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ISLAMIC SCIENCE TECHNOLOGY BASED ENVIRONMENTAL MANAGEMENT MATERIAL TEACHING MODULE TO IMPROVE 6C

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ABSTRACT

Developing learning media at the junior high school level is the focus of this research. The importance of information and communication technology is to support students in learning activities and create interesting media for learning. This teaching module discusses the importance of maintaining human behavior to live in harmony with nature. By instilling the nature of caring for the environment in students, it will grow a sense of mutual care and prevent damage to the natural environment. This study aims to develop a teaching module for the Pancasila Student Profile for educators implementing the Merdeka Curriculum. The Merdeka Curriculum includes 6C skills which is an addition to the role of skills 21st century. The teaching module developed by this researcher is differentiated, namely PAI with IPA. The method used is the R&D research and development method. This research is used to validate and develop a learning media that adapts the 4D model, namely define, design, develop, and disseminate by distributing learning media feasibility questionnaires. This research involved biology lecturers, PAI teachers, and biology teachers. The evaluation of the Islamic science technology-based environmental management module resulted in high feasibility percentages of 90%, 96.25%, and 98.75%. With a very feasible category, this teaching module can be used as an attractive learning media to support the learning process, thereby improving student learning outcomes. Therefore, the author recommends this development research be used as a reference for further research related to learning media in the form of teaching modules for the Merdeka Curriculum.

Keywords: *6C; environmental management; islamic science technology; teaching module*

INTRODUCTION

The effectiveness of the learning process relies heavily on the teacher's capacity to implement creative and innovative learning models, stimulating greater student engagement (Desi & Hani, 2020). A recent study conducted initial

observations of several junior high school teachers, revealing challenges in implementing both online and offline learning, as well as a lack of student engagement. The swift evolution of information technology in today's globalized and information-driven era has catalyzed the advancement of learning media (Anshori, 2018). Presently, teachers have access to a wealth of online resources encompassing strategies, methods, models, and learning media (Nugraha et al., 2021). Nevertheless, field observations indicate that classroom learning still lacks diversity for students, and teachers often exhibit limited understanding of available multimedia. In fulfilling their daily responsibilities, teachers must proficiently devise, execute, and assess learning using a Learning Implementation Plan (Meishanti, 2022).

Teachers play a crucial role in educating and developing the younger generation. To effectively develop their students, teachers themselves must continue their professional development, particularly in acquiring 21st-century skills (Hermawan et al., 2023). This includes the ability to create effective and efficient learning tools, such as lesson plans, modules, and student worksheets, as well as developing assessments. Teaching modules are essential teaching materials that are designed to facilitate independent learning in a systematic and engaging (Lestari et al., 2019). These materials are important for developing students' critical thinking skills and problem-solving abilities to achieve educational goals (Santosa et al., 2021)

The researcher has developed a differentiated teaching module, distinct from Islamic Religious Education and Natural Science subjects. The research methodology employed is the Research and Development (R&D) approach, which aims to validate and refine educational products or learning materials. This R&D process follows the 4D model, encompassing define, design, develop, and disseminate, ultimately culminating in the distribution of feasibility questionnaires regarding the learning materials. The subjects involved in the study include biology expert lecturers, Islamic religious education teachers, and biology teachers. Upon evaluation, the Islamic technology science-based environmental management teaching module received high percentages of 90%, 96.25%, and 98.75% from three learning design experts, categorizing it as very good.

This outcome supports the conclusion that the Islamic technology science-based environmental management teaching module is an engaging and effective learning aid that improves student learning outcomes.

The author concludes that teaching modules are tools educators use to facilitate learning and achieve the Pancasila Learner Profile and Learning Outcomes. On the other hand, the Learning Implementation Plan (RPP) is a program that aligns with specific Basic Competencies (KD) in the curriculum/syllabus. It guides teachers to ensure that the teaching is focused on the predetermined Basic Competencies (KD).

Environmental education significantly influences students' attitudes during learning (Yanti & Yusliani, 2020). The definition of ecological expertise is extensive, with Law No.32 of 2009 on environmental protection and management defining the environment as the unity of space encompassing all objects, forces, conditions, and living things, including humans and their behavior that impact nature, the continuity of life, and the well-being of humans and other living organisms (Supriatna, 2021). The environment encompasses all living and non-living elements within our surroundings and affects many aspects of human life (Supriatna, 2021). Educational initiatives can help individuals understand the impacts on the ecosystem in their surrounding environment. Schools can serve as platforms to integrate environmental education within the curriculum, fostering a love for nature and the environment. By instilling a sense of environmental care in students, a mindset and actions are formed to prevent natural environmental damage and strive to rectify any harm that has occurred (Nugroho, 2022). Notably, Article 9, paragraph (3) emphasizes that "everyone has the right to a good and healthy environment" (Arum et al., 2021).

In the contemporary era, there is notable progress in Science and Technology. The Qur’an underscores the significance of observing natural phenomena and engaging in contemplation. Science and Technology are inherently interconnected, and enhancing the quality of learning resources in the technological age is paramount. Technology facilitates independent access to educational materials for students. Furthermore, the acquisition of

science process skills is imperative for practical knowledge attainment. Experimental or activity-based learning is emphasized over theoretical learning to help students comprehend the relevance of theoretical concepts in real-world scenarios. Encouraging students to apply their knowledge in their daily lives fosters an understanding of the potential in their environment. Science process skills play a crucial role in this regard as they encompass scientific methods for acquiring and developing knowledge. Direct training to build knowledge has the potential to establish lasting knowledge retention in students (Mardianti et al., 2020).

This research seeks to develop a teaching module for the Pancasila Learner Profile to support educators in implementing the Merdeka Curriculum. In the current educational curriculum, teachers are required to incorporate the "Pancasila Learner Profile" as mandated by the Ministry of Education and Culture through Minister of Education and Culture regulation (Permendikbud) No.22 of 2022, which outlines the Ministry's Strategic Plan for 2020-2024 (Santoso et al., 2024). 21st-century education aims to equip individuals with information and technology management skills, the ability to learn and innovate, and the development of good character to meet global market demands. To meet the increasing demand for science and technology-based products, the education system needs to be responsive to these challenges (Sari et al., 2024). The current Merdeka curriculum introduces an expanded set of skills known as 6C, including character, citizenship, critical thinking, creativity, collaboration, and communication. The implementation of these skills emphasizes humanistic aspects in education, focusing on values and character development alongside subject mastery. This approach differs from previous research as it targets educators and lacks specific implementation guidelines. The research utilizes teaching modules as a learning medium, designed for efficient use and accessibility through printing or online download.

MATERIALS AND METHODS

This study is a Research and Development (R&D) project using the 4D development model (Suryaman & Suryanti, 2022). R&D is a research method used to create and test the effectiveness of products (Astutik et al., 2023). The developed product is a

teaching module based on Islamic technology science for learning purposes. The study involved Biology experts, Islamic Religious Education Teachers, and Biology Teachers. The techniques and instruments used for product validation included questionnaires and documentation. The development of the teaching modules was based on the 4D development model, which consists of five stages: Define, Design, Develop, and Disseminate (Melina et al., 2021). The stages involved preliminary study, product design, development, and dissemination through a barcode link. The data analysis techniques used included qualitative and quantitative methods. Qualitative data was analyzed to serve as a reference for product improvements, while quantitative data analyzed the scores of the validation questionnaire completed by the biology learning design experts, Islamic Religious Education teachers, and biology teachers to determine the learning media's feasibility.

RESULTS AND DISCUSSION

Product Trial Results

In previous studies, non-interactive qualitative research was conducted using the concept/content (text) analysis method. The research examined all text/content in various journals related to the development of environmental awareness in Islamic education. The study aimed to implement the development of environmental awareness in Islamic education by internalizing environment-based religious values in Islamic educational institutions. The research sought to realize learning methods using a values-based approach in every lesson, especially focusing on environment-based religious values, as well as the cultivation of role models with noble morals, particularly those who demonstrate concern for the environment (Nurulloh, 2019).

In this study, the authors used the R&D research method so that the trial data conducted in the research on the development of Islamic science technology-based environmental management teaching module learning media was carried out directly to the subject. The results of the subject data analysis are used as a basis for knowing whether or not the learning media developed is feasible. Research in the development of this learning media uses qualitative and quantitative data analysis

techniques, namely data analyzed descriptively, measured, and calculated obtained from the scores of learning design expert validation results and response scores from teachers (Tampubolon & Siregar, 2023). In this study, the research scale used was the Likert Scale. According to Sugiyono, the Likert scale is used to measure the attitudes, opinions, and perceptions of a person or group of people about social phenomena (Pranatawijaya et al., 2019). The questionnaire distributed in this study was using a Likert scale. The answer to the Likert scale choice is shown in **Table 1**.

Table 1. Likert Scale Rating Guidelines

Media and Material Validation Assessment	Student Response Assessment	Score
Very Good	Very Interesting	5
Feasible	Interesting	4
Decent Enough	Quite Interesting	3
Less Feasible	Less Attractive	2
Very Less Feasible	Very Less Interesting	1

Source : (Saski, N.H. & Tri, S., 2021)

The following are the research steps in R&D development (Pratama et al., 2021):

Define Stage

The development model of this research adapts the 4D model, namely Define, Design, Develop, and Disseminate (Rafida et al., 2022). This defining stage is the first step before designing the media, at this stage, it can be done by determining and defining the needs of a development. the need in question is something that can show the basic needs of why a learning media needs to be developed. Several stages must be done as follows:

Learner Analysis

All processes in learning must be adapted to the characteristics of the learners and things that need to be considered to find out the characteristics of the learners, namely cognitive development, psychomotor, and through analysis of learning outcomes.

Material Analysis

Based on the reality encountered in the field learning will be more interesting if the subject matter delivered by the teacher is more concise but easy to understand.

Design Stage

Design stage, at this stage, aims to produce a media design that will be developed, namely the Islamic Science Technology-Based Environmental Management Teaching Module to improve 6C. The design of learning media refers to the results of the analysis that has been carried out at the defining stage. This design consists of two stages, namely the collection of materials by the concepts that have been compiled in the draft, which are collected through observation, interviews, documentation, reference books, journal articles, and learning modules. The process of preparing the teaching module contains material.

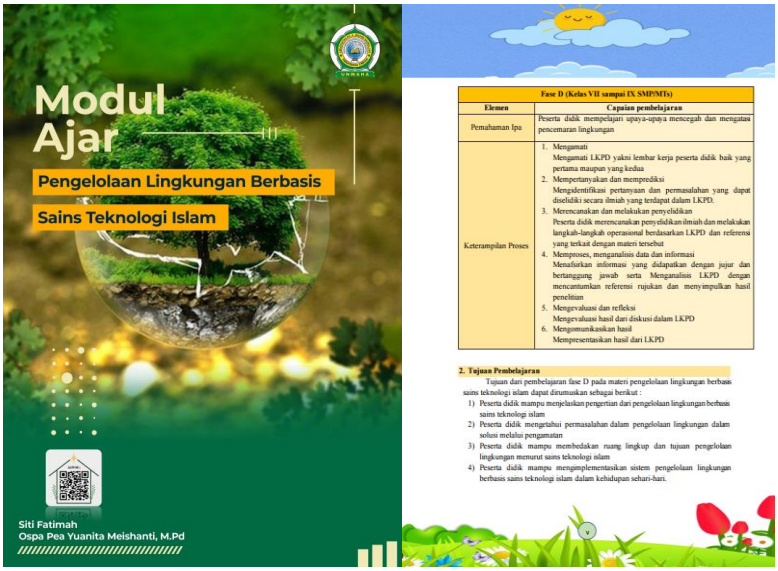

Figure 1. Picture Teaching Modules

Stage Develop

At this stage is the next sequence of steps, namely a process of making or realizing the design process (design), where the product development is a teaching module of Islamic technology science-based environmental management material to improve 6C. This teaching module is made as one of the plans for carrying out the learning process. Then the results of the product design are given to experts, namely learning design experts to determine the feasibility of teaching modules on Islamic technology science-based environmental management materials to improve this 6C.

Disseminate Stage

This stage is the distribution of the developed product, at this stage the distribution is limited through the link and has a barcode. The subjects of this

study were Biology Expert Lecturers, Biology Teachers, and Islamic Religious Education Teachers (**Tabel 2**).

Tabel 2. Validation Results

No	Question Item	Score			Xi	Total Max. Score	Percentage (%)	Criteria
		V1	V2	V3				
1.	The cover of the Teaching Module contains the university logo, writing using the Calibri body font, and below is the name of the author and the supervisor	5	5	5	15	15	100	Very Good
2.	There is general information consisting of the author, school name, school year, phase/subject matter, time allocation, number of meetings	4	4	5	13	15	86,66	Very Good
3.	Specific information raises the profile of Pancasila students and character education	5	5	5	15	15	100	Very Good
4.	The description of facilities and infrastructure, namely tools and materials along with teaching resources and teaching media	5	5	5	15	15	100	Very Good
5.	There is a target of students to be achieved by the Ministry of Education, culture, research, and Technology number 008/h/kr/2022	5	5	4	14	15	93,33	Very Good
6.	Scientific-based learning model	5	5	5	15	15	100	Very Good
7.	*Hybrid Learning* learning method	4	4	5	13	15	86,66	Very Good
8.	Core Competencies consist of Learning Achievements, Learning Objectives, learning objectives flow, meaningful understanding, learning activities	5	5	5	15	15	100	Very Good
9.	There is environmental management material which includes definitions, scope and objectives, environmental/recycling management systems	5	5	5	15	15	100	Very Good
10.	There is a relationship between environmental management, science, technology, and Islam along with their arguments	3	5	5	13	15	86,66	Very Good
11.	There is an assessment that includes diagnostic, formative, and summative assessments	5	5	5	15	15	100	Very Good
12.	Enrichment which contains questions about matchmaking	5	4	5	14	15	93,33	Very Good
13.	The remedial contains LKPD (student worksheets) I & II	3	5	5	13	15	86,66	Very Good
14.	There is an assessment grid	3	5	5	13	15	86,66	Very Good
15.	There is a Glossary which is a collection of lists of important words or terms	5	5	5	15	15	100	Very Good
16.	There is a bibliography of reference sources from Islamic science-technology-based environmental management teaching modules	5	5	5	15	15	100	Very Good
	Total number	72	77	79	228	240	95	
	of percentages	90	96,25	98,75				

Information:
V1 = Biology Lecturer
V2 = Islamic Religious Education Teacher
V3 = Biology Teacher
Xi = Total Validator Score

The trial data consisted of validation results from expert lecturers in learning design. This validation activity was carried out by one Biology expert lecturer, Mrs. Ospa Pea Yuanita

Meishanti M.Pd, one Islamic Religious Education Teacher, Mr. M. Syauqi Zam-Zami S.Pd, and one Biology Teacher, Mr. Fajrul Falah M.Pd. Based on the data from expert validation, learning design was obtained from the results of a questionnaire given to Biology lecturers at KH University. A. Wahab Hasbullah Tambakberas Jombang, Mrs. Ospa Pea Yuanita Meishanti, M.Pd. The validation questionnaire for the development of learning media teaching modules on environmental management materials based on Islamic science and technology contains 16 criteria including advice sheets and comments. The suggestions and comments provided by material experts are used as considerations to improve the learning media of teaching modules on environmental management materials based on Islamic science and technology. The percentage obtained is 90% with Very Good eligibility criteria. The suggestions and material expert comments on the teaching module on environmental management material based on Islamic science and technology are as follows:

The percentage obtained is 96.25% with Very Good eligibility criteria. The suggestions and material expert comments on the teaching module on Islamic science-technology-based environmental management material are as follows:

a. It's good and interesting, it's just how the teacher applies the teaching module in the classroom.

As for the data from the validation results of learning design experts, it was obtained from the results of a questionnaire given to the MTs biology Teacher. Roudlotul Ulum Mojoduwur, Mojowarno Jombang, namely Mr. Fajrul Falah, M.Pd. The validation questionnaire for the development of learning media, and the teaching module on environmental management material based on Islamic science and technology contains 16 criteria including advice sheets and comments. The suggestions and comments provided by material experts are used as considerations to improve the learning media of the teaching module on environmental management material based on Islamic science and technology. The percentage obtained is 98.75% with Very Good eligibility criteria. The suggestions and material expert comments on the teaching module on Islamic science-technology-based environmental management material are as follows:

a. Learning media is very helpful for the learning process
b. Attractive design
c. Easy to understand

CONCLUSIONS

Based on the results of the analysis obtained, it can be concluded that the use of learning media in the form of teaching modules can improve student learning outcomes and can have a positive impact on students in the learning process. Based on the data table of the results of the validation of learning design expert lecturers, learning media in the form of Islamic technology science-based environmental management teaching modules received very good criteria with a percentage of 90% of the validation results of biology learning design expert lecturers. Meanwhile, from the learning design expert of the Islamic Religious Education Teacher, the media received very good criteria with a percentage of 96.25%. For Biology Teacher learning design experts, learning media in the form of teaching modules for environmental management based on Islamic technology science received very good criteria with a percentage of 98.75% of the results of the validation of learning design expert lecturers.

All the results of the description above, show that the Islamic technology science-based environmental management teaching module can be used as an attractive learning media and is suitable for use to support the learning process so that it can improve learning outcomes in students. Therefore, the authors recommend this development research be used as a reference for further research related to learning media in the form of teaching modules.

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science-based environmental management teaching module received very good criteria with a percentage of 98.75% of the results of the validation of the learning design expert Biology Teacher.

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