Adiwiyata school in Indonesia: A correlation between eco-literacy, environmental awareness, and academic ability with environmental problem-solving skill

Diana Vivanti Sigit¹, Lenny Prastiwi², Rizhal Hendi Ristanto¹, Muhamad Rifan¹

¹Department of Biology Education, Universitas Negeri Jakarta, Indonesia
²Al-Azhar Islamic School, Indonesia

*Corresponding author: dianav@unj.ac.id

Abstract. Environmental problem-solving skill is defined as a person’s skill to find solutions to the differences between the current environment and the expected environment. This study aimed to analyze the correlation between ecological literacy, environmental awareness, and academic ability with environmental problem-solving skills. The research method used was descriptive quantitative with survey techniques. The respondents consisted of 245 students of grade 11th science from 3 Adiwiyatas’ Senior High Schools in Tangerang City. The study used descriptive quantitative methods with survey techniques. The research instrument used in this study were tests and questionnaires. The Pearson Product Moment correlation formula tested the research hypothesis at α = 0.05. The results showed a strong enough positive relationship between ecological literacy, environmental awareness, and academic ability with environmental problem-solving skills with a correlation coefficient of 0.462. Based on these results, it can be concluded that an increase will follow the higher the score of ecological literacy, environmental awareness, and academic ability in the score of the environmental problem-solving skill. Other schools are also expected to implement the Adiwiyata program so that students can develop ecological literacy, environmental awareness, academic ability, and environmental problem-solving skills.

Keywords: Academic ability, eco-Literacy, environmental awareness, environmental problem-solving skill.

1. Introduction

The environment is the central pillar of all life, including human life. The environment is a link between biotic components and abiotic components [1, 2]. The environment plays a role as a source of human economic activity to obtain raw materials to fulfill their lives. The impact is caused if the use of the environment is carried out in an excessive manner that reduces the ability of the environment to provide supporting factors for the living system adequately and the emergence of environmental problems [2]. Environmental problems occur in almost every region of Indonesia, including in Banten Province. Banten Province is one of the largest industrial zones in Indonesia, which can damage the environmental balance. Banten Province consists of several regions with the highest population density, namely in the Tangerang City area, reaching 13,602 inhabitants/km² [3].

With a high population density, Tangerang city will increase resource requirements so that potential environmental problems arise. Environmental issues still occur in Tangerang City. Environmental problems covering 78.6% of experienced routine flooding (annual), 46.4% of households accessing...
water sources were at risk of being polluted, and 91.7% of households were not sorted waste [4]. Based on these environmental problems, the effort is needed to develop an environmental problem-solving skill. The environmental problem-solving skill was individuals’ skill to find solutions to the environment and the expected environment [5].

The environmental problem-solving skill can be developed through environmental education. Environmental education is characterized as a learning process whose primary goal is to educate and encourage individuals to engage in more sustainable and environmentally responsible practices [6]. Environmental education is seen as a process for incorporating ecological content into the education system to increase individual awareness about environmental issues at all levels of education. Environmental education can be integrated through the Adiwiyata program [7,8].

Adiwiyata is a program from the Ministry of Environment to encourage the creation of knowledge and awareness of school communities in environmental protection [7,9,10]. This program is expected through activities in schools, such as applying waste banks, making bio pore holes, and making compost, so students can create a healthy environment and avoid negative impacts on the environment. The study results indicate that the Adiwiyata program affects the development of environmental caring characters, including maintaining classroom cleanliness and school environment, saving electricity and water, managing school waste, and conserving biodiversity [11]. Through the Adiwiyata Program, it is expected to be able to develop students’ ecological literacy. Ecological literacy is defined as the ability to use knowledge about ecology, ways of thinking to enjoy, appreciate, or study the environment [12]. This has an impact on students’ ability to understand the relevance and application of ecological concepts regarding human effects on the environment. Also, through ecological irrigation, students can evaluate environmental problems, understand individual responsibility, and develop skills to take action to prevent excessive use of natural resources [13]. The study results showed a significant increase in ecological literacy scores for students participating in environmental activities [14]. Students who are actively involved in environmental activities have a better level of environmental awareness. Environmental awareness is a concern for environmental issues. Students who have environmental awareness can understand environmental problems and have the ability to develop critical thinking and environmental problem-solving skill. Students living in urban areas have higher environmental awareness than in rural areas [15,2,16]. Generally, city dwellers live in polluted environments, making them more aware of environmental problems than villagers. Environmental awareness has a positive relationship with ecological behavior [17]. To form environmentally conscious students, it is necessary to create environmentally students.

Knowledge of the environment possessed by students can make students environmentally friendly, so they can find practical solutions to solve various environmental problems. Experience is part of academic ability. The academic ability in women is better than men [18]. Women appear academically better than men because women generally work harder and attend classes more often. The environmental problem-solving skill essential to be developed because students are the next generation who will maintain the sustainability of ecological functions in the future. Environmental problem-solving skills can be developed supported by ecological literacy, the environment’s existence, and adequate academic abilities. The implementation of the Adiwiyata Program is expected to build student participation in environmental activities so that other schools can participate in implementing the Program. Therefore, this study focuses on the relationship between ecological literacy, environmental awareness, and academic ability with environmental problem-solving skills in the Adiwiyata city of Tangerang City.

2. Methods
2.1 Research Method
The research method used in this research was a quantitative descriptive method with survey techniques. This study has three independent variables (X) which consist of ecological literacy (X₁), environmental awareness (X₂), and academic ability (X₃). The dependent variable (Y) is an environmental problem-solving skill.
Figure 1. Research Design

Description:
X₁: Eco-literacy
X₂: Environmental awareness
X₃: Academic ability
Y: Environmental problem-solving skill
rₓ₁ₓ₂ₓ₃ᵧ: The structural parameters are the magnitude of the relationship X₁, X₂, and X₃ simultaneously with Y

2.2 Data Collection
The population in this study were all high school students in Banten Province. The determination of the sample is done using a multistage sampling technique. In the first level, the sample was chosen by purposive sampling, choosing Tangerang City as a sample of the Banten population. Determination of Tangerang City as a research sample because Tangerang City has the highest population density compared to other regions in Banten Province. Based on data from the Tangerang City Education Office, there are 15 Public High Schools in the area. At the second level, from all the Schools, SMAN 2 Tangerang City, SMAN 4 Tangerang City, and SMAN 5 Tangerang City were selected by purposive sampling as the research sample. Determination of the three Schools taking into account the status of accreditation and Adiwiyata status.

At the third level, choose students of grade 11th science as the research sample. Students of grade 11th science were selected as research samples because they had studied environmental pollution material. The fourth stage is the selection of samples from each class by a simple random sampling technique. The number of students in grade 11th science from these three schools is 637 students. Furthermore, using the Slovin formula at α = 0.05 and obtained a sample of 245 out of 648 students. The proportion of the number of samples from each school is shown in Table 1.

| Schools            | Population | Number of Student’s Sample |
|--------------------|------------|-----------------------------|
| SMAN 2 Tangerang City | 205        | 81                          |
| SMAN 4 Tangerang City | 216        | 82                          |
| SMAN 5 Tangerang City | 216        | 82                          |
| **Total**          | **637**    | **245**                     |

2.3 Environmental Problem Solving Skill
The variable environmental problem-solving skill was measured based on four aspects: exploring and understanding, representing and formulating, planning and implementing, and monitoring and reflection [19]. The instrument of the environmental problem-solving skill in the form of essay tests consisting of
20 questions. Criteria for scoring answers using the assessment rubric. The validity of the test for environmental problem-solving skills was calculated using Pearson’s Product Moment formula. In contrast, the test’s reliability coefficient uses the Cronbach Alpha formula through the SPSS 20 program.

2.4 Ecological Literacy
The ecological literacy variable was measured based on three dimensions, namely concern, knowledge, and practical competence [20]. Ecological literacy instruments in the form of tests and questionnaires. The dimensions of care and practical competence were measured using a questionnaire. The number of statement items for each dimension was 30. The dimension of knowledge was measured using a test with 25 questions. Knowledge needed so that students are said to be ecologically educated includes 8 indicators [20]. The validity of ecological literacy instruments is calculated using the Pearson Product Moment and Biserial Point formula. The reliability of ecological literacy instruments was calculated using the Alpha Cronbach formula and Kuder Richardson 20 (KR-20) through the SPSS 20 program.

2.5 Environmental Awareness
The environmental awareness variable was measured based on 5 dimensions, namely causes of pollution, soil, forest and air conservation, energy conservation, human health conservation, and conservation of wildlife and livestock [2]. The instrument used to measure environmental awareness was a questionnaire consisting of 20 positive statement items and 20 negative statement items. The validity of the environmental awareness questionnaire was measured using the Pearson Product Moment formula while the reliability coefficient was calculated using the Cronbach Alpha formula through the SPSS program version 20.

2.6 Academic Abilities
Variables of academic abilities were obtained from the total value of students’ National Examinations at the level of Junior High School (SMP). The instrument is not tested for validity and reliability.

2.7 Data Analysis
The data analysis technique in this study consisted of an analysis of prerequisite tests and research hypothesis tests. The analysis prerequisite test consisted of a normality test using the Kolmogorov Smirnov test (α = 0.05) and a homogeneity test calculated using the Bartlett test (α = 0.05). This study’s research hypothesis test is a linear regression test using the F-Test (α = 0.05). The analysis then continued with a correlation test by calculating the correlation coefficient (rxy) at α = 0.05 with the Pearson Product Moment formula through the SPSS 20. The next step is to determine the coefficient of determination. The coefficient of determination is a number or index used to determine the magnitude of the contribution of independent variables to the variation (up/down) of the dependent variable [21]. The formula for determining the coefficient of determination is the coefficient of determination = rxy2 x 100.

3. Result and Discussion
3.1 Result
Based on the study results, the highest ecological literacy score was 93, the lowest score was 53, and the average score was 72. The majority of students at SMAN 2 Tangerang City, SMAN 4 Tangerang City, and SMAN 5 Tangerang City, which have Adiwiyata status, had literacy ecology scores with the ecological literacy category (basic). The ecological literacy category is presented in Table 2.

| Score Range | Category | The Number of Students | Percentage (%) |
|-------------|----------|------------------------|----------------|
| < 60        | Illiterate | 5                      | 2.05           |
| 60-69.9     | Low      | 78                     | 31.84          |
| 70-79.9     | Basic    | 139                    | 56.73          |
The results showed that the indicator of ecological literacy with the highest percentage was care, while the lowest rate was knowledge. The distribution of the percentage of ecological literacy indicators is presented in Table 3.

| Ecological Literacy Dimension | Percentage (%) |
|------------------------------|----------------|
| Care                         | 36.2           |
| Practical Competence         | 32.9           |
| Knowledge                    | 30.9           |

Data from environmental awareness research shows the highest score is 96, the lowest score is 63, and the average score is 84. The majority of students at SMAN 2 Tangerang City, SMAN 4 Tangerang City, and SMAN 5 Tangerang City which have Adiwiyata status had very good environmental awareness scores. The environmental awareness score categories are presented in Table 4.

| Score Range | Category  | The Number of Students | Percentage (%) |
|-------------|-----------|------------------------|----------------|
| 0-20        | Very Bad  | 0                      | 0              |
| 21-40       | Bad       | 0                      | 0              |
| 41-60       | Enough    | 0                      | 0              |
| 61-80       | Good      | 72                     | 29.39          |
| 81-100      | Very Good | 173                    | 70.61          |
| Total       |           | 245                    | 100            |

The highest percentage of environmental awareness indicators was the conservation of human health while the lowest percentage indicator was the conservation of wild animal and livestock life. The distribution of the percentage of environmental awareness indicators was presented in Figure 2.
The highest academic ability score is 95. The lowest score is 53. The average score is 74. 127 students from 245 students of SMAN 2 Tangerang City, SMAN 4 Tangerang City, and SMAN 5 Tangerang City who have Adiwiyata status have academic ability scores on the moderate category. The academic ability score categories are presented in Table 5.

Table 5. Academic Ability Score Category

| Score Range | Category  | The Number of Students | Percentage (%) |
|-------------|-----------|------------------------|----------------|
| 0-49        | Low       | 0                      | 0              |
| 50-74       | Moderate  | 127                    | 51.84          |
| 75-100      | High      | 118                    | 48.16          |
| Total       |           | 245                    | 100            |

Data from the research shows the highest score for environmental problem solving skill is 83, the lowest score is 5, and the average score is 45. Students at SMAN 2 Tangerang City, SMAN 4 Tangerang City, and SMAN 5 Tangerang City, which have Adiwiyata status, have environmental problem-solving skill scores with enough categories. The environmental problem-solving skill score categories are presented in Table 6.

Table 6. Environmental Problem-Solving Skill Score Category

| Score Range | Category  | The Number of Students | Percentage (%) |
|-------------|-----------|------------------------|----------------|
| 0-20        | Very Bad  | 11                     | 4.50           |
| 21-40       | Bad       | 81                     | 33.05          |
| 41-60       | Enough    | 122                    | 49.80          |
| 61-80       | Good      | 30                     | 12.24          |
| 81-100      | Very Good | 1                      | 0.41           |
| Total       |           | 245                    | 100.00         |
The highest percentage of indicators of environmental problem-solving skills is linking information that is known to compile new information while the indicator with the lowest percentage is planning a form of monitoring or supervision. The distribution of the percentage of indicators to environmental problem-solving skills is presented in Figure 3.

![Figure 3. Percentage of Environmental Problem-Solving Skill Indicators](image)

The results of the normality test on the four variables indicate that the sig score of the four variables greater than the alpha value. This shows that the four groups of data are normally distributed in Table 7.

| No | Variable                     | Sig.  |
|----|------------------------------|-------|
| 1  | Ecological literacy          | 0,112 |
| 2  | Environmental awareness      | 0,077 |
| 3  | Academic ability             | 0,583 |
| 4  | Environmental problem-solving skill | 0,195 |

Data from homogeneity test results showed that the three data groups had sig scores greater than alpha, so we can conclude homogeneous data in Table 8.

| No | Data                     | Sig.  |
|----|--------------------------|-------|
| 1  | (X1) with (Y)            | 0,54  |
| 2  | (X2) with (Y)            | 0,692 |
| 3  | (X3) with (Y)            | 0,356 |

The regression model for the four variables was \( \hat{Y} = -48,343 + 0,563 X1 + 0,309 X2 + 0,363 X3 \). Sig score (0,000) smaller than alpha value (0,05). These results can be concluded that the regression model was significant. The linearity test obtained a significance score \( p < \alpha \) which is 0,000 <0,05, based on this is known as the linear regression equation model. This model shows scores \( X_1 \) (ecological literacy), \( X_2 \) (environmental awareness), and \( X_3 \) (academic ability) affect the \( Y \) score (environmental problem-solving skill). The results of the correlation hypothesis test \( (X_1, X_2, \text{and } X_3 \text{ with } Y) \) obtained a correlation coefficient of 0.462 with a strong enough category. The T-test score (8.12) is greater than the value of
Based on these results, it can be concluded that the correlation coefficient was significant.

3.2 Discussions

Based on the research results found in Table 2, most students obtained ecological literacy scores in the basic category. This can be caused by students being involved in various environmental protection activities to implement the three schools’ Adiwiyata status. Ecological literacy formed through the Adiwiyata Program’s implementation makes students have the knowledge, care, and practical competencies needed to solve various environmental problems. This is following the Adiwiyata Program’s objectives, namely a program to realize responsible school citizens as an effort to protect and manage the environment through good school governance [11]. Knowledge indicators have the lowest percentage of the three ecological literacy indicators. This can be interpreted that students’ knowledge of ecology still needs to be improved so that it can enhance environmental problem-solving skill.

There was a significant positive relationship between environmental knowledge and the ability to solve environmental pollution problems [22]. Factors that cause students’ inadequate ecological knowledge are age and intensity of interaction with nature. Students are said to be ecologically literate if they have a basic understanding of ecology, care, and practical competence as a tool in developing environmental problem-solving skills. This has been realized by applying for the Adiwiyata Program by integrating the environment into the learning process and involving students in environmental activities. These activities have not only an impact on increasing student knowledge but also the students’ care and environmental problem-solving skill. The Adiwiyata Program can improve ecological literacy [23]. The majority of respondents obtained an environmental awareness score in an excellent category. This can be caused by implementing the Adiwiyata program in the three schools; students must actively participate in various environmental activities. These activities have an impact on the interaction of students with the environment more intensively and form environmentally conscious students.

Environmental education in schools not only increases cognitive abilities but also awareness of students about environmental protection [24,25]. The highest percentage of indicators of environmental awareness is the conservation of human health. This is because, through the Adiwiyata Program, students are accustomed to playing an active role in environmentally friendly activities such as recycling, cycling, and planting trees. The training aims to create a clean environment so that it has a positive impact on human health. This is following the Adiwiyata Program’s objective, which involves the school community in various activities towards a healthy environment so that it will form school residents responsible for environmental conservation efforts [11]. The Adiwiyata program that has been applied to the three schools impacts the intensity of students to interact with the environment to be quite intensive. This affects students’ sensitivity and awareness towards the environment so that it can help students develop their environmental problem-solving skills. Students’ active ground in various school activities, especially activities to protect skills, manage the school environment, increases students’ insight into the environment, and can instill awareness and attitudes that are environmentally friendly and able to handle various environmental problems [23]. The majority of students have an academic ability score with a moderate category. This can be caused by age. Students who are respondents in the study area in the age range of 15-17 years. Students of this age have many opportunities to improve their insight and experience. As long as the motivation is consistent, the more age increases, the more experienced and known information is known so that the academic abilities formed will be better.

The study results found that age positively correlates with academic ability [26,27]. Academic ability includes student knowledge. Students can use and associate their experience in problem-solving activities because, in the learning process, students not only memorize but also apply it to real situations through environmental activities such as making bio pore and recycling. Problem-solving requires the ability to connect knowledge and experience to determine decisions and solve problems [28]. Based on the percentage of indicators of environmental problem-solving ability found in Table 8, it is known that the indicators linking known information to compile new information have the highest rate compared to the other three indicators.
The Adiwiyata program helps students to develop their environmental knowledge by applying it as an effort to find solutions to solve environmental problems through the participation of various environmental protection activities. Answering problem-solving tests, students must use existing knowledge and skills to answer unanswered questions or difficult situations [29]. Students’ environmental problem-solving skills will be better if students have ecological literacy, environmental awareness, and academic abilities together compared to only one or two factors. Ecological literacy, environmental awareness, and academic ability jointly support students in trying to understand environmental issues and problems to help students find effective solutions that have an impact on improving environmental problem-solving skills. The environmental problem-solving skill commonly applied in schools tends to be used by students when in the community. This will have an impact on the condition of the environment around the students to be better if, in the school environment, students have the environmental problem-solving skill adequately. It can also be used as an essential indicator of a learning process’s success when students can apply what students have learned in daily life [30]. The three schools have developed students’ abilities to solve various environmental problems through participation in various school environment maintenance activities so that they are expected to be applied when students are in the community. This is following the Adiwiyata program’s objectives, namely that each school member is involved in school activities towards environmental health so that it will make school members accountable for environmental conservation and protection through good school governance to support sustainable development [23].

4. Conclusions
The results showed a positive relationship with a strong enough category between ecological literacy, environmental awareness, and academic ability with environmental problem-solving skills. Based on the study results, other schools are also expected to be able to implement the Adiwiyata program so that students can develop ecological literacy, environmental awareness, academic ability, and environmental problem-solving skills.

References
[1] Ristanto, R. H. 2011 Pembelajaran biologi berbasis inkuiri terbimbing dengan multimedia dan lingkungan rill terhadap prestasi belajar. *Jurnal Educatio*, 6 1 53-68.
[2] Badoni, A. K. 2017 Study of environmental awareness of the secondary level student. *International Education & Research Journal (IERJ)*, 3 2 7-8.
[3] Dinas Lingkungan Hidup & Kehutanan Provinsi Banten 2017 *Status Lingkungan Hidup Daerah (SLHD) Provinsi Banten*. Banten: Pemerintah Provinsi Banten.
[4] Environmental Health Risk Assessment (EHRA) 2014 *Laporan Studi EHRA Kota Tangerang Provinsi Banten*. Kota Tangerang: Pemprov Banten.
[5] Hesse, F., Care E., Buder J., Sassenberg K., & Griffi, P 2015 Assessment and teaching of 21st century skills. *Springer Science+Business Media Dordrecht* 37–57.
[6] Biedenweg, K., Monroe, M. C., & Wojcik, D. J 2013 Foundation of environmental education. North American association for environmental education, 1-115.
[7] Maryono 2015 The implementation of the environmental education at “adiwiyata” schools in pacitan regency (an analysis of the implementation of grindle model policy). *Journal of Education and Practice*, 6 17 31-42.
[8] Adela, D., Sukarno, & Indriayu, M 2018 Integration of environmental education at the Adiwiyata program recipient school in growing ecilitracy of students. *Advances in Social Science, Education and Humanities Research*, 262 67-71.
[9] Azrai, E. P., Sigit, D. V., & Qibtiah, M 2017 The correlation between environmental awareness and student’s participation in go green school activity at adiwiyata’s school. *Biosfer: Jurnal Pendidikan Biologi*, 10 2 7-11.
[10] Rachman, S. P. D., & Maryani, E 2017 Teachers’ and students’ green behaviour of Adiwiyata targeted school. 1st UPI International Geography.
[11] Caddafie, S. U., Martuti, N. K. T., & Rudyatmi, C 2017 The impact of Adiwiyata program on environmental caring character. Journal of biology education, 6 3 350-356.

[12] Berkowitz, R., Ford, M. E., & Brewer, C. 2005 A framework for integrating ecological literacy, civics literacy, and environmental citizenship in environmental education. Cambridge: Cambridge University Press.

[13] Yildirim, F. & Hablemitoglu, S. 2013 Ecological literacy for a sustainable future: proposal of an eco-sociological model. Proceedings of the International Scientific Conference (Latvia).

[14] Pitman, S. D., Sutton, P., & Daniels, C. 2017 Ecological literacy and psychographics: lifestyle contributors to ecological knowledge and understanding. International Journal of Sustainable Development & World Ecology, 25 2 1-14.

[15] Akhter, S., & Malaviya, P. 2015 Assessment of environmental awareness among rural and urban residents in Bishnah, Jammu and Kashmir, India. International Journal of Basic and Applied Sciences, 4 3 180-182.

[16] Biswas, M 2017 A study on the environmental awareness of secondary school students in relation to gender, locale of study and medium of instruction. International Education & Research Journal (IERJ), 12 3 86-88.

[17] Sharma, A 2017 Impact of social desirability and environmental awareness on ecological behavior among students. The international journal of indian psychology, 4 3 158-165.

[18] Jayanthi, S. V., Balakrishnan, S., Ching, S. A., & Latif, A. N. 2014 Factors contributing to academic performance of students in a tertiary institution in Singapore. American Journal of Educational Research, 2 9 752-758.

[19] OECD 2017 PISA 2015 assessment and analytical framework: science, reading, mathematic, financial literacy and collaborative problem solving, revised edition. Paris: OECD Publishing.

[20] Meginn, A. E. 2014 Quantifying and understanding ecological literacy: a study of first year students at liberal arts institutions, Dickinson College, USA.

[21] Riduwan 2009 Belajar mudah penelitian untuk guru-karyawan dan peneliti muda. Bandung: Alfabeta.

[22] Sigit, D. V., Ernawati, & Qibtiah M. 2017 Hubungan pengetahuan lingkungan hidup dengan kemampuan pemecahan masalah pencerminan lingkungan pada siswa SMAN 6 Tangerang, Biosfer: Jurnal Pendidikan Biologi, 10 2 1-6.

[23] Desfandi, M., Maryani, E., & Disman. Building ecoliteracy tthrough adiwiyata program (study at adiwiyata school in Banda Aceh). Indonesian Journal of Geography, 49 1 51–56.

[24] Saito, C. H. (2013). Environmental education and biodiversity concern: beyond the ecological literacy. American Journal of Agricutural and Biological Science, 8 1 12-27.

[25] Jumadil 2015 Penerapan program adiwiyata pada aspek kognitif, afektif dan psikomotor tentang pengelolaan lingkungan hidup sekolah dasar di kota Kendari. Jurnal Sains & Teknologi, 15 2 195-202.

[26] Naderi, H., Abdullah, R., Aizan, H. T., Sharir, J., & Kumar, V. 2009 Creativity, age, and gender as predictors of academic achievement among undergraduate students. Journal of American Science, 5 5 101-112.

[27] Ormrod, J. E. 2009 Creative teachers and creative teaching. In: Wilson, Anthony ed. Creativity in Primary Education (2nd ed.). Achieving QTS Cross-Curricular Strand. Exeter: Learning Matters, 36–46.
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