



ENVIRONMENTAL LITERACY PROFILE OF STUDENTS IN NATURAL SCIENCE LEARNING-BASED EXPERIENTIAL

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DOI: <http://dx.doi.org/10.26418/jpmipa.v14i1.51680>

Abstract

The issue of environmental damage has been widely discussed in recent years in various parts of the world. Environmental literacy is very necessary for the prevention of environmental problems and for creating a healthy environment. One effective model to improve environmental literacy in schools is Experiential Learning, which invites students to design actions to care for the environment and actively participate in providing solutions to environmental problems. This study aims to determine the environmental literacy profile of students at SMPN 4 Depok in experiential learning-based science learning. This research is a quantitative descriptive study with a cluster random sampling technique, namely 50 students of classes VIIA and VII C. The data collection instrument used was 7 environmental literacy description test questions developed from 4 environmental literacy indicators (knowledge, attitudes, skills, and behavior). Data analysis was carried out quantitatively by calculating the percentage to determine the category of students' environmental literacy. Based on the results of data analysis, it was found that the average achievement of the knowledge aspect was 86.2%; the attitude aspect is 65.5%; the skill aspect is 82.5%, and the behavioral aspect is 71.4%. The average of these results shows the level of environmental literacy is 76.4% which is included in the high category. After knowing the environmental literacy profile of students, it is necessary to develop research on interesting and innovative media in science learning so that the four stages of Experiential Learning can run more optimally.

Keywords: *Environmental Literacy, Experiential Learning, Science Learning.*

INTRODUCTION

Environmental problems in Indonesia are increasingly worrying, and even have an impact on the lives of

people and other countries around them (Rizky et al., 2020). These environmental problems include deforestation (Tacconi et al., 2019),



Received : 03/01/2022

Revised : 05/12/2022

Accepted : 15/12/2022

household and industrial waste (Luo et al., 2019), air pollution, smoke, and haze from forest and land fires (Greenstone & Fan, 2019). The destruction of ecosystems and the decline in the amount of biodiversity continues to become a global problem, this reflects the low level of environmental literacy in the community (Hayati, 2020). Many students in Indonesia are less responsive to environmental problems around them (Mardiani et al., 2021). Environmental literacy is indicated as one of the elements of learning that can solve environmental problems. However, the components of environmental literacy embedded in various levels of education have not been widely revealed (Ulfah et al., 2020).

Environmental literacy is the goal of environmental education (Szczytko et al., 2019) and is the capacity of individuals to act with a broad understanding of the interactions of natural systems and sustainable societies. Ramdas & Mohamed (2014) formulated the components of environmental literacy on environmental knowledge and attitudes. Meanwhile, environmental literacy indicators consist of 4 things, namely the ability to think, attitude, and behavior (Chomaini et al., 2021). The environmental literacy indicators are knowledge, skills, and awareness of environmental problems (Febriasari & Supriatna, 2017). Based on these opinions, the researcher limits environmental literacy indicators to 4 aspects, namely: attitudes, knowledge, behavior, and skills in dealing with environmental problems. The four indicators of environmental literacy can be achieved through the right

learning process. One of the lessons that can improve environmental literacy is experiential learning (Hayati, 2020).

Experiential learning is a learning process through action, Doing, discovering, and exploring (Husin, 2013). Experiential learning allows students to experience concepts firsthand, thus providing a richer and more meaningful understanding (Kolb & Kolb, 2017). Kolb as the pioneer of experiential learning said that the stages of experiential learning consisted of concrete experience; reflective observation; abstract conceptualization; active experimentation (Rosier et al., 2016). Experiential Learning greatly contributes to developing environmental literacy (Bloom & Fuentes, 2019). Strengthening environmental literacy and optimizing the implementation of learning are carried out using relevant models and methods (Ulfah et al., 2020). This research focuses on the problem of optimizing environmental literacy using experiential learning in junior high school science learning, especially on the topic of energy and its use.

Based on the results of interviews at SMP Negeri 4 Depok, environmental literacy has not been fully integrated into science learning. This is indicated by the fact that the teacher once invited students to process waste using the 3R (reduce, reuse, and recycle) method, which did not meet the four environmental literacy indicators which include attitudes, knowledge, behavior, and skills in dealing with environmental problems. The method used in environmental education is more

targeted if it uses the method of case studies, experiments, simulations, visits, debates, and projects that facilitate learning and understanding real-world problems (Koutsoukos et al., 2015).

Observation results also show that teachers have begun to insert small observations and experiments in the laboratory, but they do not dominate and have not fulfilled the Experiential Learning stage, often science learning only takes place in the classroom. Experiential learning is used by students to build environmental literacy, for example by active learning in the classroom; on the school grounds; in residential outdoor science programs, in local communities, in the wilderness, museums, aquariums, farms, and science centers (Force, 2015). There is more to experiential learning than simply visiting a site or witnessing a process, learning opportunities from experience should be diverse (field trips, videos, textual resources, expert lectures, simulations, and reflective dialogue) and carefully designed to expose students to the complexity of the phenomenon under study (Bloom & Fuentes, 2019). Researchers limit science learning activities by watching videos and conducting active experiments in class.

Through the stages of Experiential Learning, students are expected to have a high level of environmental literacy. Environmental literacy integrates variables of cognitive knowledge of environmental values and ecological behavior (Maurer & Bogner, 2020). The attitude of caring for the environment will form feelings and responsibilities towards the environment so it plays an important role in determining pro-

environmental behavior (Falabiba et al., 2014). Based on this background, researchers are interested in knowing the environmental literacy profile of SMPN 4 Depok students in experiential learning-based science learning.

METHODS

This research is a type of quantitative descriptive research to determine the environmental literacy profile of students at SMP Negeri 4 Depok. The sampling technique used was cluster random sampling from 50 students of class VII A and VII C. The data collection instrument used was 7 essay test questions covering four aspects of environmental literacy which were analyzed including knowledge, attitudes, behavior, and skills. This instrument has gone through the process of content validation and constructs validation by experts and colleagues. The results of the validation show that the test questions are valid and feasible with a very good category. The following aspects and indicators of environmental literacy are presented in Table 1.

Furthermore, the correlation of Experiential Learning stages to facilitate environmental literacy is presented in Table 2. The level of environmental literacy of students can be identified with the following analytical steps:

1. Calculating quantitative data in the form of a total score of each student's description test questions based on the assessment rubric.
2. Calculate the percentage of student answer scores using equation (1).

$$NP = /SM \times 10\% \quad (1)$$

Where NP = percentage value; R = total score obtained; and SM = Maximum score value.

3. Converting percentages to qualitative data (interval values)

according to environmental literacy score categories as shown in Table 3.

Table 1. Aspects and indicators of environmental literacy

Aspect	Indicator
Knowledge	Expressing the concept of energy
	Answering questions related to environmental issues
Attitude	Planning energy-saving efforts
	Showing the right steps to show environmental care
Skill	Analyzing problems related to environmental damage
	Predicting the relationship between global warming and energy use
Behavior	Showing behavior to protect the environment

Table 2. The correlation of experiential learning stages to facilitate environmental literacy

Stage Experiential Learning	The Aspect of Experiential Learning
Concrete Experience	Get real experience through observing phenomena in the surrounding environment
Reflective Observation	Reflecting experience by predicting the relationship between phenomena in the surrounding environment
Abstract Conceptualization	Discussing concepts based on theory and facts in the field
Active Experimentation	Conducting active experiments as a solution to understand the complexity of the phenomenon under study

Table 3. Categories of environmental literacy scores

Values	Categories
81-100	Very High
61-80	High
41-60	Medium
21-40	Low
0-20	Very Low

RESULTS AND DISCUSSION

The achievement of students' environmental literacy is described in Table 4. Each stage of Experiential Learning can accommodate four aspects of environmental literacy, which will be explained in detail in

Table 4. Based on Table 4, it can be concluded that the environmental literacy profile of students is in the high category with an average value of 76.4. The aspects of attitude and behavior need to be improved so that all aspects of environmental literacy can be achieved optimally.

Table 4. Achievement of student environmental literacy

Aspect	Average Score	Categories
Knowledge	86,2	Very High
Attitude	65,5	Heigh
Skill	82,5	Very High
Behaviour	71,4	High
Average	76,4	High

Achievement in aspects of behavior and attitudes is lower than in aspects of knowledge and skills because changes in attitudes and behavior are complex and multidimensional processes (Liang et al., 2018). The combination of several factors such as learning patterns (El-Batri et al., 2019), the period of the learning process (Aguado & Holl, 2018), integration of character-based values in schools (Miharja et al., 2020), and sociocognitive conflict management (Desfandi et al., 2017), will determine how students' attitudes towards the environment (Rahman et al., 2019). This is sorted by the statement that environmental literacy is related to environmental knowledge and ecological concepts, which are sorted by attitudes and concern for the environment that will motivate environmental care behavior (Janmaimool & Khajohnmanee, 2020). So, in this case, the knowledge and skills aspects are not enough to motivate students to have a high level of caring attitude and behavior as well.

The following is a further explanation regarding the achievement of environmental literacy in each of its aspects:

1. Knowledge aspect

The knowledge that students gain about interactions in natural-human-society systems, sustainable development, and current

environmental issues enables students to become part of the adult world through real experiences in the form of viable activities such as environmental protection (Gilmanshina, 2018). In this research, real experience is facilitated in experiential learning, especially in the concrete experience stage.

At this stage, students are required to be involved in carrying out an activity or activity. Students are provided with activities that encourage them to do activities. This activity is based on previous experiences. This activity can be done inside or outside the classroom and done individually or in groups. This stage prioritizes student interaction with the environment and produces information that involves experience. Examples of activities include playing games, manipulating symbolic objects, conducting experiments, modeling, creating products, writing, case studies, watching films, role-playing, simulations, projects, interviews, field observations, field trips, and work experiences (Kolb & Kolb, 2017). Through this stage, students get real experience through observing phenomena in the surrounding environment so that they can express energy concepts and answer questions related to environmental problems.

2. Attitude aspect

Attitudes are related to students' feelings. This is very different from the

knowledge and skills of environmental thinking, where developing a feeling to pay more attention to the environment looks more difficult and time-consuming (Nurwidodo et al., 2020). This is in line with the results of the study that the achievement level of students' attitudes is lower than in other aspects, due to the short time in Experiential Learning. If given a longer study time, it is hoped that the achievement of student attitudes will increase.

In the reflective observation stage, students remember what was experienced before and report everything they observed. In this case, the reflection process will occur when the teacher can encourage students to re-describe the experiences they have gained, communicate back, and learn from these experiences. Observations and reactions can be recorded in several ways such as written reports, postings on paper or whiteboards, and oral reports (Kolb & Kolb, 2017). In this study, students were asked to reflect on their experiences by predicting the interrelationships between phenomena in the surrounding environment so that they can plan energy-saving efforts and show the right steps to show environmental care actions.

3. Skill aspect

Three indicators are used as a reference in cognitive skills, namely problem identification, problem analysis, and action planning. Students' ability to identify, analyze, and plan cannot be separated from what they have learned and mastered (Kamarulzaman et al., 2017). In this study, the skill aspect is limited to two indicators, namely analyzing problems related to environmental damage and

predicting the relationship between global warming and energy use. These two indicators can be achieved through the abstract conceptualization stage in experiential learning whose main activity is discussing concepts based on theory and facts in the field.

This stage involves data sharing from the previous stage, where this data sharing must be processed and must be systematic. At the abstract conceptualization stage, students begin to look for reasons and feedback from the experiences they have gained. Students begin to conceptualize the experience they have obtained with the material or theory that has been studied. At this stage, students must be able to conclude what was discussed by the group and then answer questions that arise during the learning process (Kolb & Kolb, 2017).

4. Behavioral aspects

Indicators of measuring pro-environmental behavior include recycling, saving water, saving energy, and making the pro-environmental consumer choices (Szczytko et al., 2019). In this study, students carried out Active Experimentation as a solution to understand the complexity of the phenomenon under study so that they could demonstrate the behavior of preserving the environment. At this stage, students try to plan ways to test the efficacy of the model or theory to explain the new experiences that will be obtained next. At the active experimental stage, a meaningful learning process will occur because new experiences or problematic situations will arise in the future (Kolb & Kolb, 2017).

The achievement of environmental literacy is suorted by Experiential Learning which leads

students to question and re-evaluate their assumptions about how the natural world operates. Students will have a greater opportunity to cultivate critical connections from abstract concepts to real reality. This will have a positive impact on students to have the ability to make decisions and act environmentally friendly (Hayati, 2020). Experience-based education in the field is important for behavioral, ecological, evolutionary, science, and conservation science disciplines (Fleischner et al., 2017).

CONCLUSION

Based on the results of data analysis, it was found that the average achievement of the knowledge aspect was 86.2%; the attitude aspect is 65.5%; the skill aspect is 82.5%, and the behavioral aspect is 71.4%. The average of these results shows the level of environmental literacy is 76.4% which is included in the high category but needs to be optimized again so that all aspects have an even achievement. Therefore, research on human attitudes and behavior toward the environment needs to be done further because these two things occupy a significant position to improve environmental quality. In addition, it is also necessary to research the development of interesting and innovative media in science learning so that the four stages of Experiential Learning can run more optimally.

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