



Analysis of Participation in Maintaining Environmental Cleanliness through Ecological Intelligence

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Abstract

This research is a sequential explanatory mixed method research which consists of a quantitative research and a qualitative research. This study consists of two variables, the independent variable (X) namely Ecological Intelligence and the dependent variable (Y) namely Participation in maintaining Environmental Cleanliness. This study aims to obtain information about relationship between ecological intelligence and participation in maintaining environmental cleanliness and to find out other factors related to participation in maintaining environmental cleanliness of high school students in Cibinong. This research was conducted at SMA Negeri 2 Cibinong and SMA Negeri 3 Cibinong in the 2020/2021 academic year. The research began in November 2020 until June 2021. The subjects of this study are students of class XI MIPA at SMA Negeri 2 Cibinong and SMA Negeri 3 Cibinong. The research population was taken using a multistage random sampling technique. The research sample was determined by proportional random sampling technique using the slovin formula. Based on the calculation of the slovin formula, the number of samples was 166 students. The instrument used in this study is a non-test instrument, namely a questionnaire. The results of the study found that there was a positive relationship between ecological intelligence and participation in maintaining environmental cleanliness in SMA Negeri students in Cibinong District. The positive relationship is shown by the regression equation $\hat{Y} = 32.524 + 0.673x$ with an r value of 0.697 and a coefficient of determination (r^2) of 0.485, which means that 48.5% of ecological intelligence contributes to participation in maintaining environmental cleanliness, while the remaining 51.5% is a contribution from other factors beyond ecological intelligence. As for other factors related to participation in maintaining environmental cleanliness, namely: self-awareness, environment (family, friends, school), regulations, and information media.

Keywords: Ecological intelligence, participation in maintaining environmental cleanliness, student.

INTRODUCTION

The condition of environmental cleanliness is one of factors that shape a healthy life, but nowadays environment has become a major problem for global community. Environment is a place that consists of organisms interacting with each other. Environment plays an important role in meeting biological needs, which one of that is humans use natural resources to survive. Environmental damage tends to get worse with increasing human activities (Susanto *et al.*, 2020). One aspect that becomes a benchmark for environmental cleanliness is waste. According to research by Jambeck *et al.*, (2015) Indonesia got a second rank after China as a producer of plastic waste to the sea which reaches 187.2 tons per year, this is very concerning and requires serious efforts to deal with waste problems.

Environmental cleanliness is created through actions taken by humans in managing and tackling waste in the vicinity. Individual behavior in maintaining and caring for cleanliness is closely related to social relationships, this can encourage prosocial behavior and cooperation in a group to participate in maintaining cleanliness (Preston & Ritter, 2012). However, public awareness to participate in waste reduction is still very low, while the community should have a great obligation and responsibility to maintain environmental cleanliness. High school students are part of the community who have a direct influence on maintaining environmental cleanliness, especially the Department of Mathematics and Natural Sciences (MIPA) because they have received learning about protecting environment both in biology subjects on ecosystem materials or environmental pollution materials. Therefore, students should be able to apply their knowledge with concrete actions in maintaining environmental cleanliness in the community. According to Siswanto (2010) environmental cleanliness has several important aspects, there are: (1) Provision of protected clean water, (2) Disposal of waste water that meets health requirements, (3) Provision and utilization of waste disposal sites, (4) Provision of food health monitoring facilities. This statement is corroborated by Buitrago *et al.*, (2019) that the quality of a clean environment can be achieved if whole community changes their mindset and behavior to reduce waste and increase attitudes against littering. However, the fact is students' attention to environmental cleanliness is still very lacking, even though at school they have been accustomed to maintaining cleanliness, but still find students who litter when in public places.

Ecological intelligence has a very important role in educational process, because students will act as drivers of social change. Students are expected to be sensitive to global issues and the preservation of natural resources by applying their ecological intelligence. According to (Goleman, 2010) ecological intelligence combines cognitive skills with empathy for all forms of life. Cognitive skills in question are all knowledge about the impact of various human behaviors on the environment so that it will give students a sense of empathy for environmental damage, and influence students to participate in maintaining environmental cleanliness.

Based on the results of observations made in December 2020 of high school students in Cibinong, it can be seen that 56% of students do not participate in working together to clean the gutters in their home environment and have not recycled waste, 54.7% of students do not sweep and mopping their houses regularly, 53.3% of students do not clean their bathrooms regularly. These data indicate that participation in maintaining environmental cleanliness of high school students in Cibinong is still quite low. This study aims to obtain information about relationship between ecological intelligence and participation in maintaining environmental cleanliness and to find out other factors related to participation in maintaining environmental cleanliness of high school students in Cibinong.

METHOD

This research was conducted at SMA Negeri 2 Cibinong and SMA Negeri 3 Cibinong in the 2020/2021 academic year. the study began in November 2020 until June 2021. The subjects of this

study were students of class XI MIPA at SMA Negeri 2 Cibinong and SMA Negeri 3 Cibinong. The research population was taken using a multistage random sampling technique. The research sample was determined by proportional random sampling technique, namely using the Slovin formula. based on the calculation of the slovin formula, the number of samples obtained was 166 students. This study consists of two variables, namely ecological intelligence as the independent variable or independent variable (x) and participation in maintaining environmental cleanliness as the dependent variable or dependent variable (Y). The instrument used in this study is a non-test instrument, namely a questionnaire.

The method used in this research is a mix method with a sequential explanatory approach consisting of a quantitative stage and then followed by a qualitative stage (Sugiyono, 2017). The quantitative stage aims to obtain measurable data in the form of numbers, while the qualitative stage is used to deepen the data obtained in the quantitative stage. This qualitative data was obtained through the results of interviews, observations, and documentation.

Before the study, first conducted a trial of research instruments on students, this trial aims to determine the validity and reliability of the questionnaire instrument. then the normality test of the estimated error of the estimated error and the homogeneity test were carried out. the normality test of the estimated error using the Kolmogorov Smirnov Test and the homogeneity test using the Levene Test with the help of SPSS 26 software, this test aims to determine whether the research data is normally distributed and homogeneous or not. If the data is normally distributed and homogeneous, then the hypothesis is tested using a simple regression technique Pearson Product Moment with the help of SPSS 26 software. The correlation test aims to determine the relationship between ecological intelligence and participation in maintaining environmental cleanliness. interpretation of the strength of the relationship between variables X and Y variables can use the following guidelines:

Table 1. Guidelines of Interpretation correlation coefficient

Corelation Interval	Relation variable
0,000 – 0,199	Very weak
0,200 – 0,399	Weak
0,400 – 0,599	Medium
0,600 – 0,799	Strong
0,800 – 1,000	Very Strong

In the regression correlation analysis, the statistical hypotheses to be tested are:

Ho : $\rho \leq 0 \rightarrow$ there is no relationship between ecological intelligence and participation in maintaining environmental cleanliness.

Ha : $\rho \geq 0 \rightarrow$ there is a relationship between ecological intelligence and participation in maintaining environmental cleanliness.

RESULT AND DISCUSSION

The research data are grouped into two variables consisting of the dependent variable data, namely participation in maintaining environmental cleanliness and the independent variable data, namely ecological intelligence. The number of data sources shows as many as 166 respondents consisting of 103 students of class XI MIPA SMA Negeri 2 Cibinong and 63 students of class XI MIPA SMA Negeri 3 Cibinong.

Results of Quantitative Research

Analysis of data requirements research done by calculating the error normality test using the Kolmogorov-Smirnov test and homogeneity test using Levene Test with SPSS 26. The normality test results are shown in Table 2.

Table 2. Results of normality test

Unstandardized Residual		
N		166
Normal Parameters ^{a,b}	Mean	0,0000000
	Std. Deviation	10,06251129
Most Extreme Differences	Absolute	0,045
	Positive	0,030
	Negative	-0,045
Test Statistic		0,045
Asymp. Sig. (2-tailed)		0,200 ^{c,d}
a. Test distribution is Normal.		
b. Calculated from data.		
c. Lilliefors Significance Correction.		

Based on the above table significance value of $0.200 > 0.05$, it can be seen that the normality test of the estimated error between ecological intelligence and participation in maintaining environmental cleanliness comes from a normally distributed population.

The homogeneity test was carried out using the Levene Test with the help of SPSS 26 software. The results of the homogeneity test can be seen in table 3.

Table 3. Results of homogeneity test

		Levene Statistic	df1	df2	Sig.
Variable X and Y	Based on Mean	0,419	1	330	0,518
	Based on Median	0,342	1	330	0,559
	Based on Median and with adjusted df	0,342	1	329,926	0,559
	Based on trimmed mean	0,373	1	330	0,542

Based on the table above, a significance value of $0.518 > 0.05$ is obtained, it can be seen that the homogeneity test between ecological intelligence and participation in maintaining environmental cleanliness comes from a homogeneous population.

Hypothesis testing was carried out using simple correlation and regression test with the help of SPSS 26 software in determining the relationship between ecological intelligence and participation in maintaining environmental cleanliness. The results of the regression equation test can be seen in table 4.

Table 4. Results of regression equation test

	Model	B	Std. Error	Beta	t	Sig.
1	(Constant)	32,524	5,838		5,571	0,000
	Ecological Intelligence	0,673	0,054	0,697	12,43	0,000
					7	

a. Dependent Variable: Participation in maintaining environmental cleanliness

Based on the table above, it can be seen that the value of constant (a) 32.524 and constant (b) 0.673, then the regression equation obtained is $\hat{Y} = 32.524 + 0.673x$. The regression equation can interpret that previously ecological intelligence has had participation in maintaining environmental cleanliness with a constant of 32.524, and each increase of one unit of ecological intelligence will cause an increase in student participation in maintaining environmental cleanliness by 0.673.

Correlation test was conducted to find out the relationship between ecological intelligence and participation in maintaining environmental cleanliness. The results of the correlation test can be seen in table 5.

Table 5. Results of correlation test

		Participation in maintaining environmental cleanliness	Ecological intelligence
Participation in maintaining environmental cleanliness	Pearson Correlation	1	0,697
	Sig. (2-tailed)		0,000
	N	166	166
Ecological intelligence	Pearson Correlation	0,697	1
	Sig. (2-tailed)	0,000	
	N	166	166

Based on the table above, it is known that the correlation coefficient between ecological intelligence and participation in maintaining environmental cleanliness is obtained a value of $0.697 > 0$ meaning that there is a positive relationship between ecological intelligence and participation in maintaining environmental cleanliness, and the significance value obtained is $0.000 < 0.05$ so that the correlation is declared significant (Rinaldi *et al.*, 2020). If interpreted based on the correlation coefficient according to Guilford, the correlation coefficient between ecological intelligence and participation in maintaining environmental cleanliness is in the high category, because it is in the interval range of 0.600-0.799. The value of the coefficient of determination (r^2) obtained is 0.485, indicating that the increase or decrease in participation in maintaining environmental cleanliness of high school students in Cibinong can be determined by ecological intelligence of 48.5%, while the

remaining 51.5% are other factors that play a role in fostering participation in maintaining environmental cleanliness.

The results of this study are in accordance with Suhardjo (2016) stated that there is a strong positive relationship between students' intentions towards school output, and knowledge about environmental conservation and student participation in environmental hygiene. This means that students who have high ecological intelligence have a high level of participation in keeping their environment clean, and vice versa. In other words, students who are ecologically intelligent will have a more caring attitude to keep their environment clean, namely by actively participating in real actions to clean the environment. This is in accordance with Akkuzu (2016) statement that an individual needs the ability to think in determining perceptions of the environment so that they are able to determine how their actions and activities can affect the ecosystem, therefore ecological intelligence is needed for each individual.

Ecological intelligence is one of the contributing factors in raising awareness to participate in maintaining environmental cleanliness in students. Ecological intelligence can be formed in students along with an understanding of ecosystems and the habits that have been made by students in overcoming environmental problems. The knowledge and understanding gained by students regarding these environmental problems will contribute to increasing students' participation in maintaining environmental cleanliness. According to Hendriyanto *et al.*, (2018) indicators of the success of ecological intelligence in students can be seen from changes in students' attitudes and behavior in environmental management, such as: good waste management, keeping environmental conditions clean, utilizing organic and inorganic waste, and not damaging environmental sustainability by caring for trees and plants in the surrounding environment.

Result of Qualitative Research

Qualitative data were obtained based on the results of interviews, observations and documentation. The qualitative data were then analyzed by data reduction, in-site analysis, and inter-site analysis. Qualitative research was conducted after the results obtained from quantitative research. The results of the qualitative research were obtained through interviews with students, vice principals, and teachers. The preparation of the sub focus in this study was adjusted to the results of quantitative research that had been obtained previously, namely whether there were other factors besides the variable of ecological intelligence related to participation in maintaining environmental cleanliness. The following are the results of data reduction that has been carried out to determine other factors related to participation in maintaining environmental cleanliness: self-awareness, environment (family, friends, school), regulations, and information media. An illustration of the factors that are estimated to have a close relationship with participation in maintaining environmental cleanliness can be seen in Figure 1.

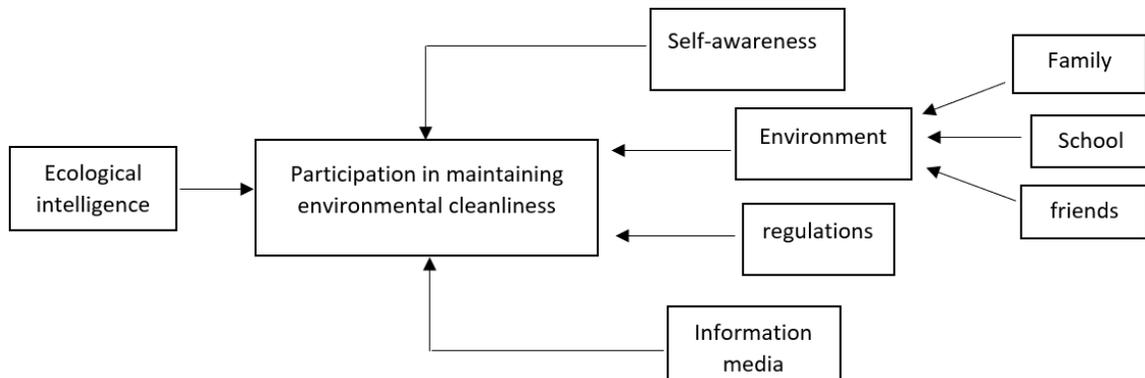


Figure 1. Other factors related to participation in environmental cleanliness

Based on the picture above, other factors related to participation in maintaining environmental cleanliness are self-awareness, environment (family, friends, school), regulations, and information media. These results are relevant to the statement of Surya pratama *et al.*, (2017) that other factors that influence students' behavior towards their environment are: interactions with friends in the school and home environment, understanding of the important functions of living things, habits and self-awareness, as well as guidance from parents and teachers.

The first factor that has a close relationship with participation in maintaining environmental cleanliness is self-awareness. Someone who already has the awareness to protect the environment will have a high initiative to participate in maintaining the cleanliness of the environment, because this will be a visible character of the person's behavior towards the surrounding environment. This is relevant to Malikha (2013) statement that self-awareness is a manifestation of a person's identity which will affect his behavior.

The second factor that has a close relationship with participation in maintaining environmental cleanliness is environmental factors, be it the family environment, friends, or the school environment. Education applied in the family environment is the main education obtained by a person in his life. The habit of maintaining a clean environment that has been applied in the family will have a positive impact on a person's attitude while in the environment. This is in accordance with the statement of Çelik & Yüce (2019) that habits that have been applied at home will have a positive impact on one's behavior when in the environment, when a person has hygienic and clean living habits, he will improve the quality of life by changing it into behavior in his environment. . In addition, the friendship environment can also have an influence on student participation in maintaining a clean environment. Friendship environment can have a positive or negative influence. One of the positive things that happens in friendship is reminding and inviting each other to participate in maintaining a clean environment, while the negative thing is that it can influence friends or their groups to be reluctant to participate and be indifferent to environmental cleanliness. This is in accordance with the research conducted by Septiyuni *et al.*, (2015) that peer groups have an important role in the development of an individual's behavior.

In addition to the family environment and friendship, the school environment also has a close relationship with participation in maintaining a clean environment for students. Based on the results of interviews, efforts that can be made by schools to increase participation in maintaining environmental cleanliness in their students are by holding community service activities to clean the school environment such as JUMSIH and KASIH, and forming picket groups in each class. The school environment plays an important role in cultivating habits in students to participate in maintaining environmental cleanliness, this is relevant to the statement by Bahrudin & Setiawan (2017) that school policies have a significant influence on the development of behavior in students, the more environmentally sound policies are applied in schools. In schools, the attitude of environmental care in students will be higher.

The third factor that is estimated to have a close relationship with participation in maintaining environmental cleanliness is regulation. In this case, policies concerning rules, regulations, appeals and invitations from the school related to efforts to maintain school cleanliness and waste management will force students to be involved in these activities. If this is done firmly and consistently by the school, it will increase student participation in maintaining a clean environment. Students who initially feel compelled to do these activities, but if they are carried out continuously, students will get used to it and will foster an attitude of initiative in students to keep the environment clean. This is relevant to Rangkuti (2017) statement that the proportion of low student participation with bad school policies is 62.2%, while the proportion of high student participation with good school policies is 66.7%. So, school policy has a relationship with student participation in an effort to maintain school cleanliness, the policies implemented will greatly affect student participation in maintaining a clean environment.

The last factor that is estimated to have a close relationship with participation in maintaining environmental cleanliness is the information media. Media information is needed as a means to increase

one's knowledge and insight, in this case information about environmental problems presented in mass media such as television, newspapers, and social media will have an effect on increasing students' participation in maintaining environmental cleanliness. According to Gifford & Nilsson (2014) high knowledge of environmental issues will affect decision-making and useful actions that will be taken by the person. Based on the results of the interview, one of the informants revealed that the news about environmental problems presented in mass media such as television, newspapers and social media will create a sense of empathy in every individual who sees or reads it, so that they will be touched by taking concrete actions to protect the environment from damage occurs. This is in accordance with the statement of Prihanti *et al.*, (2018) that education will have an influence on a person's ability to digest the information received and consider that information as the basis for his behavior.

CONCLUSION

Based on the results of the research that has been done, it can be concluded that there is a positive relationship between ecological intelligence and participation in maintaining environmental cleanliness in SMA Negeri students in Cibinong District. The positive relationship is shown by the regression equation $\hat{Y} = 32.524 + 0.673x$ with an *r* value of 0.697 and a coefficient of determination (*r*²) of 0.485, which means that 48.5% of ecological intelligence contributes to participation in maintaining environmental cleanliness, while the remaining 51.5% is a contribution from factors other than ecological intelligence.

The positive relationship between ecological intelligence and participation in maintaining environmental cleanliness shows that ecological intelligence can contribute to increasing participation in maintaining environmental cleanliness. This is because knowledge and understanding of the environment will affect a person's real actions and behavior towards his environment. However, ecological intelligence is not the only factor that contributes to increasing participation in maintaining environmental cleanliness, while other factors are: self-awareness, environment (family, friends, school), regulations, and information media.

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