



The Effects of Emotional Intelligence on Students' Mathematical Problem Solving Ability

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Abstract

This research aims to obtain information about the influence of emotional intelligence on the ability of students' mathematical problem-solving. This research was conducted at Junior High School State for class eight students. This research is a quantitative survey research with descriptive analysis method. The data obtained is data from the retrieval of the questionnaire then analyzed the results. The results showed that there was an influence of emotional intelligence on students' mathematical problem-solving abilities because the value t count $15.76 > t$ table 2.021 with a significant level of $\alpha = 5\%$.

Keywords: Education; Problem Solving Ability; Emotional Intelligence

Introduction

The world of education is filled with a variety of diversity because, no student has the same power, absorption, thinking power and intelligence, where each student is in the same class or school. For that reason, how to educate is different depending on the level of intelligence of each student. But what has happened so far is uniformity of learning procedures in each school as if all students have intelligence uniformity. Student emotional intelligence is very important to know the teacher before starting learning because by knowing the level of emotions students can determine the best method so that students can take lessons well (Slavin, 2010).

Mathematics is a basic science that is growing rapidly, both material and its usefulness. Learning mathematics at school always pays attention to its usefulness, including the development of mathematical problem-solving skills. However, there are still many students who think mathematics is an elusive lesson. Therefore, to carry out their duties as educators, a teacher must be able to understand the character of students to facilitate the teaching and learning process.

The learning process at school is complex and comprehensive. Many people argue that to achieve high achievement in learning, a person must have high intelligence because intelligence is the provision of potential that will facilitate learning and in turn, will produce optimal learning achievement. But the

phenomenon shows that not a few people with high intelligence have a low achievement, and there are many people with moderate intelligence who can surpass the learning achievements of high intelligence people. This shows that intelligence cannot always predict one's learning achievement, especially in problem-solving abilities. There are other important factors, namely emotional intelligence.

Every day we will find numbers. Mathematics strongly emphasizes the ability to think logically and systematically. Problem-solving in mathematics requires a high concentration of thinking, accompanied by perseverance, patience and an optimistic attitude to be able to create students' enthusiasm in learning mathematics. Because they consider mathematics to be the most difficult subject, so students do not feel confident, give up easily and feel that counting is unpleasant. Though the teacher has tried to teach with various media and interesting methods, emphasizing the activity of students, mathematics learning outcomes are still low. The child seems hesitant to count and gives up quickly. Especially if the results of the calculation are wrong they choose not to count again because they think they cannot solve the problem at hand or in other words students feel hopeless.

Following the latest curriculum, the factors of emotional intelligence which include affective and psychomotor began to be used as indicators of success in education. This is evidenced by the form of assessment in primary and secondary schools, there is an assessment known as conceptual assessment, reasoning ability and psychomotor abilities that will sharpen students' emotional intelligence because it stimulates the thinking and ability of students to communicate the lessons being studied in their own words based on results their deepening on the application of mathematics itself. Students' ability to communicate learning outcomes will increase emotional intelligence because it will encourage them to be more mature in responding to various problems so that learning is more effective and efficient.

Suggests that to face future challenges, students need knowledge, skills, and attitudes (Parkey, 2014). The most important thing that must be known by educators is that problem-solving skills are a part that is integrated with the growth process. Children's intellectual and emotional growth is driven by the problem-solving process. Like emotional intelligence, the ability of children to solve problems is generally in line with increasing age. Children can solve complex problems if they are used to being guided using familiar and real terms, although sometimes they are also wrong to answer questions presented in the abstract. Therefore, in the learning process, children must be invited to solve problems as often as possible according to their age and experience. If the child is accustomed to solving problems, it means that the teacher or parent has built a storehouse of experiences that can later be used to solve the next problem.

This approach has been reported to improve student's achievement and knowledge retention (Johnson, 2009). Specifically, cooperative learning has been reported to improve the student's ability and academic achievement (Gani, 2009). In levels of education, the student's in cooperative learning the situations achieved greater academic, social and psychological.

Literature Review

Problem-solving skills

Suggests that problems are something that is not liked, creates difficulties for oneself and others and needs to be eliminated (Prayitno, 2014). A problem is a deliberate or unforeseen event in life or event that can arise thanks to the existence of new knowledge or thoughts to make a condition better. Problem-solving is to use scientific methods or think systematically, logically, regularly and thoroughly to gain abilities and cognitive skills in mastering concepts, principles, and strategies expressed by Lawson

(Muhibbin Shah, 2010). The states that problem-solving is the process of applying previously acquired knowledge into a new situation that is not yet known (Wardani, 2014).

According to Polya, understanding problem solving as an attempt to find a way out of a difficulty in achieving a goal that is not so soon achieved. Polya problem solving suggests four indicators are: understand a problem, settlement planning, solving the problem according to plan and checking back for all the steps that have been undertaken. Low absorption capacity can be triggered by a lack of meaningful learning experiences (Schoenfeld, 2009).

Emotional intelligence

Emotional intelligence is a new way to raise children. Studying children's personality development is one tool that is widely used to find out. Lawrence (Hamzah, 2012) reveals children's emotional intelligence can be seen in tenacity, optimism, self-motivation, and enthusiasm. According to Daniel Goleman's research (2015), psychologists agree that IQ only supports 20% of the factors that determine success while the remaining 80% comes from other factors including emotional intelligence. Indicators of emotional intelligence are used to recognize emotions themselves, manage emotions themselves, motivate yourself, get to know the emotions of others and foster good relations with others.

According to emotional intelligence is the ability to understand others and act wisely in human relations (Torndike, 2015). Cooper and S Awaf suggest that emotional intelligence is the ability to feel, understand and effectively apply power and emotional sensitivity as a source of energy, information, connection and human influence (Darmansyah, 2012). Emotional intelligence is strongly influenced by the environment, is not permanent and can change at any time. For this reason, the role of the environment, especially parents in childhood, greatly influences the formation of characteristics. Characteristics of students include academic ability, age, maturity level, motivation towards learning, experience, skills, workability and psychomotor. EQ skills are not the opposite of IQ skills but, both interact dynamically.

Research Method

The study was conducted in Junior High School. The population in this study were all eighth-grade students with 297 students consisting of 132 male students and 165 female students. The samples to be taken in this study were 20 students. The sampling technique in this study was to use random sampling with random sampling without regard to sequence.

This type of research is a survey while the method used in this study is descriptive-analytical. The analytical descriptive survey method is a research method that takes samples from a population and uses a questionnaire as a data collection tool. This design was selected because it may help test the cause and effects relationship between the independent variable and the dependent variables (Razavieh, 2009). In this study data value and information were collected from respondents using a questionnaire. The data is obtained then the results will be presented descriptively. The instrument used to retrieve data is a description test and questionnaire.

Descriptive statistical tests are part of statistical science that only process, present data and make decisions for the population. Data processing includes the mean, mode, median, variance, and standard deviation. Before testing the hypothesis, the data is first tested for the requirements analysis, namely the

normality test, then homogeneity test and linearity test. The prerequisite test carried out by the next researcher is simple correlation analysis and coefficient of determination (Draper, 2014).

Results and Discussion

Based on the research that has been done, it can be seen that the data concerning students of Junior High School in the academic year 2016 - 2017. In this study, the sample used was as many as 20 students. Thus, 20 students were data sources representing the population, namely all students of class eight. Data on mathematical problem-solving ability with class eight flat-side space building material taken from students by giving questions in class eight as a whole has a range of 25 with the highest score of 65 and the lowest score of 90. Data analysis shows that the value data has a mean of 79, the mode is 80, the median is 80, the standard deviation is 8.52 and the variance is 72.63. The calculation results can be seen in table 1.

Table 1. Data Description of Mathematical Problem Solving Ability

Mean (average)	79
Median (Me)	80
Mode (Mo)	80
Standard deviation (SB)	8.52
Variance (s)	72.63
Range	25
Minimum	65
Maximum	90

Descriptive statistical tests of students' emotional intelligence were obtained by giving questionnaire instruments to class eight students as a whole having a range of 45 with the lowest score of 50 and the highest score of 95. Data had a mean score of 72.75, a mode of 80, a median of 80, a standard deviation is 13.42 and the variance is 180.19. The calculation results can be seen in Table 2 below:

Table 2. Description of Emotional Intelligence Data

Mean (average)	72.75
Median (Me)	80
Mode (Mo)	80
Standard deviation (SB)	13.42
Variance (s)	180.19
Range	45
Minimum	50
Maximum	95

The normal test of the data using the Lilifors test technique at a significant level with the value of $\alpha = 0.05$. The results of the calculation are presented in the following table 3 :

Table 3. Calculation of Research Data Normality

Instrument	Z _{count}	Z _{table}	Information
Mathematical problem solving skills	0.1054	1.90	Normal
Emotional intelligence	0.0946	1.90	Normal

From the table above, the calculation of mathematical problem-solving abilities is 0.1054 and emotional intelligence is 0.0946. N use values will be compared with the value Lilifors in the table with $n = 20$ and the significant level $\alpha = 5\%$, which is 1.90. Z count value smaller than Z table value then H_0 is accepted. Thus it can be concluded that the sample of this study came from a population that was normally distributed.

Ulinearity has done using simple linear regression with significance level $\alpha = 0.05$. The calculation results can be seen in Table 4 below:

Table 4. Calculation of Research Data Linearity

Source of variance (sv)	dk	Jk	rjk	F _{count}	F _{table}
Total	20	126200			
Regression (a)	1	124820	124820		
Regression (b / a)	1	1284.05	1284.05		
Residue	18	95.95	5.33	0.026	3.11
Tuna is suitable	4	378854,1	94713.5		
Error	14	378950	27067.8		

Based on the above data obtained F count = 0.026 then this value is compared with F table where the numerator $df = 4$ and denominator $df = 14$ at the significance level $\alpha = 0.05$, F table = 3.11. The value of F count < F table then H_0 is accepted. It can be concluded that there is a linear relationship between emotional intelligence variables with mathematical problem-solving abilities.

The result calculation of the correlation coefficient between emotional intelligence and students' problem-solving abilities obtained the value of $r_{XY} = 0.9684$. So these results in her appeal to the value of r table with level $\alpha = 5\%$ and $n = 20$ the obtained r table = 0.444 for the value $r_{XY} > r$ table then H_0 is rejected so that there is a relationship between emotional intelligence (X) with the ability mathematical problems (Y). The results of the calculation of the coefficient of determination obtained results of 93.77% which concluded that the contribution of emotional intelligence to the ability to solve mathematical problems in class eight was 93.77% while the rest was determined by other variables.

The next test is to determine whether this relationship means or not, then a significant test of the coefficients obtained by the formula t is held. The calculation result obtained t count = 15.76 and compared with the value of t table = 0.444 because t count > t table then H_0 is rejected so that the correlation coefficient between X and Y is significant or significant.

The regression equation between emotional intelligence (X) and mathematical problem-solving ability (Y) is $Y = a + bX$ and from the calculation results, it is found that the value for $Y = 34.63 + 0.61X$. The value N is b for 0.61 (positive) emotional intelligence with mathematical problem-solving abilities have positive relationships. The regression equation obtained illustrates that every increase of one number in the emotional intelligence variable (X) is followed by an increase in mathematical problem-solving ability (Y) of regression line 0.61. The hypothesis states there is a positive relationship between emotional intelligence and problem-solving upon ability.

Conclusions

The description of the results of management and testing of emotional intelligence data towards the problem-solving ability as stated above, conclusions are obtained as follows: the valuer $XY = 0.9684$ compared $r \text{ table} = 0.444$ then $r \text{ XY} > r \text{ table}$ means between emotional intelligence and mathematical problem-solving abilities there are relationships. The determination coefficient of 93.77 means that the contribution of emotional intelligence to the mathematical problem-solving abilities of class eight students of Junior High School is 93.77%. The calculation result obtained by the value $t \text{ count} = 15.76$ and compared with $t \text{ table} = 2.19$ then $t \text{ count} > t \text{ table}$ so that H_0 rejected, which means that there is a relationship between emotional intelligence and the ability to solve significant problems. The regression line equation is obtained $Y = 34.63 + 0.61X$ which illustrates that every increase of one number in the emotional intelligence variable is known to increase the mathematical problem-solving ability by the slope of the regression line 0.61. From these results, in this study, it can be concluded that there is a relationship between emotional intelligence and mathematical problem-solving abilities of class eight students Junior High School.

The result of research and discussion above, it can be right suggestions as follows: To grow and optimize emotional intelligence plays a role in student success in school and the surrounding environment, it is advisable to schools, especially teacher educators to incorporate elements of emotional intelligence in delivering material and involving students' abilities in the learning process. For students, it is expected to motivate themselves so they can improve their ability to solve mathematical problems optimally. Further research is needed as the development of this research.

References

- Callejo, Maria Luz & Vila, Antoni. (2009). Approach to Mathematical Problem Solving and Students' Belief Systems: Two Case Studies. *Journal of Educational Studies in Mathematics*. Volume: 72, page: 111-126.
- Creswell, j. W. (2009). *Research Design: Qualitative, Quantitative and Mixed Methods Approach*. London: SAGE Publication, Inc.
- Cheng, H. (2006). A. comparison between cooperative learning and traditional, whole-class methods-teaching English in Junior High School. *Academic Journal of Kang-Ning*, 3, 69-82.
- Darmansyah. (2012). *Strategi Pelajaran Menyenangkan Dengan Humor*. Jakarta: PT Bumi Aksara.
- Draper, N. R.. (2014). *Applied Correlation analysis* (Vol. 326). John Wiley & Sons.

- Goleman, D. (2015). *Emotional Intelligence Emotional Intelligence* . Jakarta: PT Gramedia Pustaka Utama.
- Gani, E.K.. (2009). Teaching Student's Performance and Attitude. *Canadian Social Science*, 5(6), 92-102.
- Hamiyah , Nur. & Muhammad Jauhar. (2014). *Strategi Belajar Mengajar Di Kelas*. Jakarta: Prestasi Pustaka.
- Hamzah. (2012). *Perencanaan Pembelajaran*. Jakarta: PT Gramedia.
- Johnson, D. W. (2009). An Educational Psychology Success Story: Social Interdependence Theory and Cooperative Learning. *Educational Researcher*, 38(5), 365-379.
- Marlow, B. A. (2005). *Creating and sustaining the constructivist classroom*: Thousand Oaks, CA: Corwin Press.
- Polya, G. (1985), *How To Solve It* 2nd ed. New Jersey: Princeton University Press.
- Schoenfeld, A. (2009). Learning to think mathematically: Problem-solving, metacognition, and sense-making in mathematics. *Coleccion Digital Eudoxus*, (7).
- Shah, Muhibbin. (2010). *Psikologi Pendidikan*. Bandung: PT Remaja Rosdakarya.
- Slavin, R.E. (2010). *Cooperative Learning*. Bandung: PT Nusa Media.
- Sugiyono. (2008). *Metode Penelitian Kualitatif, Kuantitatif Dan R&D*. Bandung: CV Alfabeta.
- Razavieh, A. (2002). *Introduction to research in education*. Belmont, CA: Thomson Learning.
- Wyk, M..(2010). The Effects of Teams Games Tournaments on Achievement, retention, and Attitudes of Education Students. *Journal of Social Science*, 26(3), 183-193.

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