

ECOPEDAGOGY: BIOLOGY LEARNING PROFILE OF HIGH SCHOOL IN PULAU TIMOR

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ABSTRACT

Aim. The purpose of this article is to increase human ecological awareness to protect, care for and preserve nature, its application in Indonesian schools is still limited. This study uses a qualitative model and aims to describe ecopedagogical models in biology learning and identify supporting factors in the implementation of the high school program.

Methods. This research involved 300 grade 10 students and 20 biology teachers at Kupang High School in East Nusa Tenggara Province, Indonesia. Observations, questionnaires, interviews, and documentation were used to collect data about the implementation profile of the Ecopedagogy model.

Results. The results of the study show that: expedagogical learning models must be developed by considering local cultural wisdom, teachers use textual lecture methods in carrying out environment-based learning, learning has not paid attention to local culture. society in a sustainable manner; integration of expedagogical models in media and teaching materials in Biology learning, student enthusiasm if learning is done contextually with an expedagogical approach.



Conclusion. Textual learning must be changed to contextual learning. The curriculum in schools is required to be used in limited complexity by involving the local community, in order to train students' abilities to collaborate, communicate, and improve their skills. there is the development of an expedagogical learning model that pays attention to local cultural wisdom in terms of planning, implementation and evaluation of learning through intensive training activities, bearing in mind that teachers do not yet understand the steps for preparing media and teaching materials according to the curriculum.

Keywords: Biology Learning, model ecopedagogy, contextual, local wisdom

INTRODUCTION

The focus of Indonesian National Education is basically dedicated to all aspects of national development, specifically human resource development, which is in accordance with the objectives of the 2013 curriculum (Mahirda & Wahyuni, 2016; Sibuea, 2017). The focus of Indonesian National Education is basically dedicated to all aspects of national development, specifically human resource development, which is in accordance with the objectives of the 2013 curriculum (Wahyuni, 2016). Education, like Am, acts as an interface between environmental, social, and economic goals. This needs to be followed up, considering the rapid development of technology because of the 4.0 industrial revolution (Piwowar-sulej, 2021; Potočan, Mulej, & Nedelko, 2021; Shulla et al., 2021) responsible economic development and resolution of social problems by advancement of corporate social responsibility (CSR. Education is an endeavour to civilize human civilization as a place where culture is used to humanize humans, where learning is a process of interaction between students, teachers, and learning resources in a learning environment. gaining knowledge of is a method of interplay among college students, instructors, and mastering resources in a learning surroundings (Potočan et al., 2021). Building community, solidarity and social must be one of the priorities in the world of education (Kobylarek, 2020). Humanization and multidimensional principles are required in education to be able to develop each individual potency, of which potency is diverse and it has a connection with nature or the environment. The term *environmental education* is commonly used in this context (Kang et al., 2012; Pirchio et al., 2021). Education is an important activity for the development of individuals and society which is indicated by a high level of development (Nurbiye & Cimenci, 2018). Environmental education has implicitly led to the concept of sustainable development, by providing similar goals through knowledge that appears to be interconnected. In this context, the curriculum must address the needs of a sustainable environment as well as the needs of the future (Bakar et al., 2020; Valencia, 2018; Zwolińska et al., 2022). To accomplish the expected competencies, the curriculum is constructed according to the potential and characteristics of an area as well as the characteristics of students, and the orientation is to provide

a valuable learning experience for students (Alismail & McGuire, 2015; Rapanta et al., 2020).

Environmental education is related to science. Science is a scientific study that focuses on and explains natural phenomena and their interactions. Technology is a scientific look at that focuses on and explains natural phenomena and their interactions. A crucial aspect of scientific learning is to appreciate critical history and scientific ideas development as well as the social condition and intellectual one such as its development (Meichtry et al., 2001; Iaccarino, 2001). In the implementation of education and learning in school, it is not enough to just refer to the applicable curriculum. Other factors that have an important role are principal leadership, creative teachers, student qualities, facility and infrastructure completion, and participation of all school members (Dayagbil et al., 2021; Kafu-Quvane & Chikoko, 2019; Usman, 2016) Teachers have a role as facilitators in the success of learning; thus, teachers are required to be creative and innovative in providing services and ease of understanding concepts for students. Professional teachers are teachers who are role models for their students in the context of contemporary globalization (Auziņa, 2018).

Conceptual understanding in scientific learning cannot be given through the lecture method alone, but it takes the role or activeness of students to use learning resources around them (Keiler, 2018; Kim et al., 2019; Malik, 2018; Rapanta et al., 2020). Science education should be conducted in accordance with the nature of science, namely science as a process, product, and scientific attitude. Science as technology is the application of science learning for students to examine real-life, identify problems, and use technology. Science attempts to stimulate human attention in order to develop their intelligence and understanding of the natural world (Artaga, 2021; Dwianto et al., 2017; Prajoko et al., 2016; Widowati, et al., 2017)

Ecopedagogy is an example of environmental-based education in the context of learning biology. The goal of implementing learning with this strategy is to provide students with a meaningful learning experience that allows them to easily absorb the information presented (Fadjarajani & As'ari, 2021; Okur-Berberoglu et al., 2013). Ecopedagogy is an academic movement that encourages students to develop understanding, awareness, and life skills that are compatible with the goals of nature conservation. A pedagogical model structure is required to encourage students to have cognitive, affective, and psychomotor abilities by paying particular attention to the components of the learning model such as syntax, reaction principles, and social systems. to the components of the gaining knowledge of version consisting of syntax, response principles, and social systems. Ecopedagogy emphasises raising human ecological awareness in order to protect, care for, and preserve nature (Adams, 2015; Wang, 2021). The ecopedagogy approach is capable of transforming students into independent, autonomous learners, capable of developing learning capacity that comes from outside the classroom and has an impact on

themselves and their environment (Fajar & Agustina, 2019; Hamdani et al., 2021; Uswatun, 2013).

Ecopedagogy is supported by critical theory and critical pedagogy, in which it is oriented to fraternity and solidarity with the community of life, and in line with the application of Education for Sustainable Development (ESD) principle (Adela & Permana, 2020; Jenkins, 2021; Supriatna et al., 2018). Teachers have to implement ecopedagogy approach in teaching-learning where strategy combinations of dialogue, participative, case study, field study, group discussion, role-play, brainstorming, critical reflection, contextualization, documentation, creative writing, debate, and seminars (based on application and suitability) can be integrated to enhance pro-environmental behaviour case have a look at, subject examine, institution discussion, role-play, brainstorming, crucial reflection, contextualization, documentation, innovative writing, debate, and seminars (based totally on software and suitability) can be integrated to beautify pro-environmental behaviour between students and teachers (Keeley & Benton-Short, 2020). Three main fields discussed in ecopedagogy encompass scientific eco-literacy, culture, and critical eco-literacy (Norat et al., 2016; Wasino et al., 2020).

Previous studies indicate that environment-based learning performs well when various approaches, models, and appropriate strategies are used. The fact that learning in biology is largely done through text has not prioritized the process of understanding the theories or concepts, principles, and procedures of biology (Aliakbari et al., 2015; Ardoin et al., 2020; Harackiewicz et al., 2016; Kim et al., 2019). This leads to the learning that will become less meaningful, and the students consider that Biology is a difficult lesson since it has a lot of material about memorization. Learning has not occurred in accordance with the intended educational paradigm, and most of it remains oriented on the teacher (teacher-centered). Students are not able to understand biology concepts, considering that learning is not given contextually and does not train students' scientific skills (Darling-Hammond et al., 2020). According to the findings of interviews and observations, the curriculum has not yet examined the values included in cultural heritage, therefore students' understanding of their surroundings is still lacking. Furthermore, because learning has not been contextualized, the scientific process has not been prioritized, and students have not been trained in environmental awareness, students have been unable to solve existing problems. The failure of ecopedagogy learning is due to the inability to train students to investigate in analysing, obtaining information, and drawing conclusions based on the steps of inquiry.

Various studies related to Biology learning have been conducted, in which the aim is to equip the students in enhancing hard-skill and soft-skill regarding to environmental issues around them. However, there have not been many studies on Eco pedagogy that takes syntax and cultural heritage into account. The research that has been done is the analysis of high school biology learning in terms of curriculum, student scientific literacy, and biol-

ogy learning to increase awareness based on Faith and Piety (Nasution, 2016). A study on Eco pedagogy that teaches critical literacy in college to support sustainable development has been carried out by Greg W. Misiaszek (2020). An Eco pedagogy study conducted by Wankyrshan Rymbai & Sherwin M. Sungoh, (2021), shows a result that there is a significant improvement on pro-environmental behaviour of students and teachers in rural and urban areas using an Eco pedagogy approach. Other research on Eco pedagogy learning has been carried out but in social studies learning, namely the pedagogic approach, attempts to change education towards ecological sustainability, social responsibility, and interculturalism.

Based on survey results, due to a lack of learning that involves the scientific process, the quality of Indonesian education remains low. Education is implemented through conservative patterns the emphasis is still on the process of transfer of knowledge. Programme for International Student Assessment (PISA) results of 2018, specifically about science, show that Indonesia is ranked number 70 out of 78 OECD member countries (Schleicher, 2019). To deal with that circumstance, it is necessary to take the first step toward developing an effective learning planning design by utilizing current resources and potential that are evenly distributed throughout Indonesia. The Province of East Nusa Tenggara is one place that needs improvement. Kupang, the capital city of East Nusa Tenggara Province, is located on Timor Island and possesses local wisdom that can be developed as a source of learning science, particularly biology based on environmental education (Ardan et al., 2015).

Based on prior research, the purpose of this study is to define the Eco pedagogy model in Biology learning and to identify the supporting variables for the programme implementation in high school. The research is seen from planning, implementation, and assessment of student learning outcomes. The research focuses on the efforts made by teachers and supported by school policies in the application of environmental-based learning. The research activity will be followed by an attempt to solve the problems that arise when the teacher takes out Biology learning in terms of the preparation of devices, media, and teaching materials using the Eco pedagogy model. Some of the obstacles faced by teachers related to Eco pedagogy learning are that teachers do not understand the steps for preparing teaching materials and media that show the characteristics of the Eco pedagogy model, and do not yet have facilities to support programmed implementation according to the model in question.

METHODOLOGY

This was a qualitative study that collected descriptive data through documents, questionnaires, observations, and interviews. The analytical descriptive study design was used for this study. The analytical descriptive study

focused on systematically and factually documenting data to describe subject conditions at the moment. Because this study was conducted in natural conditions (*natural setting*), the qualitative study approach is also known as the naturalistic study method.

Sample and Data Collection

The subjects of this study were 300 students of 10th grade from SMA Negeri Kupang, East Nusa Tenggara Indonesia, and 20 Biology teachers for the academic year of 2021/2022, chosen through *purposive sampling* from public schools. Observation, questionnaires or questionnaires, interviews, and documentation are used to collect data. By analyzing the devices, media, and teaching materials used, the observation method was used to determine the applicability of the ecopedagogy model that had been implemented. The questionnaire technique collects data by presenting a set of questions or written statements to the respondents, which they must answer. The questionnaire was used for this study because it is an efficient data collection strategy if the researcher knows the variables to be examined and what is anticipated of the respondents. Questionnaires were also distributed to students in order to ascertain student answers to models, methods, and approaches in learning Biology, as well as students' perspectives of environment-based learning. Interviews were performed to gather information regarding the applied Biology learning process. While the documentation method was used to collect syllabus data, lesson plans, teaching materials, and media that support ecopedagogy-based learning.

Data Analysis Technique

Data analysis technique was a process to collect data systematically, in which it could ease a researcher to draw a conclusion. Data analysis method referred to Matthew B. Miles et al. (2019) that consisted of 3 activity stages, namely data reduction, data presentation, and conclusion drawing, and data verification. Data reduction was a selection process that focused on simplification, abstraction, and rough transformations that emerged from the field as written notes. Data reduction was a component of the analysis, with the data reduction stage occurring continuously throughout the qualitative study. The next stage was to display the data after it had been reduced. In qualitative studies, data could be presented in the form of charts, brief descriptions, flowcharts, and correlations between categories. The final stage of qualitative study was drawing conclusions. The findings were still temporary at the beginning, and they would change if strong evidence was discovered during the qualitative study process, and if valid and consistent evidence was discovered, a credible conclusion might be established.

RESULT AND DISCUSSION

Result

Data of this study are obtained based on the observation in class and depth-interview to the 10th grade teachers. Interviews are done to investigate how teachers' planning, implementation, and assessment of Biology learning are related to environment-based education, namely the Ecopedagogy model. The teacher is requested to respond to a series of questions using the outline shown in Table 1.

Table 1
Interview Guide Outline Towards Teachers

No.	Outlines	Number of Question
1	Components of learning that have been designed by the teacher	1, 5, 10, 17, 18, 20
2	Ecopedagogy learning model applied in schools based on teacher perceptions	8, 12, 13, 15
3	Efforts that have been made by schools related to environmental education	2, 9, 11
4	An understanding of eco-literacy that is integrated into the school curriculum	4, 5, 16, 19
5	Selection of the right strategy related to the implementation of a curriculum that promotes a sustainable culture	3, 6, 7, 14,

Source. Own research.

Table 1 shows the interview guide outlines to the teachers related to the implementation of learning in schools, in which it is reviewed from models, strategies, and curriculum that is implemented in the school, particularly related to environmental education. Several questions are based on teachers' perceptions, of which questions are distributed in this study to acquire descriptions about curriculum and its implementation in the learning.

The questionnaire distributed regarding learning tools is a guideline used in the learning process that must be prepared by a teacher in Biology learning. Analysis of the device which consists of several indicators according to the results of the study

Observation of documentation includes devices, teaching materials and media used, using KD 3.1.1. Analysing data on environmental changes, their causes, and their impact on life. The findings of the device analysis, which explain the teaching materials and media used in Biology learning, are shown in Table 2 as follows:

Table 2
Analysis Results of Biology Learning Devices in High School

No	Rate Aspects	Analysis Results
1	Compatibility with National Education Standards	The learning devices are prepared in accordance with the curriculum recommended by the Government which refers to the Minister of Education and Culture Regulation No. 22 of 2016 concerning Process Standards
2	Components	Lesson Plan that is generally prepared consists of complete components i.e. 9 components
3	Compatibility between Core Competencies and Basic Competencies	There is KI (Core Competencies) which is a competency that shows Graduate Competency Standards, and is supported by KD (Basic Competencies) which will be used as a reference in the learning process.
4	Compatibility between Indicators and learning objectives	Indicators of competency achievement are prepared by the teacher in accordance with the source book or reference obtained, a small part of the teacher composes their own lesson plans in learning. The Competency Achievement Indicator (GPA) used shows more of a product, not a process in terms of the operational verbs used.
5	Learning model used	Learning model has been implemented by some teachers in the learning process, no one has used the Ecopedagogy model yet, based on the syntax.
6	Principles of process-based learning	Learning that puts forward a process has been implemented, but the number is still small. The learning that has been carried out has not led to environmental-based learning, and it is mostly given textually.
7	Assessment technique used	The assessment used has implemented cognitive, affective, and psychomotor aspects or realms, but authentic assessment is still not widely applied by teachers
8	Media Development	Media used still refers to the learning model based on competencies that will be achieved, and do not use learning resources in the environment around students. There are even some teachers who do not use media in learning.
9	Teaching Material Development	The teaching materials compiled are still conventional and only in the form of a collection of materials, not using a model base or scientific approach according to the demands of the 2013 curriculum. The learning resources used have not used NTT's local wisdom.
10	Learning orientation on Higher-Level Skills	The learning scenario has not shown much learning orientation according to the HOTS which consists of: Transfer of knowledge, Critical & Creative Thinking. It has not raised a problem at the beginning of learning.

Table 2 provides the analysis results of devices prepared by the teachers from several school that will be investigated. According to the obtained data, learning devices of Biology are compiled but not fully in accordance with the competencies to be achieved in the learning process. Learning has not been oriented toward contextual learning and has not made reference to environmental-based learning, i.e. Ecopedagogy. Lesson Plan compiled by the teachers has referred to National Education Standard, and there is compatibility between Core Competencies and Basic Competencies, indicators, and learning objectives. However, it has not implemented environment-oriented learning. Biology learning is carried out textually verbalistic, in which it has not provided a meaningful learning experience for students. Teachers rarely use learning that starts with a problem to educate students' higher-order thinking skills.

The findings on the implementation of Eco pedagogy model using questionnaires can be presented in Table 3.

Table 3
Eco pedagogy Aspects/principles in Learning. Questionnaire data on teachers

Aspects/ principles	Activity planning indicators	Yes	%	No	%
Eco-literacy	- Implementation of contextual learning: by observing the surrounding ecosystem	5	25	15	75
	- Environmentally oriented learning: utilizing learning resources based on local cultural wisdom	3	15	17	85
Solidarity	- Prioritizing an attitude that is integrated in device materials and teaching materials	20	100	0	0
	- Observation of attitudes in working together in completing the given task	20	100	0	0
	- Assessment of students from the aspect of communication skills and respect for friends' opinions	15	75	5	0
Technology and Information Integration	- Teachers carry out learning using learning media with learning resources around the environment and the creation of a product from a learning achievement	6	30	14	70
Problem-based learning	- When teaching with ecosystem materials, the teacher raises questions at the beginning of learning as a step in implementing Constructivism Theory	3	15	17	85
Structural transformation in curriculum	- Ecopedagogy learning is carried out in accordance with the vision of education, organization and school culture in the sense of following the curriculum and activities that are part of school management.	20	100	0	0

Aspects/ principles	Activity planning indicators	Yes	%	No	%
Learning Strategies	- Integrating local wisdom according to the environment and modern science, starting in the preparation of tools and teaching materials	5	25	15	75
Authentic assessment principles	- Learning is designed with a balance of hard skills and soft skills	4	20	16	80
Process and results-based evaluation	- The teacher does not carry out a comprehensive assessment, not only cognitive, but the assessment is also carried out by prioritizing the process in terms of the indicators set.	2	10	18	90

Source. Own research

Table 3 shows that 75% of teachers have not implemented learning contextually, and at least 85% of teachers have not implemented learning with a scientific literacy orientation, which is an ecopedagogy component. The majority of teachers use the solidarity concept in their classes, as evidenced by scores of 75% and even 100%. It is indicated by a percentage value of 70% in carrying out learning connected to media and teaching materials, as well as producing a product in Biology learning. About 15% of teachers ask questions or problems in the initial learning. With a percentage score of 100%, all teachers claim that the implementation of the ecopedagogy model is in accordance with the organization and school culture; nevertheless, only 25% of teachers integrated learning with local wisdom in creating Biology learning. According to this study, learning by contemplating the process or balancing hard skills and soft skills has not been properly implemented, as evidenced by a rate of 10% to 20%. Table 4 shows the findings of a questionnaire-based study on students' perceptions of Eco pedagogy learning.

According to Table 4, student perceptions about Biology learning using Ecopedagogy model show a high average percentage. The data was obtained based on a questionnaire containing a number of questions distributed to students to explore students' perceptions of ecopedagogy-based learning which was processed by descriptive analysis. The criteria for student statements are happy with the learning provided by the teacher through methods and approaches in accordance with the results of the research (Nova, Dwikoranto, & Lestari, 2021). Learning using learning resources in the surrounding environment is indicated by a value of 90%. Biology learning using practice is 96% and 91% is using concrete examples to provide conceptual understanding for the students. Most students feel happy to use environmental-based learning, in which it is shown with a value of 92%.

Learning using local culture is 88%, and the lowest value is 83%, in which it is on the statement given problem-based learning. Hence, it can be stated that student responses are very positive to Ecopedagogy model which is implemented in Biology learning.

Table 4

Questionnaire Results of Students' Perceptions about Ecopedagogy Learning

Statement according to Indicator	Student Answers			
	Yes	%	No	%
I like to study Biology outdoors by seeing real objects	129	92	11	8
I agree with learning that uses learning resources from the surrounding environment	120	60	20	40
Learning that is carried out with direct practice makes it easier for me to learn Biology material	127	91	13	9
I enjoy learning Biology because the teacher uses concrete examples so that the concepts are easy to understand	129	92	11	8
Environmental-based learning made me understand the importance of caring for the environment to maintain and preserve it	112	80	28	20
Biology learning by incorporating local culture is very important	115	82	25	18
I have heard the term of ecopedagogy	5	4	135	96
The learning given with problems makes me have a challenge in learning	102	73	38	27
I enjoy studying biology related to environmental issues	126	90	14	10

Source. Own research.

DISCUSSION

Departing from the finding through interview, it is indicated that environmental-based Biology learning in High School of Kupang gets a very low percentage, which is 3%. The learning is designed using the existing learning resources; yet, it is not integrated in Lesson Plan or teaching materials that are used in the learning processes. *Eco pedagogy* learning model should be implemented outside of class, since it is contextual and it has a goal to solve problems (Misiaszek, 2020; Surata et al., 2015). *Eco pedagogy* comprises eco-literacy, solidarity, and sustainable culture (Norat et al., 2016). According to the study's findings, the applied environment-based learning has not been supported by learning components that are aligned with the competences to be achieved.

Teachers tend to focus on achieving partial-textual knowledge, while the environment around the school encourages contextual integrative learning

(Barret, et al., 2019). Based on the observation results, it is discovered that the learning is often implemented by using transferring knowledge from the existing source books and prioritizes a product without prioritizing the concept discovery process. This study indicates that Eco pedagogy, a type of environmental education, is very effective at enhancing students' awareness of their surroundings and enhancing their eco-literacy. Through environmental learning, students will have a strong concern for the environment, and it can be claimed that education not only gives theoretical knowledge but is also followed by application based on the concept or knowledge. As a result, students will have a strong sense of independence since they are frequently confronted with existing problems (Darling-Hammond et al., 2020).

According to the study findings, almost all high school biology teachers in Kupang engaged in learning that considered the domains of attitude, cooperation, and communication, as shown by a percentage value of 100%. Eco pedagogy learning involves the formation of a learning community that is regarded not just from the perspective of biology or science, but also from the perspectives of other disciplines such as sociology and economics, with the objectives of advancing sustainable development. So far, contextual biology learning is rarely carried out by Biology teachers, as evidenced by a percentage of roughly 25%. Likewise, the percentage of learning that begins with a difficulty is roughly 15%. This needs attention, considering that through learning activities carried out outside the classroom, students can be trained to understand the advantages and local wisdom of the area where they live, because ecopedagogy is seen as a movement back to nature by exploring the values contained in cultural heritage regarding nature a motion again to nature through exploring the values contained in cultural heritage concerning nature conservation. Therefore, teachers are expected to be able to facilitate students through real or concrete learning experiences by considering local culture (Darling-Hammond et al., 2020; Kim et al., 2019).

The materials given to the students regarding to industry revolution era of 4.0 should have implemented IT-based learning. The findings of a study on Biology learning in schools show that the teachers are not maximized in the application of media and teaching materials, which is indicated by a percentage of 30%. According to Feng Jiang et al., 2019, the major problems that a country faces when executing the industrial revolution are in the areas of knowledge, technological, social, and political issues.

Students who learn biology are simply provided theory without real experience, causing them to be less able to understand concepts, principles, and theories about biology. Students will understand the concept of Biology better if they are taught using concrete examples (Chamany et al., 2008; Schunk, 2012). Protecting nature (natural ecology), the impact of human society on nature (social ecology), and having respect for nature, humans, culture, and diversity are the fundamentals of Eco pedagogy. Therefore,

the learning paradigm that asserts biology is a rote subject and difficult to understand is expected to no longer exist. It is the teacher's duty and responsibility to design learning such that students understand the concepts presented. Individuals are more likely to care about and commit to nature conservation if nature is viewed as a place for them (Fauzi et al., 2022; Okur-Berberoglu, 2015).

Eco pedagogy is a critical educational theory that focuses on environmental education and sustainable development. Students are not only instructed to study scientific disciplines through the ecopedagogy approach, but they are also given an awareness of socio-cultural concerns that have a broad influence. The goal of the Eco pedagogy approach is to give students with knowledge about how to overcome current and future environmental problems. Another goal is to have a more in-depth and contextual understanding of the outcomes, both positive and negative, in order to increase students' ecological awareness. Ecopedagogy is a subset of critical pedagogy and constructivism (Fadjarajani & As'ari, 2021; Korsant, 2022; Payne, 2015). Teachers should be able to build interaction which has a better dialogical with students, and makes students interact with each other and increase active dialogue in the context of their environment is a demand in this century (Garcia-Carrión, et al., 2020; Sedova, et al., 2016; Zhang & Zhang, 2020).

Based on the results of this study, lack of experiences possessed by the students in Biology learning make learning less meaningful. The use of lecture method is often implemented without giving problems that should be completed by the students in the initial learning. Biology learning using Ecopedagogy approach can be implemented in the learning so that it is able to make students aware to be individuals who have awareness and life skills by utilizing existing potential or local wisdom (Abidinsyah et al., 2019; Adinugraha, 2021)

It is intended that through teaching students about natural resources in the area, the welfare of society and the economy will improve and become more sustainable. The practice of learning based on sustainable development makes education more efficient since it focuses on creative practical applications, particularly for ecological and social problems, rather than the concept of knowledge learned. A critical perspective supported by student independence is required to provide the most recent topics related to environmental challenges as a benchmark, and education is capable of overcoming any challenge (Benavot, 2014; Glavič, 2020; Polasky et al., 2019).

This study is expected to give feedback to all parties especially for the teachers who have a role to design learning using Eco pedagogy approach. The teachers should able to build active dialogue in the environmental context and can involve the local community through contextual learning with learning resources around the student environment. One of ways to enhance students' eco-literacy is by means of Eco pedagogy, in which it

encompasses problem orientation syntax. Through problem-based learning given to the students, it will make the students discover Biology concepts independently through collaboration with other students and put forward the principle of productivity. In Eco pedagogy approach, students undergo learning through experimental activities based on scientific methodology. Raising controversial issues relating to environmental problems can help to raise critical awareness about the environment (Sukarsono et al., 2020; Turner, 2011).

This study is also carried out by providing questionnaires to students regarding the model or strategy that has been implemented. In terms of benefits and effectiveness, the data acquired from surveys or questionnaires are in the form of student responses to learning by applying the ecopedagogy model. The majority of the students agreed that learning Biology through practice will make it easier for them to grasp the concepts presented. Students are highly satisfied when learning is done through direct experience and the use of learning resources in a contextualized manner. This method can train students' independence and concern for the issues around them both locally, nationally, and globally. The Eco pedagogy-based education model can be utilized to develop taste (character), brain (knowledge), heart (character), and physical (skills). Students who participate in Eco pedagogy learning are required to exhibit critical thinking abilities as well as a caring attitude toward the environment. Continuing education encompasses knowledge-based skills, technology in the context of local culture, new ideas, and the existence of a learning practice.

CONCLUSIONS

Textual learning should be transformed into contextual learning so that it seems meaningful and simple to students. The curriculum in schools is required to be used in a limited complexity by involving the local community, in order to train students' ability to collaborate, communicate, and enhance their skills. It is necessary to develop an Eco pedagogy learning model that takes into account local cultural wisdom in terms of planning, implementing, and evaluating learning through intensive training activities, considering that teachers do not yet understand the steps for preparing media and teaching materials in accordance with the Eco pedagogy model's characteristics. This study is aimed to give teachers methods for designing environment-based learning. In terms of expected efficacy and skills, the results indicate that students are very enthusiastic and supportive of Eco pedagogy learning. Students are expected to be able to improve abilities or perform productive work while utilizing the learning resources available to them.

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