Evaluate Environmental Education of Designer: Environmental Responsible Behavior based on Literacy about Zero Waste

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Abstracts: Zero waste is a concept in which the production of an environmentally friendly industry produces zero percent waste. Zero waste among designers is an important thing because it will have an impact on reducing the amount of waste. Environmental education in this case plays a role in providing education for designers so they can reduce waste. The role of environmental education can form Environmental Literacy (EL) and Environmental Responsible Behavior (ERB). The purpose of this study is to evaluate environmental education regarding the relationship between environmental literacy, attitudes towards zero waste, and designer personality with environmentally responsible behavior. The method used in this research is to use a descriptive method with data collection techniques using surveys. The results of this study show that the t-test for t-count > t-table (0.05; 148) 1.790 > 1.65 means that the correlation coefficient between environmental literacy, attitude towards Zero Waste, and personality environmentally responsible behavior is significant. Environmental education in this case plays an important role in increasing environmental literacy so it needs to be strengthened in schools. This study concludes that there is a relationship between various variables. The limitations of this study are the difficulty in obtaining a wider sample and only limited to designers.

Keywords: Environmental education, Environmental literacy, Environmentally responsible behavior.

1. INTRODUCTION

The consumptive culture that infects fashion consumers also causes the over-consumption of waste. On one occasion, Elizabeth Cline, author of the book Overdressed: The Shockingly High Cost of Cheap Fashion said that cheap clothes often end up in the trash. Solving environmental problems is no longer just about regulating individual behavior per individual in interacting with the environment, but needs to break systemic interference from the work of modern capitalism which also determines and shapes individual behavior that is destructive to the environment to benefit only a few people (Maggi et al., 2017; Melo et al., 2018).

Designers as fashion trend makers need to think of a way out of existing problems. Designer literacy about the environment, a wise attitude towards waste, and the designer's personality are considered to apply to environmental changes for the better in the fashion industry. Consumers must be more critical and selective so they don't buy new clothes without considering the utility and pay attention to the commitment of brands that produce their favorite clothes to social costs and handling by-products of the production process.

The application of environmentally responsible behavior in various sectors of life, one of which is by applying to the fashion industry and fashion industry players, environmental problems can be overcome. Apart from that, UNESCO has also called for several of its programs so that humans always preserve and protect this earth and be able to pass on the earth and its contents to future generations (Bridgewater, 2016; DeSombre, 2017; Read & Kuhl, 2015).

There are several terms related to environmentally responsible behavior, namely: (1) environmental-protective behavior; (2) the behavior of preserving the environment (environment-preserving behavior); (3) environmentally responsible behavior; (4) ecological behavior; (5) sustainable behavior. On the other hand, this contrasts with counter-environmental behavior such as environmentally-destructive behavior and environmentally unfriendly behavior.

Environmental literacy is one of the factors that influence environmentally responsible behavior. The results of the study suggest that environmental literacy has a direct and significant effect on environmentally responsible

behavior. In addition, environmental literacy also has a positive impact on environmental values. These results indicate that environmental values are getting better with increasing literacy about the environment. This shows that environmental literacy needs to be carried out regularly within a certain period through programs in Education (Cronje et al., 2011; Innes et al., 2018; Schimek, 2016).

Designing a design work by a designer will create a pattern from that design that is used during the production process, this determines the material requirements of each design to be used. Inaccuracy in laying patterns on the material will cause more fabric residue. The zero waste design in this section is to try to reduce the remaining fabric residue so that there is no more fabric waste from the material-cutting process for a design (Qiang et al., 2021; Surono & Ismanto, 2016).

Assessment in a zero waste attitude can also be used with LCA or Life Cycle Assessment which is an approach to analyzing the impact of a product on the environment during the product's life cycle. The concept of Life Cycle Assessment is based on the idea that an industrial system cannot be separated from the environment in which the industry is located. Life cycle assessment in general is an approach to measuring the environmental impact caused by a product or activity starting from taking raw materials, followed by production and use processes, and ending with waste/waste management. The goal to be achieved in this research is to find out and obtain information related to the relationship between environmental literacy, attitudes towards zero waste, and designer personality with environmentally responsible behavior.

2. METHOD

The research was carried out from August to December 2022 and took place at the Indonesian Kartini Indonesia Association of Fashion Designers. The research method used in this study is the correlational method to measure the relationship between variables. The population in this study were all designers of the Indonesian Kartini Association of Fashion Designers. With a total sample of 150 designers selected by SRS (Simple Random Sampling). The trial sample for the research instrument test used 50 designers. The instruments used in this study were test instruments to measure literacy and non-tests to measure designer attitude and personality variables. The intended use of the instrument considers the respondent as an individual who can understand himself.

The data obtained from the research results were then analyzed using descriptive statistical analysis and inferential statistics. Descriptive statistical analysis was performed by calculating the average (mean), median, mode, standard deviation, variance, maximum and minimum scores, and equipped with a frequency distribution and histogram. While inferential statistics using correlational analysis. The steps of this research can simply be seen based on the flow chart which can be seen in the following figure.

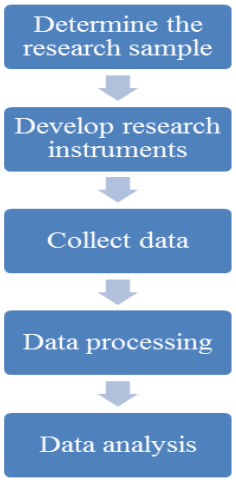

Figure. 1

3. RESULT AND DISCUSSION

After going through the process of testing the instrument and collecting data, data analysis was then carried out, including (1) a description of the data for each variable; (2) analysis requirements testing, which consists of a normality test and homogeneity test; (3) hypothesis testing; and (4) discussion of research results. The description of environmentally responsible behavior data obtained through the instrument is as follows:

Table 1. Distribution of the Frequency of Data for the Environmentally Responsible Behavior Variable Group.

No.	Range of Score	Frequency	Percentage	Cumulative percentage
1.	133-138	4	2.67	2.67
2	139-144	9	6.00	8.67
3	145-150	17	11.33	20.00
4	151-156	35	23.33	43.33
5	157-162	29	19.33	62.67
6	163-168	31	20.67	83.33
7	169-174	20	13.33	96.67
8	175-180	5	3.33	100.00
	Total	150	100	???

Based on the data obtained in the field then processed statistically into a frequency distribution list with many classes calculated according to Sturges' rules, the score range is 44, the number of classes is 8 with a maximum score of 177 and a minimum score of 133 while the class interval length is 5. From the results of data analysis obtained that the variable environmentally responsible behavior has a mean value of 158 with a standard deviation of 9.86, mode 158, and median 158.

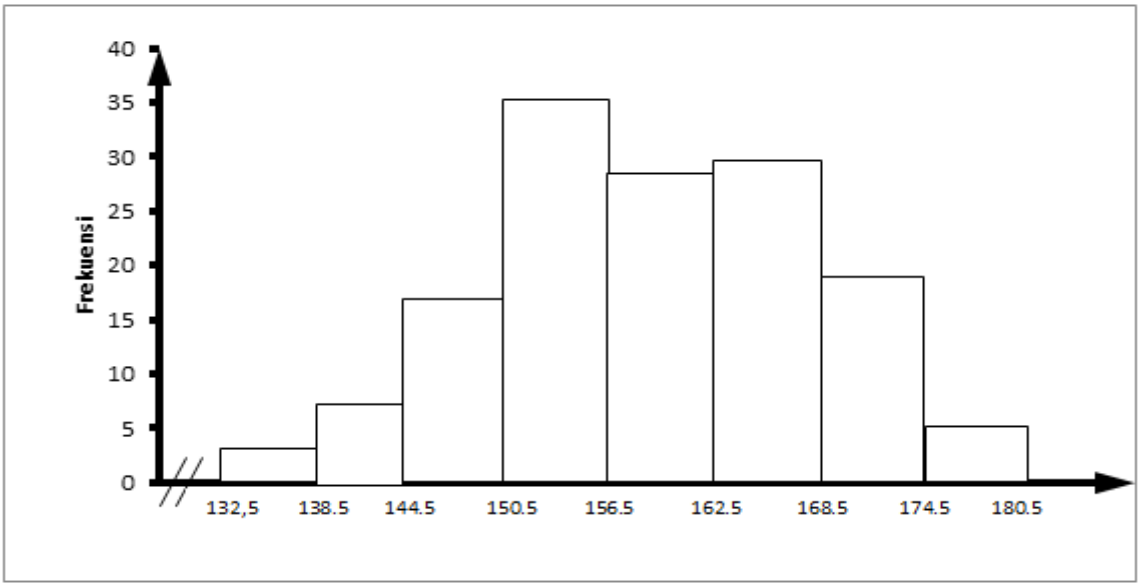

Figure 1. Histogram of Environmentally Responsible Behavior (Y).

The histogram shows that the highest frequency/number of respondents in the environmentally responsible behavior variable obtained scores between 151 to 156 with a total of 35 respondents or 23.33%. The description of environmental literacy data obtained through the instrument is as follows:

Table 2. Frequency Distribution of Environmental Literacy Variable Group Data.

No.	Range of score	Frequency	Percentage	Cumulative percentage
1.	240-248	2	1.33	1.33
2	249-257	5	3.33	4.67
3	258-266	14	9.33	14.00
4	267-275	22	14.67	28.67
5	276-284	40	26.67	55.33
6	285-293	50	33.33	88.67
7	294-302	13	8.67	97.33
8	303-311	4	2.67	100.00
	Total	150	100	

Based on the data obtained in the field then processed statistically into a frequency distribution list with many classes calculated according to Sturges' rules, the score range is 65, the number of classes is 8 with a maximum score of 305 and a minimum score of 240 while the class interval length is 8. Based on the results of the data analysis obtained that the environmental knowledge variable has a mean value of 280.79 with a standard deviation of 12.69, mode 286, and a median 282.

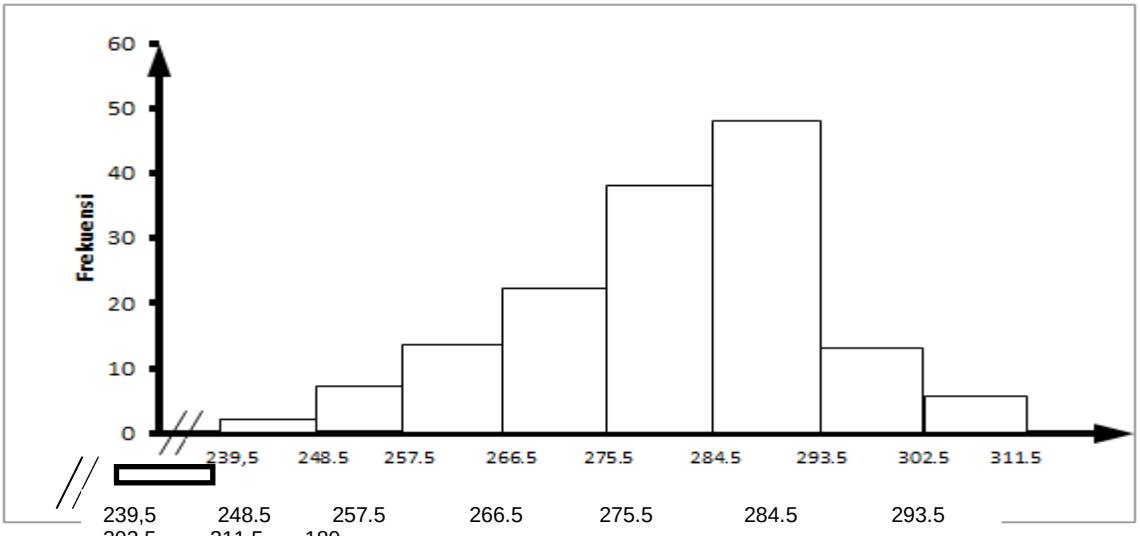

Figure 2. Environmental Literacy Histogram (X1).

The histogram shows that the highest frequency/number of respondents in the environmental literacy variable obtained scores between 285 and 293 with a total of 50 respondents or 33.33%. The description of attitude data towards zero waste obtained through the instrument is as follows.

Table 3. Frequency Distribution of Attitude Variable Data Group towards Zero Waste.

No.	Range of Score	Frequency	Percentage	Cumulative percentage
1.	22-24	45	30.00	30.00
2	25-27	38	25.33	55.33
3	28-30	24	16.00	71.33
4	31-33	16	10.67	82.00
5	34-36	14	9.33	91.33
6	37-39	5	3.33	94.67
7	40-42	6	4.00	98.67
8	43-45	2	1.33	100.00
	Total	150	100	

Based on the data obtained in the field then processed statistically into a frequency distribution list with many classes calculated according to Sturges' rules, the score range is 22, the number of classes is 8 with a maximum score of 44 and a minimum score of 22 while the class interval length is 2. The results of data analysis showed that the variable Attitude towards Zero Waste has a mean value of 28.17 with a standard deviation of 5.36 mode 25 and median 26.

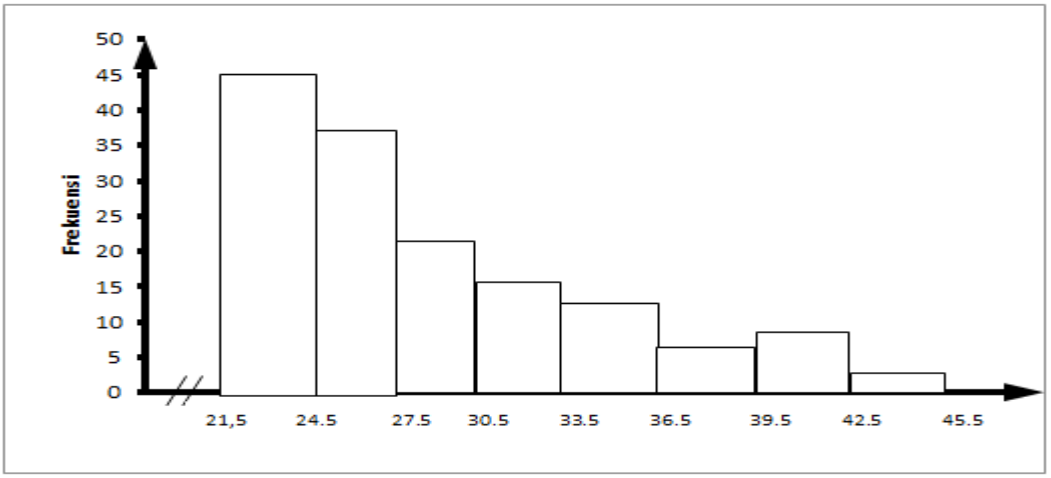

Figure 3. Histogram of Attitudes toward Zero Waste (X2).

The histogram shows that the highest frequency/number of respondents in the attitude towards zero waste variable scores between 22 and 24 with a total of 45 respondents or 30%. The description of the designer's personality data obtained through the instrument is as follows:

Table 4. Frequency Distribution of Designer Personality Variable Group Data.

No.	Range of Score	Frequency	Percentage	Cumulative percentage
1.	19-21	29	19.33	19.33
2	22-24	38	25.33	44.67
3	25-27	36	24.00	68.67
4	28-30	24	16.00	85.33
5	31-33	6	4.00	89.33
6	34-36	8	5.33	94.67
7	37-39	4	2.67	97.33
8	40-42	5	3.33	100.00
	Total	150	100	

Based on the data obtained in the field then processed statistically into a frequency distribution list with many classes calculated according to Sturges' rules, the score range is 23, the number of classes is 8 with a maximum score of 42 and a minimum score of 19 while the class interval length is 2. From the results of data analysis showed that the student character variable had a mean value of 26.08 with a standard deviation of 5.28, mode 26 and median 26.

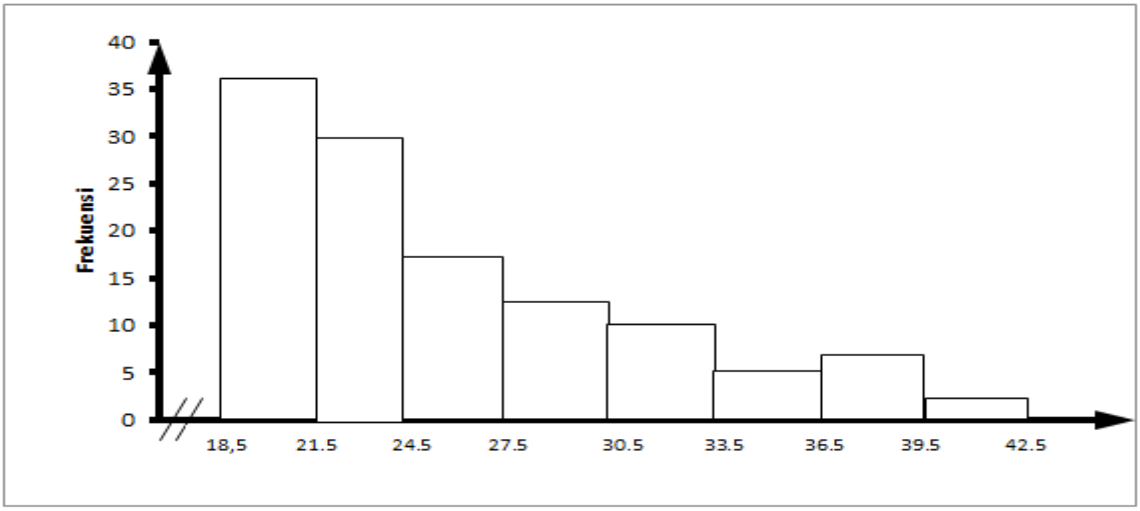

Figure 4. Designer Personality Histogram (X3).

The histogram shows that, the highest frequency/number of respondents on the personality designer variable obtained a score between 22 to 24 with a total of 38 respondents or 25.33%. The summary of the results of the normality test can be seen in table 5 below:

Table 5. Summary of Normality Test Calculation Results.

No	Variable	N	L_{tabel}	L_{hitung}	Category
1	Environmentally Responsible Behavior	150	0,072	0,069	Normal
2	Environmental Literacy	150	0,072	0.068	Normal
3	Attitude towards Zero Waste	150	0,072	0.071	Normal
4	Designer Personality	150	0,072	0.070	Normal

Based on the test results above, then the data in this study are assumed to be normal and homogeneous so that hypothesis testing can be continued. The hypothesis being tested is that there is a positive relationship between Environmental Knowledge (X1), Attitudes toward Zero Waste (X2), and Personality (X3). with Environmentally Responsible Behavior (Y) with the following results.

Table 6. Linear Regression Equation.

Model		Unstandardized Coefficients		t	t_{tabel}		Correlation		
		B	Std. Error		0,05	0,01	Second order	Partial	Part
1	(Constant)	42.341	23.655	1.790*	1,65	2,35			
	X1	0.447	0.207	2.160			0.172	0.175	0.167
	X2	0.131	0.170	0.771			0.092	0.063	0.060
	X3	0.280	0.075	3.733			0.295	0.294	0.289

Based on the table above, regarding the constants and coefficients of the linear regression equation, the regression equation is obtained $\hat{Y} = 42{,}341 + 0{,}447X_1 + 0{,}131X_2 + 0{,}280X_3$. Furthermore, testing the significance of the regression equation is determined based on ANOVA in Table 7

Table 7. ANOVA for Multiple Regression Models of Regression.

Model		Sum of Squares	Df	Mean Square	F	F_{tabel}	
						0,05	0,01
1	Regression	2971.006	3	990.335	6.656**	2,67	3,92
	Residual	21870.517	147	148.779			
	Total	24841.523	150				

In the table above the results of testing the significance of the overall regression coefficient are obtained F_{hitung} = 6,656 > $F_{tabel\ (0,01;3;147)}$ = 3,92 then the regression equation $\hat{Y}$ = 42,341 + 0,447X_1 + 0,131X_2 + 0,280X_3. is very significant. Furthermore, the results of the t-test for t_{hitung}> $t_{tabel\ (0,05;148)}$ 1,790 > 1,65 in Table 4.15 means that the correlation coefficient between environmental literacy, attitudes towards Zero Waste, and personality with environmentally responsible behavior is significant which means that variations in environmentally responsible behavior can be explained by the variables of environmental knowledge, attitudes towards Zero Waste, and personality together -The same.

Furthermore, the value of R Square or the coefficient of determination (KD) is obtained by squaring the correlation coefficient which shows how well the regression model formed by the interaction of the four variables is equal to 12% which can be interpreted that the variable environmental knowledge (X1), attitude towards Zero Waste (X2), and personality (X3) has a contribution effect of 12% on the variable environmentally responsible behavior (Y) and the other 88% is influenced by other factors. Furthermore, based on the results in the multiple correlation table in Table 6, the value of X2 has a positive relationship that is not significant in other words, on this occasion the findings are only "by chance".

The results of testing the hypothesis indicate that the designer's environmental literacy has a positive and significant relationship with environmentally responsible behavior. Environmental knowledge is one of the factors that influence environmentally responsible behavior. The results of other studies indicate that environmental literacy has a direct and significant effect on environmentally responsible behavior (Fidan & Ay, 2016; Shamuganathan & Karpudewan, 2015). In addition, environmental literacy also has a positive impact on environmental values. These results indicate that environmental values are getting better with increasing knowledge about the environment.

Attitude toward Zero Waste is related to the designer's responsible behavior but is not significant. According to Myers in Rahman, the attitude relationship will affect a person's behavior, if; (1) the factors that influence the statement of attitudes and behavior are reduced to a minimum, (2) when measuring attitudes refers to a more specific behavior, (3) there is awareness of the attitude one has when showing a behavior. Based on this, the most important determinant of a person's behavior is the intention to behave. The behavioral intention is influenced by the individual's good attitude towards the behavior, the individual's perception of subjective norms, and the extent to which the individual feels the behavior is under his control (Aziz et al., 2021; Moussaoui & Desrichard, 2017; Onel, 2017).

Personality is positively and significantly related to a designer's responsible behavior towards the environment. The designer's personality towards the environment is determined by the designer's self-control. In a broad sense, personality traits include abilities (eg general intelligence as well as numerical, verbal, spatial, or emotional intelligence), motives (eg need for achievement, power, or affiliation), attitudes (including values), and temperament characteristics as a style. overall view of one's experiences and actions (openness to experience, conscientiousness, extraversion, sociability, and neuroticism). Personality traits can be understood as a description of a person based on psychological (psychological) factors at different levels (Kesenheimer & Greitemeyer, 2021; Sawicki & Wegener, 2018; Yang et al., 2021).

The hypothesis testing concluded that there is a positive relationship between environmental literacy and personality together with environmentally responsible behavior, in this case, attitudes towards Zero Waste have a relationship but are not significant. After previously each of the three variables can be proven to be related to environmentally responsible behavior. Based on the theoretical models and relevant research studies that have been described previously, knowledge and personality factors turn out to have a role that can be calculated toward environmentally responsible behavior. As we know that environmental education is an important process in the formation of behavior (Thondhlana & Hlatshwayo, 2018; Ugulu et al., 2013; Zerinou et al., 2020). In this study, the environmental literacy variable is proven to be jointly related to personality in the formation of a designer's responsible behavior towards the environment. Thus, for the formation of behavior not only external factors in the form of knowledge but also internal factors in the form of a person's personality which in this case are designers are

needed.

The implementation of environmental education for designers needs to be evaluated because there are still many zero-waste concepts that are not applied in everyday life. Evaluation of environmental education needs to be carried out thoroughly. This is because the impact that can be caused by environmental education is of course very large in the development of the environment in the future. The environmental education curriculum for prospective designers must be reformed so that it can accommodate all learning topics related to environmental education that is contextual to what designers experience. As for the curriculum that needs to be developed, it can be based on output-oriented project-based learning in the form of products resulting from learning (Al-Balushi & Al-Aamri, 2014; Gülbahar & Tinmaz, 2006; Jantakun & Jantakoon, 2017).

4. CONCLUSION

Based on these findings, the conclusion of the dissertation can be formulated that if a designer's responsible behavior towards the environment is to be more positive, then factors such as environmental literacy and personality need to be considered to also be improved. The limitations of this study are that the sample used is still limited to designers. This makes it difficult for the results of this study to describe the situation of other professions related to zero waste. Suggestions for future research are to develop a more comprehensive environmental education model based on contextual problems.

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