
Teaching Eco-Literacy: What is The Challenge in Indonesian Elementary School

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Abstract: Environmental awareness is an important part of environmental sustainability, but environmental awareness in society, including students, is still low. This can be seen from various studies conducted previously. Eco-literacy is one of the skills that can increase environmental awareness, but it is still rarely studied. This study aims to evaluate how eco-literacy has been implemented, the challenges in implementing eco-literacy, and the ideal implementation of eco-literacy for teachers in elementary school. Data collection was conducted using qualitative methods and questionnaire techniques. Sixty teachers from Yogyakarta, Central Java, and Jakarta were interviewed. The results of the research show that eco-literacy has been implemented in elementary schools through subjects, the challenges teachers face in implementing eco-literacy are learning methods, media, and learning resources and teachers hope that eco-literacy can be implemented based on constructivist learning theory with appropriate syntax. Based on the findings in this study, it can be concluded that eco-literacy has been implemented in elementary schools, but there are still many challenges faced so that eco-literacy can be successfully implemented.

Keywords: Eco-literacy, environmental awareness, elementary school

INTRODUCTION

The environment is a place for humans to live and interact with each other and other living creatures. The environment comprises living (biotic) and abiotic (non-living) parts. Living components such as humans, animals, and plants, coexist with non-living components such as air, soil, water, humidity, light, etc. If one part of the non-living component is disturbed, the living creatures in it can also be disturbed, therefore keeping the non-living component in good condition is necessary. Globalization and world civilization are the dominant causes of continuous changes in the global environment (Singh & Singh, 2017). Pollution, ozone depletion, acid rain, global warming, depletion of natural resources, waste disposal, overpopulation, deforestation, and extinction of biodiversity are worrying global problems. Unsustainable use of natural resources is the cause of global environmental problems that occur. Therefore, it is important to make people aware of how to use natural resources adequately.

Environmental concern in society is still an unresolved problem. Based on data from BPS, it is stated that the level of public indifference towards waste management is still high, namely 0.72, which means that 72% of the public still does not care about waste management. More than half of people use environmentally unfriendly methods in managing waste such as burning waste (53%), throwing it in rivers (5%), and dumping it in random places (2.7%). Apart from that, efforts to reduce plastic waste by carrying your shopping bags or bags are still rarely carried out, there are 81.4% of households in Indonesia rarely bring their shopping bags or bags when shopping (Statistik, 2018).

In the education sector, environmental awareness has not yet achieved significant results. Based on the findings of McGinn (McGinn, 2014) the discussion regarding environmental awareness is still not yet optimally implemented in the world of higher education. Findings from Puk (Puk, 2003) also confirm that the application of environmental awareness material which is used by inserting it into science

and social studies subjects in the national curriculum in Ontario has still not been optimally successful, even though environmental education is quite important to be implemented in the school curriculum. In Indonesia, environmental awareness at the elementary school level is still not high (Fahlevi et al., 2023; Meilinda et al., 2017). Material regarding environmental issues is also still lacking in the curriculum (Pane & Patriana, 2016). Therefore, efforts to educate and provide comprehensive information regarding environmental problems are still needed.

Environmental awareness begins with having an understanding of the environment, starting from the relationship between one component and other components in the environment, environmental problems that often occur, preventing environmental damage, to sustainable environmental protection behavior, all of this is part of eco-literacy. Eco-literacy is a term introduced by Capra to describe how someone who understands ecological principles, lives a life following ecological principles and builds a life using these principles to form a sustainable society (Keraf, 2014). The ability to interact with the environment, and adapt to the environment can also be interpreted as eco-literacy (Goleman, 2010).

Eco-literacy needs to be implemented to bridge the relationship and dependence of human life on the natural processes around it [10]. Eco-literacy should be implemented in schools because schools are a place to prepare students who can face future problems, especially problems of environmental sustainability (Pitman & Daniels, 2020; Suharja et al., 2023). Eco-literacy is an important skill to apply in the 21st century (Goleman, 2010), because eco-literacy equips students with the knowledge and competencies needed to overcome complex environmental problems or issues by looking at various aspects, it allows students to help shape a sustainable society that does not damage the ecosystem where it lives.

The application of eco-literacy in schools is usually included in the curriculum through science, social studies, or civics learning materials. Apart from that, it can also be implemented through school programs and appear in school activities both inside and outside the classroom (Fadjarajani & As'ari, 2019). The application of eco-literacy in subjects usually utilizes various learning methods and strategies. However, there is still no specific strategy for

studying eco-literacy. The challenges encountered in implementing eco-literacy are also certain. Based on the explanation above, how is the implementation of eco-literacy nowadays, what are the appropriate learning strategies for implementing eco-literacy and the challenges when implementing eco-literacy are the main objectives of this research?

METHODS

This research employed a qualitative descriptive with questionnaire method design to determine the sample's experiences, opinions, attitudes, and characteristics (Creswell & Creswell, 2018). The questionnaire was used to gather data on the characteristics of the respondent's experiences, opinions, and beliefs about implementing eco-literacy learning. The respondents of this research are 60 elementary school teachers located in Yogyakarta, Central Java, and Jakarta, Indonesia. The selected elementary schools are elementary schools that are located close to many natural resources and few natural resources to provide an idea of the need for appropriate learning models to implement eco-literacy and the challenges.

Data were collected using a structured questionnaire administered by the Google Form Application. The questionnaire consisted of items on the implementation of eco-literacy, the ideal implementation of eco-literacy, and the challenges of implementation in eco-literacy. The steps taken during data collection are: making a questionnaire based on the problem of the research and selected indicators aspects, distributing the questionnaire to the elementary school teachers who are research samples, and giving clear instructions on how to fill out the questionnaire and the deadline of completing the questionnaire.

Then the data was analyzed using the Miles, Huberman & Saldana (Miles et al., 2014) model: data reduction, data presentation, and conclusions. Data reduction is carried out by selecting the main things, important data, looking for patterns in the data, and removing things that are not needed in the data. After getting a clear picture of the studies and strategies that can be applied and the challenges faced in implementing eco-literacy, the data is presented in the form of a brief understanding, pie charts, tables, etc. Then conclusions are drawn that describe how to

implement eco-literacy and the challenges faced ideally.

FINDINGS AND DISCUSSION

Findings

Data were collected from 60 elementary school teachers in Yogyakarta, Central Java, and Jakarta. Based on the data, it was observed that the number of female teachers (73.4 %) is more than the number of male teachers (26.6%). 91.8 % teachers had less than 10 years of teaching experience. They already had teaching certification as a mark of professional teachers.

The Implementation of Eco-literacy in Elementary School

In implementing eco-literacy in schools, teacher response indicators measure how eco-literacy is implemented in schools, starting from understanding eco-literacy itself, the frequency of implementing eco-literacy, and through what eco-literacy implementation is carried out. The data in Figure 1 shows teachers' understanding of eco-literacy. In terms of indicators of understanding of eco-literacy, 40% of 60 teachers understand eco-literacy as environmental education, 30% of 60 teachers understand eco-literacy as sustainability education, 10% of 60 teachers understand eco-literacy as natural knowledge and 10% of 60 teachers understand eco-literacy and eco-literacy as the ability to understand the natural systems that make life on earth possible is 20%.

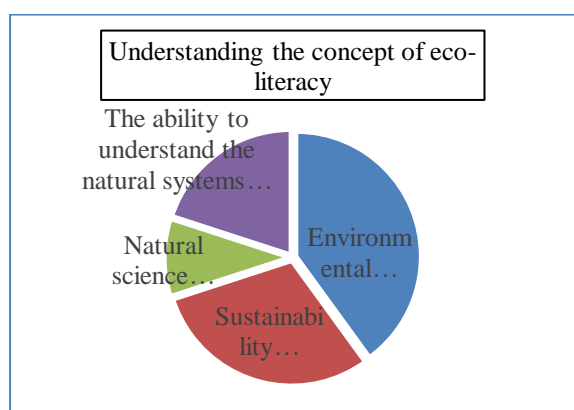


Figure 1. Teachers' understanding of the eco-literacy concept carried out

Meanwhile, how often teachers apply eco-literacy in learning inside and outside the classroom is explained in diagram 2 below. Figure 2 explains that 16.6% of 60 teachers have

often implemented eco-literacy, 35% of 60 teachers have implemented it sometimes, 16.6% of 60 teachers have implemented it and 31.8% of 60 teachers have never implemented it. The way teachers implement eco-literacy in the learning process is shown in Figure 3 below. Teachers implemented eco-literacy in the subject of social science and civic education at 38.3 % of 60 teachers. Teachers implemented eco-literacy in subject learning and outing classes, are 21.6 % of 60 teachers. Teachers who implemented eco-literacy subject learning, outing classes, and school programs are 11.6 % of 60 teachers. Teachers implementing eco-literacy subject learning, outing classes, school programs, and teachers modeling eco-literacy are 11.6 % of 60 teachers.

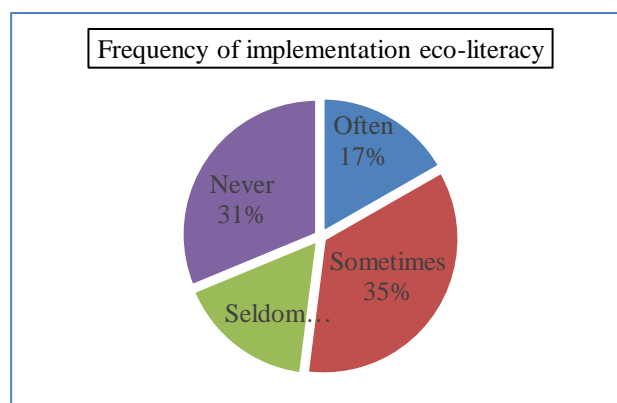


Figure 2. Frequency of teachers' implementation of the eco-literacy

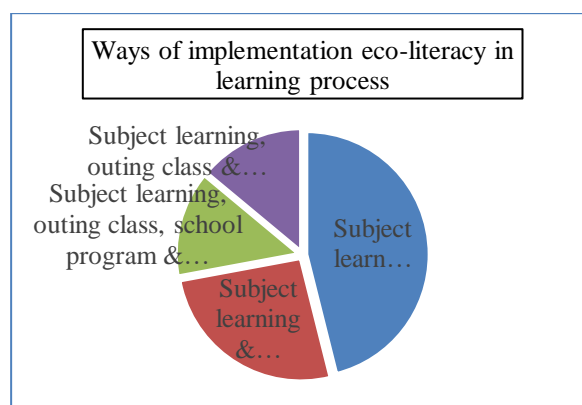


Figure 3. Ways of implementation eco-literacy in the learning process

In this research, it was also obtained that 50% of students in a class taught by 60 teachers had reached the ecological stage of illiteracy, 40% of students in a class taught by 60 teachers could reach the nominal literacy stage, 10% of students in a class taught by 60 teachers were able to reach the nominal literacy stage.

Functional/operational environmental literacy level. However, there are no students who have reached a very high level of eco-literacy, because this is the highest level of eco-literacy and is still difficult for students to achieve.

The Challenge of Implementation Eco-Literacy in Elementary School

The implementation of eco-literacy also has some challenges. Regarding the teacher's responses, it can be found that the challenges of implementing eco-literacy are still quite a lot (60%), and the rest (40%) think the challenges are minimal. In the learning method, the teachers said the learning method of implementing eco-literacy still has many challenges (73,3%), for example, the process still can cover continuity as an important part of eco-literacy, but it still needs much time to be implemented, difficult to be implemented and still not fits to eco-literacy learning. And the rest (27%) think that the method of implementing eco-literacy already fits. Meanwhile, teachers use real objects and books (80%) and video and creative media (20%) in media and learning resources. Teachers still find it difficult to use creative media because of the limited time and abilities to prepare it, also school facilities sometimes are inadequate. This teacher's perspective about media and learning resources could be based on developing a learning model that implements eco-literacy and could improve students' environmental awareness. Especially how to utilize the surrounding environment as a medium and source for student learning (Locke et al., 2013), (Pitman & Daniels, 2020).

The Ideal Eco-Literacy Learning Model in Elementary School

After knowing the challenges in implementing eco-literacy, the researchers then focused on the appropriate model for implementing eco-literacy in elementary schools based on the teacher's point of view—the first indicator of the need for constructivism learning theory as based on eco-literacy learning. Figures 4 below explain that almost all teachers (91.6%) said that constructivism learning theory still needs to be implemented in eco-literacy learning, then the rest (8.3%) said that they don't need constructivism learning theory to be implemented in eco-literacy learning.

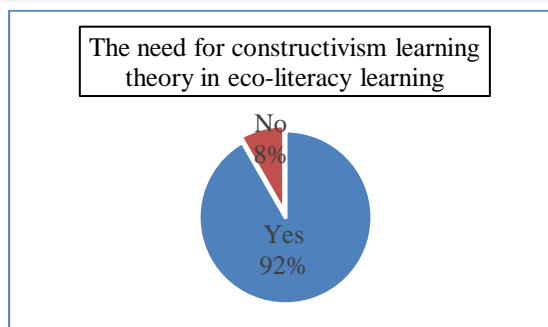


Figure 4. The need for constructivism learning theory in eco-literacy learning.

The ideal syntax of eco-literacy is also the most important of eco-literacy learning. The teacher believes the scientific method can be a syntax for implementing eco-literacy learning (51.6%). The teacher believes that learning steps in problem-based learning can be a learning step for eco-literacy (15%). Apart from that, teachers also think that looking for references in the form of books or the internet also be a step in learning eco-literacy (8.3%). Teachers are still confused about the appropriate learning steps for eco-literacy learning (25%), this is because teachers realize that eco-literacy has important learning goals, not only to bring out environmental awareness but also sustainability which must be considered in its implementation. Figure 5 below explains eco-literacy syntax from teachers' perspective.

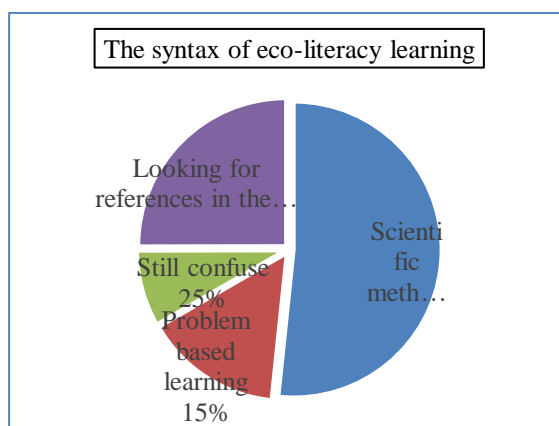


Figure 4. The syntax of eco-literacy learning

Discussion

Education in the 21st-century era is required to be able to connect various environmental factors to support real-world learning and be relevant for students. 21st-century education must also be able to face global issues in students' lives (Palmer, 2002). Apart from that, technological developments,

involvement with society and the world of work, are also important parts of 21st-century education. No less important, 21st-century education must be able to provide broad opportunities for the environment so that it can foster awareness and concern for the environment as a step in realizing environmental stay. One way of providing ample opportunities to raise environmental awareness and concern is by providing literacy regarding human relationships with the surrounding environment and everything in it, which is also known as eco-literacy, or ecological literacy.

Capra also defines eco-literacy (Keraf, 2014) As a condition where someone already understands ecological principles and lives a life adhering to ecological principles to organize and build a life together on this earth and create a sustainable society. Humans' ability to adapt to their environment is also defined as eco-literacy (Goleman, 2010). Eco-literacy aims not only to increase knowledge about the environment but also to develop environmental awareness and make environmental awareness a habit in life and participate in building a sustainable society.

The history of eco-literacy begins with environmental literacy which was introduced by Roth in 1978 who asked how to make people environmentally literate (McBride et al., 2013). In 1980, student achievement in discussing environmental literacy in America was quite low even though environmental literacy education had been implemented, the American Association for the Advancement of Science (AAAS) then requested that the curriculum be reviewed so that not only did students' learning achievement improve but they were also able to change habits. Students care more about the environment. Environmental literacy was further developed by Risser and emphasized understanding ecological literacy and how to make decisions or solutions when environmental problems occur. Berkowitz et al. McBride et al (McBride et al., 2013) added ecological systems thinking into the ecological framework, in addition to the thinking framework, knowledge about ecological keys, and ecological relationships with society. In 1992, David Orr initiated ecological literacy towards postmodern education, then Orr added sustainable communities as an important part of ecological literacy which was later shortened to eco-literacy.

If we trace the history of eco-literacy, eco-literacy has been implemented, but people are

still unfamiliar with the term. This is following the findings of this research, that 40% of 60 teachers understand eco-literacy as environmental education, 30% of 60 teachers understand eco-literacy as sustainability education, 10% of 60 teachers understand eco-literacy as nature education and 20% the rest define eco-literacy as the ability to understand the natural systems that exist on this earth. This explains that teachers have implemented eco-literacy, even though they do not use the term eco-literacy, and have not fully implemented eco-literacy. Based on the findings above, it was found that 16.6% of the 60 teachers had often implemented eco-literacy, 35% of the 60 teachers had sometimes implemented eco-literacy, and there were even 31% of the 60 teachers who had never implemented eco-literacy at all. Literacy in learning inside and outside the classroom.

The eco-literacy component is not only cognitive material, but some skills must be applied and how to behave or behave following eco-literacy principles. Cognitive components include, for example, understanding the environment, the biosphere, and the relationship between humans and the surrounding environment. Then proceed with skills in applying knowledge about eco-literacy, for example how to make short observations, and what skills to use. Then it continues with how to get used to applying the principles of eco-literacy in everyday life, for example getting into the habit of throwing rubbish in its place so as not to cause flooding. These components of eco-literacy are summarized by Roth & Center of Ecoliteracy (McBride et al., 2013) Into the components of the head, the heart, the hands, and the spirit. Other components of eco-literacy are mentioned by Wooltorton (Wooltorton, 2006) as follows: experience and knowledge as well as awareness of ecology, awareness of the existence of the environment, awareness of being a citizen who protects the environment, thinking systems and their relationship with the environment, ecological paradigm, education for sustainability and ability to observe natural and cultural conditions in the surrounding environment. Based on the components above, eco-literacy is often applied inside and outside learning, for example, 46% of 60 teachers apply eco-literacy through learning subjects only, 26% of 60 teachers apply eco-literacy in subjects and outing classes, 14% of the 60 teachers implemented eco-literacy in subjects, outing classes, and school

programs, the remaining 14% implemented eco-literacy coupled with modeling teachers to become pro-environmental actors. Similar research conducted by Cutter & Smith (Cutter-Mackenzie & Smith, 2003) found that 69.2% of eco-literacy learning was carried out incidentally and 65.4% was carried out by integrating it into the curriculum. This integration in the curriculum is usually included in social subjects as much as 64.1% and science subjects as much as 62.8%.

Eco-literacy itself has the same levels or gradations as other abilities, for example, the first stage of eco-literacy starts with having a little understanding of the environment and how the environment works, increasing again to being able to recognize various basic uses of environmental understanding and how the environment works, up to the level of highest level of being part of a society that applies sustainability principles in everyday life. Cutter & Smith (Cutter-Mackenzie & Smith, 2003) summarize the levels of eco-literacy into three, namely ecological illiteracy, nominal literacy, functional/operational eco-literacy, and highly involved eco-literacy. Based on Cutter & Smith's opinion, eco-literacy begins with a little understanding and many misconceptions about environmental issues, then develops into having the ability to recognize and feel how to provide solutions to problems that occur or nominal eco-literacy, followed by functional/operational eco-literacy which places an understanding of the organization and function of the environmental system and its relationship with humans, while the highest, namely highly evolved eco-literacy, places a human understanding of the environmental working system and its relationship with humans, being able to implement environmental sustainability, being able to synthesize environmental problems and apply them. Sustainability principles in everyday life. In this study, the results showed that 40% of students in classes taught by 60 teachers were at the ecological illiteracy stage, 45% of students in classes taught by 60 teachers were at the nominal literacy stage, 15% of students in classes taught by 60 teachers had reached functional/operational eco-literacy, and there are no students who have reached the level of highly engaged eco-literacy.

In implementing eco-literacy, several obstacles were also found, for example, difficulties with the methods used, what steps should be used, what the best media or learning

resources are, etc. In this research, challenges in learning methods were still frequently encountered (73.3%). These challenges include, for example, how the learning steps can accommodate sustainability in them, it takes quite a lot of time to apply various learning methods and there are difficulties regarding which methods are truly appropriate and very unique to eco-literacy. The media and learning resources used in eco-literacy are also still limited. If the school is located in a rural area, it can use various original materials related to the environment, for example, various types of plant roots around to provide an understanding of the types of roots that can also be used. Can absorb water when it rains heavily, but if the school is located in an urban area it will certainly be difficult.

The media and learning resources that are often used apart from real objects are books, while the use of videos and other creative media is still rarely used. Even though this learning resource factor is quite important for implementing eco-literacy (Paryanti et al., 2021), (Zuhriyah, 2023). The challenge of time was also found in the results of a study on the implementation of eco-literacy by Cutter & Smith (Cutter-Mackenzie & Smith, 2003), that time is the biggest factor that hinders the success of implementing eco-literacy, other factors are teachers' understanding of eco-literacy, curriculum, changes that are too fast, learning resources, and teacher commitment to pro-environmental behavior.

The various challenges in implementing eco-literacy that are found in practice in elementary schools are one of the bases for developing appropriate implementation of eco-literacy. Based on the challenges faced in implementing eco-literacy, namely learning methods, learning media, and learning resources, as well as findings from Cutter & Smith, the author concludes that one of the right ways to implement eco-literacy is through a learning model. The learning model is an overall description of the learning carried out, starting from the underlying theory, indicators of achievement, learning design, and assessments carried out, to how classroom management must be carried out (Joyce & Weil, 2003). In this research, the parts of the learning model used are following the theory of Eggen and Kauchak (Eggen & Kauchak, 2012) that the learning model is a specific approach to the learning

process which has parts such as objectives, phases or syntax, and foundations or basic theories that underlie the implementation of this learning model.

The first indicator of the application of ideal eco-literacy is regarding the application of constructivist learning theory. The result is that almost all teachers (92%) think that constructivist learning theory can be a theoretical basis that can be used to implement eco-literacy. Constructivism views that learning occurs when a process of assimilation and accommodation of new knowledge takes place (Schunk, 2012). Students have a concept of knowledge that is not innate but is based on experiences gained. This also applies to the eco-literacy learning model, where the learning process is carried out by students acquiring their knowledge.

Constructivism theory is reflected in the first application of eco-literacy from Piaget's theory which explains the concrete operational stages experienced by elementary school-age students (Schunk, 2012). Intellectual development in this stage is demonstrated by the logical and systematic use of symbols, which are related to concrete objects. The second constructivist theory used is from Vygotsky, where the application of eco-literacy involves student interactions with fellow students, with teachers, and with the student community, Vygotsky's Zone of Proximal Development (ZPD) theory which is applied is also reflected in the role of teachers and students as peers. Which helps students who have difficulty carrying out learning. The third constructivist theory used is Kohlberg's moral theory (Zhou & Brown, 2017), that explains the level of moral reasoning possessed by elementary school students, namely at the pre-conventional moral level. In its application to eco-literacy learning, students can be introduced to the direct consequences of their attitudes or actions, for example, the direct consequences of throwing rubbish in the classroom, namely, the classroom becomes dirty and they may receive punishment from the teacher for throwing rubbish carelessly.

The method for implementing eco-literacy is also still a big challenge, in this case, the method in question is the learning steps that can be taken to implement eco-literacy. The most important content in eco-literacy is environmental issues or problems that occur around them. From this content, students can learn about the basics of ecological literacy, how

to solve environmental problems, and what attitudes or behaviors towards environmental problems occur. Risser (McBride et al., 2013) explains that eco-literacy has four frameworks, namely the use of natural resource materials, the relationship between nature and humans, the ecological relationship with culture and the economy, and the ecological concept as a whole. Concrete. McBride et al (McBride et al., 2013) summarizes that the framework of ecological literacy is knowledge about the environment to base decisions on resolving various environmental problems.

Based on research conducted, 52% of 60 teachers think that the scientific method is the right syntax or learning steps, but problems that occur in the environment often cannot be solved using the scientific method. The step in the problem-based learning method was seen by 15% of 60 teachers as a solution in implementing eco-literacy where the main problem is environmental issues, but the problems studied in problem-based learning have not been able to accommodate sustainability in eco-literacy. The third learning step that is considered capable of being used to implement eco-literacy is searching for various book or internet references (8% of 50 teachers), however, this step is still felt to be incomplete. 25% of the 60 teachers were ultimately confused about what learning steps to use that could accommodate eco-literacy. McBride et al (McBride et al., 2013) summarize various learning strategies that can be used to apply eco-literacy to the learning process based on the eco-literacy content studied, for example, eco-literacy content regarding environmental problems or issues can use case study strategies or problem-based learning. Problem-based learning strategies help students develop their thinking abilities based on real problems that occur around students through learning (Lewinsohn, 2015). The key to the problem-based learning model itself according to Arends and Kilcher (Arends & Kilcher, 2009) is that problems that occur around students become the starting point for learning, the problems used as the starting point for learning must be authentic, investigations and solving problems that occur are carried out, using a multidisciplinary perspective, there is a small collaboration, there is a product to solve the problem and a presentation is made regarding the solution to the problem.

The syntax in problem-based learning strategies according to Arends and Kilcher (Arends & Kilcher, 2009) begins with problem orientation, student organization, guiding investigations, developing and presenting learning results, and reflecting and evaluating solutions offered by students. Then the principle of sustainability which is the key to eco-literacy is included in the syntax of the problem-based learning strategy, namely in the reflection stage, becoming a reflection on sustainability. The problem raised is also specifically an environmental problem, so in the first stage of presenting the problem, it is added to presenting an environmental problem. The ecoliteracy syntax that was developed then became several stages, namely: orientation to environmental problems, student organization, guiding the investigation, developing and presenting the results of the investigation, and reflecting on the results of the investigation based on the principles of sustainability.

The implementation of this syntax must of course be supported by relevant media and learning resources. The use of interactive learning modules (Nugraha et al., 2022) technology-based learning media and diverse learning resources is the key to the successful implementation of this eco-literacy learning model. Apart from the learning model syntax and learning support, learning objectives are also an important part. The aim of implementing the learning model, in this case the aim is to introduce environmental awareness to elementary school students. Eco-literacy is a gateway for students to introduce, get used to, and later become a character for students to always care about the environment (Wooltorton, 2006). Meanwhile, another impact is getting used to sustainability to protect the environment which will later be able to lead to a sustainable society (Orr, 1992).

CONCLUSION

The conclusion from this research is that the implementation of eco-literacy is often carried out by 17% of 60 teachers and sometimes carried out by 35% of 60 teachers. The implementation of eco-literacy is understood by 40% of the 60 teachers as environmental education, this happens because the term eco-literacy is still considered by most teachers as a layman. Eco-literacy is most often implemented

through subjects at school (46% of 60 teachers), outing class activities, independent school programs, and teacher modeling for pro-environments are still rarely carried out to accommodate eco-literacy. The biggest challenge in implementing eco-literacy is the learning method used (73.3% of 60 teachers), as well as the media and learning resources. Based on these challenges, the teacher believes that implementing eco-literacy requires an underlying constructivist learning theory. In the learning methods section, 52% of 60 teachers believe that the use of scientific methods is quite relevant, but cannot yet cover environmental issues which are important content in eco-literacy, therefore other learning steps are still needed to be able to cover environmental issues raised in eco-literacy.

The challenges and ideal views regarding eco-literacy above are the basis for the author to develop an eco-literacy learning model. The learning model itself was chosen because it is the overall learning design that contains the objectives to be achieved, the underlying theory, and the phases or syntax of learning that must be carried out. This eco-literacy learning model is based on the constructivism theory of Piaget, Vygotsky, and Kohlberg. Meanwhile, the syntax or learning steps use a modified problem learning syntax with continuity in it which is then made in the form of reflection. The syntax of the eco-literacy learning model is as follows: environmental problem orientation, student organization, guiding investigations, developing and presenting investigation results, and reflection on sustainability. It is hoped that by using this eco-literacy learning model students will become more concerned about their environment, where this environmental concern is expected to become a habit and then become an inherent character of the students.

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