

Research Article

Environmental responsibility and pro-environmental behavior: Biology undergraduate students' profile

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ABSTRACT

Environmental responsibility is a crucial aspect which determines the environmental solving problems in term of enhancing the pro-environmental behavior. This study aimed to examine the relation between the environmental responsibility and pro-environmental behavior of the undergraduate students. The sample of this descriptive correlational study was 106 students of biology education department which was taken randomly. This study showed that the undergraduate students were in high criteria of environmental responsibility (ER). This was represented by feeling guilty which was the highest percentage and followed by responsibility feeling and responsibility judgment respectively. In addition, the undergraduate students were in positive pro-environmental behavior (PEB). The regression model was $y = 23.876 + 0.623x$; while ER contributed as high as 22.1% to the undergraduate student's PEB. This implied that to improve the undergraduate student's PEB is by strengthening their ER.



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INTRODUCTION

The problem of environmental degradation has become the world's attention (Bronfman, Cisternas, López-Vázquez, De la Maza, & Oyanedel, 2015; Choudri et al., 2017; Miller & Bush, 2015). Environmental problems that often arise such as global warming, depletion of the ozone layer, accumulation of inorganic waste and environmental pollution by chemicals. Every country contributes to the destruction of the global environment, especially in big cities. Big cities experience problems such as river pollution, air pollution, and industrial waste problems (Aye & Widjaya, 2006; Hama & Hilal, 2017; Kanchanabhandhu & Woraphong, 2016; Song, Li, Duan, Yu, & Wang, 2017).

Environmental problems are complex problems that are interrelated with the emergence of other problems. This is due to high population growth, both caused by birth and urbanization. The main environmental problems

in major cities in Indonesia include reduced water catchment areas, shrinking green open areas, damage to blue open areas (rivers, waterways and coastal waters), underground water exploitation, coastal abrasion due to loss of mangrove forests on the north coast, and a bad city drainage system (Gabarda-Mallorquí, Fraguell, & Ribas, 2018; Lazaridou, Michailidis, & Trigkas, 2018). This has become a special focus for environmentalists, many efforts can be made to minimize the adverse effects of the environment (Cooper, Larson, Dayer, Stedman, & Decker, 2015; Steinhorst & Klöckner, 2017).

The problem of environmental degradation as happened in Jakarta is caused by many factors in human behavior. Humans use natural resources available to meet their growing needs. Excessive exploitation of a commodity in a region will certainly damage the region. This is showed by the reduced diversity in the area and the depletion of natural resources there (Cooper et al., 2015; Margono, Potapov, Turubanova, Stolle, & Hansen, 2014; Strange, Jellesmark, Bladt, Wilson, & Rahbek, 2011).

Humans as subjects who can process natural resources have responsibility for the environment and various flora and fauna that exist on the face of the earth. This responsibility is called Environmental Responsibility (ER). In simple terms, ER is a behavior in which a human being is responsible for his daily behavior so that his environment can be maintained (Choudri et al., 2017; Lekakos, Vlachos, & Koritos, 2014; Wong, Miao, Cui, & Tang, 2018). The implementation of the ER can be started on a small scale, such as changing daily behavior to be more environmentally friendly or to be a loving behavior for the environment.

Meanwhile besides the ER needed, a human being is also required to have a Pro-environmental behavior (PEB) which is a behavior that is shown to be concerned with the environment (Durr, Bilecki, & Li, 2017; Rezvani, Jansson, & Bengtsson, 2017; Schmitt, Akin, Axsen, & Shwom, 2018; Tang, Geng, Schultz, Zhou, & Xiang, 2017). People who have high PEB will definitely do everything by considering the environment. They will not act or do anything that is contrary to the environment in which they live.

Undergraduate students are young intellectuals and act as agents of change. Biology undergraduate students study the science of living things and their environment. Biology undergraduate students are expected to have a high ER because the ER is the main goal of environmental education. Therefore, biology undergraduate students are expected to be able to apply their knowledge to daily behavior as a PEB and socialize it to the public (Akenji, 2014; Buzov, 2014; Ichsan, Sigit, Miarsyah, Azrai, & Heryanti, 2019; Jonell, Crona, Brown, Rönnbäck, & Troell, 2016; Krettenauer, 2017). Previous research mostly examined ER and PEB in the community, but not specifically studied related to undergraduate students in the Biology study program (Du, Jian, Zeng, & Du, 2014; Panno et al., 2017; Wong et al., 2018). This is a novelty of this research, which presents ER data and PEB undergraduate students in biology education programs. Based on various studies that have been conducted from various sources, it is suspected that there is a relationship between ER and PEB, in this case, the Biology Education undergraduate students. The purpose of this study was to determine the relationship between ER and PEB for Biology undergraduate students at Universitas Negeri Jakarta.

METHOD

The method used is descriptive survey research with independent variables (X) is environmental responsibility (ER) and the dependent variable (Y) is the pro-environmental behavior (PEB). This research was conducted at the Biology Education Study Program, Universitas Negeri Jakarta in January 2017. The population is undergraduate students from the 5th semester of the Biology education study program at the Universitas Negeri Jakarta. A sample of 106 undergraduate students was taken by simple random sampling.

The instrument used was the ER questionnaire consisting of 40 statements with dimensions including Responsibility Feeling, Feeling Guilty, Responsibility Judgment (Du et al., 2014; Kaiser, Ranney, Hartig, & Bowler, 1999). The PEB questionnaire consists of 41 statements including energy conservation, transportation mobility, consumerism, waste avoidance, representative social behavior towards conservation and recycling according to what was stated by Kaiser & Wilson (2004). Both instruments have been tested for validity and reliability and the instrument was declared valid and reliable. After that, data were analyzed by normality and homogeneity test, while data have normal distributed regression and linearity test can be use, but if data doesn't normal distribution, data analyze with non-parametric test (such as Spearman rank test). Hypothesis testing was analyzed by regression model and coefficient of determination between variables. The research hypotheses was there is a positive relationship between ER and PEB in Biology undergraduate Students.

RESULTS AND DISCUSSION

Most Undergraduate students (10+78%) were shown to had very high and high levels of ER and 1% with low criterion as shown in Table 1.

Table 1. Percentage of students who fall into each environmental responsibility criterion

Criteria	Percentage (%)
Very High	10
High	78
Moderate	11
Low	1

The distribution of biology undergraduate students in three ER indicators is shown in Table 2. The highest percentage was 42% for feeling guilty, while the indicator with the lowest percentage of 19% was the responsibility judgement. The remaining 39% was for the responsibility feeling indicators

Table 2. Percentage of students categorized into the indicator for environmental responsibility

Indicators	Percentage (%)
Responsibility Feeling	39
Feeling Guilty	42
Responsibility Judgment	19

The majority of biology undergraduate students have a PEB score with positive criteria of 77.4%, while 22.6% get negative criteria, as shown in Table 3.

Table 3. Percentage of students who fall into alternative pro environmental behavior criterion

Criteria	Percentage (%)
Positive	77.4
Negative	22.6

PEB includes 6 indicators. The percentage of students categorized into each indicator is shown in Table 4. The indicator of PEB which had the highest percentage were energy conservation, transportation, and mobility of 19%, while the indicator with the lowest percentage (13%) was recycling. The rest were consumerism (18%), waste avoidance (16%) and representative social behavior towards conservation (15%).

Table 4. Percentage of students categorized into the indicator for pro environmental behavior

Indicators	Percentage (%)
Energy Conservation	19
Transportation and Mobility	19
Waste Avoidance	16
Consumerism	18
Recycling	13
Vicarious, Social Behavior	15

On average, female students had a higher score for ER than male students. The average ER score of female undergraduate students was 98.70 while that of male students was 95.46. The difference between the value of male and female was 3.24, as shown in Table 5.

Table 5. Average environmental responsibility score based on gender

Gender	ER Score
Male	95.46
Female	98.70

For the PEB variable, the average of female undergraduate students scores higher than that of male students. The average score of female students is 85.20 while that of male students is 84.00, as shown in Table 6. The difference between the value of male and female students is 0.80. This shows that PEB is influenced by gender in conformity with the other report (Ichsan, Sigit, & Miarsyah, 2018; Vicente-Molina, Fernández-Sainz, & Izagirre-Olaizola, 2018).

Table 6. Average pro-environmental behavior score based on gender

Gender	PEB Score
Male	84.00
Female	85.20

Nearly 90% of the respondents, undergraduate biology students, were shown to have a high ER. This is because environmental knowledge and environmental problems in studying biology can produce students' self-

awareness of the environment. A person's awareness to the environment depends on the knowledge of the environmental problem and everyone must be responsible for their respective environment (Chander & Muthukrishnan, 2015; Chuang & Huang, 2018; Istiana & Awaludin, 2018; Juhanda & Maryanto, 2018; Lee, Sung, Wu, Ho, & Chiou, 2018; Suryanda, Azrai, & Wari, 2016).

Among the indicator for ER, feeling guilty has the highest percentage of 42%. This shows that guilt because of bad behavior towards the environment in undergraduate students plays the biggest role in generating a sense of responsibility towards the environment. When undergraduate students damage the environment, students would be feeling guilty, so students reduce their actions that damage the environment. The influence of guilt on someone can be a great behavioral motivator (Fitriani, Adisyahputra, & Komala, 2018; Moghavvemi, Sulaiman, Jaafar, & Kasem, 2018; Owens, Sadler, Barlow, & Smith-Walters, 2017; Supriyatin, Nurnawati, & Heryanti, 2016). The lowest dimension with a percentage of 19% is the dimension of responsibility assessment. Responsibility is an important thing if we talk about the environment (Azrai, Ernawati, & Sulistianingrum, 2017; Choudri et al., 2017; Collado, Staats, & Sancho, 2017; Istiana & Awaludin, 2018; Schmitt et al., 2018).

Based on the results of the study, the data shows in a normal and homogeneous distribution. Correlation test results show that ER and PEB have a positive and significant relationship. The regression model was obtained $\hat{Y} = 23.876 + 0.623X$ while the coefficient correlation was 0.469 which means there was a moderate correlation. This shows that the two variables studied have a moderate correlation. The results of this study indicate that the higher the ER the higher the PEB undergraduate student, while the lower the ER of students, the lower the PEB too. PEB can be well predicted by the ER. Students with low responsibility for the environment might have bad attitude to the environment (El Ghoul, Guedhami, Kim, & Park, 2018; Koutsoukos, Fragoulis, & Valkanos, 2015; Lai, 2018; Moisander, 2007; Sangroya & Nayak, 2017).

ER and PEB are also influenced by demographic factors such as gender, age, and duration of education. ER scores and PEB scores for female undergraduate students were higher than for male undergraduate students. This is because women have a higher level of responsibility in protecting the environment and caring for others in taking responsibility for reducing environmental problems (Derevenskaia, 2014; Ertz, Karakas, & Sarigöllü, 2016; Freed, 2018; Jonell et al., 2016; Kamerilova, Kartavykh, Ageeva, Veryaskina, & Ruban, 2016). In many studies also found gender differences in perceptions of the environment. Ordinary women are trained early to be more expressive, sympathetic, nurturing, cooperative, independent, and helpful (Syabilla, Suryanda, & Sigit, 2018; Vicente-Molina et al., 2018). In addition, environmental-related behaviors mostly occur at home, such as saving electricity, using recycled products, and buying household products (Arnold, Kibbe, Hartig, & Kaiser, 2018; Kaiser & Wilson, 2004; Matthes & Wonneberger, 2014; McCarthy & Liu, 2017).

The age range of undergraduate students in this study is 18-21 years. The highest ER and PEB score in this study was not obtained from 21-year-old students who were the highest age, but the highest ER score was obtained from 20-year students, while PEB was obtained from 19-year students. This is not consistent with the theory that older people are environments that behave better than younger ages. Older people play a more important role in PEB than younger humans (Han, Nelson, & Kim, 2015; Havu-Nuutinen & Niikko, 2014; Koutsoukos et al., 2015; Schmitt et al., 2018). The incompatibility of the results of this study with the theory can be caused by the close age range of the respondents so that it does not have a major influence on the ER and PEB scores (Jonell et al., 2016; Wong et al., 2018).

Based on the results of the study, the determination coefficient value of 0.221 obtained indicates that the ER variable contributes 22.1% to the PEB variable. While the other 77.9% of PEB is influenced by other factors in the form of external factors and other internal factors. External factors that can affect PEB such as socio-cultural and economic factors (Akenji, 2014; Austgulen, 2016; Haanpää, 2007). If environmental norms in community groups are upheld, then the community will be more environmentally friendly. Likewise, vice versa, if the environmental norms in a group of people are ignored, people will be lazy to take care of the environment (Aslan, 2015; Collado et al., 2017; Ito & Kawazoe, 2015; Nordin & Alias, 2013; Wynveen & Sutton, 2017).

In addition, economic factors play a role in making decisions for PEB. Students have a high need to support their lectures. While most students do not have their own income. Such problems can affect students not to have high PEB. Some PEB as a good behavior in protecting the environment must pay higher costs, such as choosing organic food products, using renewable energy sources such as solar panels, the price of bags is more expensive than plastic bags (Arafat, Jijakli, & Ahsan, 2015; Diaz-Rainey & Ashton, 2011; Gu, Chhaged, Petrucci, & Yalabik, 2015; Ichsan & Mulyani, 2018; Strange et al., 2011).

CONCLUSION

The result of the present study indicates a positive relationship between ER and PEB in biology undergraduate students. Based on this study, it is concluded that increasing people to have a PEB is by letting

them to recognize an ER. For the further studies, it is recommended to make measurements on other factors that influence students eco-friendly behavior, knowledge, and awareness.

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