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Development of an Ecoliteracy Capacity Measurement Instrument

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ABSTRACT

This research is aimed at developing and validating instruments to measure ecoliteracy capabilities, so that this research can produce a product in the form of a measurement instrument that has been validated and is used for measuring the ability to ecoliterate students. This research and development uses the ADDIE development method. This instrument is based on the Basic Competence of Class X Biology lessons, which consists of three dimensions of ecoliteracy. Based on 30 issues developed, there are 18 right and 12 wrong. The results of the analysis were obtained 15 questions on the dimension of knowledge, 2 questions about the dimensions of concern, and 1 questions about practical competence dimensions. Based on the differential power test, there were six bad criteria, six sufficient, three good and three very good criteria. The empirical validation was conducted by conducting trials on 36 students in the 11th grade of Mother of the Holy Heart High School in Jakarta, which were then analyzed using Pearson Product Moment correlation. The reliability test result was 0.80 using the Kuder Richardson-20 (KR-20) formula that falls within the very high criteria. It shows that the ecoliteracy measurement instrument developed is worthy of use to the students.

Keywords: Ecoliteracy, 21st century skills, environmental pollution

INTRODUCTION

Ecoliteracy is often referred to as ecological intelligence. The application of eco-literacy becomes effective because education becomes a means for the formation of character and the attention of the pupils to their surroundings (Lestariyanti, 2020). Implementing ecologically conscious behavior is achieved through an understanding of a wide range of skills related to various types of ecoliteracy, such as experiences with other world environments, understanding that nature plays a role in sustaining life, and developing a level of awareness in society about the role of the living environment (Desfandi et. al., 2017). Similar research written by Keraf (2014) says that ecoliteracy is the state of a person who is already aware of the importance of the living environment. Ecoliteration is the awareness of the significance of living environments. One who can be said to have existed at the level of eco-literacy is a person who is aware of how important the living environment is, the importance of preserving and caring for the earth,

ecosystems, nature as a home, and the development of life. Based on this awareness, humans organize their patterns and lifestyles in harmony with the environment (Afifah & Rofiah, 2020). Things are important in ecological literature like ecological knowledge, ecological attitudes, cognitive skills, and environmental behavior. Some things are indicators of someone who has environmental literacy, awareness, and insight (Firdausi, 2021). Besides that, the ability to identify issues, analyze issues, and plan action is also essential to putting awareness into the real actions of caring for the environment. At the end of the day, it aims to form a personality that has a real commitment to preserving nature. (Hunter, 2019). Therefore, it is hoped that through this eco-literacy, students can measure their ecological literature, which will affect their behavior in responding to environmental problems as well as encourage a sense of responsibility for the environment. (McBride, 2013). The learning process that connects environmental problems with everyday life is a special challenge for students to understand the problem-solving process. (Ihsan, 2020).

The learning process is a good time to teach and develop the students' ecoliteracy skills. So the teacher's competence in teaching is very much needed in this regard. In addition to teaching, teachers also have demands for understanding learning evaluation. Learning evaluation is to identify whether the program planned by the teacher is achieved and valuable and to see the level of effectiveness of its implementation. (Ratna dan Rusdiana, 2013). Education evaluation is therefore essential, as it is an activity or process to assess the extent to which students are able to learn attitudes, knowledge, and skills in order to make decisions about attitude, preservation, conservation, and protection of their environment.

Based on the above description, to measure the students' understanding of ecology, in particular environmental pollution materials, it is necessary to conduct a study on the development of eco-literacy instruments. This kind of research is based on the research and development that have been carried out. 1) Wherdiningsih and Tjaturahono (2021) level of understanding of the natural system of the people of the village asinan to the conservation of the dew area. This shows the average result of the percentage variable. Ecological literacy is 22.12%, a high category. However, the average percentual variable, which is conservation efforts, is 32.77%, with a higher category. 2) Vonny, V., Nihlah, K., Miarsyah, M., & Ristanto, R. H. (2021): Development of instrument tests to promote biology literacy among students. In the development of literacy instruments, the research showed that there were 19 right questions and one wrong one. The innovation in this research is that there are such variables as measured, selected concepts, and the determination of the level of different educational units. 3) Kusumaningrum (2018) Environmental literacy skills measurement is required in terms of seeing and evaluating the environmental literature skills of the pupils, which contains four components of the environment, including views on the environment, such as knowledge of environmental basics, sensitivity to environmental conditions, and feelings for the environment; cognitive skills that include identifying environmental problems; environmental analysis and implementation of planning; as well as behavior towards the environment in reality. The instrument in this study

refers to Orr's (1992) ecoliteracy indicator, modified by McGinn (2014) with the aim of illustrating ecoliteracy with the dimensions of knowledge, care, and practical competence.

This research has the objective of 1) developing an instrument to measure the ability of the learner to develop eco-literacy and 2) measuring the ecoliteracy of the student in the aspects of environmental knowledge and concern for the environment. Based on the above objectives, it is expected that this research can provide benefits in adding knowledge and reference to the development of science in the field of ecoliteracy.

METHOD

Included in the Research and Development (R&D) or research or development model ADDIE updated from Dick and Carey in 1996 is the model. The "ADDIE" model is a method of instruction commonly used as a guide to producing an efficient and effective design. There are five stages in the ADDIE model that are interrelated with each other (Aldoobie, 2015). The research and development procedures using the AD DIE model have five phases: analysis, design, development, implementation, and evaluation (Cahyadi, 2019). The ADDIE model can be seen in Figure 1.

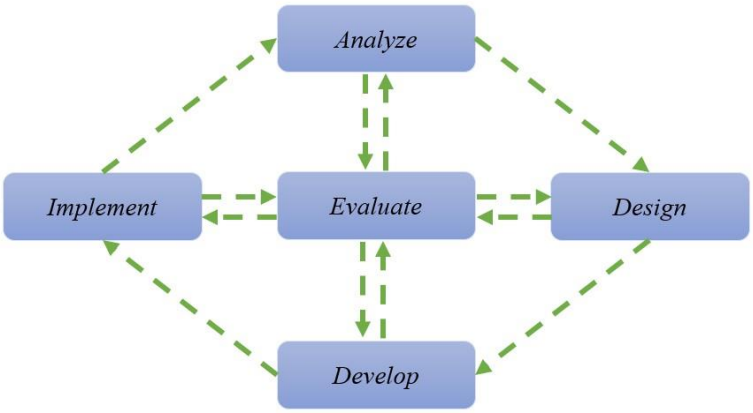


Figure 1. ADDIE model (Sugihartini & Yudiana, 2018).

The first phase, analysis, is the phase of analyzing the problem and the need for the development of a new product and analyzing the feasibility and conditions of product development. In this case, he did the indicator analysis of the issue, starting with the analysis of basic competence, the dimension of ecoliteracy, and then the indicators of ecoliteracy related to the material of high school biology. Based on the results of the analysis obtained, the correct concept for the assessment of ecologiteracy is the concept of environmental pollution in High School Class X.

The second phase, design, is the phase of designing products that form the basis of the development process, such as determining learning objectives, creating question indicators, and compiling question and evaluation instruments. Validation is useful to know systematically whether the instruments developed are in line with the purpose or not. Expert validation is aimed at providing information, evaluating, and advising on instruments that have been created. The instruments created and the validation sheet were then sent to two expert validators, namely the

biology education lecturer and the high school biology teacher, who mastered the material and the ability to ecoliteracy. Both of these experts have the following qualifications: they have passed the S2 level of education in the field of biology education, have been certified in the teaching field, and also have at least 5 years of experience in the area of biology education. That's what they're referring to as validators in the development of this instrument.

The third phase is the development of an evaluation instrument designed to measure the eco-literacy of the students. In this phase, an evaluation tool is developed that refers to the processing, evaluation indicators, and preparation of validation to see whether or not the products and evaluation instruments are adequate. Based on the results of the development, a product will be obtained, as will the results of the validity test of the product.

The fourth stage, implementation, is the stage for testing instruments, performing tests, and distributing responses. Then the fifth stage, evaluation, is a stage to find out the success of test instruments as well as to analyze the improvements that need to be made in the application of evaluation instruments to measure the eco-literacy of learners on the concept of environmental pollution. However, the researchers restricted it to the three stages of analysis, design, and development. This is due to the limited time of the research, so the implementation and evaluation stages are not carried out.

This eco-literacy assessment instrument has been developed in the form of a double-selection test of 30 questions. The study was conducted in February 2022 with 36 eleven-grade students at a private high school located in Jakarta. These inquiries are given to students using Google Forms.

Qualitative data analysis of suggestions, criticisms, and validator comments is used for instrument improvement, followed by data analysis on instruments using the Aikens formula. Based on the calculation of index V, a device can be categorized according to its index. If the index is less than or equal to 0.4, then the validity is less; 0.4–0.8 is the mean validity; and if it is greater than 0.8, it is very valid (Dawati et al., 2017). The technique then uses the Pearson Product Moment correlation test, the KR-20 reliability, the differential power test of the matter, and the difficulty level of the issue. The technique used to find out the results of the content validity test by two experts, i.e., using the Aiken test, (Aiken, 1980).

Based on the calculated V index, a fruit or device can be categorized according to its index. If the index is less than or equal to 0.4, it is said to be less valid; 0.4–0.8 is considered moderate; and if it is greater than 0.8, it is considered very valid. (Dawati et al., 2017). Data analysis techniques include conducting reliability tests and difficulty level tests.

RESULT AND DISCUSSION

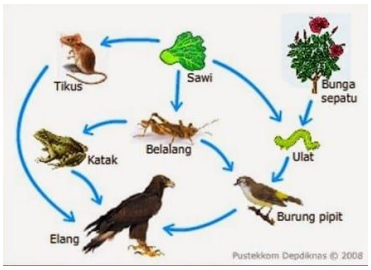
The whole study uses an eco-literacy assessment instrument that matches the concept of environmental pollution in Biology Class X subjects. There are 30 issues spread across a number of topic indicators that have been adapted to the basic competence (KD) and the ecoliteracy dimensions. The developmental stages of the ecoliteracy measurement instrument can be seen in Table 1.

Table 1. Sets of Ecoliteracy Capacity Measurement Instruments

Basic Competence	Ecoliteracy Dimension	Ecoliteracy Indicator	Question Number
3.10 Analyze data on environmental changes and the impact of such changes on life.	Knowledge	Understanding the impact of human activity on ecosystems.	1, 11, 21
		Understanding the species and its habitat	2, 12, 22
		Understanding climate change and its impact.	3, 13, 23
		Explain all kinds of energy sources.	4, 14, 24
		Submitting environmental support	5, 15, 25
		Understanding the succession of ecosystems	6, 16, 26
		Analyses the interaction between species in an ecosystem	7, 17, 27
		Understand the water cycle and the food grid.	8, 18, 28
	Care	Build an attitude of concern for the living creature and its environment.	9, 19, 29
	Practical competence	Take action that can reduce the negative impact on nature.	10, 20, 30

Based on the above table, 24 questions are included in the knowledge dimension, 3 questions are found in the concern dimension, and 3 are found within the practical competence dimension. Examples of eco-literacy assessment instruments that have been developed can be seen in Table 2.

Table 2. Forms of Ecoliteracy Capacity Measurement Instruments Developed

Basic Competence	Ecoliteracy Dimension	Question
3.10	Knowledge	Look at the following picture!  A scientist succeeded in finding an effective insecticide to eradicate insects. This has an impact on the food web in the picture above. The loss of insects has an impact …. a. decreased productivity of mustard greens

Basic Competence	Ecoliteracy Dimension	Question
		b. increasing frog population c. increasing eagle population d. declining sparrow population e. does not have a significant effect on food webs
	Care	Humans are an inseparable part of nature. Therefore, humans have a role as managers of nature and are responsible for the sustainability of the system within it. The following are appropriate human activities in environmental management, namely …. a. the use of chemical fertilizers needs to be increased to obtain good-quality harvests b. the solution to reduce waste is to close factories that produce waste c. burning waste is one solution to reduce the amount of waste produced by humans d. using shopping bags can reduce plastic waste in circulation. e. using AC at all times is a way to provide a cool atmosphere in the room
	Practical competence	Look at the following picture!  The right action to overcome the above problems is to .... a. capture all the tigers to finally put them in captivity b. providing outreach regarding tiger conservation to the community c. provide strict sanctions for illegal hunting. d. utilizing these rare animals into goods with high selling value e. making the tiger a preserve for research

Logical validity tests on developed instruments are then validated and evaluated by two validators. The evaluation is based on material, construction, and language aspects. The results of the logical validity test are analyzed using the Aiken formula. The result of the validation test by the validator can be seen in Table 3.

Table 3. Validation Test Results Content by Validator

Aspects Examined	Result	
	Score	Index
A. Material		
Compatibility of material concepts with ecoliteracy measurements	0,67	Valid
Compatibility of material concepts with ecoliteracy indicators	0,67	Valid
Compatibility of the ecoliteracy dimension with the ecoliteracy indicator	0,83	Very Valid
Compatibility of material concepts with student abilities	0,67	Valid
Compatibility of the issue with the ecoliteracy indicator	0,67	Valid
B. Construction		
There's a clear drawing clue	0,67	Valid
Question formulation according to the answer options	0,83	Very Valid
There's one choice of right answers	0,83	Very Valid
There is a matching case/disaster, picture, table or chart with questions and answers options	0,83	Very Valid
Questions sorted with varying degrees of difficulty	0,67	Valid
C. Language		
The wording of the sentence is communicative.	0,67	Valid
Question sentences and answer choices using good and correct language principles	0,5	Valid
The wording of the question sentence and the choice of answers does not lead to duplicate interpretation or misunderstanding.	0,5	Valid
Use easy-to-understand words and language	0,83	Very Valid
The questions and answer formula does not contain words that may offend the feelings of others	0,83	Very Valid

Based on the results of the expert validation test, on the material aspect, there are 4 valid indices and 1 highly valid index; on the construction aspect, there are 2 valid indices and 3 highly valid indicators; and on the language aspect, there are 3 valid indices and 2 highly valid indices. It shows that overall, both validators state that such instruments belong in the valid category. The instrument can be distributed to the student with some notes or revisions that need to be made to improve the instrument. Examples of revisions on the subject are in Table 4.

Table 4. Examples of Questions Before and After Revision

Question	Description
Before revision Humans are a part that cannot be separated from nature. Therefore, humans have a role as managers of nature and are responsible for the sustainability of the system within it. The following are appropriate human activities in environmental management, namely …. a. the use of chemical fertilizers needs to be increased in order to obtain good harvest quality b. provide a solution to reduce waste by closing factories that produce waste c. burning waste is one solution to reduce the amount of waste produced by humans d. using shopping bags can reduce plastic waste in circulation e. using AC at all times is a way to provide a cool atmosphere in the room.	Suggestion: Just delete sentences that are less effective and have nothing to do with the question. Try to make answer sentences of the same length. Validator provides revision to delete sentences or words that are less effective in the subject.
After revision The following are appropriate human activities in environmental management, namely …. a. the use of chemical fertilizers needs to be increased in order to obtain good harvest quality b. provide a solution to reduce waste by closing factories that produce waste and are dirty c. burning waste in open area is solution to reduce the amount of waste produced by humans d. using shopping bags made from cloth or paper can reduce plastic waste in circulation e. using AC at all times is one way to provide a cool and safe atmosphere in a closed room	Less effective sentences and words have been deleted and corrected according to the revisions suggested by the validator.

A small-scale test of empirical validation was conducted in the eleventh grade of the private high school in Jakarta with a total of 36 students. The results of the validity test were obtained using the Pearson product moment correlation coefficient. Empirical validation of the results is presented in Table 5.

Table 5. Validity Test Results Details

No.	r_{count}	r_{table}	Conclusion	No.	r_{count}	r_{table}	Conclusion
1	0,03	0,32	Invalid	16	0,66	0,32	Valid
2	0,33	0,32	Valid	17	0,11	0,32	Invalid
3	0,32	0,32	Valid	18	0,18	0,32	Invalid
4	0,49	0,32	Valid	19	0,04	0,32	Invalid
5	0,07	0,32	Invalid	20	0,51	0,32	Valid
6	0,47	0,32	Valid	21	0,63	0,32	Valid
7	0,52	0,32	Valid	22	0,42	0,32	Valid
8	0,42	0,32	Valid	23	-0,01	0,32	Invalid
9	0,33	0,32	Valid	24	0,45	0,32	Valid

No	rcount	rtable	Conclusion	No.	rcount	rtable	Conclusion
10	0,19	0,32	Invalid	25	0,43	0,32	Valid
11	0,58	0,32	Valid	26	0,35	0,32	Valid
12	0,46	0,32	Valid	27	0,26	0,32	Invalid
13	0,27	0,32	Invalid	28	0,43	0,32	Valid
14	0,08	0,32	Invalid	29	0,33	0,32	Valid
15	-0,12	0,32	Invalid	30	-0,18	0,32	Invalid

According to the table, there are 18 valid and 12 invalid questions. can be seen with the value rtable < rhitung as a valid determinant of whether or not the matter. The KR-20 reliability test was then calculated, and the reliability result was r = 0.791. Based on the results of the test, it was shown that the assessment instruments in this study belonged to the high reliability category. Then a difficulty test is performed on the valid part of the subject, and the results are shown in Table 6.

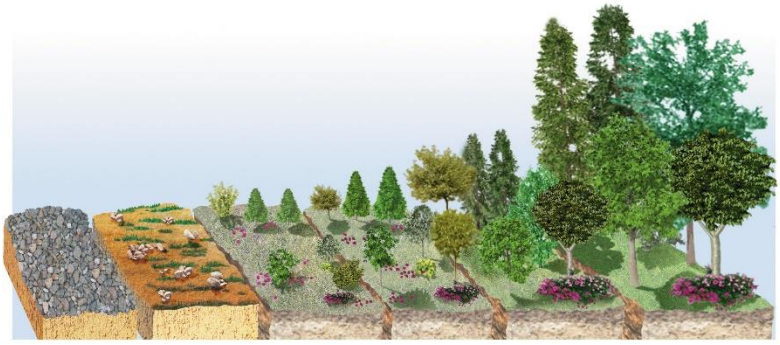
Table 6. Valid difficulty test results

No.	Difficult Level		No.	Difficult Level	
	Score	Criteria		Score	Criteria
1.	0,94	Easy	10.	0,67	Medium
2.	0,83	Easy	11.	0,25	Sulit
3.	0,81	Easy	12.	0,28	Sulit
4.	0,69	Medium	13.	0,69	Medium
5.	0,97	Easy	14.	0,94	Easy
6.	0,92	Easy	15.	0,64	Medium
7.	0,94	Easy	16.	0,58	Medium
8.	0,86	Easy	17.	0,86	Easy
9.	0,86	Easy	18.	0,89	Easy

Based on the above test of 18 questions, there were 2 difficult questions, 5 moderate questions, and 11 easy questions. The difficulty index of the issue (p) is then grouped into several categories, i.e., (a) $p \leq 0.30$ = difficult point; (b) $< p \geq 0.70$ = medium point; and (c) $p > 0.70$ = easy point (Arikunto, 1999). Here's an example of each of the question characters that can be seen in Table 7.

Table 7. Examples of Questions Based on the Characteristics of Easy, Current, and Difficult

No.	Example Question	Difficult Index	Right Answer
1.	Look at the following graph! 	Easy	b

	The correct information based on the graph above is .... a. environmental quality continues to improve over time b. environmental quality continues to decline over time c. environmental quality is relatively stable over time d. the quality of clean water continues to decline over time e. environmental quality is unstable over time		
13.	Oil palm land clearing activities that do not pay attention to AMDAL (Environmental Impact Analysis) will have an impact on climate change, namely .... a. clearing oil palm land can cause flooding and erosion b. clearing oil palm land reduces soil fertility c. clearing palm oil land increases greenhouse gas emissions d. clearing oil palm land eliminates the habitat of the animal species within it e. clearing oil palm land makes the land barren	Medium	c
12.	Look at the following picture!  The image above depicts the succession process in a previously damaged ecosystem. Primary succession begins with the emergence of pioneer plants from the group .... a. Bryophyta and Pteridophyta b. Bryophyta and Gymnosperms c. Gymnosperms and Dicotyledoneae d. Dicotyledoneae and Monocotyledoneae e. Angiosperms and Pteridophyte	Hard	a

A good question is a question that is not too easy or not too difficult. In a matter instrument, it must consist of matters with varying levels of difficulty. The results of this study are presented in Table 8.

Table 8. Result of Differential Strength Analysis

No.	Scor	Criteria	No.	Score	Criteria
1.	0,11	Bad	10.	0,67	Good
2.	0,11	Bad	11.	0,67	Good
3.	0,33	Enough	12.	0,94	Excellent
4.	0,39	Enough	13.	0,56	Good
5.	0,06	Bad	14.	0,11	Bad
6.	0,17	Bad	15.	0,72	Excellent
7.	0,11	Bad	16.	0,83	Excellent

No.	Scor	Criteria	No.	Score	Criteria
8.	0,28	Enough	17.	0,28	Enough
9.	0,28	Enough	18.	0,22	Enough

Based on the results of the test, we obtained six bad criteria for numbers 1, 2, 5, 6, 7, 14, and 6 criteria are sufficient on numbers 5, 4, 8, 9, 17, 18, while 3 criteria are good on numbers 10, 11, and 13, and the last three criteria are well on numbers 12, 15, and 16. Examples of issues with each of these criteria can be seen in Table 9.

Table 9. Examples of Questions by Character: Bad, Enough, Good, and Excellent

No.	Example Question	Criteria	Right Answer
2.	Indonesia is a country with abundant biodiversity in terms of mammals, insects, birds, and other types of animals. The following are Asian-type faunas …. a. anoa, hog deer, komodo dragons, and bulls b. elephants, tigers, orangutans, and one-horned rhinos c. eagles, anoas, birds of paradise, peacocks, and bali starlings d. cendrawasih, maleo, black monkey, and cuscus e. komodo dragons, elephants, tigers, and hog deer	Bad	b
6.	If a community is damaged, the result is that the original community no longer remains, so new life is formed by forming a new community as a pioneer. This is an example of .... a. tertiary succession b. primary succession c. secondary succession d. community e. population	Enough	b
22	The following are the exact characteristics of the Australis fauna in Indonesia …. a. large mammals and many endemic bird species b. small mammals and many endemic birds c. marsupial mammals and many types of insects d. large reptiles and large mammals are diverse e. has types of birds with small sizes	Good	b
26	The succession process can generally occur due to disasters such as volcanic eruptions and can also be caused by humans, for example, land clearing by burning. The recovery of the ecosystem depends on how severe the damage is. If the damage is only partial, then recovery will be faster. This is because .... a. there are still animals in this ecosystem b. there are still water sources in this ecosystem c. there are still communities that fill this ecosystem	Excellent	c

d. there is still production in this ecosystem
e. there are still nutrients in the ecosystem

Based on the above data, it can be concluded that the question is bad and quite a lot more compared to the question having good criteria because of the students' less ability to fill it properly and their higher level of difficulty in appealing to other subjects. Differential strength is called the descriptive index (D), with a range between 0.00 and 1.00. Difference criteria are: 0.00 - 0.20 includes bad (poor); 0.21 - 0.40 includes satisfactory (satisfactory); 0.41 - 0.70 includes good (good); and 0.71 - 1.00 includes excellent (excellent) categories (Arikunto, 1996).

It produces an eco-literacy assessment instrument through the ADDIE research model on environmental pollution materials. There are three dimensions of eco-literacy: 1) the knowledge dimension that focuses on the knowledge of the student about ecological concepts in their lives; 2) the concern dimension that encompasses the student's responses to the environment and its problems, as well as the ability to provide solutions to environmental problems; and 3) the practical competence dimension that emphasizes the real actions of the learner not to have a negative impact of human activity on the environment (Mcginn, 2014).

The manufacture of instruments proceeded to the design stage by assembling test instruments. The slices are made by defining the question type as well as the number of questions that are tailored to the KD, the ecoliteracy dimension, and the question indicator. It's like a double choice with a total of 30 different issues, such as statements, analysis, pictures, and stories. There are many different types of issues with this instrument that are used to trigger the learning process in the pupils. That thing fits. A statement is a tool used to convey a message from the sender to the recipient that can channel the thoughts, feelings, attention, interests, and attention of the student in such a way that the occurrence of the learning process (Safei, 2008) is the medium. In addition, with the existence of the story, there is a development in the understanding of the students against some kind of environmental pollution. It is because reading can enhance the creativity of students to understand, solve problems, and provide responses to the topic requested (Fitriana, 2018).

The next stage of the design is to compile a validation sheet. The instrument validation leaf contains assessment aspects that must be considered, such as material, construction, and language aspects (Retnawati, 2016). The material aspect contains details about the compatibility of concepts, dimensions, and indicators of questions. The construction aspect includes details of the conformity of the question formulation with the answers, the instructions of the executor of questions, the correspondence of images, disasters, tables, and graphics with questions and answers, and the diversity of questions' difficulty levels. The language aspect contains details about the wording of sentences that are correct and easy to understand, and there is no language that can offend the feelings of others. This assessment aspect will be subsequently contained by an expert validator to test the validity of the instrument.

The next stage of instrumentation is development. At this stage, the instrument will be validated by an expert. There is no difficulty, just because the current situation and time limitations are not conducive due to the pandemic, so it is a little difficult to meet directly with

the expert validator. This can be addressed by sending a validation sheet through an expert validator's email, and everything related to instrument validation is done online. Today's technological advances can facilitate the affairs and needs of society in the midst of the current pandemic, so that society can be protected from unwanted dangers (Baeti & Munandar, 2021).

The objective of conducting the validity test of the contents of this study is to determine the level of appropriateness of the instrument to measure the ecoliteracy ability of the students. An instrument can be considered eligible if it has certain components and criteria in accordance with what is measured. The expert validator will then determine whether or not the instrument is qualified based on the assessment aspects contained in the evaluation section. The content validity test is carried out before conducting empirical validity tests on the student; it aims to determine the quality of the initial product of the item, which is then improved based on input as well as advice from an expert validator (Sa'idah et al., 2019).

The results of the content validation test by the expert validator obtained nine items declared valid and six items stated highly valid, but there were evaluations and improvements regarding 1) effective use of grammar and communication, 2) more in-depth concept of the ecosystem, 3) the existence of the use of the concept of ecoliteracy being less accurate, 4) the selection of images and graphics being less clear, and 5) questions for the topic of discourse being more analytical. Thereafter, improvements or revisions are made to the instrument on the basis of improvements and recommendations given by the expert validator before the instrument is tested by the student. The overall evaluation of the instrument by the validator is presented in Table 3, as well as the improvement results based on input from the validator in Table 4. Based on the results in the table, then the instrument has been declared eligible to be given to the learner.

The next development phase is an empirical validity test of 36 private high school students in Jakarta, 11th grade. A given instrument is an instrument that has been improved based on the results of a validation test by an expert validator. Based on the results, the student then conducted the empirical validity test, reliability test, difficulty test of the issue, as well as the power test of different issues, so that the details of the question are worthy of being given to the learner. This study is similar to what was done by Kusuma Rahmadiyah (2020) on the Development of the Literacy Test of Scientific Diversity of Life, which was discussed by the students who used Analyze, Development, Design, Implementation, and Evaluation, or ADDIE, as well as test instruments to test validity and realisticity, which was performed using the validity of the element of the question and realism performed using the Kuder Richardson Formula 20 (KR-20).

The empirical validation result presented in Table 5 is the validity of the element using the Pearson product moment correlation coefficient. When the rtable value < rhitung, then the question element can be said to be valid, thus obtaining 18 valid questions and 12 invalid questions out of 30 questions in total. Then the stated question is invalid (rtabel > rhitung), and the question can be corrected or not used in the evaluation instrument (Sugiyono, 2016). In this study, inappropriate subjects are either discarded or not used. This is because the question has

not yet been able to measure the students' ecoliteracy abilities, and based on the said valid question, it is sufficient to represent any ecologiteracy dimension and indicator expected.

There are many factors that can influence the invalidity of the item, including internal factors that are eliminated by the test instrument and external factors that come from outside the instrument. These internal factors include the preparation of words in an unclear item so that the student does not understand the meaning of the item, the difficulty level of a topic that is so difficult for the student to answer a question, the number of questions that are too small to represent a sample, or answers that are too easy to predict by the student. Other factors are external, such as the limited time of the issue, so the student becomes less focused and rushed to work on the issue, there is fraud in the question, inconsistent scoring techniques, the student is less able to follow the instructions given, or the lack of explanation from the supervisor related to the way the item is written (Yusup, 2018).

Furthermore, the reliability test score of 0.791 belongs to the high category. The primary purpose of a reliability test is to determine how much variability the measurement error causes and how much the score variability is in the actual test, or to know to what extent a measure is reliable due to its inaccuracies. The magnitude of the reliability coefficient obtained can be seen from the level of rehabilitation (Setiyawan, 2014). One of the criteria that a measuring instrument must meet before it is used to collect data is rehabilitation.

The difficulty of the test results is calculated and shown in Table 6. Based on the calculation, there are three levels of difficulty in matters: easy, moderate, and difficult. The difficulty level of the question is the ratio between the number of test participants who answered the question with the correct answer and the number of participants in the test. (Iskandar & Rizal, 2017). This means that the more participants answer the question correctly, the higher the index of the difficulty level, which means the easier the question is answered. However, if fewer test participants respond correctly to the question, it can be understood that the question becomes more difficult. The problems found after obtaining the results of the difficulty level test of the issue, i.e., the uneven spread of the level of difficulty of the question, The number of questions that belong to this category is too large compared to other categories. So there is a need for further evaluation to improve the quality of the matter and produce a more even level of difficulty.

A good question is whether the level of difficulty is known to be neither too difficult nor too easy (Solichin, 2017). A question that is too easy does not encourage the student to make the effort to solve it (Hanifah, 2014). The degree of difficulty of a question may be due to the complexity of the question and the conditions of the choice of answers provided. The difficulty of the question depends on how easy or difficult it is for a student. A question with a level is more than easy compared to a medium level and difficult because of the skill or ability of the student in the school in answering it, not seen from the point of view of the teacher as the question maker. Difficulty is expressed by the percentage of students who answer the question correctly; the greater the proportion of students answering the question right, the easier it is.

The ability to distinguish is the ability of a subject to distinguish between a clever student and a less intelligent student. (berkemampuan rendah). The closer to the value of 1,00, the better the differentiator of the matter (Solichin, 2017). Based on the analysis of the different issues, there are still many issues that have bad criteria, which indicates that the subject does not have a good enough power to measure the ability of students. This may be due to: (a) the key to the question answer is inaccurate; (b) the item has two or more correct answers; (c) the measured competence is unclear; (d) the distortion does not work; (e) the question is too difficult, so many students guess; and (f) most students who understand the item think there is something wrong with the item. (Natar, 2011). Based on these factors, the criteria for bad questions need to be corrected so that they have good differential powers to measure the ability of the student.

This research is carried out only up to the development stage, whereas the implementation and evaluation stages are not implemented. The reason for not carrying out these two stages is due to time constraints and impossible conditions. So, it is necessary to continue this research to be able to find out to what extent such instruments are effective in developing the students' ecoliteracy skills.

Every detail of the matter is structured, adapted to the problems that occur, and easy or visible in the day-to-day activities, such as environmental issues. In order to be able to raise the level of concern, the child will be more sensitive to the conditions of the surrounding environment, including the natural environment where he lives, and learning will become more meaningful (Siregar et al., 2021). Environmental problems are important to address, as they cause environmental damage and misuse. One of the preventive efforts to overcome these disparities is learning to raise awareness of the importance of living environments. Ecoliteracy describes awareness of the importance of the living environment. With the achievement of which one is already very aware of the life environment, it is important to care for and maintain ecosystems, the earth, and nature as the development and residence of life (Lestariyanti & Hakim, 2020).

Through this eco-literacy, it is also expected to be able to generate these attitudes, because in the eco-literacy contained, these dimensions can be poured into the threshold of matters to measure the learner's ecoliteracy. Ecoliteracy is the ability to study the relationship between the environment and human beings to support sustainable development so that students have a good understanding of the environment that ultimately influences their attitude (Tyas et al., 2021). According to research conducted by Hanafi et al. (2021), it is said that environmental literacy tools need to be developed to measure the level of ambient literacy as one solution to addressing environmental problems.

CONCLUSION

Ecoliteracy skills need to be developed in the learning process by training students to become accustomed to working on ecoliteracy issues associated with environmental issues. The whole study uses an eco-literacy assessment instrument that matches the concept of environmental pollution. There are 30 issues scattered into some indicators of issues that have

been adapted to the Basic Competence and the dimension of ecoliteracy. Based on the results of the research, it can be concluded that the instrument of evaluation of ecoliteracy is declared appropriate, valid, and reliable. This shows that overall, the instrument has been worthy of use for students. As for the suggestions that can be followed, it is about developing an evaluation instrument similar to other biological materials and continuing this research to the stage of implementation and evaluation that has not yet been implemented.

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