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Environmentally Responsible Behavior of High School Students in terms of The Ability to Solve Environmental Problems

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ABSTRACT

This research aimed to determine whether there is a positive relationship between the ability to solve environmental problems with environmentally responsible behavior and to determine other factors that have a relationship with environmentally responsible behavior. The population of this study were students of SMAN 1 Arjawinangun. This research was conducted in March-May 2021. The quantitative research data were obtained by using questionnaires, and multiple choice. The qualitative research data were obtained by doing interviews and observations. The data hypothesis was tested using statistics SPSS version 26. The results of this research showed that there was a positive relationship between environmentally responsible behavior and the ability to solve environmental problems. The interpretation correlation coefficient value is very low and is influenced by other factors.

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INTRODUCTION

The environment is a place where humans are carrying out all activities of daily life that have an influence on human behavior. Therefore, humans and the environment always have reciprocal interactions in responding to the environment. Human behavior plays a very important role in protecting the environment (Candamio, 2018).

The current state of the environment is truly deplorable. Human activities that do not have responsible behavior such as littering, still use plastic bags when shopping. These activities can be a problem for the environment if not managed properly. Humans who are supposed to care for, protect, and preserve the environment are actually putting tremendous pressure on the environment. Therefore, the school environment is one of the important aspects that can support activities to instill environmentally responsible behavior. Through the school environment, students can take advantage of nature as a source of environmental learning. The role of students who know, realize and believe that education will have an impact on increasing knowledge and skills in the formation of positive behavior (Ardianti et al, 2017).

Based on the results of observations, students have environmental responsibility behavior that is not good. This requires a

concern for the responsible behavior of students towards the environment, so that environmental quality can be maintained and environmental damage can be minimized. Environmental quality is highly dependent on human behavior patterns (Shafiei & Maleksaeidi, 2020). One of the things that causes environmental damage is that environmentally responsible behavior is not properly embedded (Erwati, 2013). Therefore, responsible behavior needs to be developed for students to carry out their duties and obligations in every action taken against themselves, society and the environment. This is based on the many problems of environmental damage.

Environmental problems can be overcome if the ability to solve environmental problems can be developed especially in students, because students are an educational component that is expected to contribute to making changes for the better for the environment. Therefore, students must be educated to know and be aware of current environmental problems in order to form the expected ability to solve environmental problems. According to Azrai et al., (2017) the ability to solve problems is important to develop because students are the next generation who will maintain the sustainability of environmental functions in the future.

This research aimed to determine whether there is a positive relationship between the ability to solve environmental problems with environmentally responsible behavior and to determine other factors that have a relationship with environmentally responsible behavior.

METODE

The research was conducted at SMAN 1 Arjawinangun in semester 2 of the academic year of 2020-2021. The research started from March to May 2021. The research method was a sequential explanatory mixed method. The research variables consisted of an independent variable (X) of the ability to solve environmental problems and a dependent variable (Y) of environmentally responsible behavior. The research population included all MIPA students at SMA Negeri 1 Arjawinangun, consisting of 756 students. Sampling conducted using multistage random sampling with Solvin's criteria and resulted in 262 students for samples.

The quantitative research instrument used is a questionnaire on environmentally responsible behavior and is in the form of a multiple choice test on the ability to solve environmental problems and qualitative research data were obtained by doing interviews and observations. The questionnaire instrument uses a Likert Scale that contained some positive and negative statements with 5 (five) response choices. The validity test on the environmentally responsible behavior instrument was carried out by testing each item of the questionnaire using the Pearson Product Moment formula. The results of the validity test showed that there were 35 valid questions out of a total of 40 questions. While the reliability test of the questionnaire item environmentally responsible behavior of students who already have valid criteria, then tested the reliability using Cronbach's Alpha technique. The results of the reliability test showed that the instrument was reliable with a reliability coefficient of 0.91. The test instrument in the form of multiple choice in the ability to solve environmental problems is carried out by testing each multiple

choice. Test the validity using Biserial Point formula. The results of the validity test showed that there were 35 valid questions out of a total of 40 questions. While the reliability test of multiple choice items in the ability to solve environmental problems that already have valid criteria, then tested its reliability using the KR 20 (Kuder Richardson 20) technique. The reliability test results show that the instrument is reliable with a reliability coefficient of 0.88.

Data collected were analyzed using descriptive statistics and inferential statistics. A normality test of estimated standard error Kolmogorov-Smirnov One Sample test using the Lilliefors test and homogeneity test used the Barlett test. Homogeneity test was conducted to see the value of homogeneity of variance and Levene Statistics using SPSS version 26. The hypothesis testing was conducted using the simple regression correlation technique of the Pearso product-moment correlation.

The data collection procedures in the qualitative research were observation and interview, and the interview results were recorded. The recording results were recorded in the form of written notes. The data analysis technique used was qualitative data analysis that consisted of data reduction, data presentation, and conclusions drawing activities. The data from the hypothesis testing results using the quantitative method were combined with the qualitative method's data. Therefore, quantitative data will be expanded and deepened with the qualitative data

RESULT AND DISCUSSION

Data of the research results that will be presented consisted of data from the quantitative research result (description of research result data, two data prerequisites testing of normality and homogeneity tests, and submission of hypothesis) and data from the qualitative research results (data reduction, data presentation, and conclusions drawing). The research results in the environmentally responsible behavior variable (Y) obtained descriptive statistical calculations, which can be seen in Table 1.

Table 1. Descriptive Statistical Results in the Environmentally Responsible Behavior

Y	
Mean	99,31
Standard Error	1,06
Median	99
Mode	100
Standard Deviation	17,20
Sample Variance	295,82
Kurtosis	0,76
Skewness	0,25
Range	116
Minimum	46
Maximum	162
Sum	26019
Count	262

The data frequency distribution of the environmentally responsible behavior variable (Y) is shown in Table 2.

Table 2. Frequency Distribution of Environmentally Responsible Behavior

Class Interval	**Frequency**	**Relative Frequency (%)**
46+58	2	0.8
59+71	9	3.4
72+84	38	14.5
85+97	72	27.5
98+110	81	30.9
111+123	40	15.3
124+136	13	4.9
137+149	5	1.9
150+162	2	0.8
Score $\sum$	262	100

The research results in the ability to solve environmental problems variable (X) obtained descriptive statistical calculations, which can be seen in Table 3.

Table 3. Descriptive Statistical Results in the Ability to Solve Environmental Problems

	X
Mean	17,94
Standard Error	0,39
Median	19
Mode	21
Standard Deviation	6,29
Sample Variance	39,52
Kurtosis	-0,62
Skewness	-0,29
Range	29
Minimum	4
Maximum	33
Sum	4700
Count	262

The data frequency distribution of the ability to solve environmental problems variable (X) is shown in Table 4.

Table 4. Frequency Distribution of the Ability to Solve Environmental Problems

Class Interval	**Frequency**	**Relative Frequency (%)**
4+6	11	4.19
7+9	21	8.02
10+12	24	9.16
13+15	33	12.60
16+18	39	14.89
19+21	47	17.94
22+24	50	19.08
25+27	25	9.54
28+30	10	3.82
31+33	2	0,76
Score ∑	262	100

The analysis prerequisite test employed normality and homogeneity tests. Based on the calculation results obtained normality Lilliefors value (Lo) of 0.043 with N = 262 and α = 0.05 level of significance acquired Lpricet of 0.200, thus obtained value Lo <Lt which is 0.043 <0.200. Based on these results, it can be infered that the estimated standard error One Sample Kolmogorov-Smirnov between environmentally responsible behavior and the ability to solve environmental problems came from a normally distributed population can be seen in Table 5

Table 5. Normality Test Results

One-Sample Kolmogorov-Smirnov Test		
		Unstandardized Residual
N		262
Normal Parameters[a,b]	Mean	0,0000000
	Std. Deviation	17,18160102
Most Extreme Differences	Absolute	0,043
	Positive	0,043
	Negative	-0,034
Test Statistic		0,043
Asymp. Sig. (2-tailed)		0,200[c,d]

a. Test distribution is Normal.
b. Calculated from data.
c. Lilliefors Significance Correction.
d. This is a lower bound of the true significance.

Homogeneity test was carried out by comparing x^2value with x^2statistic. If the value of x^2 value > x^2statistic both variables' variance is homogeneous and vice versa. Calculation results indicated x^2value = 0.515, and at a significance level α = 0.05 so that the value of x^2statistic = 0.05. Based on these data, it can be concluded that the variance of environmentally responsible behavior data and the ability to solve environmental problems originated from a homogeneous population can be seen in Table 6.

Table 6. Homogeneity Test Results

Test of Homogeneity of Variances					
		Levene Statistic	**df1**	**df2**	**Sig.**
Y	Based on Mean	0,965	26	235	0,517
	Based on Median	0,779	26	235	0,772
	Based on Median and with adjusted df	0,779	26	149,595	0,768
	Based on trimmed mean	0,957	26	235	0,528

ANOVA
Y

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7456,651	26	286,794	0,966	0,515
Within Groups	69751,307	235	296,814		
Total	77207,958	261			

Two hypotheses would be tested in the research via a statistical method of regression and correlation tests. Two data would be tested, namely: environmentally responsible behavior and the ability to solve environmental problems. The regression test was carried out to learn the functional relationship between variable X (the ability to solve environmental problems) and variable Y (environmentally responsible behavior). The results of statistical calculations obtained a regression equation $\hat{Y} = 0.124 + 0.169X$. It suggested that the simple linear regression resulted in a regression direction of 0,169X in the same direction as a constant 0.124. The regression linearity test was intended to discover whether the regression model used is linear or vice versa. The regression significance test was carried out to find out the regression equation obtained. The results of the linearity test and regression significance test can be seen in Table 7.

Table 7. ANOVA for Significance Test and Liniarity Test with Regression Equation $\hat{Y} = 0.124 + 0.169X$

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	158.823	1	158.823	0.54	.465[b]
	Residual	77049.14	260	296.343		
	Total	77207.96	261			

a. Dependent Variable: Environmentally Responsible Behavior

b. Predictors: (Constant), The Ability to Solve Environmental Problems

Coefficients[a]

M	UC B	UC Std. Error	SC Beta	t	Sig.	95,0% CI for B LB	95,0% CI for B UP
C	97.08	3.22		30.14	0	90.7	103.43
x	0.124	0.17	0.05	0.732	0.47	-0.21	0.458

a. Dependent Variable: Environmentally Responsible Behavior

Note : UC (Unstandardized Coefficients); SC (Standardized Coefficients); CI (Confidence Interval); M (Model); C (Constant); LB (Lower Bound); UB (Upper Bound)

Table 7, indicated that the regression significance calculation obtained Fvalue of 0.465 > Fstatistic 0.05 using a significance level of $\alpha = 0.05$. It can be infered that the regression equation of the ability to solve environmental problems (X) with environmentally responsible behavior (Y) was significant. In contrast, the liniearity test resulted in Fvalue of 0.465 < Fstatistic 0.536, indicating that the regression model was linear. Based on the significance test and linearity test, it can be concluded that the simple regression analysis with the equation $\hat{Y} = 0.124 + 0.169X$ was significant and linear.

The correlation test was carried out using SPSS version 26. The calculation derived a coefficient of correlation between the ability to solve environmental problems and environmentally responsible behavior of 0.045. The correlation significance test employed a t-test. The results of the correlation calculation and correlation significance test are presented in Table 8.

Table 8. The Summary of t-test Correlation Calculation Results

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	158.823	1	158.823	0.54	.465[b]
	Residual	77049.14	260	296.343		
	Total	77207.96	261			

a. Dependent Variable: Environmentally Responsible Behavior

b. Predictors: (Constant), The Ability to Solve Environmental Problems

The results of the calculation of correlation t-test shows that the correlation coefficient is negative with r = 0.045, and the coefficient of determination is 2%. The significance of the correlation value is obtained from the calculation results of tvalue= 0.465 while tstatistic for significance level = 0.05 and = 0.01. Based on the results of these calculations, it can be stated that tvalue > tstatistic so that the correlation is significant. This shows that there is a very low positive relationship between the ability to solve environmental problems (X) and environmentally responsible behavior (Y). This very low relationship or correlation is indicated by the value of the correlation coefficient (r) which ranges from 0.00-0.199.

Based on the research results, the ability to solve environmental problems has a positive relationship with environmentally responsible behavior. These results indicate that if the alternative hypothesis (Ha) is accepted, then environmentally responsible behavior in students is able to make a positive contribution to the ability to solve environmental problems. The existence of a very low positive relationship between the ability to solve problems with environmentally responsible behavior is indicated by the results of the calculation of the significance of the regression obtained with a significance level of $\alpha = 0.05$, it can be concluded that the regression equation for environmentally responsible behavior with the ability to solve environmental problems is significant, while the results linearity test shows that the regression model is linear.

The ability to solve environmental problems has an influence on environmentally responsible behavior by 0.002%, while 99.98% environmentally responsible behavior is influenced by other factors. The large percentage of the relationship between environmentally responsible behavior on the ability to solve environmental problems which can be seen in Table 8 that the results show a significant correlation coefficient value and have a very low interpretation value due to the main factor due to lack of self-awareness, student awareness responses to environmental problems that are still ongoing not good and the knowledge gained in the current learning conditions is not optimal, so that it affects the behavior of environmentally responsible in solving environmental problems. This is in accordance with the statement of Slavoljub et al. (2015) that environmental problems are problems that arise from human behavior that is less responsible for environmental conditions related to behavior and knowledge. This is supported by research by Insani & Utami (2016) that in solving problems requires complex thinking, namely cognitive abilities and awareness in using the right strategy. Thus, it can be concluded that if students' cognitive abilities are low, students' ability to solve problems is also hampered, as well as if students' environmentally responsible behavior is very low, it will grow environmental damage which has an impact on environmental preservation and environmental quality.

Based on the results of interviews that there is a very low relationship between environmentally responsible behavior and the ability to solve environmental problems is due to a lack of self-awareness, habits in the home environment in association, lack of insight and lack of knowledge of cognitive abilities, as well as lack of motivational support in learning from other people or the

surroundings while studying during a pandemic. Students can develop the ability to solve environmental problems supported by good environmentally responsible behavior.

The correlation coefficient value indicates that there is a very low relationship, the sub-focus of this research will strengthen the reason for the very low ability to solve environmental problems with environmentally responsible behavior and other factors that most influence it.

Conclusion of sub-focus 2, factors that most influence students in the ability to solve an environmental problem, the first factor is self-awareness, the second factor is family environment habits at home in association, education from an early age that is obtained by someone in life is obtained from education in family, the third factor is the lack of knowledge of cognitive abilities obtained and the fourth factor is the lack of motivational support in learning, namely the current pandemic environmental conditions which result in learning resources and insights obtained are not optimal.

The first factor related to environmentally responsible behavior is self-awareness. According to Hudha & Rahardjanto (2018) that education is the most appropriate means to raise awareness and change students' behavior towards the environment. A person's self-awareness can be known through his behavior and appearance in good or bad conditions in his soul. The importance of self-awareness of the environment is related to responsible behavior for current and future actions in the surrounding environment (Severo & Dorion, 2018). In fact, self-awareness in students' environmentally responsible behavior is still very low which has an impact on environmental preservation and environmental quality (Dorion et al., 2012). This is in accordance with the statement of Sadik & Sadik (2014) that every human being's self-awareness of environmental problems is something that must be faced, meaning that all human activities have consequences for environmental change (Osman et al., 2014).

The second factor related to environmentally responsible behavior is the family environment or home habits in association. The family is the first environment that is known by children to be able to get the first educational process, of course the family environment always strives to provide the best education for children. This can also be a consideration for teaching children to distinguish between good and bad deeds, so that a directed personality can be formed. On the other hand, if the family environment cannot lead to bad behavior, it will be a disaster for parents and the environment (Mizal, 2014). In the family environment, the role of parents in a child's early education begins at an early age before the child knows other educational institutions in relation to environmentally responsible behavior, natural resources, and disposal of environmental waste. Family education is important in shaping children's behavior towards being environmentally responsible to always do things that are responsible for the environment such as educating them to help each other, helping parents in cleaning housework and disposing of garbage in its place (Munib dkk, 2011). Therefore, parents as the closest to their children must be able to be good role models and be able to guide them in behaving in a good direction (Saputro & Talan, 2017). This shows that the interaction of parents and children can be realized in the form of parenting patterns

that can affect the child's ability to be able to solve environmental problems (Idrus, 2012). A good and conducive family environment will certainly stimulate children to learn and the child's social environment influences the behavior shown. This can apply student behavior to habits at home in carrying out environmentally responsible. All humans born in the world certainly have behaviors that are inherited from their parents which become identical in their personalities. In addition, in its growth and development, it is never separated from interaction with the environment, as a result it will form a behavior that shows that the individual is socializing in his interactions in the environment. The influence of habits in the association also affects one's behavior, because in associating with good peers it will also have a good effect on one's behavior. According to Rifa'i & Anni (2012) that the influence of peers in the association is usually stronger than the influence of teachers and parents.

The third factor related to environmentally responsible behavior is cognitive ability. Environmental knowledge is a very important cognitive ability to be able to shape student behavior through knowledge and a sense of concern for environmental problems and being able to propose solutions for how to preserve them (Zsoka et al., 2013). The competence needs of teachers to be able to develop students' cognitive abilities in the learning process as an experience of interaction between teachers and students that will affect something new on cognitive abilities and behavior. This is in accordance with the statement of Notoatmodjo (2010) Cognitive ability will affect student behavior. Knowledge possessed by a person will lead to self-awareness, and eventually will behave responsible in accordance with the knowledge he has. Effective learning can instill good behavior, because education is essentially the beginning of the acquisition of knowledge and good guidance for students to get the same attention in education (Milfayetty, 2015).

The fourth factor related to environmentally responsible behavior is motivation in learning. The environment is part of students' lives, where students live by interacting, needing and relating to each other. Environmentally responsible behavior includes an action that comes from student motivation in its aim to prevent environmental damage in solving environmental problems. Encouragement or motivation from parents strongly supports the progress of children without motivation from parents, children will have difficulty in developing and their abilities. Thus, parents must provide positive motivation so that children remain confident in what is their goal. Giving motivation by parents can be in the form of reinforcement or appreciation for good behavior. Giving motivation should not only be given when the child does good, but also when the child experiences difficulties and failure is mandatory for parents to motivate (Setiardi & Mubarok, 2017). The interaction of students with teachers affects the motivation in learning. Teachers can foster motivation through the support and involvement of students in their interactions. Teachers can facilitate guidance, encouragement, and feedback that are informational, not evaluative, and express student involvement by showing affection, interest, and adjustment (Stroet et al., 2015). Understanding student motivation and learning strategies has an important role to help teachers develop better learning processes (Arquero et al.,

2015). According to Wong & Nunan (2011) found that students who were significantly more successful were students who were more independent and active in learning. In general, student learning strategies are developed to achieve dynamic learning objectives and can be developed in a shorter time (Zlatovic et al., 2015). According to Kim & Theodore (2011) that the current condition of focusing on motivation in learning towards student's responsible behavior during online learning is one of the main principles for efficient education. In line with the results of research by Raes & Schellens (2012) that the behavioral component in the motivational factor, the correlation is weaker, but still positively related and is obtained from the teacher's role by providing support and student involvement in increasing motivation in learning (Schuitema et al., 2014).

SIMPULAN

Referring to the research results, it can be inferred that there was a positive relationship between the ability to solve environmental problems and environmentally responsible behavior of MIPA students at SMAN 1 Arjawinangun. The correlation coefficient with very low interpretation value means that environmentally responsible behavior is influenced by other factors. Based on the results of interviews and several informants, the factors that most influence environmentally responsible behavior in addition to the ability to solve environmental problems are lack of self-awareness, family environment or home habits in association, lack of knowledge of cognitive abilities obtained, and lack of motivational support in learning, that is the current pandemic environmental conditions which results in learning resources and insights obtained are not optimal.

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