

Prospective Elementary School Teachers Environmental Literacy: What, Why, and How?

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Research Article

Prospective Elementary School Teachers Environmental Literacy: What, Why, and How?

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Environmental literacy is one of the main subjects and themes in developing 21st-century skills. Environmental literacy can be used as an effort to overcome problems related to environmental issues. This paper aims to provide an overview of the role of universities in producing prospective elementary school teachers who have good environmental literacy and are expected to be able to implement it in learning. For this purpose, there are 3 questions in this paper 1) What are the components of measuring environmental literacy from elementary school teacher's perspective? Why is it necessary to develop environmental literacy in elementary school teacher's perspective? How can environmental literacy be trained and improved? This study uses a descriptive method with a qualitative approach. Data collection techniques used were literature documents such as international articles, national articles, and relevant books. The data analysis technique includes four stages, namely (1) data collection, (2) data presentation, (3) data reduction, and data inventory (4) data conclusion. The results of this study are in the form of information on measuring components of environmental literacy for prospective elementary school teachers, reasons why it is necessary to develop literacy, and alternative learning models that can be used to instill environmental literacy for prospective elementary school teachers. The results of this study can be used as reference material in training and developing the environmental literacy of students, especially in universities.

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1. INTRODUCTION

Environmental problems are a global problem, an urgent problem in the world as environmental damage continues to occur [1]. Environmental problems are largely caused by human lifestyle and activities [2, 3]. Lifestyle and human activities have a major role

to play in the transformation towards a more environmentally friendly society and in addressing the impact of the environmental crisis.

One way that can be used to overcome this environmental problem is by building environmental literacy through formal education [1]. Environmental literacy is defined as information about the environment and the level of environmental awareness that also includes visible behavior in which individuals can turn their information and sensitivities into behaviour [4]. Referring to the Partnership for 21st Century Skills [5], environmental literacy is included in the main subjects and themes of 21st-century skills along with health literacy; civic literacy; financial, economic, business, and entrepreneurial literacy; and global awareness. Environmental literacy is one of the main focuses in the world of education which is highly emphasized in the learning process for students. In addition, the International conference that has been taking place over the past few decades highlights the importance of changing lifestyles and finding ways to prepare young people and involve their environmental initiatives within them, which shape environmental literacy [1, 6]. Environmental literacy is one of the main topics that need to be improved for learners.

Some researchers emphasize the importance of increasing the level of environmental literacy of individuals [1, 4, 7–10]. The results of several researchers' studies show that the environmental literacy of learners is still unsatisfactory. Results of research conducted by [11–13], that there is no balance between the four components of environmental literacy, where the components of knowledge still dominate compared to other components, namely attitudes, behaviors, and values. There is no balance between the four components of environmental literacy that need to be controlled by students so further study is needed.

Other researchers found that the environmental literacy of prospective teachers was still low [8, 14, 15]. Prospective teachers are prospective educators who will teach and will be imitated by students in their schools later. Tuncer [16] argue that if the teacher lacks environmental knowledge, good environmental attitudes, and concern about environmental issues, it is less likely that the students he teaches have environmental literacy. Prospective teachers should get teaching about the environment has a good environmental attitude and behavior [17]. Students will have good environmental literacy if the teacher who teaches them has high knowledge, attitude, and concern for the environment [11, 16, 18]. Environmental literacy is a way to address environmental problems. Environmental literacy is considered the main goal of the Environmental Education program [1, 6, 7, 19–22]. Based on the results of this research, the need to integrate environmental literacy into the curriculum of higher education.

Universities, especially LPTK as a printer for prospective teachers must be able to produce teachers who in addition to having the ability to think must also have good environmental literacy. Prospective elementary school teachers must be equipped with knowledge and understanding of environmental literacy as a way to achieve sustainable development. Based on this background, it is necessary to conduct a study related to environmental literacy. The study in this paper focused on the following questions: 1) What is the component of environmental literacy measurement for prospective elementary school teachers? 2) Why is it necessary to develop environmental literacy for prospective elementary school teachers? 3) How can environmental literacy be trained and improved? The results of this study are expected to be a reference material for training and developing the environmental literacy of students, especially in Universities in Indonesia.

2. RESEARCH METHOD

This research uses a descriptive method with a qualitative approach. Data collection techniques use the study of literary documents such as international articles, national articles, and relevant books. Data analysis techniques include four stages, namely (1) Data collection that is the focus of research. Data is collected from the results of previous research published in international journals, national journals, and books and proceeding relevant to the concept of environmental literacy (2) Presentation of data that has been collected at the previous stage (3) Reducing data and inventorying data, at this stage researchers summarize selecting and focusing the data that has been collected. (4) Infer data that has been collected, reduced, and presented in an easy-to-understand way [23].

3. RESULTS AND DISCUSSION

3.1. What are the Components of Environmental Literacy for Prospective Elementary School Teachers?

The environmental literacy of prospective elementary school teachers can be measured by referring to the environmental literacy component. Previously it will be explained the meaning of environmental literacy. Environmental literacy comes from the words literacy and environment. Understanding literacy according to the Great Dictionary of Indonesian is the ability to write and read, knowledge or skills in certain fields or activities

(computers) as well as the ability of individuals in processing information and knowledge for life skills (Language Development and Development Agency, 2016). The environment means everything that affects the growth of living things. Over time, the definition of literacy has become more widespread not only related to reading and writing literacy is also used in other fields such as science literacy, digital literacy, and environmental literacy.

The definition of environmental literacy was first put forward by Harvey [24], environmental literacy is a person who is environmentally literate as a person who has basic skills, understanding, and feelings for human relations with the environment [19, 25]. Charles E. Roth proposed expanding the definition of environmental literacy. According to Roth [4], environmental literacy is defined as information about the environment and its level of consciousness. Environmental literacy also includes visible behaviors in which individuals can turn their information and sensitivities into behaviors. In other words, environmental literacy means the public has the appropriate knowledge to make environmental systems work without problems and take the necessary precautions and do what is necessary to ensure the system is natural to achieve its overall goals [19].

The concept of environmental literacy according to the North American Association for Environmental Education (NAAEE) is defined as covering knowledge, abilities, dispositions, and behaviors that allow students to make decisions and act to address environmental problems [26]. Its assessment framework includes four interrelated components of environmental literacy, namely knowledge, disposition, competence, and environmentally responsible behavior. A person who has environmental literacy will do something for his environment and know how to do the right action for the environment [6].

The environmental literacy measurement framework continues to develop. Here are some of the latest environmental literacy components that are discovered by experts or institutions. More information is presented in table 1.

From several components of this environmental literacy developed instruments to measure environmental literacy for learners both for elementary school students, high schools, students, and the public. Specifically, this paper refers to an instrument that has been developed by Kaplowitz & Levine [27], which has been translated and adapted by Tuncer [16] to measure the environmental literacy of prospective teachers in Turkey using The scale of Environmental Literacy (SEL).

TABLE 1: Environmental literacy components.

Researcher/Institution	Environmental Literacy Components
Roth (1992)	Environmental literacy has four main components: knowledge, skills, attitudes (environmental sensitivities, attitudes, and values), and behavior (investment and personal responsibility, and active engagement).
NAAEE (<i>North American Association for Environmental Education</i>) (2011)	Four components of environmental literacy: (1) context — awareness of local, regional, or global situations involving the environment; (2) competence — the ability to identify and analyze environmental problems, evaluate potential solutions to environmental problems, and propose and justify actions to address environmental problems; (3) environmental knowledge — knowledge of physical ecological systems, environmental problems, sociopolitical systems, strategies for dealing with environmental problems; (4) disposition to the environment—interests, sensitivities, loci of control, responsibility, intention to act.
Mcbeth et al., (2011)	Four components of Environmental Literacy: (1) basic ecological knowledge; (2) environmental influences — verbal commitment, environmental sensitivity, and environmental feelings; (3) cognitive skills—problem identification, problem analysis, and action planning; (4) behavior — actual commitment, i.e. pro-environmental behavior
NELA (<i>National Environmental Literacy Assessment</i>)	This test instrument is prepared by adapting the Middle School Environmental Literacy Survey /Instrument (MSELS/I) test questions including knowledge (<i>knowledge</i>), cognitive skills (<i>cognitive skills</i>), attitudes (<i>attitudes</i>), and environmentally responsible behavior.
<i>Environmental Literacy on framework for 21st century learning</i> (2015)	Demonstrate knowledge and understanding of the environment and the circumstances and conditions that affect it, especially concerning air, climate, soil, food, energy, water, and ecosystems Demonstrate knowledge and understanding of society's impact on nature (e.g., population growth, population development, resource consumption levels, etc.) Investigate and analyze environmental problems, and make accurate conclusions about effective solutions Taking individual and collective action to address environmental challenges (e.g., participating in global action, designing solutions that inspire action related to environmental problems)

3.2. Why is it Necessary to Develop Environmental Literacy for Prospective Elementary School Teachers?

Environmental issues are urgent problems that need to be addressed by various parties. Environmental issues such as the Sustainable Development Goals (SDGs) are based on climate change, biodiversity, disaster mitigation, and sustainable product consumption are the focus of the main study. UNESCO [28] made the pillar of education a means to realize the concept of sustainable development. Related to the environmental dimension for sustainable development, it is necessary to develop environmental literacy for prospective elementary school teacher students. Environmental literacy is one of the big themes in 21st-century learning.

The need to improve or develop the literacy of prospective teachers is emphasized by some researchers that learners will have good environmental literacy if the teachers who teach them have high knowledge, attitude, and concern for the environment [11, 16, 18]. Teachers become role models for their students in elementary school because it will be an example in their daily lives. As stated by Tuncer [16] that teachers who do not have environmental knowledge, good environmental attitudes, and concern about environmental issues, it is less likely that the students they teach have environmental literacy. Prospective teachers should get teaching about the environment has a good environmental attitude and behavior [17].

The environmental literacy of prospective teachers can be measured using framework measurements that refer to the environmental literacy instrument developed by Kaplowitz & Levine,[27] which has been translated and adapted by Tuncer [16] to measure the environmental literacy of prospective teachers in Turkey using The scale of Environmental Literacy (SEL). The indicator can be seen in Table 2.

3.3. How Can Environmental Literacy be Trained and Improved?

Characteristics of Environmental Learning in the 21st Century according to the Framework for 21st-century learning skills [5] include 1) compiling learning practices, human support, and the physical environment that will support the teaching and learning of 21st-century skills; 2) Supporting a professional learning community that enables educators to collaborate, share best practices, and integrate 21st-century skills into classroom practice; 2) Enable students to learn in a relevant real-world 21st-century context (for example, through project-based work or other applied for work); 3) Enable equitable access to quality learning tools, technologies, and resources; 4) Provide 21st century architectural and interior design for group, team and individual learning; 5) Support the wider community and international involvement in learning, both face-to-face and online.

Environmental literacy can be trained and improved by integrating environmental literacy content into the curriculum [29]. Integration can be in the form of compiling lecture materials, preparing appropriate learning models, preparing worksheets for learners who explore environmental issues, using open questions related to environmental issues, and measuring environmental literacy skills that are appropriate for prospective teacher students. In this study, the author will focus on two major topics only, namely the selection of learning models and taking environmental literacy measurements.

TABLE 2: Student environmental literacy measurement instrument.

Environmental Literacy Components	Indicators of environmental literacy	Measurement Instruments Environmental literacy
<i>Environmental knowledge</i>	Understanding of basic ecological principles related to the environment	Definition of biodiversity Motor vehicles as the largest contributor to carbon monoxide power plant in Indonesia by hydroelectric power plant Industrial discharge is one of the main sources of surface water pollution Trees are a renewable resource Ozone's role as a protective layer of cancer-causing sunlight Most of the waste in Indonesia ends up in solid waste storage areas. The main government agency for environmental protection in Indonesia is the Ministry of Environment and Forestry. Batteries are household hazardous waste Human activity in habitats is the main reason for animal extinction A common method of storing nuclear waste worldwide is storage and monitoring.
<i>Environmental attitudes</i>	Respondents' feelings are related to environmental and environmental issues, which measure the respondent's desire in the use of the environment to be able to behave responsibly towards the environment.	We are approaching the limit of the number of people the earth can support. When humans disturb nature, it often has devastating consequences. The Earth has many natural resources if we learn how to develop them. Plants and animals have the same right as humans to live. The balance of nature is strong enough to cope with the impact of modern industrialized countries. Despite our special abilities, humans are still subject to the laws of nature. The so-called 'ecological crisis' facing mankind is too exaggerated. Man is meant to rule the whole of nature. If things continue as they are now, we will soon have a major ecological disaster.
<i>Environmental uses</i>	It aims to determine how humans utilize and manage land, trees, animals, plants, and water	Special areas should be devoted to endangered species. The law on water quality should be stricter. Wild animals that provide meat to humans are the most important species to protect. Poisonous snakes and insects that threaten humans must be killed. Landowners should be allowed to dry wetlands for agricultural or industrial purposes. everyone needs to be aware of environmental issues. Individuals should be allowed to use private land as they see fit. I feel personally responsible for helping to solve environmental problems. Governments should regulate the use of private land to protect wildlife habitats. People must be held accountable for any damage they cause to the environment. All plants and animals play an important role in the environment. Technological change often harms the environment as well as damages the environment. The government must pass a law to require recycling. Air pollution laws are already quite strict. Science and technology will be crucial in solving our environmental problems. Cultural change will be crucial in solving environmental problems. Changes in human values will help solve environmental problems. Collective action (i.e., movement) is important for solving environmental problems. Lifestyle changes (e.g., consumption) will help solve environmental problems.
<i>Environmental concern</i>	Environmental concern Interest in environmental issues and environmental issues	1. Smoke pollution 2. Noise pollution 3. Car emissions 4. Industrial pollution 5. Hazardous waste 6. Poor drinking water quality 7. Indoor air pollution 8. Ozone depletion and global warming

In the selection of learning models, in this study, researchers direct to choose learning models that can develop students' critical and creative thinking skills. In addition, choose a learning model that can solve problems and create creative ideas. Here are some of the recommended learning models for implementing learning that is expected to develop environmental literacy: problem-based learning models, project-based learning models, and other relevant creative and innovative learning models that can be used.

On this occasion, researchers also recommend using a relatively new learning model developed by the peculiarities of Indonesian society. The learning model developed is based on the difficulties faced by teachers and learners in Indonesia. The model is RADEC (Read, Answer, Discuss, Explain And Create). Radec's learning model was developed by Sopandi [30], which is centered on learners. This model provides opportunities for learners to experience firsthand the learning process. In addition, this model is applied to build 21st century skills, especially HOTS so that the RADEC learning model can be used as an alternative learning model [31].

Some reasons for using the RADEC learning model in learning [30]; 1) the RADEC learning model is easy to use with syntaxes that are easy to remember by educators, and 2) this learning model is developed by the conditions of Indonesian society where students' reading interest is still low and the Indonesian education system requires students to understand many science concepts in a limited time, 3) The RADEC learning models have been proven to have a positive impact on learning outcomes, understanding of concepts [32], students' high-level thinking skills [31], critical thinking skills [33–35], improve students' creative thinking skills [36]. A learning model capable of training creative thinking, critical thinking, problem-solving, communication, and collaboration is in line with the demands of life skills in the 21st century. In addition, it is expected to be used in solving problems and environmental issues. Radec's learning model to develop student environmental literacy still needs to be proven further. Based on the characteristics of the model and the need to develop student environmental literacy further research can be done.

4. CONCLUSION

Environmental literacy is a person's knowledge of the environment and his level of awareness of the environment which includes attitudes and behaviors of caring for the environment. Environmental literacy content needs to be integrated with the curriculum by designing learning that is by the environmental literacy component Components of environmental literacy measurement students prospective elementary school teachers

can use instruments developed by Kaplowitz & Levine [37] and Tuncer [38] covering environmental knowledge, attitudes towards the environment, environmental utilization and interest in environmental problems.

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