

The Influence Between Self-Concept and Emotional Intelligence on The Ability of Physics Problem Solving

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Abstract

This research aims to know the relationship between self-concept and emotional intelligence on the ability to solve the physics problem of students. The sample used was one hundred and fifteen people determined by simple random sampling. The ability to solve physics problems is measured by test instrument. The research data were processed using simple linear regression techniques and multiple regression. The results showed there was weak and significant positive relationship between self-concept and the ability to solve physics problems; there is very weak and insignificant positive relationship between emotional intelligence and the ability to solve physics problems; there is weak and significant positive relationship between self-concept and emotional intelligence together to the ability to solve physics problems.

Key Words: self concept, emotional intelligence, problem solving ability

INTRODUCTION

Advances in Technology and Information are very fast marked by the era of digitalization that brings to ease the activities of all walks of life or often referred to as the industrial era 4.0. To deal with this era, the Indonesian Minister of Education and Culture said that his ministry had prepared a special standard of learning strategy to deal with the industrial revolution 4.0. That standard has been made long ago. The preparation is to redesign the educational curriculum which has five potentials, namely (1) the ability to think critically, (2) the creativity of the students' children, (3) communication skills, (4) collaboration, and (5) to present self-confidence, namely making students who have high self-confidence so that they can become capital in facing the industrial revolution 4.0. Related to the fifth point, which clearly shows that students need to have confidence in themselves, be able to assess everything positively, and respect their life.

Many stories of youth or students that we find interesting in society, namely inspiring stories

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that show how they are able to understand themselves, assess and respect themselves in facing external influences and environmental influences and there are also students unable to direct their potential towards which is positive, the students are not sure of their abilities. Conflicting attitudes indicate that no matter how much effort is made in educational institutions also depend on students. Encouragement in students is certainly very influential. The term that represents this ability is self-concept, students who have a positive self-concept will be able to withstand external or internal pressure or influence (Verma & Bagley, 1982; Oyserman, 2001; Julius, Abdullah, & Suhairom, 2018; Marsh, & Seeshing, 1997)

From the description above, it shows that the concept of self has a big influence in our lives. A good self-concept can have a good effect on us and vice versa, a bad self-concept can have a negative impact on us (Akin & Folorunso, 2014; Matovu, 2012; Noviandari & Mursidi, 2019). After students were able to understand, assess and value themselves positively, students will become individuals who feel able to overcome problems,

feel equal to others, receive praise without shame and feel able to improve themselves. A broad understanding of himself can provide a trigger for building his own intelligence.

Intelligence is owned by every human being, although there is no human who has the whole intellect, there is an intelligent intellectual, there is an intelligent emotional, and so on. Mayor and Salovey (Wade & Tavis, 2007) say emotional intelligence is an ability to identify emotionally experienced by oneself and others accurately, the ability to express emotions properly and the ability to regulate emotions in oneself and others. Goleman (2001), said that many people have excellent expertise and academic potential (IQ) but have failed in their lives. The fatal weakness in each case he encounters is in the emotional domain. Uncontrollable emotions can make smart people stupid. People who are less emotionally intelligent will not use their cognitive abilities to reach their full potential (Bahman & Maffini, 2008; Lantieri, 2008; Stough et al, 2009; Weisberg, 2006; Pushpa, & Yeshodhara, 2014; Raeisoon, Jan, & Sharifzadeh, 2014; Rozell, Pettijohn, & Parker, 2002)

The world of education is often highlighted by the many student brawls that cannot control emotions. Students who have stable emotional intelligence, are able to control anger and can solve interpersonal problems. So that it can significantly affect learning achievement in every subject taught at school, "she explained.

Rachmat (2009) states many factors affect the ability of problem solving in adolescents. These factors include motivation, self-confidence and the right attitude, habits and emotions. Emotional intelligence is one of the factors that influence the ability of problem solving. Emotions color the way of thinking in dealing with situations, without being aware of emotions often seen in them that cause someone to think ineffectively. A whole human being cannot rule out emotions, emotions are not the main obstacle but if they reach a high intensity it will become stressful which causes difficulty thinking efficiently and impedes problem solving.

In the process of learning physics a student will experience a process to make an effort in order to obtain knowledge related to physics. In order for the learning effort to be implemented the students must have the ability to solve various physics problems, which in this case is called the ability to solve physics problems. A student who has high problem-solving abilities will have the opportunity to achieve maximum learning success (Whimbey & Lochhead, 2013; Rusczyk & Lehoczky, 2006).

In learning physics, the ability to solve student problems is still relatively low. In doing physics problems given by the teacher, students more often directly use mathematical equations without analyzing, guessing the formula used and memorizing examples of questions that have been done to do other problems. Students experience difficulties when dealing with complex problems. Students were able to solve simple quantitative problems but lack the ability to solve more complex problems (Azizah, 2015; Spraul, 2012).

This is supported by various studies, one of which is by Siti et al, (2017) which shows that there is a significant relationship between self-concept and emotional intelligence on biology learning outcomes. The relationship between self-concept and emotional intelligence is very related to student learning outcomes, because if a person's self-concept is not in line with his emotions, this can destroy a person in everything, both about his daily life or even in terms of learning to achieve maximum value in the teaching and learning process that carried out wherever and whenever it takes place. In addition, the results of research conducted by Amalia (2017), concluded that there is a very significant relationship between emotional intelligence with the ability to solve problems.

The observation results of researchers at SMAN 1 Majene obtained information that students are still difficult to solve physics problems that require support for high problem solving abilities. This is supported by the facts from the Primary and Secondary Education Basic Data of the Directorate General of Primary and Secondary Education that the results of the National

Examination in physics subjects at 6 State High Schools in Majene Regency in 2017 obtained average school grades in the range of 2.99 to 6.00. The low results of the National Examination in the subject of physics in such students should be suspected to occur due to the lack of students' physics problem solving abilities.

Based on the description stated above, it is an important effort in conducting research on self-concept, emotional intelligence and the ability of students to solve physics problems. This study aims to describe the effect of self-concept and emotional intelligence on physics problem solving abilities. The hypotheses in this study are as follows; (1) there is a positive relationship between self-concept and the ability to solve physics problem, (2) there is a positive relationship between emotional intelligence and the results of problem solving abilities, and (3) there is a positive relationship between self-concept and emotional intelligence together to the problem-solving ability of class X Science students of SMAN 1 Majene in the 2018/2019 school year.

METHOD

This research is a "ex-post facto" research which is correlational consisting of three variables, namely two independent variables and one independent variable. The independent variable (independent) is the concept of self and emotional intelligence, while the dependent variable (dependent) is the ability to solve physics problems.

The research design carried out is a dual paradigm form with two independent variables and one dependent variable as displayed in Figure 1.

The study population was all students of class X Science of SMA Negeri 1 Majene in the 2018/2019 school year, totaling 154 people. The sampling method used is simple random. The technique used to determine the sample size is the Solvin technique and obtained a sample size of 115 people taken evenly from all class X.

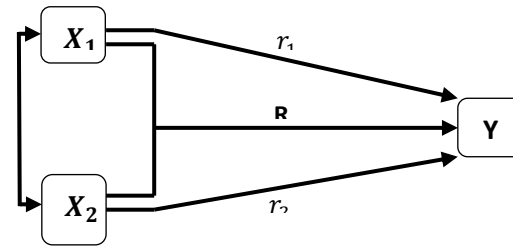


Figure 1. paradigm form with two independent variables and one dependent variable.

Information:

- X_1 : the student's self-concept
- X_2 : the emotional intelligence of students
- Y : the result of students' physics problem solving abilities
- r_1 : the correlation between X_1 and Y
- r_2 : the correlation between X_2 and Y
- R : the correlation between X_1 and X_2 with Y

The data collection instrument in this study used a questionnaire guideline based on a Likert scale. The questionnaire about self-concept used in this study is the result of the adoption of the *Tennessee Self Concept Scale* (TSCS) compiled and developed by Fitts (1965). Emotional intelligence measured by this questionnaire reveals the five components of emotional intelligence Goleman (1998).

The statement used to measure the level of students' self-concept is a combination of two dimensions including one subself from the internal dimension (identity, judging, and behavioral) and one subself from the external dimension (physical, moral-ethical, personal, family and social). From the combination of these two dimensions, 15 combinations are obtained.

There are five indicators that will be used to measure emotional intelligence according to Daniel Goleman, namely: 1) Recognizing one's emotions 2) Managing emotions 3) Self-motivating 4) Recognizing other people's emotions, and 5) Fostering relationships.

According to Polya (1973), problem solving contains four steps to solve, namely: 1) understanding the problem, 2) devise a plan

(translate), 3) carry out the plan (solve), and 4) look back (check and interpret).

Measurement of self-concept variables and emotional intelligence using a non-test instrument (questionnaire) Likert scale model with a range of scores 1-5, as for the number of self-concept questionnaire as many as 34 items and 42 items of emotional intelligence. While the variable ability to solve physics problems is measured by using 10 items test in the form of essays by using Polya steps.

Data obtained in this study were processed and analyzed with inferential statistics. Before testing the research hypothesis, the prerequisite analysis is first performed which includes: normality test, homogeneous test. Then the hypothesis test includes simple linear regression analysis and then correlation analysis. Product moment correlation analysis was performed to determine the relationship between the variables X_1 with Y , and the relationship X_2 with Y . Multiple correlation analysis was carried out to determine the relationship between the variables X_1 and X_2 together against the Y variable. To simplify the analysis, Statistics computer software Social Science Package (SPSS 22 for windows) was employed.

RESULT AND DISCUSSION

Based on the power prerequisite test performed using the Kolmogorov-Skrinov test, the probability value (sig.) of the self-concept variable, emotional intelligence, and the problem solving ability is greater than 0,05. It can be concluded that the data from the three variables obtained are normally distributed. Based on the Test of Homogeneity of Variances, the probability value for the self-concept variable and the emotional intelligence variable is greater than 0,05. Because the probability value of the three variables above is greater than 0.05, it can be stated that the data on self-concept and emotional intelligence, on the problem-solving ability of first grade science students of SMA Negeri 1 Majene in the 2018/2019 academic year are homogeneous.

The linear regression results of the relationship between self-concept and the physics problem solving ability of students in First Grade Science students of SMA Negeri 1 Majene of SMA Negeri 1 Majene can be seen in Table 1.

Table 1. Summary of Linear Regression Results the Relationship between Self-Concept (X_1) and Problem-Solving Ability (Y)

Variable	Regression Coefficient	t_{count}	Sig
Constant	0.412		
X_1	0.750	2.785	0.006 ^b
F_{count}	= 7.755		
R Square	= 0.064		

The correlation coefficient is positive, it means there is a positive (weak) relationship between self-concept and the physics problem solving ability of First Grade Science students of SMA Negeri 1 Majene.

The results of the linear regression test the relationship between emotional intelligence and the ability to solve physics problems of students in Class X Science of SMA Negeri 1 Majene are displayed in Table 2.

Table 2. Summary of Linear Regression Results the Relationship between Emotional Intelligence (X_2) and Problem-Solving Ability (Y)

Variable	Regression Coefficient	t_{count}	Sig
Constant	1.734		
X_2	0.454	1.880	0.063 ^b
F_{count}	= 3.536		
R Square	= 0.030		

The linear regression equation models the relationship of self-concept and the ability to solve the physics problem solving of students in class X Science of SMA Negeri 1 Majene are: $Y = 1.734 + 0.454 X_2$. From the product moment correlation coefficient test results obtained correlation coefficient of 0.174.

Furthermore, the results of the multiple linear regression test the relationship between self-

concept (X_1) and emotional intelligence (X_2) together on the ability to solve physics problems (Y) students of class X Science of SMA Negeri 1 Majene in the 2018/2019 school year can be seen in Table 3.

Table 3. Summary of Linear Regression Results the Relationship between Self-Concept (X_1) and Emotional Intelligence (X_2) on Problem Solving Ability (Y)

Variable	Regression Coefficient	t_{count}	Sig
Constant	0.265		
X_1	0.692	2.034	0.044
X_2	0.084	0.282	0.779
F_{count}	= 3.886		0.23
R Square	= 0.065		

From the results of the multiple correlation test, the magnitude of the relationship between self-concept and emotional intelligence simultaneously to the problem-solving ability is 0.255. The correlation coefficient is positive, it means there is a positive (weak) and significant relationship between self-concept and emotional intelligence simultaneously to the physics problem solving ability of students of class X Science of SMAN 1 Majene in the academic year 2018/2019. The main section of a scientific article containing result of data analysis, result of hypothesis testing and can be completed with table or graph to clarify the result verbally.

In general, self-concept can be divided into two, namely positive self-concept and negative self-concept. Taylor (in Syamsul BT, 2010) suggested that students who have positive self-concepts are clearly able to overcome problems in daily life, tend to be more independent, confident, and free from undesirable characteristics such as anxiety, excessive fear and feelings lonely.

The above mentioned research results are relevant to the results of Musriandi's (2017) research which states that there is a positive and significant relationship between self-concept (self-concept) with the ability to solve mathematical problems. This means that self-concept can be

used to predict the level of students' mathematical problem solving abilities. Ernawati (2015) found that there was a positive and significant relationship between the influence of self-concept on problem solving for students at SMAN East Jakarta. With a positive correlation coefficient which indicates that the correlation of the two variables is strong. In line with this Sunnah (2014) shows that self-concept has a positive correlation coefficient. This can be seen that between self-concept has a strong and positive relationship or goes in the direction of the ability of problem solving. That is, there is a positive relationship between self-concept and problem-solving ability. This means that the higher the entrepreneur's self-concept, the higher the problem-solving ability he has.

According to Ibrahim (2012), emotional intelligence has a role that is not small, especially in order to improve students' mathematical problem solving abilities. Essentially, emotional intelligence becomes a supporter of intellectual intelligence in achieving learning success. Thus emotional intelligence affects the ability of students to problem solving in accordance with the opinion of Sharei (2012) which states that the ability to solve problems does not depend only on cognitive abilities but also affects emotional intelligence.

These results are supported by Goleman (2007) which states that IQ for a person's success contributes around 20% and the remaining 80% is determined by a group of factors called emotional intelligence. According to Kalsum (2018) who said that the correlation coefficient of the relationship between emotional intelligence with the ability to solve physics problems, thus concluding that there was a significant relationship between emotional intelligence with the ability to solve physics problems of class IX SMP 24 Banjarmasin. Furthermore, Octaviana (2017) stated that there is a positive correlation between emotional intelligence and problem solving abilities in students. The results of the reliability coefficient of the problem solving scale are 0.853 and the results of the emotional intelligence scale reliability coefficient are 0.825. With these results and conclusions, the hypothesis in this study can be

accepted. Thus it can be said that there is a relationship between emotional intelligence and the ability of problem solving in students of Candle Tree High School, Serpong Tangerang.

Associated with the relationship between self-concept and emotional intelligence on the ability to solve problems, Ahmad (2015) revealed that the ability to know oneself or to conceptualize themselves and think critically is needed in developing the ability to analyze, solve problems, synthesize and summarize problems encountered in daily life day, as well as testing or criticizing to get answers to the problems they face. Bambang (2012) revealed that the ability to solve problems is an important learning outcome in the education process. As part of intellectual skills, it is also a result of high ranking learning.

Mayer (2001) define "emotional intelligence" as the ability to feel, respond to and manipulate emotional information without having to understand it and the ability to understand and manage emotions without having to feel the feelings well or experience them fully. It is divided into four branches. One branch of the discussion is emotional assimilation, which includes thinking that prioritizes emotions by directing attention to important information. Emotional states differently encourage specific problem solving approaches such as when happiness facilitates inductive reasoning and creativity.

Students who have a good self-concept have unique answers in solving physics problems. If we look at the sequence of how to solve physics problems, the student writes a very good visualization of the problem, which is to draw a sketch of the problem, identify the known quantities in the problem, identify the problem to be solved, and identify a general approach to the problem. Then the student presents the problem into the concept of physics, namely using the principles that have been identified to make a diagram or graph about the problem, writing down the known and asked quantities in the existing problem. We know that each of these steps is part of the "understanding the problem" in Polyas' steps. In other words, students who have a good

self-concept tend to understand a problem well before trying to solve it.

Likewise with students who have a good emotional intelligence, where they have unique answers in solving physics problems. If we look at the sequence of ways to solve physics problems, the student always checks back and re-evaluates the answers he gets. The student always checks back on the course of problem solving that has been carried out in the previous stage and always checks the size of the results and the units in the answer. This is indicated by the existence of several answer corrections that the student made after he worked on them, such as dimensional analysis notes and rounding corrections to significant figures. In other words, students who have a good emotional intelligence will always be able to respond to mistakes in every problem that occurs.

Other research also shows how complex psychological processes are around self-concepts, as well as how large the potential for individual variations are across learners and contexts (Merner, 2011; Smith & DeMarree, 2017).

In order to live a decent life, students who are also in a community position must know how to solve problems because they are an inseparable part of a person's life and often become a source of stress that requires a response. This level of stress is not only influenced by the size of the problem but also individual characteristics such as personality, biological factors, life experiences and imitation, including effective problem solving will determine the shape of a person's response to problems. Despite the fact that personality and biological factors are partially predetermined and experiences cannot be forgotten, there is much to be done in problem-solving skills so that the severity of the stress response can be reduced. Research carried out in the last two decades revealed how problem-solving skills are important in dealing with chronic problems, stressful life events and difficulties experienced in the adjustment process (Heppner et al., 2002). This will really help us in forming individuals who can solve problems (including life problems) appropriately.

Knowing how to predict problem solving skills through emotional intelligence can yield very useful suggestions for future directions of problem-solving skills programs and forms of follow-up afterwards. This can be done with the initial basis for describing the relationship between emotional intelligence and problem solving skills.

A person's perception of solving problems cannot be built without a self-concept. Systems and self-concept provide an overview of the cognitive and metacognitive systems in working on problems or solving problems. Efklides' research results show that a person's metognitive effect can influence self-concept and several other attributes in solving a problem (Efklides, A., Niemivirta, M., & Yamauchi, H. 2002; Efklides, A., & Tsiora, A. 2002)

This positive self-perception is assumed to be the basis of motivation for strategic and best performance and self-regulation during the learning process. Regarding the relationship between academic self-concept and academic achievement, the existing literature supports both a direct and indirect relationship between the two. However, it is believed that this is only a small part of the factors that influence both (Guay, Marsh, & Boivin. 2003)

This study only examined the variables of self-concept and emotional intelligence, did not examine many factors that affect students on the ability to solve physics problems, for example situational, personal, biological, and sociopsychological factors and others. These factors are very influential on the ability of problem solving.

CONCLUSION

Students of class X, who have a good self-concept writes a very good visualization of the problem, which is to draw a sketch of the problem, identify the known quantities in the problem, identify the problem to be solved, and identify a general approach to the problem. In other words, students who have a good self-concept tend to understand a problem well before trying to solve it. Students who have a good emotional-intelligence

always checks back and re-evaluates the answers he gets. In other words, students who have a good emotional intelligence will always be able to respond to mistakes in every problem that occurs.

Based on the results of research and discussion, it can be concluded as follows:

- a. There is a weak and significant positive relationship between self-concept and the ability to solve physics problem in class X Science students of SMAN 1 Majene in the 2018/2019 school year.
- b. There is a positive relationship that is very weak and insignificant between emotional intelligence with the problem solving ability of class X students of SMAN 1 Majene in the academic year 2018/2019
- c. There is a weak and significant positive relationship between self-concept and emotional intelligence together to the problem solving ability of class X students of SMAN 1 Majene in the 2018/2019 school year.

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