina, 2019). Hence, students will have the motivation to learn and engage with the learning process in a positive attitude on physics, and vice versa. They are activated when individuals encounter unfamiliar problems, uncertainties, questions, or dilemmas. Therefore, students who acted positively on physics will multiply and have a passion for learning physics. Students who enjoy learning physics then it will have the ability to think a good analysis.

With the interest of students in participating in physics learning, it will arise their confidence that they have abilities in physics. Therefore, by having this ability, students are more motivated in learning (Higgins & Kruglanski, 2000). Because motivation is a psychological process that can encourage and activate a person's behavior, students who are highly motivated in learning make it possible to get

high learning outcomes too, meaning that the higher the motivation, the more intensity of effort and effort is made, the higher the learning achievement he gets (Trobojevic, Otasevic, & Mitrovic, 2015).

Discipline is a very important behavior that is owned by everyone because it is related to the behavior/character of each person. Damrongpanit (2019) state, "self-discipline is one qualification for all societies and people needed." Discipline toward students is closely related to problems from students and schools. Winkler, Walsh, de Blois, Maré and Carvajal (2017) stated the current school discipline approach, especially used for the problems of the student and school community. Discipline is a character component that must not be separated by each student. Consequently, a discipline usually reflects the values and norms of individuals or groups (Thomas, Rick, George, & Schwarz, 2008). Discipline has a positive effect on learning in school. Discipline in the classroom is considered as one of the keys to effective learning teaching (Ugurlu et al., 2015), while student discipline toward science is a habit that is carried out consistently toward science in everyday life, especially learning science at school.

The purpose of this study was to determine the attitude and the relationship between motivation, attitudes, and discipline of students toward physics learning in high school.

1. How to describe student attitude toward physics learning?
2. How to describe student motivation in physics learning?
3. How to describe discipline student in physics learning?

What is the relationship between students' motivation and attitudes toward physics subjects?

2. Methodology

2.1 Research Design

The research design used in this study is the associative quantitative research method with a correlational research design. Associative quantitative research is research that aims to determine the relationship between two and more variables (Cohen, Manion, & Morrison, 2007). According to Creswell (2015), "correlational design is a procedure in quantitative research that is used by researchers to measure the degree of association (relationship) between two and more variables using statistical analysis correlation procedures."

2.2 Research Sample

The samples that the researchers used were all students of Senior High School in one and five Batanghari district, six and eight Muaro Jambi district, Senior High School which numbered 612 students, with male students numbering 284 and female students totaling 328 students. In this study, the researcher used total sampling technique. Total sampling is a technique of determining samples that uses all populations as a sample (Creswell, 2015).

2.3 Instrument and Procedure

In this study, the study used three questionnaire instruments where, in the attitude questionnaire adopted from the Darmawangsa, Astalini and Kurniawan (2018) study which had 28 valid statements with three indicators which had a Cronbach alpha reliability value of 0.9, for the motivational questionnaire adapted from Sudibyo, Widodo and Jatmiko (2015) has 23 valid statements with 12

indicators that have Cronbach alpha reliability value of 0.86, and for the discipline questionnaire has 25 valid statement. In this study, researchers using a Likert scale five for positive statements strongly disagree having a score of 1, disagree having a score of 2, neutral having score 3, agree has a score of 4, and strongly agree 5. For negative statements strongly disagree has a score of 5, disagree has a score of 4, neutral has a score of 3, agree has a score of 2, and strongly agree has a score of 1.

In Table 1, there are categories of questionnaires, which are very good, good, sufficient, not good, and not very good.

Table 1. Characteristics of attitude, motivation, and discipline

Category	Interval				
	Enjoyment of physics lesson	Pleasure interest in science	Career interest in science	Motivation	Discipline
Very not good	10.0–18.0	8.0–14.4	10.0–18.0	23.0–41.4	25.0–45.0
Not good	18.1–26.0	14.5–20.8	18.1–26.0	41.5–59.8	45.1–65.0
Enough	26.1–34.0	20.9–27.2	26.1–34.0	59.9–78.2	65.1–85.0
Good	34.1–42.0	27.3–33.6	34.1–42.0	78.3–96.6	85.1–105.0
Very good	42.1–50.0	33.7–40.0	42.1–50.0	96.7–115	105.1–125.0

2.4 Data Analysis

The data in this study used quantitative analysis data using the SPSS program to look for descriptive and inferential statistics. Descriptive statistics are a description or presentation of large amounts of data, in this case, in the form of summary frequencies, for example, mode, mean, median, minimum, maximum and standard deviation, and statistical inference using product-moment correlation (Cohen, Manion, & Morrison, 2007).

3. Results and Discussion

Students can be viewed from the characteristics of students, namely, from feeling happy, or just ordinary from these students that student can be seen from feeling happy, unhappy, like or dislike, and motivated or unmotivated. Attitude is a term that reflects pleasure, displeasure or an ordinary feeling (neutral) of a person toward something (Oba & Lawrence, 2014; Astalini, Kurniawan, Darmaji, Sitorus, & Perdana, 2019). The validity of this research is viewed from the indicators of enjoyment of physics lesson, pleasure interest in science and career interest in physics derived from Fraser’s (1981) research and implemented in Indonesia in terms of validity and reliability with validity values of 28 statements and having Cronbach alpha values of 0.9 carried out by Darmawangsa, Astalini and Kurniawan (2018).

3.1 Result

What will be examined in this study are three indicators, namely, enjoyment of physics lesson, pleasure interest in science, and career interest in physics..

3.1.1 Enjoyment of Physics Lesson

The results of the analysis of descriptive statistics on student attitudes questionnaire indicators of the enjoyment of physics lesson are presented in Table 2:

Table 2. The results from the enjoyment of physics lesson

Category					Mean	Median	Min	Max	%
Interval	Female	Male	Attitude	Total					
10.0–18.0	24	22	Very not good	46	38.0	35	15	45	7.6
18.1–26.0	45	39	Not good	84					13.7
26.1–34.0	126	105	Enough	231					37.8
34.1–42.0	95	91	Good	186					30.5
42.1–50.0	38	25	Very good	63					10.4
Total	328	284		612					100

From Table 2, 284 respondents high school for male students and 328 students' for female, it was categorized as enough for male with a total of 105, then for female as many as 126 in enough category and processed results using the SPSS program application, it was obtained for an enjoyment of physics lesson to have enough category at 37.8% for a total of 231 out of 612 students, good category of 30.5% for a total of 186 students of 612 students, very good at 10.4% for a total of 63 students of 612 students, not good at 13.7% for a total of 84 students of 612 students, and very not good at 7.6% for a total 46 out of 612 students. Of 612 students, the mean was 38.0, median 35, maximum value 45, minimum value 15.

3.1.2 Pleasure Interest in Science

The results of the analysis of descriptive statistics on student attitudes questionnaire indicators of interest to reproduce time studying physics are presented in Table 3:

Table 3. The results from pleasure interest in science

Category					Mean	Median	Mini	Maxi	%
Interval	Female	Male	Attitude	Total			mum	mum	
8.0–14.4	24	22	Very not good	46	29.0	14	9	38	7.5
14.5–20.8	35	29	Not good	64					10.5
20.9–27.2	95	90	Enough	185					30.2
27.3–33.6	140	106	Good	246					40.2
33.7–40.0	34	37	Very good	71					11.6
Total	328	284		612					100

From Table 3, 284 respondents high school for male students and 328 students' for female, it was categorized as good for male with a total of 106, then for female as many as 140 in good category and processed results using the SPSS program application, it was obtained for a pleasure interest in science to have a good at 40.2% for a total of 246 out of 612 students. Enough category of 30.2% for a total of 185 students of 612 students, very good at 11.6% for a total of 71 students of 612 students, not good at 10.5% for a total of 64 students of 612 students, and very not good at 7.5% for a total 46 out of 612 students. Of 612 students, the mean was 29.0, median 14, maximum value 38, and minimum value 9.

3.1.3 Career Interest in Science

The results of the analysis of descriptive statistics on student attitudes questionnaire indicators of career interest in science to reproduce time studying physics are presented in Table 4.

Table 4. The results from career interest in science

Category	Female	Male	Attitude	Total	Mean	Median	Min	Max	%
10.0–18.0	24	29	Very not good	53	39.0	36	13	47	8.7
18.1–26.0	45	36	Not good	81					13.2
26.1–34.0	116	98	Enough	214					34.9
34.1–42.0	85	83	Good	168					27.6
42.1–50.0	58	38	very good	96					15.6
Total	328	284		612					100

From Table 4, 284 respondents high school for male students and 328 students' for female, it was categorized as enough for male with a total of 98, then for female as many as 116 in enough category and processed results using the SPSS program application, it was obtained for a career interest in science to have enough category at 34.9% for a total of 214 out of 612 students, good category of 27.6% for a total of 168 students of 612 students, very good at 15.6% for a total of 96 students of 612 students, not good at 13.2% for a total of 81 students of 612 students, and very not good at 8.7% for a total 53 out of 612 students. Of 612 students, the mean was 39.0, median 36, maximum value 47, and minimum value 13.

3.1.4 Motivation

The results of the questionnaire obtained for the motivation are described in the following table5 :

Table 5. The results from motivation

Category	Female	Male	Attitude	Total	Mean	Median	Mini mum	Maxi mum	%
23.0–41.4	24	17	Very not good	41	82.0	80	25	112	6.7
41.5–59.8	25	22	Not good	47					7.7
59.9–78.2	94	103	Enough	197					32.4
78.3–96.6	137	96	Good	233					38.3
96.7–115	48	46	Very good	94					14.9
Total	328	284		612					100

From Table 5, 284 respondents high school for male students and 328 students' for female, it was categorized as enough for male with a total of 103, then for female as many as 137 in good category

and processed results using the SPSS program application, it was obtained for a motivation to have a good category at 38.3% for a total of 233 out of 612 students. Enough category of 32.4% for a total of 197 students of 612 students, very good at 14.9% for a total of 94 students of 612 students, not good at 7.7% for a total of 47 students of 612 students, and very not good at 6.7% for a total 41 out of 612 students. Of 612 students, the mean was 82.0, median 80, maximum value 112, and minimum value 25.

3.1.5 Discipline

The results of the questionnaire obtained for the discipline are described in the following table:

Table 6. The results from discipline

Category	Female	Male	Attitude	Total	Mean	Mode	Mini mum	Maxi mum	%
25.0–45.0	44	37	Very not good	81	88.0	86	30	120	13.2
45.1–65.0	23	32	not good	55					8.9
65.1–85.0	81	92	Enough	173					28.3
85.1–105.0	122	125	Good	247					40.4
105.1–125.0	58	25	Very good	83					13.6
Total	328	284		612					100

From Table 6, 284 respondents high school for male students and 328 students' for female, it was categorized as good for male with a total of 122, then for female as many as 125 in good category and processed results using the SPSS program application, it was obtained for a discipline to have a good category at 40.4% for a total of 247 out of 612 students. Enough category of 28.3% for a total of 173 students of 612 students, very good at 13.6% for a total of 83 students of 612 students, not good at 8.9% for a total of 55 students of 612 students, and very not good at 13.2% for a total 81 out of 612 students. Of 612 students, the mean was 88.0, median 86, maximum value 120, and minimum value 30.

3.1.6 The relationship between attitude, motivation, and discipline

The results of the questionnaire obtained for the indicator of career interest in the field of physics are described in Table 7.

Table 7. Test of output relationships attitude, motivation, and discipline at senior high school

Component/Variable	Mean	Attitude		Motivation		Discipline	
		<i>r</i>	Sig. (two-tailed)	<i>r</i>	Sig. (two-tailed)	<i>r</i>	Sig. (two-tailed)
Attitude	78.5		1	0.725	0.035	0.702	0.015
Motivation	81.0	0.725	0.035		1	0.658	0.027
Discipline	82.0	0.702	0.015	0.658	0.027		1

From Table 7, we can see the value is 0.035 small from 0.05, it can be seen that there is a relationship between motivation and attitudes of students in the *r*-value of 0.725 and positive, for attitude with discipline has a sig value of 0.015 more small than 0.05, it means there is a relationship between attitudes and student discipline with a *r*-value of 0.702 which means positive. Motivation and discipline have a value of sig 0.027 which means that it is smaller than 0.05, indicating that there is an

association between motivation and discipline of students with a r-value of 0.658, which means positive. If the value of sig. <0.05, then there is a relationship (Gall, Borg & Gall, 2003).

4. Discussion

The attitude of the pleasure of learning physics from students has relevant relationships with attitudes attraction multiple time student learning on subjects of physics and an attitude of interest in a career in the field of physics. Students who love the physics subjects will tend to reproduce time to study physics as well as having an interest in a career in the field of physics. The indicator on the pleasure of learning physics, students have a balanced stance between the attitude quite well and good attitude based on the results of the questionnaire. The results of the interviews with students are as follows:

“Do you like the physics lessons taught in school?”

“Yes, I love the studied physics at school.”

“What makes you love the lessons of physics in schools?”

“The physics of it interesting, not boring, and studied physics can add useful insights into daily life.”

“Besides, I like physics because fields of study are also good.”

The results of the interviews conducted to students with a good attitude on the indicator category pleasure studied physics show that students liked the lessons of physics because physics is a subject that is fun and not boring. This is because the way the teaching of teacher’s field of study (Asrial, Syahrial, Kurniawan, Subandiyo, & Amalina, 2019). The results of the interviews conducted to students with a good attitude on the indicator category pleasure studied physics show that students liked the lessons of physics because physics is a subject that is fun and not boring. According to students, teacher of physics in school is a good teacher and not rigid in teaching. How to teach teachers to study not stiff cause students liked the lessons taught in physics (Astalini, Kurniawan, Perdana, & Kurniawan, 2019). One of the factors because of a good physics teacher in learning. This shows that students feel enjoy with teachers while learning so that feels good. Nordin and Lin (2011) states students who acted positive as high confidence and knowing the importance of science in life will be the motivation for them to reach the goal at the same time affects their willingness to learn and improve their skills and achieve academic achievements that can be achieved. This is in accordance with the results of the interviews students who like physics because it caused the students to realize the benefits of learning physics in everyday life.

“Do you like the physics lessons taught in school?”

“No, I don’t like the existing physics lessons at school. If necessary, the physics lessons at school were abolished only.”

The results of the interviews done to students by category not good attitudes in indicators of pleasure studied physics suggest that students consider studying physics are a very tedious activity so that students often sleepy time the learning process. This causes the students to want the clock to increase not physics subjects at school, and it would be nice if there was no school in the subjects of physics. There are many factors that make physics became boring subjects for students; one of them is the assumption that physics are difficult subjects. According to Ornek, Robinson and Haugan (2008) which makes studied physics, it is very difficult for many students because of physics as a discipline requires learners to understand the word for word, tables, figures, graphs, equations, diagrams, and associated it. Physics requires the ability to use algebra and geometry to understand the concept of physics. In addition, physics students required to be able to work on the issue using mathematical calculations, whereas some students have a weakness in mathematics. If students have a happy feeling when studying physics subject, it can affect the learning outcomes of their physical subjects

(Astalini, Kurniawan, Perdana, & Kurniawan, 2019). According to the results of his discoveries, the higher positive attitude they have toward mathematics, the better grades they obtain in physics and the higher grades they obtain in mathematics, the better they are at solving problems in physics. Therefore, students who lack understanding of mathematics tend to be difficult to solve the problems that exist in the course of physics so that students do not like physics.

Do you often study physics at home?

Yes, I often read physics books at home, even though there is no homework or exams. I am also happy to find out about physics via the internet.

Based on the results of interviews that have been done that the students who have the interest to spend time to study physics also such as physics lessons and want hours of physics at school in multiply. If physics subjects plus students can better understand the subject of physics, according to Astalini, Kurniawan, Perdana and Kurniasari (2018); Welch (2010), students will feel excited and happy to learn a subject in the students like against the subjects. In addition, students who have an interest in spending time to study physics are students who read physics books at home not only because they have homework assignments and will be held exams but also students who take the time to read, googling, and asked teachers and friends to obtain information about the physics he wanted to know states that someone who is positive/good toward the subject is marked by willing to take the time to fill activities related to the subject.

How would you feel if the hours of physics at school in multiply?

I do not want physics school hours reproduced because it will make me dizzy.

While students who do not have an interest in increasing the time of physics study, the results of the interviews show a contradictory statement with students who have an interest in physics study time, i.e., students do not like studying physics and increase the time of physics learning at school and at home. Students will feel dizzy if physics lessons at school multiplied. Students never read physics books at home except only if there will be a repeat or a semester exam. Students who have no interest in spending time to study physics do not do homework at home but work in school. It is also stated that Astalini, Kurniawan, Perdana and Kurniasari (2018) someone who is negative/not good to the subjects is marked by not or less willing to take the time to fill activities that have something to do with these subjects.

Are you interested in a career in physics?

I do not refuse to work with scientists or if I have to work in a laboratory because it will be fun and well known. But I am not interested if I have to work as a physics teacher.

Based on interviews conducted on students who are in the category of attitudes enough, it is known that students have doubts to work in the field of physics. Students consider working in the field of physics to look cool but have a hard life like a scientist who is always in the laboratory. In addition, some students choose only a career in a particular field of physics, such as students who just want to be a teacher and do not want to be a scientist and work in a laboratory, and vice versa. There are also students who love the subject of physics but not interested in a career in physics because it has other ideas. Wong, Wong, and Peng (2011); Olasimbo (2012), career awareness is the reflection over a series of issues such as career goal, the path, ethics, capabilities, faith, and its development, with career knowledge as the basis and the rational knowledge about career values as the core. This is because, that one of the factors influencing career interest in science is pleasure in studying science which is like studying science, having an interest in science and considering science is fun.

We can see the value is 0.035 small from 0.05, it can be seen that there is a relationship between motivation and attitudes of students in the r-value of 0.725 and positive, for attitude with discipline has a sig value of 0.015 more small than 0.05, it means there is a relationship between attitudes and student discipline with a r-value of 0.702 which means positive. Motivation and discipline have a value

of sig 0.027 which means that it is smaller than 0.05, indicating that there is an association between motivation and discipline of students with a r-value of 0.658 which means positive. If the value of sig. <0.05, then there is a relationship (Gall, Borg, & Gall, 2003)

5. Conclusion and Recommendation

Based on the results of research that has been done, it can be concluded that from the three indicators of attitude, students of senior high school one and five Batanghari, six and eight at Muaro Jambi High School only one indicator that has good, enough, and enough criteria. Pleasure interest in science on personnel categorized has a good category of 40.2% for a total of 246 of 458 students. The dimensions of enjoyment of physics to have a sufficient category of 37.8% for a total of 231 out of 612 students. The dimensions of career interest in the field of physics are categorized a sufficient at 34.9% for a total of 214 out of 612 students, motivation has a good at 38.3% for a total of 233 out of 612 students, and discipline has a good at 40.4% for a total of 247 out of 612 students. There is a relationship between motivation and attitudes of students with a r-value of 0.725 and positive, for attitude and student discipline with a r-value 0.702 and positive. Motivation and discipline have a r-value of 0.658 which means positive.

Based on the results of research that has been done, the indicators that get the criteria well enough need to do further improvement/investigation to improve the better results of these indicators, namely, the indicator pleasure interest in science, enjoyment of physics, and career interest in the field of physics. Efforts to improve indicators that still have sufficient criteria; the indicator of the normality of scientists can be done by introducing more biodata and life history of scientists on the teaching and learning process in learning materials related to the history of scientists. Then, for an indicator of career interest in the field of physics, such as providing knowledge about jobs in the field of physics, such as the work of a scientist.

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