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ANALYSIS OF STUDENTS' ENVIRONMENTAL LITERACY PROFILE ON BEHAVIORAL COMPONENTS IN CONSERVATION BIOLOGY LECTURES

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ABSTRACT

Environmental literacy can answer concerns about the problem of ecological crisis. The environmental literacy has a category of behavior. Behavior toward attitudes of ecological concern is shown in an individual's daily lifestyle and patterns. This study aims to analyze students' environmental literacy skills, especially in 6 components of attitude: energy conservation, mobility and transportation, waste avoidance, recycling, consumerism, and vicarious attitudes toward conservation. This is a survey study using a cross-sectional method. The research instrument is a questionnaire consisting of 40 positive and negative statements. The subjects of this study were biology education students who were taking conservation biology courses. The results show that students' environmental literacy is in a good category, that contains 74% overall have shown an attitude of environmental concern. Specifically, energy conservation has an excellent category (83%). This is indicated by the presence of 2 components of attitudes in the good category, which are waste avoidance (79%) and consumerism (79%). Meanwhile, the other 3 components show a sufficient category, especially vicarious behavior towards conservation (72%) the mobility and transportation component (66%), and waste recycling habits (65%). In conclusion, further habituation and education are needed to improve the pro-environmental behavior, especially in the category that is still not good.

Keywords: *Environmental Literacy, Behavior, Biology Conservation*

INTRODUCTION

Over the years, the environment we live in has degraded quality. This decline in environmental quality can affect the survival of living things on Earth. However, it is undeniable that environmental damage is mostly caused by human activities (Diartho & Fardian, 2022). Indirectly, human activities can cause climate change (Basuki et al., 2022; Indrajaya et al., 2022; Monk &

Priatna, 2022), deforestation (Nugroho et al., 2023), land degradation (Harrison et al., 2020), pollution (Ma'ruf, 2021; Pirmana et al., 2021), and contamination (Zahroh & Najicha, 2022). Therefore, there needs to be a lifestyle change that can preserve the environment we live in so that it remains sustainable. This lifestyle can be reflected in an individual's insight into the environment.

The personal insight through the environment is known as environmental literacy. Environmental literacy prepares individuals to understand the impact of human activities on the environment (Holmes et al., 2022). Environmental literacy will make someone aware of being actively involved in environmental conservation, both through understanding and awareness that they gain (Afrianda et al., 2019). According to (Szczytko et al., 2019), environmental literacy can be categorized into four main components. The four components consist of a basic understanding of the environment (ecological knowledge), sensitivity to the environment (environmental affect), ability to solve environmental problems (cognitive skill), and pro-environmental behavior. In this study, we will focus on the last component, as well as the pro-environmental behavior.

Pro-environmental behavior refers to actions that describe an individual's sensitivity to always preserve the environment, reduce risks, or even prevent environmental damage (Hollweg et al., 2011; Szczytko et al., 2019). Meanwhile, (Maurer & Bogner, 2020) defines pro-environmental behavior as an action that has environmental values. This behavior is related to an individual's understanding of the environment (Kousar et al., 2022). According to (Kaiser et al., 2007), this pro-environmental behavior is categorized into six sub-components. These sub-components consist of energy conservation actions, mobility and transportation, waste avoidance, consumerism and green economy, waste recycling habits, and indirect actions towards conservation.

Based on several studies, it is stated that the pro-environmental behavior of students and college students in Indonesia is still in the low category (Anawati & Utari, 2023; Roshayanti et al., 2019). Furthermore, a study developed by (Israilova et al., 2023) claimed that environmental and conservation education influences better behavioral changes towards caring for the environment. In line with the opinion (Lestari & Siskandar, 2020) that pro-environmental behavior can be trained through habituation in the form of learning. One of the learnings that supports this at the tertiary level is the conservation biology course (Ardoin et al., 2020). Conservation and ecology lectures can provide pro-environmental behavior (Aripin et al., 2021; Fonseca et al., 2020).

This study aims to analyze the profile of pro-environmental actions of students in conservation biology classes. This research is a survey-based study using a questionnaire instrument. The questionnaire was adapted by a framework from (Kaiser et al., 2007). This research is expected to provide an overview of the pro-environmental behavior of conservation class students and can be used as an evaluation to plan better conservation classes in the future.

METHODS

This study is a survey study with the method used is the cross-sectional study method. Cross-sectional research explains a phenomenon at a certain time (Creswell, 2019). This study analyzes students' environmental literacy skills, especially in the behavioral component. The sample in this study were biology education students who were teaching Conservation Biology lectures. The sampling technique used convenience sampling, where researchers could access a particular class from the available population. This study used an instrument in the form of a questionnaire (Kaiser et al., 2007) which was adapted to the climate and weather conditions in Indonesia. The questionnaire contains short statements in six categories of habits, there are energy conservation, mobility and transportation, waste avoidance, recycling, consumerism, and indirect behavior toward conservation. The questionnaire contains 40 positive and negative questions, the following is a grid of the instrument used:

Table 1. Questionnaire Instrument Grid

The Category of Behavior	*Statement Items*		*Total*
	Positive	*Negative*	
Energy Conservation	2, 4	1, 3, 5, 6	6
Mobility and Transportation	7, 9	8	3
Waste Avoidance	11, 14, 16, 17	12, 13, 15,10	8
Recycling	18, 19, 20, 21, 22	23	6
Consumerism	24, 25, 26, 29	27, 28, 30, 31	8
Vicarious behavior toward conservation	32, 33, 34, 35, 36, 37, 38, 39,40	-	9
		Total Amount	40

The questionnaire was given to students in the form of a *g-form* with a 5-1 Likert scale filling model (Always, Quite Often, Sometimes, Ever, Never) and the opposite value for negative statements. The data analysis used was descriptive analysis with a focus on interpretation to determine the environmental literacy profile of students in the behavior component. The data analysis process was assisted using SPSS software. Furthermore, the data obtained mean and maximum values that's will be converted into percentages. The percentage obtained is then interpreted as an attitude category based on (Amka & Mirnawati, 2020).

RESULT AND DISCUSSION

Behavior on environmental literacy will be reflected in daily habits as a lifestyle. This behavior is interpreted as a way of acting, behavior, and individual decisions towards the environment (Pangsuma & Surtikanti, 2023).

In other words, behavior is an action taken by individuals that reflects their knowledge and attitudes towards environmental issues, where these actions can reduce negative impacts on the environment. Good environmental literacy is often followed by pro-environmental behavior (Bissinger & Bogner, 2018; Maurer & Bogner, 2020; Wong et al., 2018). However, there is often a gap between understanding and attitudes shown towards the environment (Fang, 2020; Maurer & Bogner, 2020). Environmental concern indirectly influences awareness and willingness through environmental attitudes (Solekah et al., 2022).

Based on the survey conducted, the student behavior profile overall showed 74% indicating a good category. This shows the need to increase pro-environmental behavior to reduce environmental problems. There are 83% in energy conservation habits, which is an excellent category. Energy conservation is an effort to reduce energy consumption through more efficient use and reduction of energy waste (Kaiser et al., 2007). Energy sufficiency aims to reduce energy consumption and emissions (Sorrell et al., 2020). Several factors such as the availability of alternative energy (Irfan et al., 2021), the high cost of alternative energy (Olughu, 2021), and public understanding of energy conservation (Dursun et al., 2019) are the causes of low energy conservation. Furthermore, research (Wolske et al., 2020) states that energy consumption behavior is influenced by peers, neighbors, or relatives (Dursun et al., 2019). This shows that there is a pattern of energy use that is connected to the social environment around us. The development of energy-efficient electronic devices is one solution to increasing energy conservation (Murshed, 2020). In addition, education can contribute to improving energy conservation (Gill & Lang, 2018; Gródek-Szostak et al., 2021; Irmak et al., 2023; Tolysbayeva et al., 2023). Therefore, conservation biology lectures can be the first step to provide energy conservation.

The student behavior profile in the mobility and transportation category obtained a score of 66%, indicating a sufficient category. The assessment of this category is seen from the habit of walking mobility, the use of motorized vehicles, and the use of environmentally friendly transportation (Kaiser et al., 2007). Some people sometimes choose to use private transportation rather than public transportation. However, some groups of people have started to switch to environmentally friendly transportation such as bicycles or electric cars. The following is the behavior profile for these three habits:

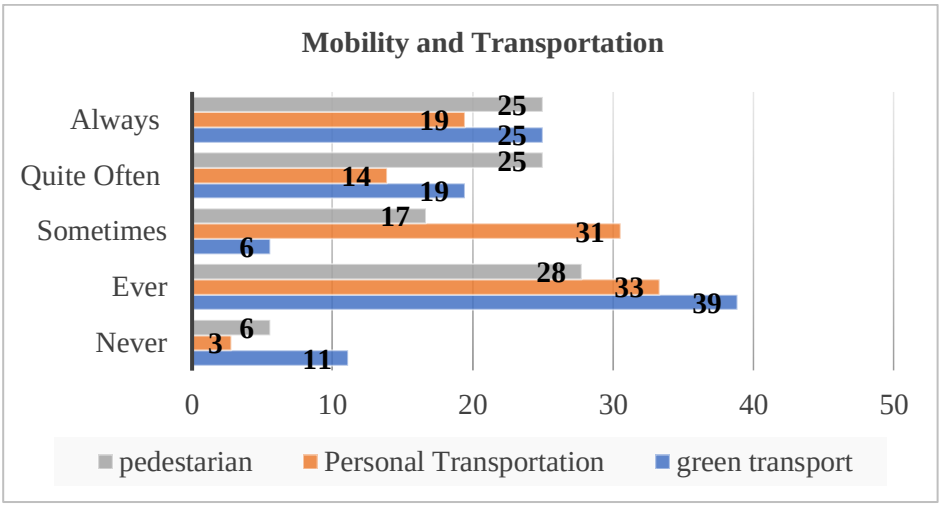

Figure 1. Mobility and Trasportation Behavior

The availability of inadequate public transportation affects people's perspectives (Javaid et al., 2020) to buy several motorized vehicles that are not environmentally friendly (Anagnostopoulou et al., 2020; Si et al., 2020). In addition, the level of daily activity and heavy traffic conditions also affect this. Therefore, improving public transportation routes and services is one solution for sustainable transportation (Wang et al., 2020). In addition, the provision of public transportation services can allow people to travel comfortably, and have an impact on reducing emissions (Gallo & Marinelli, 2020).

In the waste avoidance category, it obtained a score of 79% with a good category. The assessment of waste avoidance is seen from the habit of processing household waste such as food and utilities (plastic, product packaging, and non-recyclable waste). According to (Jacobsen et al., 2022), a vegetarian is better at avoiding waste, this is because their diet is limited to certain products. Several factors such as shopping habits significantly influence food waste avoidance behavior (Aydin & Yildirim, 2021). Social norms also play a role in influencing waste avoidance behavior (Jacobsen et al., 2022). This is shown by the community's perspective on the quality of products that are considered suitable for them. For example, some people prefer to keep cooking broccoli stems rather than throwing them away as trash. The same thing is also shown in choosing a rag rather than using disposable tissues for the house cleaning process. Knowledge about food conservation is related to waste avoidance attitudes (Aydin & Yildirim, 2021; Messner et al., 2020). Household overproduction and consumption also affect waste avoidance habits (Messner et al., 2020). Innovation in product packaging technology can increase waste avoidance behavior (Sumrin et al., 2021). Therefore, the habit of using household product consumption in moderation is a good thing to increase waste avoidance behavior.

As for the recycling category, it is assessed through the habit of recycling waste, avoiding single-use products, and using recycled products. In the survey conducted, this habit obtained a value of 65% with a sufficient category. This shows that not many individuals are aware of the importance of recycling habits. The following is the survey data on recycling habits:

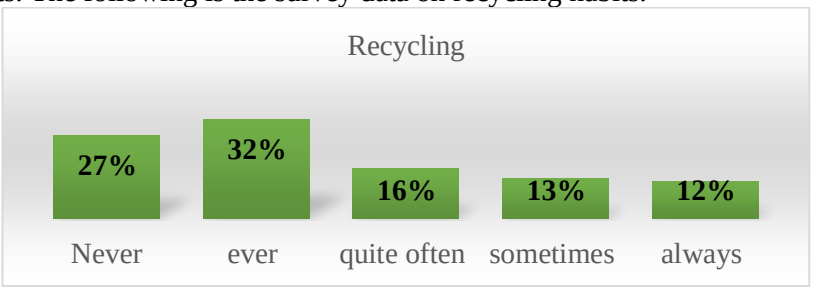

Figure 2. Recycling Habit.

Based on diagram 2, the people who always recycle are 12%, this value is still very small compared to the percentage of individuals who never recycle (27%). However, the percentage of individuals who have recycled is still quite high at 32%. In line with research (Oh & Hettiarachchi, 2020) which states that recycling rates remain low globally. In line with research (Darus et al., 2020) which states that increasing post-consumer recycling is very important in Indonesia. Effective waste management requires local community involvement. Public awareness of the health risks of burning waste is low. (Northcott, 2020). Therefore, recycling education, waste management regulations, and government support are needed to improve good waste recycling habits.

The behavior profile in the consumerism category scored 79% in the good category. Consumerism is how an individual buys and uses environmentally friendly products (Kaiser et al., 2007). Sustainable consumption shows the relationship between environmental sustainability and human life needs, accessibility, product quality, economy, and consumer health (Eren & Şengun, 2022). Consumer behavior is influenced by attitudes, norms, and social awareness (Widayat et al., 2022). Consumer perception influences the decision to purchase environmentally friendly products (ElHaffar et al., 2020). Cultural values influence customer preferences for them (Ghazali et al., 2021). This shows that social concerns significantly impact the way people consume environmentally friendly products (Chen et al., 2021). In addition, the high cost of environmentally friendly products also limits people's access to sustainable products (Nuh et al., 2023). Minimizing waste is also very important for changing consumer behavior towards a more sustainable direction (Chen et al., 2021). Thus, public education is needed regarding environmentally friendly products and government support to be able to provide access to environmentally friendly products for all levels of society.

In the last category, vicarious behavior towards conservation, it obtained a score of 72% with a sufficient category. The assessment in this category is seen from the individual's lifestyle that shows conservation behavior either indirectly. This behavior can be in the form of habits of using non-disposable products such as drinking bottles, shopping bags, food and drink containers, and other utilities. Direct activities with nature can foster motivation to carry out conservation (Yue & Chen, 2023). In line with research stating that nature experiences can influence conservation behavior (Sun et al., 2024). Educational interventions influence these conservation habits (Walters et al., 2023).

Based on the research conducted, the behavioral profile of students in the conservation biology class shows a good category with a percentage of 74%. The following is the percentage of behavior in the six components:

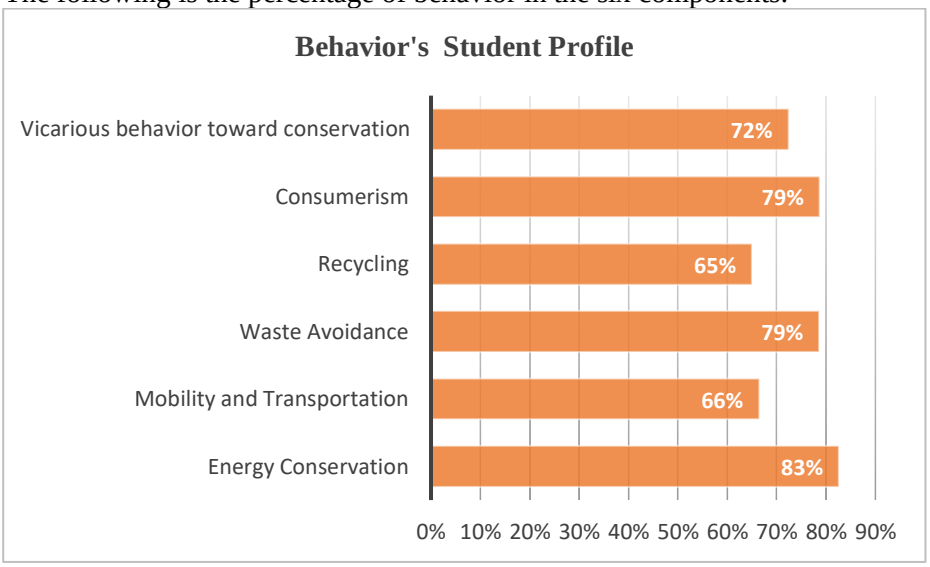

Figure 3. Behavior's Student Profile.

Figure 3 shows the behavioral profile on energy conservation (83%), mobility and transportation (66%), waste avoidance (76%), waste recycling habits (65%), consumerism (79%), and direct attitudes towards conservation (72%). Several factors such as environmental understanding (Maurer & Bogner, 2020), social norms (Genoveva & Syahrivar, 2020), cultural trends (Widayat et al., 2022), educational support (Pangsuma & Surtikanti, 2023) and local government (Wang et al., 2020) influence an individual's sustainable behavior.

CONCLUSION

Students' overall environmental literacy behavior profile is at an average of 74% with a good category. Behavior on energy conservation has an excellent good category (83%). There are 2 behavioral components in the good category waste avoidance (79%) and consumerism (79%). In contrast, the other 3

components show a sufficient category through the vicarious toward conservation (72%), mobility and transportation (66%), and waste recycling habits (65%). Further habituation and education are needed to improve the pro-environmental behavior component, especially in categories that are still good enough. The effort to improve pro-environmental behavior is through education, especially conservation biology lectures.

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