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Development of a Teaching Module on Classification of Living Things Based on Biodiversity Analysis at Irenggolo Waterfall

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ABSTRACT. This research aims to develop a teaching module on the classification of living organisms to facilitate students' understanding of the subject. The study employs the Research & Development (R&D) method using the 4D model, which consists of four stages: Define, Design, Develop, and Disseminate. In the Define stage, the researcher conducts an initial analysis to identify problems in the teaching of science, specifically on the topic of classification of living organisms. In the Design stage, the researcher designs the teaching module that will be developed. During the Develop stage, the teaching media and materials are created according to the designed plan and are then validated by subject matter experts and media experts. In the Disseminate stage, the product is distributed through schools. The developed teaching module received a media validation score with a validity percentage of 72%, categorized as highly valid and suitable for use. The content validation showed a validity percentage of 96.7%, also categorized as highly valid and suitable for use. In addition to expert validation, the feasibility of the media was also assessed based on student response surveys, which showed a percentage of 94% with a criterion of highly suitable. Based on the reliability test results, it was found that the Cronbach's Alpha value was 0,651 with a total of 20 items tested. Since the Cronbach's Alpha value is greater than 0.60, it can be concluded that the research instrument has an adequate level of reliability and consistency in measuring the variables being studied variables.

Keywords: media development, module, classification of living organisms, biodiversity

INTRODUCTION

Biodiversity is one of the important indicators of ecosystem health on our planet. The high level of biodiversity indicates the complex and interdependent interactions between different species, which play a role in maintaining the balance of vital ecological functions, such as the nutrient cycle and climate regulation. Irenggolo Waterfall is a vivid example of a biodiversity-rich habitat, which supports a wide range of species with special adaptations to the waterfall conditions.

Irenggolo Waterfall is an example of a habitat with high and unique biodiversity. The humid environment and continuous flow of water create ideal conditions for a wide range of species, from the microorganisms inside the waterfall to the surrounding plants and animals. The dynamic water flow in the falls creates zones that support typical vegetation such as mosses and aquatic plants, which in turn provide habitat for insects, amphibians, and birds. Around the falls, transition zones support species that are tolerant of environmental changes, such as forest plants and shade animals, and provide insight into species adaptations and interactions between them.

Understanding the classification of living things is a key element in science education, as it provides a solid foundation for students to understand biodiversity and the relationships between species (Budiarto & Rahmawati, 2018). Classification helps students learn how species are grouped based on similarities and differences in their characteristics, as well as how

evolutionary relationships are between them. It is the foundation for a deeper learning of ecology, evolution, and biology in general.

Teaching the classification of living things in the Independent Curriculum supports learning that is contextual and relevant to the student's surrounding environment. By providing materials that are directly related to the diversity of local species, students can more easily understand and appreciate the biodiversity around them. It also helps in building practical and scientific skills that can be applied in real-world contexts.

The teaching module of the classification of living things is a teaching material that is designed systematically and comprehensively to facilitate the learning of the concept of classification of living things, including learning objectives, teaching materials according to the curriculum, practicum activities, student worksheets, evaluations, and guides for teachers. Based on the Independent Curriculum, this teaching module is specially designed for grade VII students by considering their level of understanding, using an interactive and student-centered approach.

Effective media allows students to more easily understand complex concepts such as biodiversity and the classification of living things. Additionally, innovative educational media can help students develop critical thinking skills and scientific skills necessary for further research and exploration. In this way, media development not only enriches the learning experience, but also prepares students to become skilled scientists and think critically in the future.

The selection of Irenggolo Waterfall as the research location is based on the uniqueness and relevance of the research on the classification of living things. The waterfall offers an environment rich in biodiversity, with a variety of species of flora and fauna adapting to the specific conditions of the falls. This provides an opportunity to examine the classification of living things in a unique and dynamic context, different from other habitats such as forests or grasslands. Research at this site allows for the exploration of species variations and their adaptations to the waterfall environment, as well as groupings based on morphological and ecological characteristics.

Finally, the selection of this location also considers aspects of conservation and environmental protection. By focusing research on important biodiversity such as Irenggolo Falls, this research can raise awareness about the need to protect natural habitats and support sustainable conservation efforts, in line with the principles of environmental conservation and sustainable education.

To find a comparison that will be used as a basis for developing new innovations in this study, the researcher refers to the results of previous research as reference material. For example, research conducted by Siti Rohmah in 2018 with the title Biodiversity Analysis in Waterfall Biodiversity as a Source of Science Learning (Rohmah, 2018). The results of the research found that the biodiversity of waterfalls has high biodiversity and can be used as an interesting and effective source of learning. Agus Santoso's research conducted in 2019 with the title Development of Fern Plant Book Herbarium (*Pteridophyta*) at the Rembangan Termite Garden Waterfall as a Learning Media for Mater I Biodiversity and Classification of Class X Living Creatures at Mas Raudlotul Muta'Allim Foundation (Susanto, 2019) with the results of biodiversity-based MODULE research increases students' understanding of the concept of biodiversity and interspecies interactions. The research conducted by Andi Rahmat which was carried out in 2020 with the title The Use of Digital Teaching MODULES in Ecology Learning to Improve Student Understanding (Rahmat, 2020) with the results of the digital teaching MODULE research is effective in increasing students' understanding of the concept of ecology. Research conducted by Budi Wibowo which was carried out in 2021 entitled The Effectiveness of Project-Based TEACHING MODULES in Improving the Understanding of Biology Concepts of Junior High School Students (Wibowo, 2021) with the results of project-based TEACHING MODULES improving students' understanding of biology concepts and critical

thinking skills. Students (Kusuma, 2020) with the results of the research Environment-based learning significantly improve students' science process skills.

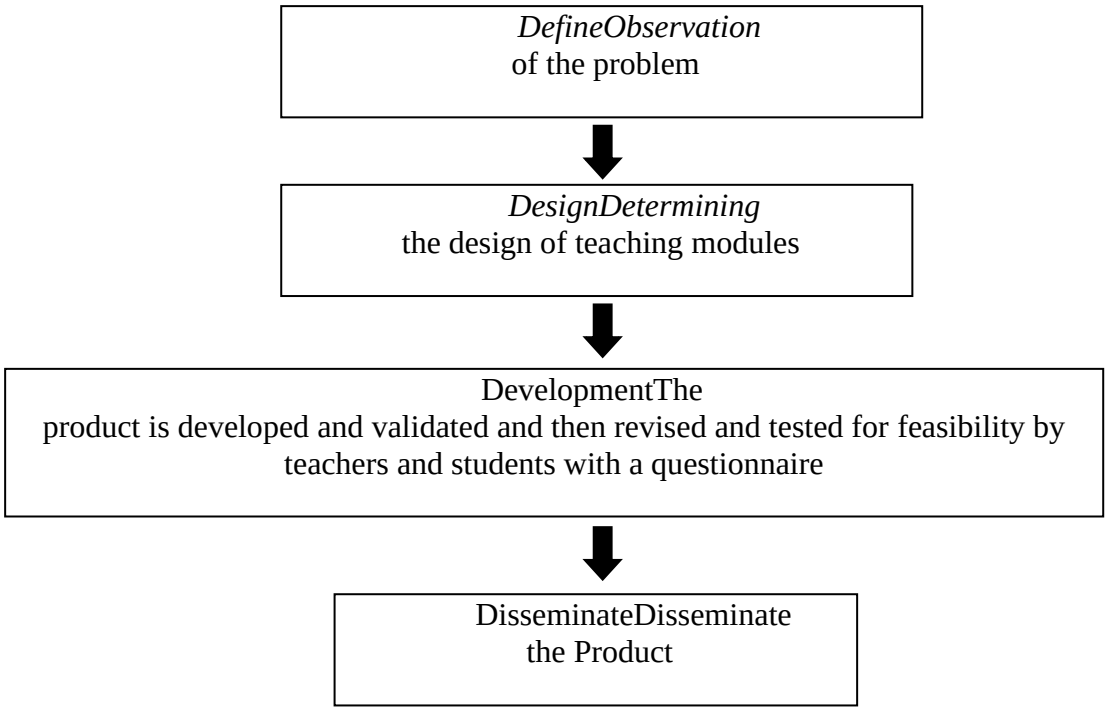
After observation at MTsN 8 Kediri, the results were obtained that a learning module is needed that applies the appearance of nature around students and can increase students' motivation to learn and. It is hoped that the application will increase students' awareness to protect the surrounding environment. So the development of this module is very necessary. Because it not only discusses material about the classification of living things, but also uses the environment around students as material for their learning.

This study aims to test the development of a teaching module for the classification of living things based on the analysis of biodiversity in Irenggolo Waterfall which was developed to help student understanding and to test the validity of the teaching module developed in helping student understanding.

METHOD

The research methodology to develop a teaching module on the classification of living things in the context of biodiversity analysis in the Irenggolo Waterfall biodiversity uses a *Research and Development (R&D) approach*. Research and Development (R&D*) research methodology* is a systematic approach that aims to develop and improve a product or process through structured stages of research and development (Okpatrioka, 2023) The 4D development model includes Define, Design, Develop, and Disseminate (Hartono, 2022)

Table Model 4D



The subject of this study is grade VII students at MTsN 8 Kediri. The research instruments used are observation instruments carried out by researchers at Irenggolo Waterfall and questionnaire instruments that contain questions designed to find out views on various aspects of the teaching module, such as the level of difficulty of the material, the clarity of presentation, the effectiveness of visual aids, and how interesting the teaching modules arefor them. This questionnaire instrument will be filled by material expert validators, media expert validators, teachers and students. The data obtained in this study are in the form of quantitative and

qualitative data. Qualitative data was obtained from observations and field notes conducted by researchers at Irenggolo Waterfall. Meanwhile, quantitative data was obtained from filling out questionnaires carried out by material expert validators, media expert validators, teachers and students.

The data analysis technique used in this study is in the form of descriptive statistical analysis. Descriptive statistical analysis is a data analysis method used in this research and development to process data from development.

RESULT AND DISCUSSION

Define stage

The initial analysis of the research highlights the need for learning media that are in accordance with the Merdeka curriculum for schools. One of the competencies that must be mastered by students at this level is the ability to understand and classify living things based on their special characteristics. In this case, there is an urgent need to provide teaching modules that are comprehensive, systematic, and in accordance with the applicable curriculum. In addition to analyzing the need for learning media, the researcher also analyzed various flora and fauna in the Irenggolo Waterfall area, an area that is still very natural with high biodiversity. The results of the analysis obtained by the researcher are that Irenggolo Waterfall is located in a very natural area with the dominance of trees and forests.

Design stage

The choice of media and format is very important to ensure efficient learning activities and make students more active and interested in participating in learning. In the context of this research, namely the development of teaching module media for classification materials for living things. After the selection of media and format, the researcher made a design of the teaching module that will be developed for the classification material of living things.

Develop stage

The research on the development of the teaching module for the classification of living things produced quantitative and qualitative data. Quantitative data is obtained from the results of questionnaires or questionnaires that have been filled out by validators, while qualitative data comes from suggestions and comments given by validators. This validation aims to determine the validity and feasibility of the teaching module media classification of living things before it is applied to students.

The analysis of the Validation Data of the Teaching Module Classification of Living Things was carried out by one expert validator, the validator was a Lecturer at IAIN Kediri, Mrs. Dr. Yulianti Yusal, M.Pd. The following data analysis of the material validation results can be seen in the table 1.

Table 1. Data Analysis Table of Material Expert Validation Results

Indicator	Material Expert
Total Score	116
Maximum Score	120
Average Validity Percentage	96,7%
Validation Criteria: Highly Valid	

The analysis of Media Validation Data for the Teaching Module of Classification of Living Beings was carried out by one expert validator, the validator was a Lecturer at IAIN Kediri, Mrs. Ummiy Fauziyah Laili, M.Si. The following is the analysis of the data from the media validation results seen in the table 2.

Table 2. Data Analysis Table of Media Expert Validation Results

Indicator	Media Members
Total Score	86
Maximum Score	120
Average Validity Percentage	72%
Validation Criteria: Valid	

The analysis of questionnaire data by the teacher of the Teaching Module Classification of Living Things was carried out by one person, the teacher was a science teacher at MTsN 8 Kediri, namely Mrs. Yaraful Maspiah, S.Pd. The following is an analysis of the questionnaire data results seen in the table 3.

Table 3. Data Analysis Table of Teacher Readability Results

Indicator	Teacher Readability
Total Score	80
Maximum Score	80
Average Validity Percentage	100%
Validation Criteria: Highly Valid	

Table 4. Data Analysis Table of Student Readability Results

No.	grain	Student Respondent Score									
		S 1	S 2	S 3	S 4	S 5	S 6	S 7	S 8	S 9	S 10
1	1	4	4	4	4	4	4	4	4	4	4
2	2	4	3	4	4	4	4	3	3	4	4
3	3	4	4	4	4	4	4	4	4	4	4
4	4	4	4	4	3	4	4	4	3	4	4
5	5	3	4	4	4	4	3	3	4	4	3
6	6	3	4	4	4	4	4	4	4	4	3
7	7	4	4	4	4	4	4	4	4	4	4
8	8	4	4	4	4	4	4	4	4	3	4
9	9	4	4	4	3	3	3	4	4	4	4
10	10	4	4	3	4	3	2	4	4	3	4

No.	grain	Student Respondent Score									
		S 1	S 2	S 3	S 4	S 5	S 6	S 7	S 8	S 9	S 10
11	11	4	4	3	4	4	3	4	4	4	4
12	12	3	4	4	4	4	2	4	3	4	3
13	13	4	4	4	4	4	4	4	4	4	3
14	14	4	4	4	3	3	4	4	3	4	3
15	15	4	4	4	3	3	4	4	3	4	3
16	16	3	3	4	4	4	2	3	4	4	4
17	17	4	4	4	4	4	2	3	4	4	4
18	18	3	4	4	3	4	3	3	4	4	4
19	19	4	4	4	4	4	4	4	4	3	3
20	20	4	4	4	3	4	4	4	3	4	4
Sum		75	78	78	74	76	68	75	74	77	73
Total Amount											748
Maximum Score											800
Average Validity Percentage											94%
Validation Criteria: Highly Valid											

The description of the material validation above is calculated by data management from Sugiyono using the following formula:

$$P = \frac{\sum x}{N} x\ 100\%$$

$$P = \frac{748}{800} x\ 100\%$$

$$P = 94\%$$

Based on the Likert Scale 4.9 table and the available table results, the average percentage of student readability validity was obtained at 94%, which shows the Very Valid criterion. With these results, it can be concluded that the material in the teaching module media is declared to be Very Valid and appropriate to use.

The results of the reliability test for the variables in this study are as follows:

Reliability results image

Reliability Statistics

Cronbach's Alpha	N of Items
.651	20

Based on the results of the reliability test displayed in the table "*Reliability Statistics*," it is known that *Cronbach's Alpha* value is 0.651 with the number of items tested as many as 20. Because the *value of Cronbach's Alpha* is greater than 0.60, it can be concluded that the research instrument has an adequate and consistent level of reliability in measuring the variables studied.

Disseminate stage

The dissemination stage is the last stage of the research and development process of the 4D model.

CONCLUSION

The research on the development of a teaching module on the classification of living things based on biodiversity analysis in Irenggolo Waterfall uses a research and development (R&D) research method using the 4-D model (define, design, develop, disseminate). The validity of the media in this development research was obtained from the results of validation data analysis by media experts, material experts, and student response questionnaires. Media validation shows a validity percentage of 72%, which is categorized as very valid and worthy of use. The validation of the material showed a validity percentage of 96.7%, also categorized as very valid and suitable for use. In addition to validation from experts, the feasibility of the media was also assessed based on the results of the student response questionnaire, which showed a percentage of 94% with very feasible criteria. Based on the results of the reliability test, it is known that the value *of Cronbach's Alpha* is 0.651 with the number of items tested as many as 20. Because the *value of Cronbach's Alpha* is greater than 0.60, it can be concluded that the research instrument has an adequate and consistent level of reliability in measuring the variables studied.

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