Development of Textbook Based on Science Literacy on Ecosystem to Improve Science Learning Outcomes in Class V SDN 101783 Saentid Regency of Deli Serdang

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Abstract. This study aims to develop a science literacy-based textbook and test its feasibility and effectiveness. The development of the textbook uses a 4D model development procedure. Data collection instruments are in the form of assessment sheets for material experts, media experts, design experts, and learning outcomes tests. The method used in analyzing the data is using a quantitative descriptive technique which is stated in the rating scale category. The results of the development of the textbook product that has been validated state that the textbook product developed is feasible to use. The results of student learning completeness on the pre-test and post-test have differences. This shows that science literacy-based textbooks are more effective than commonly used textbooks.

Keywords: Textbooks, Science Literacy, Learning Outcomes.

1 Introduction

Scientific literacy is the ability to use scientific knowledge, identify problems, and draw conclusions based on evidence, to understand and make decisions about nature and its changes as a result of human activities. Scientific literacy needs to be mastered by every individual because it is not only limited to the development of science and technology but also relates to how one can understand the environment and other problems faced by modern society. In scientific literacy, there are several parts, including (1) Science as a body of knowledge; (2) Science as a way to investigate; (3) Science as a way of thinking; and science as the interaction of science, and technology in society.

Currently learning in elementary schools uses the 2013 curriculum or thematic learning that combines more than one material into one theme, including science. Science learning in the

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classroom has not fully made the surrounding environment an example of what is done during teaching and learning activities. Learning Natural Sciences in Elementary Schools is a lesson that has been systematically arranged and studies nature and its surroundings. In learning science in class V, scientific literacy can be applied to students through ecosystem materials. Ecosystem materials can involve the surrounding environment because these materials interact directly with the environment. Thus, ecosystem materials are expected to make it easier for students to understand learning because they can find examples when studying in the surrounding environment. Ecosystem materials are easily obtained through student handbooks. However, in the current student handbook, there are still many reading contexts so it is still a little difficult for students to understand. Thus, it is necessary to develop textbooks that make it easier for students to study ecosystem material.

According to [1], in essence, textbooks are the elaboration of curriculum content. Before the elaboration, it is necessary to pay attention to several things, including the objectives of primary or secondary education, educational standards, and learning theories, the use of language, media or images used, and others related to parts of the teaching book. Textbooks for students are a learning resource in which there are teaching materials for each meeting. Thus it is said that the textbook is a student handbook where there is material content that is interrelated to learning. The suitability of choosing textbooks can affect learning and increase the value of learning.

From the results of observations made in class V on Ecosystem material, it can be seen that in that class students are still less interested in reading the textbooks that have been provided. This is because the textbooks used are less attractive, besides the teaching materials, there are also other learning materials. So that students do not seem to focus on completing the ecosystem material being taught. Lack of student knowledge about the importance of reading books is one of the causes of problems that often occur when studying. Thus, educators are expected to use teaching materials, which are easy for students to understand. The solution to improving reading skills in the classroom is to choose and use the right textbooks when learning.

There are many ways that teachers can do in improving students' scientific literacy skills, one of which is by applying and choosing books that allow students to further develop their ability to master learning. Science learning essentially has main elements such as 1) product, science is not only presented about the concept of facts or concepts; 2) scientific processes, science to study natural processes and phenomena; 3) and IPA as attitude fertilization. In this case, the researcher develops a product in the form of a book based on scientific literacy where the book will describe the three main concepts of science. By developing science literacy-based textbooks, it is hoped that students will be more effective in learning so that students not only learn the components of scientific literacy but also the main elements in science learning.

Based on the background, it is known that the research objective is to produce a valid scientific literacy-based textbook product based on input and advice from experts so that textbooks can be used during the learning process.

2 Method

The research was conducted at the Basic Education Program, Medan State University, and State Elementary School 101783 Saentis Deli Serdang Regency in February 2022. The

subjects in this study were 4 expert lecturers and 20 elementary school students. Meanwhile, the object of this research is textbooks based on scientific literacy on ecosystem materials. This research is the development of Research and Development (R&D) by producing certain products. The development model uses Four-D by Thiagarajan. The procedures for this research model include: (1) defining, by analyzing the initial needs of students and teachers; (2) design, by designing the initial product as a result of the analysis from the previous stage; (3) development, by including the results of the revision of expert lecturers and conducting trials on the developed product; (4) and dissemination, by disseminating the final product of the development. Instruments in analyzing the data in the form of validation sheets for the feasibility of textbooks, the feasibility of graphics, and the feasibility of the presentation modified by [2] were filled by expert lecturers from Medan State University.

Data analysis on product development is descriptive and quantitative. The score data obtained from the validator is marked with a checklist in the form of a Likert scale table.

Table 1. Criteria Instrument using Likert Scale

No.	Answer Criteria	Score
1.	Very good	4
2.	Well	3
3.	Not good	2
4.	Not good	1

After the score results are obtained, it is analyzed to determine the percentage gain for each category that has been developed, using the formula [4].

$$Score(\%) = \frac{skor\ per\ kategori}{skor\ maksimal} x100\% \quad (1)$$

The results of the percentage analysis obtained are then confirmed as follows:

Table 2. Textbook Eligibility Category Criteria

Percent Value Interval	Criteria
85%-100%	Very good
70%-84%	Well
60%-69%	Pretty good
50%-59%	Not good

The reliability test in this study was conducted to measure the reliability, as well as the consistency of the test in measuring the data. [6] said that the reliability test can use the Kuder-Richardson formula.

3 Result and Discussion

This development has the aim of obtaining printed books on ecosystem materials.

Definition

The first stage in this development is analyzing student needs, collecting information about learning materials such as syllabi, and lesson plans, and observing the textbooks used. After that, observations were made on students, concept analysis, and task analysis. Based on the results of observations of current student teaching materials, students are less involved in learning, so it is known that the acquisition of learning scores is still not successful or many are incomplete. Task analysis for ecosystem materials is intended to make it easier for researchers to identify the main skills on the subject.

Table 3. Ecosystem Material Task Analysis

Topics	Type of activity	the meeting
Ecosystem Components	- Pay attention to the teacher's explanation. Students can determine the various components in the ecosystem in the surrounding environment correctly. - Conduct question and answer activities with the teacher. - Students can name the types of components in an ecosystem. - Solve problems related to the components contained in the ecosystem that have been listed in the book.	1
Relationships between living things in an Ecosystem	- Pay attention to the teacher's explanation, ask questions, and discuss with other students about the learning material. - Solve problems related to the relationship between living things in the surrounding environment that have been listed in the book.	2
Ecosystem Balance	- Pay attention to the teacher's explanation, ask questions, and discuss with other students about the learning material. - Solve problems related to the balance of the ecosystem that has been listed in the book.	3

Based on the task analysis table, it can be concluded that in learning students are given tasks based on each material contained in the product developed by the researcher.

Design

The stage in this development is to design an initial product that is adjusted to the results of the analysis at the definition stage. The results at this design stage are test questions, learning media, and assessment formats. The format of the book is the same as before, namely: title, KD, materials, supporting information, exercises and assessments.

Development

This development stage is: validation of material lecturers, media lecturers, and learning design lecturers; further testing 1.2 using the product developed.

Table 4. Validation of subject matter expert lecturers

Indicator	Validator 1	Validator 2	Average	Criteria
Content eligibility	84.37	93.75	89.06	Very good.
Serving Eligibility	87.5	90	88.75	Very good.
Average Earnings			88,90	Very good.

Table 5. Validation of Learning Media Expert Lecturers

Indicator	Validator	Criteria
Initial design	92.85	Very good.
Content design	100	Very good.
Textbook cover typography	91.66	Very good.
Content illustration	100	Very good.
Average Earnings	96.12	Very good.

Table 6. Validation of Learning Design Expert Lecturers

Indicator	Validator	Criteria
Serving eligibility	100	Very good.
Presentation	87.50	Very good.
language	91.66	Very good.
Image selection	100	Very good.
Earnings—average	94.79	Very good.

From the results of tables 2,3 and 4 above, it can be said that the acquisition of percentage values and expert responses is in the "Very Good" criteria. The results from the material lecturers got a score of 88.90%, the media expert lecturers got a score of 96.12, and the learning design experts got a score of 94.79%. The conclusion is that printed textbooks are suitable for use in the classroom.

Based on the calculation analysis, the reliability results obtained are 0.735. This means that the reliability of the student learning outcomes test of the developed product is in the "High" criteria. It can be said that all test items in the test meet the reliable criteria and can be used without revision.

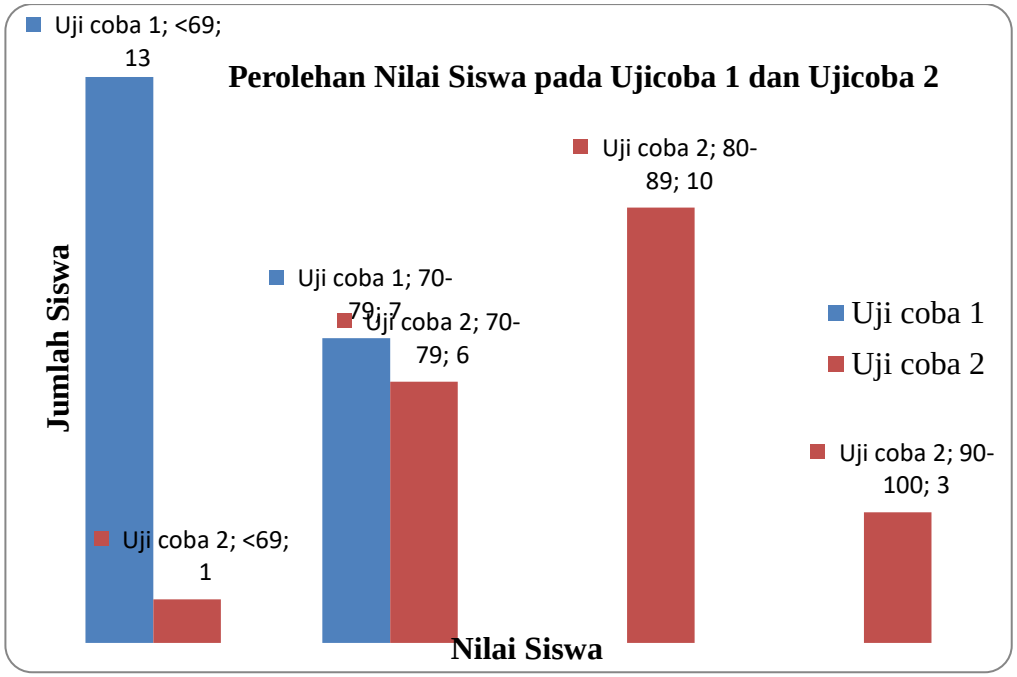

Figure 1. Student learning outcomes in trials 1 and 2

Based on table 4 above, it is known that the students who succeeded in the first trial were 7 students and 19 students during the second trial. Therefore, it can be said that the use of science literacy-based textbooks on ecosystem materials is successful in improving student learning outcomes.

Disseminate

The process of spreading this only to school teachers was investigated.

The product was developed in the form of a Science Literacy-Based Science book for ecosystem materials intended for fifth grade elementary school students.

Table 8. Composition of Materials in Ecosystem Textbooks Based on Science Literacy

Subject	Subject matter
Chapter 1. Ecosystem Components	
Science as the Body of Knowledge	a. Definition of ecosystem. b. Examples/types of pet food. c. Classification of animal types d. Life cycle. e. Life cycle in animals
Science as a way to investigate	Observing the animals found in the surrounding environment, then classifying the animal into what type of animal and mentioning the type of food from the animal.
Science as a Way of Thinking	a. Let's do it

Subject	Subject matter
	b. Let's observe c. Recalling d. Enrichment e. Let's practice f. Let's write g. Let's discuss h. Competence test
Science Interaction with Society	a. Environment in the ecosystem (abiotic and biotic) b. Activities carried out by humans in the face of changing ecosystems.
Chapter 2.Relationships Between Living Things In Ecosystems	
Science is the Body of Knowledge	a. Definition of symbiosis b. Types of symbiosis c. Definition of food chain d. The relationship between living things in an ecosystem
Science as a way to investigate	Investigate the types of animals found in certain ecosystems, then look for similarities and differences between animals that live in one ecosystem and another.
Science as a Way of Thinking	a. Let's practice b. Let's observe c. Let's do it d. Let's think e. Competence test
Science Interaction with Society	a. Relationship between living things and their environment
Chapter 3. Ecosystem Balance	
Science of the Body of Knowledge	a. Understanding ecosystem balance. b. Food chain, c. Food webs. d. Factors causing disruption of ecosystems.
Science as a way to investigate	analyze the types of human activities that can harm the local ecosystem
Science as a Way of Thinking	a. Let's practice b. Let's try c. Let's do it d. Competence test
Science Interaction with Society	a. The relationship of every living thing in the balance of the ecosystem

The composition of the material that has been designed aims to make it easier for readers to understand the part of scientific literacy in the developed textbooks. In each chapter, there are indicators of scientific literacy that students must learn. Thus, students can focus more on the distribution of ecosystem materials from books that have been developed. The front of the textbook is made based on the existing environmental concept so that the cover and the contents of the book are still related to each other.

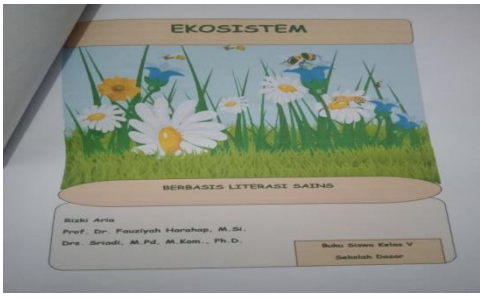

Figure 2. Cover of science literacy-based textbooks on ecosystem materials

Discussion

The results of the development of the textbook were reviewed by expert lecturers from Medan State University. The validation of material expert lecturers is carried out by two lecturers from the Unimed postgraduate program, while for media and learning design by one expert lecturer each. Thus, the researcher used four expert lecturers in developing science textbook products based on Ecosystem material science literacy in elementary school. After filling in the score data on the instrument, suggestions and input were given regarding the development of textbooks that had been carried out.

The opinion of the material expert is that the material is still small, so it is necessary to add to the textbook material. Input from media experts, namely the size of the image in the book to be enlarged so that it is more clear for students to understand the image. Input from learning design experts is whether the pictures in the book are made in real form or not in the form of animation, and the picture is made as a description of the picture. The appearance of attractive textbooks is expected to increase students' desire to participate in learning activities both inside and outside the environment.

Aspects of the developed textbooks are stated to be very good invalidity because the product after being developed is by the indicators on the instruments that have been provided. Based on the score of the material expert, it is said that the material is appropriate so that it supports teaching and learning activities. The media aspect of the developed textbooks is said to be very good for use during teaching and learning activities. Because the product is by the expected presentation instrument. The learning design aspect is declared valid because it is following the expected presentation standards. The validity status in each category has been declared very good because it has been adjusted and compiled based on the grid from the assessment of the textbook instruments provided.

The product that has been developed makes students more active with the illustrations that are placed, with these illustrations students will be more enthusiastic and the interaction between educators and students is better. Based on the instrument category, it is known that the science literacy-based textbooks on ecosystem materials have been systematically prepared for students. The material chapters contained in the textbook make the surrounding environment the main material for the media in its preparation so that students have no difficulty in thinking about the types of examples given during learning.

4 Conclusion

The validity of the development of the product that has been developed has been in very good criteria so that the product is declared suitable for use for learning activities with ecosystem materials. The scientific literacy used has also been well structured based on suggestions and input from validation experts so that students can more easily understand the learning material by utilizing the scope of the material and also part of the learning that involves parts of the ecosystem. The score obtained is the expert lecturer presenter88.90%, media experts 96.12, and learning design experts got a score of 94.79%. The score is obtained by conducting a study of the textbook using the specified instrument.

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