The environmental attitude of the prospective biology teachers in Indonesia

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Abstract: Environmental attitude should be possessed by students as an effort to manage their relationship with environmental problems. However, there has never been any study on the environmental attitudes of prospective biology teachers in Indonesia. This study aims to discover the environmental attitude of the prospective science teachers throughout Indonesia. This cross-sectional survey study analyzes the aspects of gender, grade point average (GPA), college status, and study status which are positioned as the character of the respondent whose impact on the students' environmental attitudes are analyzed in this study. The target population size of this study is 1300 people. Thus, based on Krejcie and Morgan Table, the minimum sample size with a confidence level of 95% and margin error of 5% is 1235 students. The data collection instrument used in this study is the Environmental Attitude Inventory/EAI questionnaire which has been validated by bilingual experts and transformed into an online questionnaire by means of Google Form. SPSS software was used to examine the data. The results indicate that there is no significant difference in EA scores based on gender, GPA factor, and university status background. The difference in EA scores is affected by whether or not students have taken courses related to the environment ownership. The researchers believe that it is critical to ensure that the course materials concerning environmental education are properly planned and implemented. Courses should be supplemented with themes on environmental issues ranging from local to global scope.

Keywords: environmental attitude, environmental education, prospective biology teachers

Introduction

Environmental issues in Indonesia are becoming more alarming (Case et al., 2007; Kurniawan & Managi, 2018), and having negative impacts on people's lives, and even neighboring countries (Fadli et al., 2019). These environmental issues include deforestation (Austin et al., 2019; Islam et al., 2016; Petrenko et al., 2016; Tacconi et al., 2019), water pollution from household and industrial waste (Belinawati et al., 2018; Garg et al., 2018; Luo et al., 2019), air pollution in urban areas, smoke and haze from forest and land fires (EoF team, 2019; Greenstone & Fan, 2019; Kusumaningtyas & Aldrian, 2016; Madsen, 2015; WHO, 2018), pollution by pesticides, soil pollution, and decreased soil fertility (Hartemink, 2005; Joko et al., 2017; Leimona et al., 2015; Luo et al., 2019; Savci, 2012).

Environmental issues can be resolved or at least mitigated, by raising public awareness of the importance of environmental quality and preservation. Environmentally friendly behavior will be manifested as the result of public awareness of environmental quality and sustainability (Hendryx et al., 2013; Hendryx & Ahern, 2008). Evidently, environmental issues are expected to decrease as environmental education

spreads in various educational institutions ranging from high schools to universities, particularly as the number of institutions implementing pro-environmental programs tends to increase (Olsson, 2018; Schüßler et al., 2019; Steg & Vlek, 2009; Szczytko et al., 2018; Ulutas & Köksalan, 2017). Almost all countries have included environmental education materials in their curricula (Afandi, 2013; Hudson, 2001; Sawitri, 2016). Particularly in Indonesia, the materials are included as local content in regular educational institutions or incorporated in the subject materials (Adisendjaja & Romlah, 2008; Muhaimin, 2015; Steele et al., 2015; Sudjoko, 2014). Learning innovation must be promoted in order to improve students' environmental competence, knowledge, and environmental attitude (EA) (Farwati et al., 2017).

Encouraging the implementation of EA is crucial to reduce the environmental impact and to move forward to a more sustainable future (Bøhlerengen & Wiium, 2022; Shafiei & Maleksaeidi, 2020; Stegeman et al., 2020). College has an important role in training professionals who play an important role in protecting the environment in the future (Heyl et al., 2013). Environmental awareness is important to the study of pollution prevention and environmentally friendly attitudes (Akkor & Gündüz, 2018). College institutions must not forget its educational/formative purpose. In this context, to achieve changes in students, it is necessary to pay attention to how they are and how they interact with their environment (the area where the attitude process occurs). Attitudes influence and guide us in our perceptions of reality; they are a personal synthesis that filters our perceptions, guides our thinking, and facilitates individual adaptation to context (Ibáñez et al., 2020).

Efforts taken to improve student environmental attitudes imply a high level of urgency (Dutt & Kumari, 2016; Yang et al., 2022) because they are all potential scientists, policy makers, consumers and future leaders. They will be responsible for providing solutions to various environmental problems that arise in the future (Ozsoy et al., 2011). The prevailing environmental education is very important to produce citizens with good environmental attitude towards the future of earth (Ajaps & McLellan, 2015). Environmental attitudes are recognized as a prerequisite for changing environmental behavior. Environmental attitudes are a major topic in the context of college institutions that play an important role in shaping students' views of the world (Evert et al., 2021). In this regard, having knowledge of the environmental attitudes of young people enables an increase of their role in environmental education (Muñoz-García et al., 2022).

To effectively carry out their roles, educational institutions must first understand their primary stakeholders, namely college students (Sousa et al., 2021). In this study, we propose to analyze the EA aspect of college students. We also intend to investigate whether the characteristics of student demographics influence these variables. Correspondingly, individual EAs, as well as knowledge of their academic background, are potential factors that can help overcoming these environmental challenges (Arshad et al., 2020).

Researches on EA are mostly done abroad. Several previous studies have discovered that education is significantly and positively correlated with various pro-environmental attitudes (Harring et al., 2020). In some cases, it can be illustrated by this example. A study with students as the subjects in Pakistan indicates high levels of environmental attitudes only for two groups, namely physics and biology, attitudes and behavior. The influence of environmental attitude is significantly negative (Arshad et al., 2020). A study with Sultan Qaboos students as subjects indicates that the students generally have a positive attitude toward the issues raised, with female students being more positive than men. Results of the study show that students' attitude towards environmental issues does not seem to be influenced by the faculty they study in, except in terms of energy, where there is a significant difference between the attitudes of students from the faculty of education and the faculty of agriculture, the former showed a more positive attitude than the latter (Al-Rabaani & Al-Mekhlaf, 2009).

Meanwhile, the research was conducted to discover the attitude of Hatay Mustafa Kemal University students in Turkey toward environmental problems in local or national scale as well as the influence of education status and gender. The results indicate that the level of awareness is found to be higher than the level of attitude in students. Yet, gender is not found to be an effective parameter on environmental attitudes (Bozdogan et al., 2016). EA among undergraduate students is studied at a South African university. According to the findings, the students' environmental attitudes are more inclined to utilization, which is an anti-environmental factor, than to environmental conservation factors. Furthermore, demographic factors such as gender and ethnicity are significantly and positively associated with student's EA but most of the time, stereotypically associated too. These results are practical implications to adapt environment-based interventions which aim to promote pro-environmental attitude among students. However, the results also raise concerns about the cross-cultural validity and efficacy of some measurement instruments related to EA and environmental organizations, indicating a need to develop culturally sensitive EA measures, as well as environmental organizations with a greater emphasis on social justice and indigenous knowledge systems (Evert et al., 2021).

Based on the preceding studies, we conclude that a study focusing on prospective teachers is still uncommon, particularly in Indonesia (overall). It is possible that there has been a lot of studies on prospective biology teachers, but it has been done on a single campus/college scale which does not describe the overall EA of biology teacher candidates in Indonesia.

The environmental attitude in this study consists of two aspects, namely the dimension of conservation

and the dimension of utilization. The Preservation dimension prioritizes the preservation of nature and the diversity of natural species in their natural (original) state, protecting them from human use and change. The Utilization dimension expresses the belief that it is right, appropriate, and necessary for nature and all natural phenomena and species to be used and transformed for human purposes. Therefore, Preservation will predict ecological behavior, whereas Utilization will predict economic liberalism, which represents aspects of the Dominant Social Paradigm (Milfont & Duckitt, 2006, 2010).

This study will contribute on the real illustration of EA for biology education students in Indonesia. This study will be the first and holistic data that can serve as a reference and baseline study for other researchers, in which it can be connected with psychological aspects. This research will also be the basis for policy makers in schools and universities in implementing various environmental education programs. According to Dhenge et al (2022), EA is an important component in environmental protection psychology. This study tries to determine the environmental attitudes of prospective biology teachers throughout Indonesia. This study will review it from the aspects of gender, Grade Point Average (GPA), college status, and study status.

Method

Research Design and Participants

This cross-sectional survey study aims to collect data about Indonesian students' attitudes toward environment. Data collection process was carried out since June to August 2022. The target respondents were students major in education, specifically in biology field of study from various institutions in Indonesia. Gender, Grade Point Average (IPK), college status, and study status were established as respondent characteristics whose impacts on students' environmental attitudes are examined in this study.

Target population size of this survey is 1300 people. Hence, based on the Table of Krejcie and Morgan, the minimum sample size with a confidence level of 95% and margin error of 5% is 1235 students. The inclusion criteria for respondents in this study are prospective biology teacher students from Indonesian universities, Indonesian citizens who are still enrolled as students and willing to voluntarily participate as research respondents. They are students who major in Biology Education of the Faculty of Teacher Training and Education, the College of Education, and the Faculty of Mathematics and Natural Sciences. The exclusion criteria in this study, on the other hand, are postgraduate students, students who do not major in education study programs, students who have dropped out, and students who do not provide complete information on the characteristics of respondents.

Instrument and Data Collection Procedure

The instrument of data collection used in this study is Environmental Attitude Inventory/EAI questionnaire (Ajdukovic et al., 2019; AlMenhali et al., 2018; Milfont & Duckitt, 2010) which has been validated by bilingual experts. The questionnaire consists of 12 items that use 5-point of Likert scale, ranging from unimportant (score 1) to extremely important (score 5). During the data collection process, the COVID-19 outbreak was still affecting Indonesia. Additionally, the target respondents are also very large and diverse. In light of these circumstances, the survey process was completed online. Therefore, the 12-items of Environmental Attitude Inventory questionnaire were transformed into online questionnaire by means of Google Form.

Data Processing and Analysis

Before analyzing process, the survey data was downloaded into a comma separated value (csv) format, checked, and labeled using Microsoft Excel. After the data has been checked and labeled, analyzing process was conducted using the SPSS software. Data of the respondents' characteristics were analyzed using frequency and percentage. Mean and standard deviation scores were calculated in each item. The Mann-Whitney U Test was used to compare two groups of students, while the Kruskal-Wallis H Test was used to compare more than two groups. In this study, the alpha value was set at 5%.

Results and Discussion

Table 1 provides information on the demographic distribution of respondents of the study. The data result of this study has been tested for the normality of distribution through two tests, namely Kolmogorov-Smirnov and Shapiro-Wilk tests. The data is deemed to be normally distributed if the obtained p-value (value in column Sig.) is above 0.05. Unfortunately, based on the analysis results, the majority of the data are not normally distributed. Thus, non-parametric analysis is conducted (Hoermann et al., 2020; Sainani, 2012; Vickers, 2005; Wadgave & Ravindra Khairnar, 2019).

Table 1. Distribution of respondents' demographics

	Group	Frequency	Percentage (%)
Gender	Male	177	13.97
	Female	1090	86.03
GPA	Less than 3	52	4.10
	3 to 3.5	552	43.57
	3.6 to 4.0	663	52.33
College Status	Public University (*PTN*)	765	60.38
	Private University (*PTS*)	502	39.62
Study Status	Have taken the course	1011	79.79
	Have not taken the course	256	20.21

The average scores of students' responses for each EA item are elucidated in Table 2.

Table 2. Average student answer scores in each EA item

Item	Mean	SD
I REALLY ADORE visiting countryside, especially those with farms or forests.	4.04	1.11
Government MUST CONTROL the level of use of raw materials and ENSURE their long-term availability.	4.26	1.04
I WANT TO PARTICIPATE ACTIVELY in environmental groups.	3.85	1.09
ONE OF THE MOST IMPORTANT REASONS for keeping lakes and rivers (waters) clean is to provide the community a place to enjoy water sports.	3.75	1.15
NO environmental issues can be resolved by modern science.	2.48	1.27
Humans FREQUENTLY abuse the environment.	3.97	1.16
A wild and natural garden is PREFERABLE to one that is neat and orderly (cultivated/manipulated by humans).	3.17	1.23
I TRY to conserve natural resources as much as possible.	3.98	1.04
I DO NOT BELIEVE that humans were created or evolved with the intent of DOMINATING the nature.	2.99	1.17
It is MORE IMPORTANT to protect the environment than to protect people's jobs.	3.42	1.05
It BREAKS my heart to see forests being cut down or cleared for agriculture.	4.02	1.13
Families should be encouraged to having two or fewer children.	3.30	1.17

The Mann-Whitney U test is also used to determine the effect of gender, college status, and study status on EA. The Kruskal-Wallis test, on the other hand, is used to determine the effect of GPA on EA. Table 3 presents a summary of the findings from the four variable analyses.

Table 3. The difference in the mean EAI scores for each group of students

	Group	Average	SD	*p-value*
Gender	Male	43.60	9.00	0.511
	Female	43.19	8.27	
GPA	Less than 3	41.60	11.10	0.512
	3 to 3.5	43.03	8.68	
	3.6 to 4.0	43.56	7.85	
College Status	Public University (*PTN*)	43.56	8.01	0.451
	Private University (*PTS*)	42.79	8.89	
Study Status	Have taken the course	43.58	8.01	0.011
	Have not taken the course	41.93	9.58	

According to Table 3, the EA score of male students and female students is not significantly different. The results of this study are in line with Bord and O'Connor (1997) that there is no consensus on the reasons of gender differences related to EA. Considering that gender roles have no effect, men and women have equal status and roles in environmental protection; thus, Dhenge et al (2022) asserted that continuous assistance is required to effectively understand gender roles in environmental protection. Consequently, social media campaigns, government policies, and the involvement of groups such as scientists, extension officers, research organizations, various training programs, students, and universities in environmental protection movements and awareness campaigns are all needed.

The results of this study is different from the meta-analysis results conducted by Gökmen (2021) in the period of publication of 2009–2019 that gender variable affects EA, in which it indicates that women are at a low level. The results by Gökmen (2021) are in line with Vicente-Molina et al (2018) that the elasticity values are generally higher for men; thus, men tend to be more sensitive to programs that try to change their behavior.

Nevertheless, this study is in line with the given recommendation that environmental education from an early age is required. Environmental education is an education that focuses on the environment as the main axis in its discussion. Developing a caring and respectful attitude toward environment is one of the objectives of environmental education for young children (Ardoin & Bowers, 2020; Djoehaeni et al., 2018; Hermawan et al., 2022; Santos-Pastor et al., 2022; Vicente-Molina et al., 2018). If character and attitudes are formed early, then as they get older, they will become accustomed to protecting and respecting the environment. Through this habituation, providing children with the proper environmental education will have a positive impact on their life and the environment in the future (Safira, 2020).

Departing from Table 3, students who have GPA less than 3, 3 to 3.5, and above 3.5 also have EA scores that are not significantly different. GPA is related to students' cognitive abilities. In practical terms, these results differ from the conclusions of other studies. This may be something unique in Indonesia. Vicente-Molina et al (2013) underlined that knowledge (objective and subjective) clearly influences pro-environmental behavior. By observing the findings of Langenbach et al (2020), individual differences in main cognitive control components moderate how attitudes and environmental behavior interact. Baierl et al (2021) also propose that one of the aspects affecting cognitive performance and environmental awareness is preservation. Yet, Zheng et al (2018) delivered a different perception that cognition can be defined as an individual's unpublished/shown intrinsic behavior towards various affairs in the environment, as a persistent and consistent behavioral tendency towards cognition and preferences towards environment.

Table 3 also reveals that there is no significant difference in EA scores between PTN (Public) and PTS (Private) students' mean scores. EA is not affected by college status both public and private. This is in line with statement by Vicente-Molina et al (2013) that educational background or institution is not a relevant variable with EA. This is natural since students in higher education are adults, where according to Eilam and Trop (2012), among adults, the strategies required to influence attitudes differ from those required to influence behavior. According to Le Hebel et al (2014), students can consider the diversity of people's perspectives on the environment and position themselves within this diversity of attitudes. They can recognize that people can support environmental issues for a variety of reasons, regardless of their background.

Additionally, by observing the Table 3, it is known that the group of students who have taken environmental-related courses have a significantly higher EA score than the group of students who have not taken environmental-related courses (p = 0.011). This is in line with the purpose and spirit of implementing environmental education, one of which is developing EA for students (Pettus, 1976). Environmental education is clearly positively correlated with EA (Liu et al., 2018). Boeve-de Pauw and Van Petegem (2010) asserted that environmental education in universities has been found to have a correlation with EA, with students who major in biology having higher environmental concerns.

Thus, Muñoz-García et al (2022) recommended that environmental education in the university (in the context of transformative education) needs to be encouraged in order to support students in adopting a more pro-environmental attitude so as to develop environmental awareness and concern. Peer learning is a pattern that can be used to enable them to be present through conversation and cooperation, promoting a sense of connectedness to nature and enthusiasm to take part in group activities. Therefore, according to Sadik and Sadik (2014), environmental education course material should be enhanced in a way that connects to global issues. Furthermore, activities with the potential to influence environmental attitudes and behavior (practical and interrelated activities based on the natural environment, projects, work groups, discussions, case studies, audio and visual simulations, and brainstorming) must involve not only theoretical knowledge but also practical knowledge.

Conclusion

This study of cross-sectional survey shows that EA score based on gender is not significantly different for prospective biology teacher students in Indonesia. The researchers also discover that GPA factor does not affect the EA score of students. Additionally, there appears to be no significant difference in EA scores based on higher education status (PTN/Public and PTS/Private). The difference in EA scores is affected by whether or not students have taken environmental courses. The EA score is significantly higher in the students who have taken environmental-related courses than in the students who have not done so. Hence, as a recommendation, it is necessary to ensure that environmental education course materials are properly planned and implemented. Environmental courses should be enhanced with the theme of environmental issues ranging from local to global scope. Furthermore, EA implementation activities must involve more than just theoretical knowledge and must reach a practical level.

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Conflicts of Interest

The author states that there are no problems in the process of writing and publishing this article.

Author Contributions

A. R.; H. H. and S. H.: research, preparation, and improvement; N. L. and D. F.: preparation, research, and improvement methods; and all authors: read and approved the final manuscript.

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