

Analysis of Environmental Problem-Solving Ability of Students in Class XI Social Science at State Senior High School 17 West Jakarta

Fellix Rimba^{1*} , Ranny Rastati²

¹Department of Geography Education Faculty of social sciences education, Universitas Pendidikan Indonesia, Bandung, Indonesia

²Department of Media and Communication Studies, Faculty of Arts and Social Sciences, Universiti Malaya, Malaysia

²Badan Riset dan Inovasi Nasional, Jakarta, Indonesia

E-mail: fellixrimba72@gmail.com

Received: January 13, 2023	Revision: July 19, 2023	Accepted: July 23, 2023
-------------------------------	----------------------------	----------------------------

Abstract

The environment is an important pillar for all life, including human life. However, today's environmental problems cannot be separated from human activities. It is necessary to have environmental problem-solving skills in students. This study aimed to analyze the environmental problem-solving ability of students in Class XI Social Science at State Senior High School 17 West Jakarta. The research method used is descriptive quantitative. This study used a sample of 27 students. The sampling technique used is simple random sampling. Research results showed that the ability to solve environmental problems for class XI Social Science at State Senior High School 17 West Jakarta was classified as high (71,22%). The results of the indicator research are as follows: defining the problem using test questions at 30,19% and questionnaire results at 31,02%, identifying problems using test questions at 25,19% and questionnaire results at 21,27%, formulating various alternative solutions using test questions at 23,52% and questionnaire results of 25,19% and determine the best solution using test questions of 21,10% and questionnaire results of 22,52%. The highest score is found on the indicator defining the problem, and the lowest score on determining the best solution. This finding implies that there is a tendency for students to understand, identify and formulate solutions to environmental problems.

Keywords: Ability, Problem-Solving, Environmental, Senior High School

INTRODUCTION

Humans are part of the living environment that benefits and preserves. The atmosphere is not only seen as a resource to be exploited. But as a living place that requires compatibility between humans and their environment. Humans and their environment have a reciprocal relationship. Humans affect their environment, while humans are affected by their environment (Azrai, 2017).

The environment is an important pillar for all life, including human life. The atmosphere is a link between biotic components and abiotic components (Badoni, 2017). Humans and the environment are essentially two interdependent things. Humans utilize various sources of life from the

environment, while environmental sustainability depends on human actions in treating the environment (Wijaya, 2021). The relationship between humans and the environment occurs in three phases. The first phase, humans in nature, is one with the characteristics of humans who depend on the environment. Then the second phase is called humans against nature, where humans have been able to develop science and technology so that they are less dependent on the environment. In this phase, humans start destroying the environment. The third phase is called human and nature, where humans begin to realize that environmental damage causes harm to humans themselves, so efforts to

improve the environment begin to emerge (Sigit, 2017).

Human growth is increasing. This also increases the need for clothing, food, shelter, etc. This need is obtained through the exploitation of natural resources so that the fulfillment process directly or indirectly creates environmental pollution problems. The population of Jakarta has increased every year in terms of numbers. This increase was mainly due to the high birth rate and population migration from villages to cities, known as urbanization. Based on the results of the population census, which is held every ten years, the town of Bandung continues to increase, reaching 10.61 million people in 2021. This number has increased by 0.45% compared to the previous year, which amounted to 10.56 million people (Central Bureau of Statistics, 2021).

The city of Jakarta is the capital of Indonesia. The city is known as the center of government, economy, and industry with many international companies, and this causes the city of Jakarta to be inseparable from environmental problems. These problems give rise to industrial, household, health, and other waste pollution (Jakarta City Environmental Agency, 2015).

Based on the conditions, the natural environment has biodiversity characteristics with more complex functions, while the built or artificial environment has relatively more limited functions and biodiversity. In addition, converting agricultural land in urban areas into residential or residential areas is evidence that human needs for housing are increasing (Tursilowati, 2005). Another problem that indicates decreased environmental quality is related to air pollution. The main sources of air pollution are industrial activities and motor vehicle fumes (Pitman, 2016).

In addition, water pollution has disrupted the function and role of the Ciliwung River as a source of clean water for the people of Jakarta. The breakdown is caused by changes in land use in the upstream, middle, and even downstream

areas of the Ciliwung River watershed. Besides, people's habits, such as disposing of garbage in the wrong place and household waste directly into the river, also trigger river pollution. Other problems in the city of Jakarta include the problem of lack of clean water, waste problems, narrow green open spaces, slum areas, traffic jams, and other social issues. For this reason, a solution is needed to overcome environmental pollution (Lagonayaki, 2014).

Education is a solution to forming responsible and environmentally caring human beings (Saito, 2013). Education introduces students to important issues in people's lives currently, both in social and environmental energy, so students are also moved to solving these problems. This is based on Yarmayani's explanation (2016) that education must introduce students to important issues faced by humanity, while at the same time, it must be able to provide solutions to these humanitarian problems so that students have an awareness of their true nature, namely who, to what and how.

Education aims to form students who can understand environmental problems and seek to be directly involved in efforts to solve local and global issues. Education that can support future development is education that can develop students' potential so that students can solve and provide the best solutions to the problems of life they face. Likewise, the learning process has the goal of guiding students to be able to adapt, can think creatively and critically, and scientifically the ability to solve a problem that occurs in the surrounding environment, and this ability can be developed in geography education and learning (Hariyadi, 2019).

In geography lessons, various concepts are studied, including environmental pollution. Environmental pollution is closely related to natural phenomena and symptoms. Learning about ecological pollution requires different geographic abilities, one of which is solving problems. Geographic problem-solving

ability is a process of eliminating differences or discrepancies that occur between the results obtained and the desired results. One part of the problem-solving process is deciding the best solution from several available alternatives. Inappropriate decision-making will affect the quality of the results of the problem-solving carried out.

The ability to solve problems is seen as necessary for students to have. These abilities can help students make the right decisions, be careful, systematic, logical, and consider various points of view. Conversely, lacking these abilities results in students carrying out multiple activities without knowing the purpose and reasons (Widiawati, 2016).

The ability to solve environmental problems is a process of students understanding issues, planning, and acting as a solution to problem-solving (Sumartini, 2016). Problem-solving skills are very important to develop because students are the next generation who will maintain the sustainability of environmental functions in the future. Problem-solving abilities can be developed supported by adequate environmental literacy (Azrai, 2017).

Students who can solve environmental problems are expected to play an active role in environmental sustainability both in the school environment and the social environment;

actions that care about the climate impact the surrounding environment and have a global impact. Based on the description of the theory put forward, finally, the substance of the ability to solve environmental problems is a person's capacity in the thought process and finding solutions to environmental issues. Problem-solving skills include higher-order thinking, which is necessary for helping students, especially at the upper secondary level, make accurate, careful, systematic, logical decisions and consider various viewpoints (Supiandi, 2016).

Based on the description of the background of the problems that have been described, this research study seeks to analyze the ability of students to solve environmental issues, with the title "Analysis of the environmental problem-solving ability of students in Class XI Social Science at State Senior High School 17 West Jakarta".

RESEARCH METHODS

This research was conducted at State Senior High School 17 West Jakarta. The method used in this research is a quantitative descriptive method. The population of this study was 108 students of class XI Social Science. The sampling technique used is simple random sampling. Samples were taken from as much as 25% of the population of 27 students.

Table 1. Sampling

No.	Class	Population	Sampling
1.	XI Social Science1	36	9
2.	XI Social Science2	37	9
3.	XI Social Science2	35	9
Total		108	27

Source: Primary Data (2022)

Data collection techniques using questions and questionnaires. The indicators for measuring the ability to solve

environmental problems can be seen in Table 2.

Table 2. Indicators of Environmental Problem-Solving Ability

Problem-Solving Ability Indicator	Information
Define the problem	Formulate problems from certain events that contain conflict issues, so students understand what problems will be studied.
Identifying problems	Collect and compile the necessary information, determine the characteristics, and explain the cause-and-effect relationship of a statement.
Formulate various alternative solutions.	It is finding alternative solutions to one of a problem that will encourage someone to express and argue about the best possibilities.
Determine the best solution.	Decision-making about which strategy can be implemented

Source: Chang (1998).

Data were analyzed using descriptive statistics, namely calculating percentages.

The percentage score can be calculated using the following calculation formula:

$$\%Skor = \frac{\text{total score obtained}}{\text{maximal total score}} \times 100\%$$

Calculations from the results of the data above will produce numbers in the form of a percent (%). Then classified with a

score in the form of a percentage. Then categorized with qualitative sentences as follows:

Table 3. Solving Ability Value Interval Student Problems

Interval value	Criteria
81-100	Very high
61-80	Height
41-60	Currently
21-40	Low
<20	Very low

Source: Ansori (2020).

RESULTS AND DISCUSSION

The ability to solve environmental problems in students that will be studied in this study includes defining problems, identifying problems, formulating various alternative solutions, and determining the best solutions. Data analysis of problem-

solving abilities with test instruments was obtained using questions with a score range of 0-3. The data on the results of the frequency distribution of students are presented in Table 4 below.

Table 4. Results of Student Test Instrument Frequency Distribution

Interval value	Criteria	Frequency	Relative frequency
81-100	Very high	7	25.93
61-80	Height	14	51.85
41-60	Currently	6	22.22
Total		27	100

Source: Primary Data (2022).

Table 4, obtained from 27 respondents, shows that the highest score for environmental problem-solving ability is 95, and the lowest is 57. Based on calculations, seven respondents are in the 81-100 class range (25.93%) and 61-80 class range, namely as many as 14 respondents (51.85%). In the range of 41-60, as many as

six respondents (22.22%). In this test instrument, the average value of the accumulated results of all students' scores was 71.22, classified in the High category.

The results in the table above can be translated back based on the four indicators of problem-solving ability so that the results in the following diagram are obtained:

Table 5. Indicators Problem-Solving Ability Test Instrument

Indicator	Percentage
Define the problem	30.19
Identifying problems	25.19
Formulate various alternative solutions	23.52
Determine the best solution.	21.10
Total	100

Source: [Primary Data \(2022\)](#)

When viewed from the four aspects used as indicators in the test instrument for the ability to solve environmental pollution problems, namely defining the problem (indicator 1), identifying the problem (indicator 2), formulating various alternative solutions (indicator 3), and determining the best solution (indicator 4), then you will see the percentage difference in the average score of students as many as 27 respondents. The aspect most mastered by students is defining the problem at

30.19%, while the lowest part is determining the best solution at 21.10%.

Data from the analysis of students' problem-solving abilities with non-test instruments in the form of a questionnaire consisting of 20 statements with four possible answers, namely strongly disagree (SDA), disagree (DA), agree (A), and strongly agree (SA). The frequency distribution data of the questionnaire sheet can be presented in Table 6.

Table 6. Results of Student Questionnaire Instrument Frequency Distribution

Interval value	Criteria	Frequency	Relative frequency
81-100	Very high	7	25.93
61-80	Height	14	51.85
41-60	Currently	6	22.22
Total		27	100

Source: [Primary Data \(2022\)](#)

Table 6 shows ten students who got very high criteria with a percentage of 37.03%, 14 who got high bars with a ratio of 51.85%, and three who got medium standards with a rate of 11.11%.

Based on the data in Table 6, it can be said that all students can understand each problem-solving indicator and can be translated back based on the four problem-solving ability indicators.

Table 7. Indicators Problem-Solving Ability Questionnaire Instrument

Indicator	Percentage
Define the problem	31.02
Identifying problems	21.27
Formulate various alternative solutions	25.19
Determine the best solution.	22.52
Total	100

Source: [Primary Data \(2022\)](#)

The table above shows four indicators of problem-solving abilities with non-tests, with each average scoring students' level of understanding. The indicator for defining the problem gets a score of 31.02%, identifying the situation receives a score of

21.27%, formulating various alternative solutions is 25.19%, and determining the best answer is 22.52%. A comparison of the gain between test instruments and non-test instruments in this study can be seen in Table 8.

Table 8. Comparison of Test and Questionnaires Instrument Results

Indicator	Test Instrument Percentage	Questionnaires Instrument Percentage
Define the problem	30.19	31.02
Identifying problems	25.19	21.27
Formulate various alternative solutions	23.52	25.19
Determine the best solution	21.10	22.52
Total		100

Source: Primary Data (2022).

Table 8 shows students' problem-solving abilities based on test and non-test instruments' results. A balanced gain is obtained by the indicators defining the problem. The results of the test instrument and the non-test indicator indicators of planning obtained a high percentage of 30.19% for the question instrument and 31.02% for the non-test tool.

The ability to solve environmental problems is the ability of students to solve problems gradually. Problem-solving ability has four indicators that can be used to analyze the problem-solving skills of State Senior High School 17 West Jakarta students: defining problems, identifying problems, formulating various alternative solutions, and determining the best solutions.

The results that have been obtained indicate that the average value of students' problem-solving abilities is included in the high criteria. Overall, students can develop their thinking to solve the problems listed

in the questions. However, if analyzed for each indicator, the indicator determining the best solution has the lowest percentage. This is not in line with the results on the questionnaire sheet. The results of obtaining student questionnaire sheets show that students can understand statements. This can be seen in the acquisition of the average value, which shows that the questionnaire instrument has increased in filling out. Four indicators of problem-solving abilities can help students complete challenges. Problem-solving skills are useful when solving complex and multidimensional challenges that can be developed in active learning that involves students ([Handayani, 2016](#)).

This situation can occur because students feel that answering questions follows the statements on the questionnaire sheet, which contains steps to work on the questions. However, when working on test questions, students did not do it according to the statements on the questionnaire

sheet. If students find it difficult to understand the test questions, it is more difficult for them to comment in describing the steps they are taking clearly and completely. This makes the percentage in the question instrument lower than the questionnaire sheet instrument (Fan, 2021).

The indicator defines the problem of obtaining high results because, in determining the problem, students already understand the situation. This is in line with the opinion of Khoiriyah (2018) that the ability to understand issues is the first step for students in solving problems; to recognize problems, students must have a strong foundation about the situation. In solving problems with Polya, students can understand the problem but use language that resembles the problem (Marwazi, 2019). This ability is the first step for students in working on problem-solving questions. Students who experience mistakes in analyzing questions will have difficulty solving problems. The results shown on this indicator in the questions are in line with the results in the questionnaire. Mechanisms are interrelated between the question instrument and the questionnaire—students when working on questions according to the statements on the questionnaire sheet.

Indicators identify the problem. This step emphasizes the success of obtaining an understanding of the problem. This step involves deepening the problem, sorting out facts, determining relationships between attributes, and formulating problem questions. Every written problem, even the easiest one, must be read several times, and the information in the problem must be studied carefully. Usually, students must restate the problem in their language.

The indicator of formulating the best solution obtains maximum results, and this step is the next stage after students can analyze the problem. This is because students can find and plan solutions, and problem issues are also related to students' daily problems so that students have

obtained an overview in finding solutions. Along and in tune with Anwar (2013), students can discover and plan solutions or ways to solve problems in questions if students are directed to see a problem in questions and with real conditions and do not rely on memory. A questionnaire filled in by students also supports the analysis results on the indicators for planning. The results on this indicator are the highest percentage, which aligns with the effects on the question instrument. This means that students are very confident in the answers, understand the intent of the questions, and can formulate appropriate alternative solutions.

CONCLUSION

Based on the study results, it can be concluded that the ability to solve environmental problems in Class XI Social Sciences Senior High School 17 West Jakarta is included in the high category (71.22%). With indicators defining the situation gets the highest score and determines the best solution receives the lowest score.

ACKNOWLEDGMENT

We sincerely thank Lembaga Pengelola Dana Pendidikan (LPDP) Ministry of Finance of the Republic of Indonesia for funding our master's studies and supporting this research. Lastly, thanks to Pendidikan Geografi Universitas Pendidikan Indonesia.

REFERENCES

- Ansori, M. (2020). *Metode Penelitian Kuantitatif Edisi 2*. Surabaya: Airlangga University Press.
- Anwar, S. (2013). Penggunaan Langkah Pemecahan Masalah Polya dalam Mennyelesaikan Soal Cerita Materi Perbandingan di Kelas VI MI Al Ibrohimy Galis Bangkalan. *Jurnal Pendidikan Matematika E-Pensa*, 1(1), 1-6.
- Azrai, E. P., Sigit, D. V., & Puji, 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, <https://doi.org/10.21009/Biosferjpb.10-2>.
- Badoni, A. K. (2017). Study of environmental awareness of Secondary Level Students International Education & research journal (IERJ), 3 (2), 7-8. Retrieved from ierj.in/journal/index.php/ierj/article/download/686/6.
- Chang, R.Y. (1998). Step By Step Problem-Solving. Jakarta: Pustaka Binaman Pressindo.
- Fan, L., & Zhu, Y. (2021). From convergence to divergence: The development of mathematical problem-solving in Singapore's research, curriculum, and classroom practice. *ZDM Mathematics Education* 39. <https://doi.org/10.1007/s11858-007-0044-1>.
- Handayani, D., & Sopandi, W. (2016). Penggunaan Model Problem Based Learning Untuk Meningkatkan Kemampuan Memecahkan Masalah Dan Sikap Peduli Lingkungan Peserta Didik. *Eduhumaniora: Jurnal Pendidikan Dasar Kampus Cibiru*. 7(2), 105-114. DOI: 10.17509/eh.v7i2.2702.
- Hariyadi, Eko. (2019). Hubungan Literasi Lingkungan Dengan Kemampuan Berpikir Ilmiah Mahasiswa Pendidikan Geografi Universitas Sembilan belas November Kolaka. (Tesis). Sekolah Pascasarjana, Universitas Pendidikan Indonesia, Bandung.
- Khoiriyah, A. J., & Husamah, H. (2018). Problem-Based Learning: Creative Thinking Skills, Problem-Solving Skills, And Learning Outcome of Seventh Grade Students. *Jpbi (Jurnal Pendidikan Biologi Indonesia)*, 4(2), 151-160.
- <https://doi.org/10.22219/Jpbi.V4i2.5804>
- Loganayaki, B. (2014). Creating Environmental Awareness for Tribal School Children. *International Journal of Scientific Research*, 3 (2), 174-176. <https://www.doi.org/10.36106/ijsr>.
- Marwazi, M., Made, N., & Putra, D. (2019). Analysis of Problem-Solving Ability Based on Field Dependent Cognitive Style in Discovery Learning Models. 8(2), 127-134.
- Pitman, S., D., Sutton, P., & Daniels, C. (2016). Ecological Literacy and Socio-Demographics: Who Are The Most Eco-Literate In Our Community, And Why. *International Journal of Sustainable Development & World Ecology*, 1-14. Doi 10.1080/13504509.2016.1263689.
- Prihastuti, W. S., Hudiono, B., & Mirza, A. (2013). Pemecahan masalah matematis siswa ditinjau dari tingkat kemampuan dasar matematika. *Jurnal Pendidikan dan Pembelajaran*, 2 (12), 1- 16.
- Saito, C. H. (2013). Environmental Education and Biodiversity Concern: Beyond the Ecological Literacy. *American Journal of Agricultural and Biological Science*, 8 (1), 12-27. Doi:10.3844/Ajabssp.2013.12.27.
- Sigit, D. V., Ernawati, & Qibtiah, M. (2017). Hubungan Pengetahuan Lingkungan Hidup Dengan Kemampuan Pemecahan Masalah Pencemaran Lingkungan Pada Siswa SMAN 6 Tangerang. *Biosfer: Jurnal Pendidikan Biologi*, 10(2), 1-6. DOI: <https://doi.org/10.21009/biosferjpb.10-2.1>.
- Sumartini, Tina Sri. (2016). Peningkatan Kemampuan Pemecahan Masalah Matematis Siswa Melalui Pembelajaran Berbasis Masalah. *Mosharafa: Jurnal Pendidikan Matematika*. 5 (2). 148-158.
- Supiandi, M. I., & Julung, H. (2016). Pengaruh Model Problem Based Learning (PBL) Terhadap

- Kemampuan Memecahkan Masalah Dan Hasil Belajar Kognitif Siswa Biologi SMA. *Jurnal Pendidikan Sains*, 4(2), 60-64. DOI: 10.17977/jps.v4i2.8183.
- Tursilowati, L. (2013). Urban Heat Island dan Kontribusinya pada Perubahan Iklim dan Hubungannya dengan Perubahan Lahan. *Prosiding Seminar Nasional Pemanasan Global dan Perubahan Global*, 89-96.
- Widiawati, Maharani., Barkah, Rika Fathul., Nur Ds, Yulistina. (2022). Analisis Penerapan Pendidikan Lingkungan Hidup Di Sekolah Dasar. *Jurnal Pancar: Pendidikan Anak Cerdas Dan Pintar*, 6 (1), 181-186. DOI: <https://doi.org/10.52802/pancar.v6i1.333>.
- Wijaya, I Komang Wisnu Budi., Prathiwi, kadek Jayanthi Riva., Muliani, ni Made. (2021). Pengembangan Literasi Lingkungan Siswa Sekolah Dasar. *Adi Widya: Jurnal Pendidikan Dasar*, 6 (1), 46-53. DOI: 10.25078/aw.v6i1.2115.
- Yarmayani, A. (2016). Analisis Kemampuan Pemecahan Masalah Matematis Siswa Kelas XI MIPA SMA Negeri 1 Kota Jambi. *Jurnal Ilmiah Dikdaya*. 6(2), 12-19. DOI: <http://dx.doi.org/10.33087/dikdaya.v6i2.9>.