*Advances in Social Science, Education and Humanities Research, volume 536*
**Proceedings of the First International Conference on Science, Technology, Engineering and Industrial Revolution (ICSTEIR 2020)**

# Effect of Gender on Environmental Literacy of High School Students in Bali, Indonesia

Ni Putu Ayu Parwati[1], I Wayan Redhana[2*], and I Nyoman Suardana[1]

[1]*Natural Science Study Program, Universitas Pendidikan Ganesha, Indonesia.*
[2]*Chemistry Education Study Program, Universitas Pendidikan Ganesha, Indonesia*

[*]*Corresponding author. Email: redhana.undiksha@gmail.com*

## ABSTRACT
Environmental problems are one of the concerns of the world community. Environmental problems can be overcome if people have literacy toward the environment. The environmental literacy can be influenced by a variety of demographic variables. The purpose of this study was to describe the effect of gender on students' environmental literacy. This study is an ex post facto research. The population of this study was the twelfth-grade students majoring in Mathematics and Natural Sciences at Public High School 1 Melaya Jembrana Bali Indonesia. The number of samples in this study was 140 students consisting of 54 male and 86 female students. The instrument used in this study was an environmental literacy inventory consisting of five dimensions, including knowledge, attention, sensitivity, attitudes, and behavior toward the environment. The environmental literacy inventory was created in Google forms and distributed to students online. Students' environmental literacy data were analyzed using the independent sample t-test. The results showed that the environmental literacy of male and female students is still low category and there was no difference in environmental literacy between male and female students.

***Keywords:*** *Environmental literacy, Human behaviour, Education, T-test analysis*

## 1. INTRODUCTION

Environmental issues are one of the concerns of the world community. Human behavior has changed the world's ecosystems in the last 50 years [1]. Humans play a very important role in preserving the environment. This is because humans have the ability to process, maintain, and repair damaged environments [2]. On the contrary, humasn can also cause environmental damage that can lead to scarcity of natural resources and disasters for humans [3]. Environmental problems can be addressed if all humans have concerns and awareness about the importance of preserving the environment. Environmental awareness is very important given the ongoing environmental damage. Environmental awareness can start from simple actions to educational processes [4]. Environmental awareness starts with individuals who need to be environmentally conscious and become agents of change to protect and manage the environment [5].

One indicator of environmental concern that can be measured is environmental literacy [4]. Environmental literacy is an individual's knowledge and attitude relating to environmental issues as well as their skills and motivations in solving an environmental problem [6]. Environmental literacy involves awareness and sensitivity to the environment, knowledge, and understanding of how humans interact with nature and environmental issues on a local, national, international, and global scale [7],[8]. Environmental literacy involves more than just knowledge of the environment but also involves values, attitudes, skills, and behaviors [9]. One must be able to decide to take responsibility for the environment and create a balanced behavior to maintain the quality of the environment [10]. Environmental literacy should be instilled early in a person from family, school, and community environments.

 

Environmental education is seen as the most important way to improve environmental literacy [11]. One of the important learning outcomes of environmental education is knowledge of the environment that is expected to influence people's attitudes towards the environment. Environmental literacy is influenced by many factors. Study on factors that influence students' environmental literacy in Europe has been studied for a long time, but in Indonesia, especially in Bali the study has not been done much. Some of the sociodemographic factors that influence students' environmental literacy include gender, length of study, place of residence, parental employment, and parental educational background [11].

The influence of gender on environmental literacy remains a debate [11]. Research on the influence of gender on literacy has been conducted in several countries such as Malaysia, Turkey, Nigeria, Iran, Taiwan, and Brazil. Some of the results showed that gender did not effect on environmental literacy [1] [11]-[16]. However, on the other hand, the other results showed different things in which gender positively affects environmental literacy [4], [17]-[23]. So, these factors need to be re-examined.

## 2. METHODOLOGY

This study is an ex post facto research. The population of this study was the twelfth-grade students majoring in Mathematics and Natural Sciences at Public High School 1 Melaya Jembrana Bali Indonesia. The number of samples in this study was 140 students consisting of 54 male and 86 female students.

The instrument used in this study was an environmental literacy inventory consisting of five dimensions, including knowledge, attention, sensitivity, attitude, and behavior towards the environment. The knowledge dimensions (15 items) are multiple-choice questions. The dimensions of attention (15 items), sensitivity (16 items), attitude (9 items), and behavior (8 items) in the form of open statements consisting of 5 options, namely strongly agree, agree, disagree, disagree, and strongly disagree. Each option has a scale of 5-1. The validity of items and the reliability of the instrument amounted to 0.31– 0.78 and 0.92, respectively. The environmental literacy inventory was created in google forms and distributed to students online.

The data obtained in this study were students' environmental literacy scores. These data were analyzed using descriptive statistics by calculating the mean score and standard deviation. The students' environment literacy categories were determined based on Table 1.

Table 1. Categories of students' environmental literacy

| No. | Range of scores | Categories |
|---|---|---|
| 1 | 0–20 | Very low |
| 2 | 21–40 | Low |
| 3 | 41–60 | Medium |
| 4 | 61–80 | High |
| 5 | 81–100 | Very high |

To compare students' environmental literacy based on gender, data analysis was carried out using inferential statistics, namely the independent sample t-test. The analysis was conducted at a 5% significance level using the help of SPSS version 25.

## 3. RESULTS AND DISCUSSION

Students' environmental literacy data were collected by administrating environmental literacy inventory links online. A summary of students' environmental literacy data was presented in Table 2.

Table 2. Summary of students' environmental literacy data

| Gender | N | Mean | Interpretation | Sdv |
|---|---|---|---|---|
| Male | 54 | 38.9815 | Low | 25.6344 |
| Female | 86 | 39.1744 | Low | 25.6813 |

Based on the data in Table 2, it could be seen that the environmental literacy of male and female students is still low category.

Furthermore, the analysis was carried out to determine the influence of gender on environmental literacy, then an independent sample t-test was conducted. Before the independent sample t-test, the assumption tests needed to be done, that is the normality test and homogeneity test. The results of the assumption tests that have been done were as follows.

### *3.1 Test normality*

Normality tests were carried out using the Kolmogorov-Smirnov technique. Normality test results were presented in Table 3. The results of this test showed that all significance values were more than 0.05 (Sig.>0,05). Thus, it could be concluded that all students' environment literacy data were distributed normally.

Table 3. Normality test results with Kolmogorov-Smirnov

| Test | Gender | Kolmogorov-Smirnov | | |
|---|---|---|---|---|
| | | Statistics | df | Sig. |
| Students' environmental literacy | Male | 0.102 | 54 | 0.200 |
| | Female | 0.055 | 86 | 0.2 |

Based on the data in Table 3, it could be seen that the lowest number of significance was found in the knowledge dimension (p=0.065) and the highest significance was found in the attitude dimension (p=0.504). Overall, the values of the significance of each dimension of the literacy environment of male and female students were greater than 0.05 (Sig.>0,05). This indicated that gender did not effect on students' environmental literacy.

### *3.2 Test homogeneity variants*

Variance homogeneity tests of both groups were conducted using the Levene test. The results of this test showed that significance values were more than 0.05 (Sig.>0,05). This meant that the variance of the environmental literacy scores of both groups was homogeneous. Variance homogeneity test results were presented in Table 4.

### *3.3 Independent sample t-test*

Based on the assumption tests that had been conducted, all data obtained met the normality and homogeneity test requirements. Thus, an independent sample t-test could be continued. Testing was conducted at a significance level of 5%. Statistical test results could be found in Table 5.

Table 4. Variance homogeneity test results

| Test | Description | Statistics Levene | df1 | df2 | Sig. |
|---|---|---|---|---|---|
| Students' environmental literacy | Based on Mean | 0.122 | 1 | 138 | 0.728 |
| | Based on Median | 0.082 | 1 | 138 | 0.775 |
| | Based on Median and with adjusted df | 0.082 | 1 | 137.998 | 0.775 |
| | Based on trimmed mean | 0.108 | 1 | 138 | 0.743 |

Table 5. Independent sample t-test results

| Dimensions | Gender | Mean | Sdv | t | df | Sig |
|---|---|---|---|---|---|---|
| Environmental knowledge | Male | 7.8889 | 1.97786 | 1.863 | 138 | 0.065 |
| | Female | 7.3488 | 1.44521 | | | |
| Environmental concerns | Male | 62.2407 | 12.76927 | 0.717 | 138 | 0.475 |
| | Female | 60.7326 | 11.68752 | | | |
| Sensitivity to the environment | Male | 57.6111 | 9.34338 | -1.136 | 138 | 0.258 |
| | Female | 59.2791 | 7.84654 | | | |
| Attitudes towards the environment | Male | 32.9074 | 6.70192 | -.670 | 138 | 0.504 |
| | Female | 33.5814 | 5.14145 | | | |
| Behavior towards the environment | Male | 28.1852 | 4.41299 | -1.643 | 138 | 0.103 |
| | Female | 29.3372 | 3.78421 | | | |

### *3.4 Discussions*

Several sociodemographic factors that influence students' environmental literacy have been studied before although the results were not the same in each study. Sociodemographic factors studied include gender, length of study, place of residence, parental employment, and parental educational background [11]. This research focused on knowing the influence of gender on students' environmental literacy. Instruments used was an inventory of environmental literacy that covered five dimensions, covering knowledge, attention, sensitivity, attitude, and behavior toward the environment. The environmental literacy inventory was created on Google forms then

distributed online to students. Based on the average data of environmental literacy scores it was known that the environmental literacy of male and female students was still low category.

Statistical test results obtained in the significance of each dimension of the environmental literacy of male and female students were greater than 0.05 (Sig.>0.05). This indicated that gender did not effect on students' environmental literacy. This is because the male brain is the same as the female brain [24], so it cannot be said that boys are smarter than girls or vice versa. Other reasons are that male and female students obtain the same opportunity to access all kinds of information [13] so those male and female students can obtain the same information about the environment. In addition, this study was conducted during the Covid-19 pandemic so that students' analysis and learning motivation decreased due to students learning from home. The research on Sujarwo et al. [25] found that there is a decrease in learning motivation of students who participated in online learning during the Covid-19 pandemic situation.

Some previous studies have also shown that gender did not effect on students' environmental literacy [1], [8], [10], [11], [14], [15]. Studies conducted on 139 males and 125 females taken from 5 elementary schools in Oyo State and found that gender had no significant effect on students' knowledge, attitudes, and environmental practices [12]. Also, studies conducted on 417 prospective teacher students at Cumhuriyet University Faculty of Education resulted that there was no gender influence on students' behavior or environmental thinking [13]. Besides, studies on prospective students confirmed that that gender was not a factor that affects students' knowledge, awareness, attitudes, behaviors, and perceptions of the environment [16].

In addition to the above studies that support the researchers' findings, several studies showed different results. Female environmental literacy was higher than that of men [4],[17],[19],[22],[23]. This ensures there is a gender influence on environmental literacy. This is because women have a positive attitude towards the environment and feel more responsible for the environment because traditionally they have a responsibility to care for children and homes, so nurturing the environment can be considered a natural feature inherent in women conducted research on 376 students at Pamukkale University, Turkey and found that female students were more environmentally sensitive than male students [26]. Different results indicated that male students had higher environmental literacy than female students, although these results did not differ statistically [22].

## 4. CONCLUSION

Environmental problems are becoming more and more serious. If this is allowed, the environment will become more damaged and can lead to scarcity of natural resources and cause disasters for people. Therefore, awareness to maintain the environment must be instilled early in family, school, and community environments. Awareness of the importance of maintaining the environment can be realized if a person has environmental literacy. The results of this study showed that gender does not effect on students' environmental literacy.

## REFERENCES

[1] R. J. Naiman, M. G. Turner. A future perspective on North America's freshwater ecosystems. Ecological applications, 10 (4) (2000) 958-970. DOI: https://doi.org/10.1890/1051-0761(2000)010[0958

[2] R. De Alwis, A. D. A. De Silva. European Journal of Mathematics and Science Education. Education, 1 (2) (2020) 150-156. DOI: http://dx.doi.org/10.12973/ejmse.1.2.107

[3] M. Jannah, L. Halim, T. S. M. Meerah, M. Fairuz. Impact of environmental education kit on students' environmental literacy. Asian Social Science, 9 (12) (2013) 1. DOI: http://dx.doi.org/10.5539/ass.v9n12p1

[4] L. Chawla. Childhood nature connection and constructive hope: A review of research on connecting with nature and coping with environmental loss. People and Nature, 2 (3) (2020) 619-642. DOI: https://doi.org/10.1002/pan3.10128

[5] N. K. Fidan, T. S. Ay. Acquisition of Operational Environmental Literacy in Social Studies Course. International Journal of Environmental and Science Education, 11 (13) (2013) 5951-5968.

[6] C. T. Pan, S. J. Hsu. Effects of a One-day Environmental Education Program on Sixth-Graders' Environmental Literacy at a Nature Center in Eastern Taiwan. Sustainability, 12 (12) (2020) 5043. DOI: https://doi.org/10.3390/su12125043

[7] D. Goldman, O. B. Z. Assaraf, D. Shaharabani. Influence of a non-formal environmental education program on junior high-school students' environmental literacy. International Journal of Science Education, 35 (3) (2013) 515-545. DOI: https://doi.org/10.1080/09500693. 2012.749545

[8] S. W. Liang, W. T. Fang, S. C. Yeh, S. Y. Liu, H. M. Tsai, J. Y. Chou, E. Ng. A nationwide survey evaluating the environmental literacy of undergraduate students in Taiwan. Sustainability, 10 (6) (2018) 1730. DOI: https://doi.org/10.3390/su10061730

[9] D. Niemistö, T. Finni, M. Cantell, E. Korhonen, A. Sääkslahti. Individual, Family, and Environmental Correlates of Motor Competence in Young Children: Regression Model Analysis of Data Obtained from Two Motor Tests. International journal of environmental research and public health, 17 (7) (2020) 2548. DOI: https://doi.org/10.3390/ijerph17072548

[10] D. Goldman, O. Ayalon, D. Baum, B. Weiss. Influence of 'green school certification on students' environmental literacy and adoption of sustainable practice by schools. Journal of cleaner production, 183 (2018) 1300-1313. DOI: https://doi.org/10.1016/j.jclepro.2018.02.176

[11] V. H. Kaya, D. Elster. German Students' Environmental Literacy in Science Education Based on PISA Data. Science Education International, 29 (2) (2018) 75-87.

[12] G. M. Mahuro, N. Hungi. Parental participation improves student academic achievement: A case of Iganga and Mayuge districts in Uganda. Cogent Education, 3 (1) (2016) 1264170. DOI: https://doi.org/10.1080/2331186X.2016.1264170

[13] C. H. Machebe, B. N. Ezegbe, J. Onuoha. The Impact of Parental Level of Income on Students' Academic Performance in High School in Japan. Universal Journal of Educational Research, 5 (9) (2017) 1614-1620. DOI: 10.13189/ujer.2017.050919

[14] J. D. Dagdag, H. G. Cuizon, A. O. Bete. College students' problems and their link to academic performance: Basis for needs-driven student programs. Journal of Research, Policy & Practice of Teachers and Teacher Education, 9 (2) (2019) 54-65. DOI: https://doi.org/10.37134/jrpptte.vol9.no2.5.2019

[15] S. Wilder. Effects of parental involvement on academic achievement: a meta-synthesis. Educational Review, 66 (3) (2014) 377-397. DOI: https://doi.org/10.1080/00131911.2013.780009

[16] M. A. Hasnat. Parents' perception of their involvement in schooling activities: a case study from rural secondary schools in Bangladesh. Studia paedagogica, 21 (4) 137-149. DOI: 10.5817/SP2016-4-7

[17] R. Noss, R. Nash, P.Paquet, M. Soulé. Humanity's domination of nature is part of the problem: a response to Kareiva and Marvier. BioScience, 63 (4) (2013) 241-242. DOI: https://doi.org/10.1525/bio.2013.63.4.18

[18] F. Kiruy, J. Manduku, V. Ngeno. Parents' Economic Status and Academic Performance in Public Primary Day Schools in Multinational Tea Estates Kericho County, Kenya. East African Journal of Education Studies, 2 (1) (2020) 38-46. DOI: https://doi org/10.37284/eajes.2.1.164

[19] D. Evans, D. Gaysina, A. P. Field. Internalizing symptoms and working memory as predictors of mathematical attainment trajectories across the primary–secondary education transition. Royal Society Open Science, 7 (5) (2020) 191433. DOI: https://doi.org/10.1098/rsos.191433

[20] J. Brown, A. Luderowski, J. Namusisi-Riley, I. Moore-Shelley, M. Bolton, D. Bolton. Can a Community-Led Intervention Offering Social Support and Health Education Improve Maternal Health? A Repeated Measures Evaluation of the PACT Project Run in a Socially Deprived London Borough . International journal of environmental research and public health, 17 (8) (2020) 2795. DOI: https://doi.org/10.3390/ijerph17082795

[21] A. Mahsoon, L. Sharif, M. Banakhar, N. Alasmee, E. Almowallad, R. Jabali, S. Assur. Parental support, beliefs about mental illness, and mental help-seeking among young adults in Saudi Arabia. International journal of environmental research and public health, 17 (15) (2020) 5615. DOI: https://doi.org/10.3390/ijerph17155615

[22] O. R. Pandey, R. R. Kattel. Education status and factors affecting effective education among indigenous Tharu community in Nepal. GSJ, 8 (4) (2020) 5.

[23] F. Frahasini, T. M. P. Astuti, H. T. Atmaja. The Impact of The Use of Gadgets in School of School Age Towards Children's Social Behavior in Semata Village. Journal of Educational Social Studies, 7 (2) (2018) 161-168. DOI: https://doi.org/10.15294 /jess.v7i2.26842

[24] J. Bakker, O. Brock. Early oestrogens in shaping reproductive networks: evidence for a potential organisational role of oestradiol in female brain development. Journal of neuroendocrinology, 22 (7) (2010) 728-735. DOI: https://doi.org/10.1111/j.1365-2826.2010.02016.x

[25] S. Sujarwo, S. Sukmawati, A. Akhiruddin, R. Ridwan, S. S. S. Siradjuddin. An Analysis of University Students' Perspective on Online Learning in the Midst of Covid-19 Pandemic. Jurnal Pendidikan dan Pengajaran, 53 (2) (2020) 125-137.