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Environmental literacy profile of Muhammadiyah junior high school students in Malang city: Intervention without having to consider factors!

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ABSTRACT

Students of Muhammadiyah Junior High Schools and Muhammadiyah Islamic Junior High Schools need to have environmental literacy to practice environmentally friendly attitudes, become nature conservationists, and fulfill the school's role in serving education and the environment. However, there has been no mapping of EL profiles in Muhammadiyah Junior High Schools and Muhammadiyah Islamic Junior High Schools in Malang City. This study aims to analyze the EL profile of Muhammadiyah Junior High Schools and Muhammadiyah Islamic Junior High Schools in Malang City. Using a cross-sectional survey approach, EL data from 412 students in grades VII, VII, and IX in six Muhammadiyah schools were collected and analyzed based on gender, class, and parental education. The results showed that there were no significant differences in EL between male and female students, as well as between classes, and parental education. This study concludes that interventions or policies to improve environmental literacy can be applied universally, regardless of gender, grade level, or parental education.

Keywords: Environmental literacy, environmental problems, junior high school students

INTRODUCTION

Environmental problems in Indonesia are increasingly worrying (Kurniawan & Managi, 2018), even have a detrimental impact on people's lives, including social, cultural, economic, and agricultural sectors (Fadli et al., 2019). For example, environmental degradation has led to disruptions in agriculture, affecting food security and livelihoods, while also contributing to social inequalities as marginalized communities bear the brunt of the environmental impacts (Osman & Abebe, 2023; Raj et al., 2022). Additionally, the loss of biodiversity and the degradation of natural resources have cultural implications, threatening traditional ways of life that are closely linked to the environment (Adla et al., 2022; Brown et al., 2022; Shin et al., 2022).

These environmental problems include deforestation (Austin et al., 2019; Islam et al., 2016; Petrenko et al., 2016; Tacconi et al., 2019), water pollution (Belinawati et al., 2018; Garg et al., 2018; Luo et al., 2019), air pollution (EoF team, 2019; Greenstone & Fan, 2019; Kusumaningtyas & Aldrian, 2016; Madsen, 2015; WHO, 2018), pollution by pesticides, soil pollution, and decreased soil fertility (Joko et al., 2017; Leimona et al., 2015; Luo et al., 2019). Environmental issues can be addressed, or at least mitigated, by enhancing public awareness of the significance of environmental quality and conservation. This heightened awareness will manifest in the adoption of environmentally conscious perspectives (Hendryx et al., 2013), which is built from environmental literacy (EL).

In fact, it is hoped that environmental problems will decrease with the increasing spread of environmental education in various educational institutions, especially with the increasing number of institutions implementing pro-environmental programs (Olsson, 2018; Schüßler et al., 2019; Szczytko et al., 2018;

Ulutas & Köksalan, 2017). Environmental education materials have been included in the curriculum in almost all countries (Sawitri, 2016). Specifically in Indonesia, as local content in regular educational institutions or integrated into subject materials (Muhaimin, 2015; Steele et al., 2015; Sudjoko, 2014). Innovation in learning should be continuously encouraged, particularly in religious-based schools, to improve students' environmental competence and EL. These innovations are essential for ensuring that students develop a deeper understanding of environmental issues and are better equipped to address them in the future (Farwati et al., 2017), especially in religious-based schools (Hadi et al., 2020; Husamah et al., 2020; Mardiani et al., 2021), including in Muhammadiyah schools (Samidjo et al., 2023).

Muhammadiyah schools have spiritual excellence because they have subjects such as Al-Islam, Muhammadiyah and Arabic (*Al-Islam, Kemuhammadiyahan dan Bahasa Arab/ISMUBA*) which are an integration of religion with life (Romadhonie, 2023; Umami, 2018). Mainstreaming and even implementing in daily life practices including in the field of learning or co-curricular activities that have been responded to by Muhammadiyah. This can be seen from the publications of the Muhammadiyah Central Leadership and Muhammadiyah scientists who show a pattern of environmental awareness approach and environmental management that involves religious elements (theology). Several publications with Islamic and environmental nuances that have been produced are (1) Himpunan Rutusan Tarjih Volume 3 of the Central Leadership; (2) Environmental Akhlak, Guide to Environmentally Friendly Behavior; (3) Environmental Theology; and (4) Ethics of Environmental Management in an Islamic Perspective, and so on (Mawardi et al., 2016).

Efforts to encourage strengthening EL are essential to reduce environmental impacts and move towards a more sustainable future. Educational institutions, especially junior high school and Islamic junior high school levels, are places of education for students who are undergoing a process of change from children to teenagers (Hastutiningtyas et al., 2021; Wendari et al., 2016) plays an important role in training future generations who have an important role in protecting the environment in the future (Heyl et al., 2013). EL is an important requirement for the study of environmental pollution prevention and environmentally friendly attitudes for sustainability (Akkor & Gündüz, 2018). Educational institutions must not forget their educational and formative goals. In this context, it is necessary to pay attention to how to be and how to interact with the environment to achieve changes in students. EL influences and guides a person in relation to environmental reality (Ibáñez et al., 2020).

In order for educational institutions to carry out their roles efficiently, it is important to know well their main stakeholders, namely the students (Sousa et al., 2021). In this study, we propose to study or map students' EL as a basis for developing an appropriate environmental learning model in Muhammadiyah schools (junior high school and Islamic junior high school level). We also intend to analyze whether students' demographic characteristics affect these variables. In line with that, individual EL, as well as their academic background knowledge, are potential factors that can help overcome these environmental challenges (Arshad et al., 2020).

Previous researchers have had an intense focus on EL and various other competencies that support efforts to realize the Sustainable Development Goals, especially in higher education (Husamah, 2023; Husamah et al., 2022b, 2022a, 2022c, 2023; Husamah, Rahardjanto, et al., 2024; Husamah, Suwono, et al., 2024; Rahardjanto & Husamah, 2024). It is also realized that the urgency of efforts to map EL in Islamic boarding schools has been carried out (Hadi et al., 2020; Husamah et al., 2020; Mardiani et al., 2021). However, while several researchers have explored the EL profiles of

high school students, there has been limited focus on mapping the EL profile specifically in Muhammadiyah schools. Previous studies have examined EL in high school students through initial surveys (Gustria & Fauzi, 2019; Mahinay et al., 2023; Maknun et al., 2017; Muhlis et al., 2022; Prasetiyo et al., 2020), applied specific interventions followed by measurements of EL aspects (Angreani et al., 2022; Parwati et al., 2021), and assessed EL within the context of Adiwiyata/green schools (Maghfiroh et al., 2024; Nurwidodo et al., 2020). However, there is a gap in research focusing on the EL profiles within Muhammadiyah schools, which warrants further investigation.

Knowing the EL profile of students is important because students are the next generation who will face various environmental challenges in the future (Berame et al., 2022; Kurdiati & Fathurohman, 2024; Mebane et al., 2023). High school students are at a critical age, they begin to build awareness, understanding, and concern for environmental issues. Students' EL profiles can provide an overview of the extent to which they have ecological knowledge, environmental expectations, cognitive skills, and behavior (Szczytko et al., 2019) needed to actively participate in environmental conservation efforts (Meilinda et al., 2017; Putra et al., 2021; Stern et al., 2022; van de Wetering et al., 2022).

While there has been research on environmental literacy (EL) in various educational settings, we have not found any studies specifically focusing on Muhammadiyah Junior High Schools or Islamic Junior High Schools, particularly in Malang City. The gap in existing research lies in mapping the EL profiles of students within Muhammadiyah schools, as well as understanding how the unique context of these schools may influence students' environmental literacy. In fact, this information and data are important as an effort to serve Muhammadiyah's da'wah in the fields of education and the environment in Malang City. In addition, Malang City is known as a city of education, so it will be a barometer for other regions. Therefore, this first survey is certainly something new (pioneer) and will be a baseline and reference for interested parties.

In this regard, this study aims to analyze the EL of Muhammadiyah Junior High School and Muhammadiyah Islamic Junior High School students in Malang City, as an educational area and city. We review it from the aspects of gender, class, and school status (junior high school and Islamic junior high school). This information is very useful especially for education developers in higher education in designing effective learning strategies to improve students' EL, especially in Muhammadiyah schools. By understanding the EL profile, targeted interventions can be carried out, such as strengthening the environmental education curriculum, developing extracurricular activities based on the environment (in line with the Project of Pancasila Student Profile Strengthening), and fostering students' concern and responsibility for local and global environmental issues. Thus, junior high school and Islamic junior high school students can be prepared to become a generation that has the awareness, knowledge, and skills to contribute to environmental conservation efforts in the future.

METHOD

Research design and participants

This cross-sectional survey study aims to collect EL data on students of Muhammadiyah Junior High School in Malang city. The data collection and analysis process were carried out in August-December 2024. The target respondents are junior high school students with a Muhammadiyah background in Malang city. The schools are SMP Muhammadiyah 1 Malang, SMP Muhammadiyah 2 Malang, SMP Aisyiyah Muhammadiyah 3 Malang, SMP Muhammadiyah 4 Malang, MTs Muhammadiyah 1 Malang, and MTs Muhammadiyah 2 Malang. Gender, class, and parent's education status is positioned as respondent characteristics whose

impact on students' EL is analyzed in this study. The target population size of this survey is 360 people (60 students per school; or 20 per grade level in each school). Therefore, based on the Krejcie and Morgan Table, the minimum sample size with a 95% confidence level and a 5% margin of error is 342 students. The exclusion criteria in this study were students from public school programs and non-Muhammadiyah private schools, had dropped out, and did not provide complete respondent characteristic information data. After collecting data in the field, we obtained a higher number of respondents, namely 412 students (231 male; 181 female).

Before the survey, written informed consent was obtained from all the respondents. Students were provided with clear information about the study, its purpose, methods, and their right to withdraw from the study at any time without penalty. Parental permission was obtained from children before they participated. Confidentiality of their answers and anonymity of their information were assured for all respondents. Voluntary participation only was ensured, and no personal identifying information was collected. Respondents were informed that their data would be used only for the purposes of this research and would be kept in a secure location. The research was conducted in compliance with ethical considerations and with protection of human subjects.

Data collection instruments and procedures

The data collection tool employed in this study was the Environmental Literacy Instrument based on Spirituality (ELIS), which had been previously developed, validated, and published. The use of ELIS was particularly relevant for this study as it specifically integrates the concept of spirituality within the framework of environmental literacy (EL). Unlike other environmental literacy instruments that primarily focus on knowledge, attitudes, and behaviors related to environmental issues, ELIS emphasizes the spiritual connection between individuals and the environment. This focus on spirituality provides a deeper understanding of how environmental issues are perceived and experienced on a personal, emotional, and spiritual level. The rationale for using ELIS over other environmental literacy instruments lies in its unique approach, which allows for a more holistic assessment of individuals' environmental engagement, considering both cognitive and spiritual dimensions. Given the growing recognition of spirituality's role in environmental awareness and behavior, ELIS offers a distinct advantage in capturing this multidimensional aspect of environmental literacy. This instrument encompasses five dimensions: ecological knowledge (five items), environmental hope (seven items), cognitive skills (eight items), and behavior (six items). The questionnaire includes 26 items measured on a 5-point Likert scale, ranging from "not important" (score 1) to "extremely important" (score 5) (Husamah et al., 2022c).

Because of the large number of respondents to be targeted and to follow the principles of environmental sustainability, the survey was conducted online through Google Forms. In order to ensure the validity of data to be gathered online, several steps were taken. First, the survey itself was designed with clear and concise questions to limit misinterpretation and to ensure that the respondents understand the questions correctly. The questionnaire was additionally pre-tested on a small sample to identify and correct any ambiguities or issues before it was administered to the whole sample.

Additionally, to prevent bias and ensure a representative sample, the survey link was shared with a heterogeneous group of respondents from various demographic backgrounds. The anonymity of respondents was maintained to enable unbiased and honest responses. To also ensure data validity, validation checks were implemented in Google Forms to filter out inconsistent or incomplete

responses, such as making all mandatory fields required before submission.

Moreover, the survey could only be accessed through a specified link sent directly to respondents via email, reducing the possibility of duplicate responses. Randomization of question order was also part of data collection to reduce response bias. These actions were taken to enhance the validity and reliability of data that would be gathered through the online survey.

Data processing and analysis

The survey data were exported in CSV (comma-separated value) format, then reviewed and labeled by the authors using Microsoft Excel prior to analysis. Once the data review and labeling were completed, the analysis was carried out using SPSS software. Respondent characteristics were evaluated using frequency and percentage distributions. Mean and standard deviation scores were calculated for each item. Gender differences were assessed through a t-test, while variations based on class level, father's education, and mother's education were analyzed using one-way ANOVA. Prior to conducting these parametric tests, prerequisite assumption tests were performed to ensure the validity of the analyses. For the t-test, the normality of the data was checked using the Shapiro-Wilk test, and homogeneity of variances was assessed with Levene's test. For the one-way ANOVA, the assumption of normality was again evaluated using the Shapiro-Wilk test, and homogeneity of variances was confirmed using Levene's test. The significance level for this study was set at 5%.

RESULTS AND DISCUSSION

T-Test

The results of the t-test of the gender aspect are presented in Table 1 and Table 2. Table 1 shows that in the EL aspect the average for males is 112.5584 with a standard deviation of 9.89927. The average for females is 111.9503 with a standard deviation of 9.36558. Table 2 shows Levene's Test for Equality of Variances showing that the variance of EL shows a difference (p = 0.479), but the p-value for EL is still greater than 0.05, so there is no significant difference. The t-test for EL produces t = 0.634 with p = 0.263, also showing no significant difference between the average EL in males and females.

Meanwhile, Table 3 and Table 4 are the results of the analysis showing that there is no significant difference in the EL variable between men and women. Although the averages of both are slightly different, the p-value obtained from the t-test is greater than 0.05 for both variables, thus not supporting the hypothesis of a difference. The small effect size indicates that the difference does not have a significant impact. Therefore, it can be concluded that both men and women have relatively equal levels of EL in this sample.

Table 1. Group statistics for gender aspects

Group Statistics				
Gender	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Male	231	112.5584	9.89927	.65132
Female	181	111.9503	9.36558	.69614

Table 2. Independent samples test (Levene's test for equality of variances) for gender aspects

Independent Samples Test						
Env_Literacy	**Levene's Test for Equality of Variances**		**t-test for Equality of Means**			
	F	**Sig.**	**t**	**df**	**Significance One-Sided p**	
Equal variances assumed	.502	.479	.634	410	.263	

Independent Samples Test					
Env_Literacy	Levene's Test for Equality of Variances		t-test for Equality of Means		
	F	Sig.	t	df	Significance One-Sided p
Equal variances not assumed			.638	395.742	.262

Table 3. Independent samples test for gender aspects

Env_Literacy	t-test for Equality of Means				
	Significance Two-Sided p	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
				Lower	Upper
Equal variances assumed	.527	.60817	.95977	-1.27852	2.49485
Equal variances not assumed	.524	.60817	.95333	-1.26605	2.48238

Table 4. Independent samples effect sizes for gender aspects

Independent Samples Effect Sizes				
Env_Literacy	Standardizer[a]	Point Estimate	95% Confidence Interval	
			Lower	Upper
Cohen's d	9.66860	.063	-.132	.257
Hedges' correction	9.68633	.063	-.132	.257
Glass's delta	9.36558	.065	-.130	.260

a. The denominator used in estimating the effect sizes.
Cohen's d uses the pooled standard deviation.
Hedges' correction uses the pooled standard deviation, plus a correction factor.
Glass's delta uses the sample standard deviation of the control group.

With a p-value greater than 0.05 for both variables, it can be concluded that gender does not have a statistically significant effect on the scores for the environmental literacy (EL) variables tested in this study. The small effect size further suggests that any differences between male and female students are minimal and unlikely to have substantial practical implications. Therefore, based on the findings of this study, interventions or policies aimed at improving EL could be applied without regard to gender differences, but further research may be needed to explore any potential gender-related factors in EL more thoroughly.

The findings align with prior research suggesting that environmental awareness and literacy are not inherently gendered traits (Drake et al., 2024; Gökmen, 2021). The p-value greater than 0.05 and the small effect size indicate that gender does not have a meaningful influence on EL, supporting the view that both men and women are equally capable of understanding and addressing environmental challenges when given the same opportunities and resources. This underscores the importance of designing inclusive EL programs that do not segregate based on gender, ensuring equitable access to educational materials and initiatives (Larkins, 2024; Lu et al., 2024).

Given these findings, policymakers and educators should focus on creating gender-neutral strategies to improve EL, leveraging frameworks such as transformative learning theory, which emphasizes the role of inclusive education in fostering critical environmental awareness (Lange, 2019; O'Grady, 2023). For instance, integrating EL into formal curricula through interdisciplinary approaches can ensure that students of all genders benefit equally. Additionally, leveraging interactive methods such as collaborative projects or digital learning platforms can maximize engagement and understanding across gender groups (Hajj-Hassan et al., 2024; Leal Filho et al., 2023; Lu et al., 2024). By prioritizing inclusivity and evidence-based practices, educators and policymakers can promote widespread and equitable environmental awareness.

Oneway ANOVA

1. Class aspect

Table 5, Table 6, and Table 7 are a series of one-way ANOVA results for class aspects in relation to EL of junior high school students with Muhammadiyah backgrounds. Based on Table 6, the F value is 0.082 with a significance value (p) of 0.921. This indicates that there is no significant difference between the average EL among the three classes. Based on Table 7, the results of the analysis show that there is no significant difference in the EL variable between grades 7, 8, and 9. The p value for both ANOVA analyses is greater than 0.05, indicating that the average scores for the two variables are similar among the three classes. The small effect size indicates that the differences do not have a significant impact. Thus, it can be concluded that the three classes have relatively consistent levels of EL and do not show statistically significant differences.

Table 5. Descriptive information on class aspects

Env_Literacy	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum
					Lower Bound	Upper Bound	
VII Grade	161	112.1677	9.30338	.73321	110.7197	113.6157	95.00
VIII Grade	140	112.2071	10.25116	.86638	110.4942	113.9201	91.00
IX Grade	109	112.6239	9.53142	.91294	110.8142	114.4335	87.00
Total	410	112.3024	9.67472	.47780	111.3632	113.2417	87.00

Table 6. Results of one-way ANOVA test of class aspects

ANOVA					
Env_Literacy	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	15.455	2	7.727	.082	.921
Within Groups	38267.043	407	94.022		
Total	38282.498	409			

Table 7. Results of ANOVA effect sizes for class aspects

Env_Literacy	Point Estimate	95% Confidence Interval	
		Lower	Upper
Eta-squared	.000	.000	.006
Epsilon-squared	-.005	-.005	.001
Omega-squared Fixed-effect	-.004	-.005	.001
Omega-squared Random-effect	-.002	-.002	.000

a. Eta-squared and Epsilon-squared are estimated based on the fixed-effect model.
b. Negative but less biased estimates are retained, not rounded to zero.

The finding that there were no significant differences in EL variables between VII, VII, and IX grades suggests that EL levels tend to be stable across grade levels. The observation that EL levels remain consistent across grades VII, VIII, and IX suggests a stability in students' environmental understanding during these middle school years. This finding aligns with the constructivist learning theory, which posits that learners construct knowledge through experiences and reflections, leading to a gradual and cumulative development of understanding. According to many experts, consistent exposure to environmental concepts across grade levels supports the reinforcement and stabilization of EL among students (Garcia & Cobar-Garcia, 2018; Lee, 2023; Özer-Keskin & Aksakal, 2020).

To further enhance EL across all grade levels, educators might consider adopting constructivist approaches in environmental education. Robottom (2004) discusses the application of constructivist theories beyond traditional conceptual change models, emphasizing the importance of socially mediated learning experiences in environmental education.

Additionally, integrating problem-based learning strategies can actively engage students

in real-world environmental issues, fostering deeper understanding and retention. A study by Arik and Yilmaz (2020) demonstrates that constructivist learning approaches, including active learning methods, have a significant positive effect on environmental education outcomes.

2. Father's education aspect

Table 8, Table 9, and Table 10 are a series of one-way ANOVA results for the aspect of father's education in relation to EL of junior high school students with a Muhammadiyah background. Based on Table 8, it is known that the average value for each participant group shows variation, with the 'SD' group showing the highest value (114.65) in the EL variable. Overall, the average EL value is 113.03, indicating a relatively good level of proficiency in both of these variables among the participants involved. Based on Table 9 on the results of the analysis of variance (ANOVA) shows that there is a significant difference between groups in EL (F = 1.285, p = 0.270). This indicates that the father's education or educational background has an influence on EL. Table 10 shows the effect size measured by Eta-squared for EL is 0.020, indicating that although there is a significant difference, the effect size is relatively small, meaning that the education factor only contributes little to the variability in the measured values.

Given that the significance value is greater than 0.05, it suggests that the group differences do not significantly affect the scores. The small effect size (as indicated by Eta-squared and other values) further suggests that the differences between groups have minimal practical impact. Based on these findings, it is recommended that interventions or policies aimed at improving EL be designed and implemented without the need to account for group differences. However, further research could explore whether other factors might influence EL more significantly.

Table 8. Descriptive information on father's education aspects

Descriptives

Env_Literacy	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
Bachelor - Doctorate	170	112.2882	9.72123	.74558	110.8164	113.7601
Diploma 1-Diploma 3	30	109.6333	9.83478	1.79558	105.9610	113.3057
Senior High	155	113.1419	9.52607	.76515	111.6304	114.6535
Junior High	37	110.0000	9.07989	1.49273	106.9726	113.0274
Elementary School	17	114.4118	10.94908	2.65554	108.7823	120.0413
No school	3	111.3333	8.08290	4.66667	91.2543	131.4124
Total	412	112.2913	9.66155	.47599	111.3556	113.2269

Table 9. One-way ANOVA test results for father's education aspect

ANOVA

Env_Literacy	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	597.544	5	119.509	1.285	.270
Within Groups	37767.505	406	93.023		
Total	38365.049	411			

Table 10. ANOVA effect sizes results for father's education aspects

ANOVA Effect Sizes[a,b]

Env_Literacy	Point Estimate	95% Confidence Interval	
		Lower	Upper
Eta-squared	.020	.000	.039
Epsilon-squared	.011	-.009	.031

ANOVA Effect Sizes[a,b]			
Env_Literacy	Point Estimate	95% Confidence Interval	
		Lower	Upper
Omega-squared Fixed-effect	.011	-.009	.031
Omega-squared Random-effect	.002	-.002	.006

a. Eta-squared and Epsilon-squared are estimated based on the fixed-effect model.
b. Negative but less biased estimates are retained, not rounded to zero.

The observation of a small effect size, as indicated by Eta-squared values, suggests that the differences between groups have minimal practical significance. This aligns with the interpretation guidelines provided by the Institute of Education Sciences, which emphasize that small effect sizes often denote limited practical impact in educational settings (Lipsey et al., 2012). Furthermore, Kraft (2019) discusses that while Cohen's benchmarks categorize effect sizes as small, medium, or large, the practical significance of these sizes can vary depending on the context of the intervention.

Given the minimal effect size observed, it is reasonable to conclude that interventions or policies aimed at enhancing EL can be implemented broadly without tailoring to specific group differences. This perspective is supported by Lipsey et al (2012), who suggest that when effect sizes are small, the differentiation between groups is negligible, allowing for uniform application of educational interventions. Additionally, the U.S. Department of Education's guidelines on interpreting effect sizes indicate that small effect sizes often justify the implementation of standardized interventions across diverse groups (Vernez & Zimmer, 2007).

3. Aspect of mother's education

Table 11, Table 12, and Table 13 are a series of one-way ANOVA results for the aspect of maternal education in relation to EL of senior high and vocational school students with Muhammadiyah background. Based on Table 13, ANOVA for EL shows a statistically significant difference with an F value of 0.418 (p = 0.836). The effect size (Eta-square = 0.005) indicates a small effect.

Table 11. Descriptive information on maternal education aspects

Descriptives						
Env_Literacy	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
Bachelor - Doctorate	156	111.9359	9.90320	.79289	110.3696	113.5022
Diploma 1-Diploma 3	31	111.7419	8.37842	1.50481	108.6687	114.8152
Senior High	188	112.9468	9.86689	.71962	111.5272	114.3664
Junior High	28	111.2857	8.80176	1.66338	107.8727	114.6987
Elementary School	7	110.0000	9.67815	3.65800	101.0492	118.9508
No school	2	109.0000	1.41421	1.00000	96.2938	121.7062
Total	412	112.2913	9.66155	.47599	111.3556	113.2269

Table 12. Results of one-way ANOVA test of maternal education aspects

ANOVA					
Env_Literacy	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	196.572	5	39.314	.418	.836
Within Groups	38168.477	406	94.011		
Total	38365.049	411			

Table 13. Results of ANOVA Effect Sizes of maternal education aspects

ANOVA Effect Sizes[a,b]			
Env_Literacy	**Point Estimate**	**95% Confidence Interval**	
		Lower	**Upper**
Eta-squared	.005	.000	.012
Epsilon-squared	-.007	-.012	.000
Omega-squared Fixed-effect	-.007	-.012	.000
Omega-squared Random-effect	-.001	-.002	.000

a. Eta-squared and Epsilon-squared are estimated based on the fixed-effect model.
b. Negative but less biased estimates are retained, not rounded to zero.

The results of the ANOVA analysis showed that there was no significant difference between groups in the tested variable, namely EL. The significance value greater than 0.05 suggests that the group differences do not significantly affect the scores. Additionally, the small effect size (as indicated by Eta-squared and other values) implies that the differences between the groups have minimal practical impact. Based on these findings, it is suggested that interventions or policies aimed at improving EL can be implemented without the need to account for differences between groups. However, further research could explore other potential factors that may influence EL more significantly.

The ANOVA analysis reveals no significant differences in EL across groups, as indicated by a significance value exceeding 0.05. This suggests that the variable under consideration, such as mother's education level, does not substantially influence EL scores. This finding suggests that parental education levels may not have a significant impact on students' environmental awareness in this study. However, further research is needed to explore the potential influence of parental background on environmental literacy, as this relationship has not been extensively reviewed in the existing literature. For instance, a study on environmental public awareness and waste management found no statistically significant difference in environmental awareness based on parents' education levels (Zhou et al., 2022).

Furthermore, the observed small effect size, as measured by Eta-squared, indicates that the differences between groups are minimal and lack practical significance. This aligns with the guidelines provided by the U.S. Department of Education, which suggest that small effect sizes often justify the implementation of standardized interventions across diverse groups (Vernez & Zimmer, 2007).

Based on the findings, it appears that parental education levels do not significantly influence EL. As a result, policies and interventions aimed at enhancing EL can be implemented universally, ensuring that all students have equal opportunities to benefit from environmental education. This approach supports the goal of promoting EL across diverse groups, regardless of parental background.

This study concludes that policies or interventions to improve EL can be applied universally, regardless of gender, grade level, or parental education level. The fact that these variables do not significantly influence students' EL in Muhammadiyah schools can be explained by several factors. First, Muhammadiyah schools are known to have egalitarian education practices that promote equal access to knowledge for all students, regardless of their demographic characteristics. The curriculum and instruction in such schools may place strong focus on communal values and environmentalism so that all the students receive equal exposure to the same environmental education.

In addition, such consistency in EL achievement can further be attributed to the possibility that Muhammadiyah schools possess a homogeneous education structure, whereby students of different grades or sexes would have similar learning experiences, particularly environmental education. Such homogeneity can

serve to neutralize the probable impact of individual demographic variables like gender or parents' education on students' EL.

Compared with other forms of schools, there is a possibility that private schools, public schools, or other religious-oriented schools will have different outcomes due to curricula differences, teaching materials, and parental engagement. For example, in resourceful private schools, it is possible to have more ease of access to more sophisticated environmental education programs, while public schools may struggle to implement such programs due to a lack of resources. Likewise, in other religious schools, the incorporation of environmental education can differ according to religious principles and school values. Thus, the fact that there are no significant variations in EL across demographic factors in Muhammadiyah schools implies that these factors may not be as significant in determining EL in this particular context.

This outcome conforms with previous research that shows demographic factors such as gender and parental education have no effect on environmental knowledge among students. For example, Silalahi and Sudibyo (2016) in their study showed that there was no difference in the environmental knowledge of students by gender. Similarly, Sabriati (2018) finds that parents' educational attainment has no significant effect on student performance.

As a result, one can argue whether the impact of non-discriminatory-by-gender or grade or parents' education level EL improvement policies is effective. The approach by universality promotes equal opportunities to all learners who have equal access to developing their EL across all demographic groups (Ramulumo & Shabalala, 2024; Shaeffer, 2019). To promote equally-based environmental knowledge and awareness among young people can have positive effects towards larger-scale environmental conservation programs.

CONCLUSION

The findings from the survey provide insights into the factors that influence EL in this context. (1) Gender and Environmental Literacy: The analysis revealed no significant difference in EL between male and female students. Both genders exhibited similar levels of environmental literacy, as indicated by the results of the t-test ($p = 0.263$) and the small effect size. This suggests that gender does not significantly affect the EL scores among the participants, which aligns with prior research that indicates environmental literacy is not inherently gendered. Therefore, interventions to improve EL can be applied equally to both genders without the need for gender-specific strategies. (2) Class Level and Environmental Literacy: Similarly, no significant difference in EL was found between the different grade levels (VII, VIII, and IX), as shown by the one-way ANOVA ($p = 0.921$) and the small effect size. The results suggest that students' environmental literacy remains relatively stable across grade levels. This stability may reflect consistent exposure to environmental education across the middle school years. Educational strategies that integrate constructivist learning approaches may further support and reinforce EL across all grade levels. (3) Parental Education and Environmental Literacy: The study also found that the level of parental education, specifically father's education, had no significant impact on students' EL. The one-way ANOVA analysis for father's education ($p = 0.270$) and the small effect size (Eta-squared = 0.020) suggest that parental educational background does not strongly influence students' environmental literacy in this sample. Similar findings were observed for mother's education, where no significant differences were found across different educational levels.

The lack of significant differences across gender, class, and parental education indicates that interventions to improve environmental literacy can be applied uniformly, without the

need for tailoring strategies based on these factors. The results support the idea that environmental literacy programs should focus on providing equal access to educational resources and fostering a universal approach to environmental education.

In conclusion, this study demonstrates that factors such as gender, class level, and parental education do not significantly impact environmental literacy among junior high school students in Malang City. The findings suggest that policies and interventions to enhance environmental literacy can be applied universally across these demographic factors. Further research could explore the influence of additional variables such as socioeconomic status or geographic location on environmental literacy, as well as the integration of action competence for sustainability in future educational programs.

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