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The Development of Inquiry Based Integrated Science Modules on The Structure and Function of Plant Tissues Integrated with Religious Values for Class VIII Secondary School

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Abstract

The purpose of this research is to create an Inquiry-based integrated science module that focuses on the structure and function of plant tissues while incorporating religious values to help students learn in grade VIII Secondary School. This module is designed to improve students' understanding of science concepts and religious values in the context of Islamic education. This study was conducted at MTs Islamiyah, Palangka Raya City, from 30 April - 30 June academic year 2023-2024. R&D (Research and Development) was used, which is a 4-D development model consisting of Definition, Design, Development, and Distribution. The results of the study showed that the developed module can be used The validation results of the material experts obtained an average of 3.78, which is very valid, the design experts obtained 3.71, and the religious value experts obtained 3.45, which is very valid, and the students' responses to the module obtained an average of 3.76, which is very valid, and the teacher's response was 3.62. The module test results were 3.49 for individual test, 3.59 for small group test, and 3.67 for field test, respectively.

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INTRODUCTION

Individuals and all humans with minds are said to have the right to education, which is necessary for the development of their life processes. Education also refers to a set of instructional and learning activities that prepare a person to appropriately follow the learning process in order to meet the predetermined learning objectives (Swastika, 2020). The development of education in Indonesia continues, as seen from the evolution of the curriculum system in various educational units. The several curricula that are put into place, which are learning plans that students must create and complete, reflect this shift (Marisa, 2021).

The Merdeka Belajar Curriculum, which attempts to enhance Higher Order Thinking Skills (HOTS) through the learning process, has been included into Indonesia's present educational system (Sumarsih *et al.,* 2022). HOTS involves complex thinking processes such as connecting, manipulating, and transforming knowledge to solve problems and perform analyses (Suryaman, 2020). However, the development of HOTS skills requires a more in-depth learning approach, in contrast to the previous approach that tends to focus on Low Order Thinking Skill (LOTS) which only focuses on memorising and understanding material without in-depth analysis (Manalu et al., 2022).

The Merdeka Belajar curriculum also emphasizes active student involvement in learning with in an effort to produce generations that have high-level thinking skills and can compete in the era of globalisation (Arisanti, 2022). In science subjects such as Biology, material on the structure and function of plant tissues is a broad and complex topic (Rofi'i et al., 2016; Vhalery *et al.,* 2022). Because of the complexity of this material, a methodical approach is needed to ensure that students understand it well during the learning process (Eresti *et al.,* 2021).

Explained in the Al-Quran Al-Mujādalah [58]: 11 regarding the obligation of a Muslim regarding the law of learning which reads.

يٰٓاَيُّهَا الَّذِيْنَ اٰمَنُوْٓا اِذَا قِيْلَ لَكُمْ تَفَسَّحُوْا فِى الْمَجٰلِسِ فَافْسَحُوْا يَفْسَحِ اللّٰهُ لَكُمْۚ وَاِذَا قِيْلَ انْشُزُوْا فَانْشُزُوْا يَرْفَعِ اللّٰهُ الَّذِيْنَ اٰمَنُوْا مِنْكُمْۙ وَالَّذِيْنَ اُوْتُوا الْعِلْمَ دَرَجٰتٍۗ وَاللّٰهُ بِمَا تَعْمَلُوْنَ خَبِيْرٌ ١١ (المجادلة/58: 11)

Meaning: O you who have believed, when you are told, "Space yourselves" in assemblies, then make space; Allah will make space for you. And when you are told, "Arise," then arise; Allah will raise those who have believed among you and those who were given knowledge, by degrees. And Allah is Acquainted with what you do. (Al-Mujadalah/58:11)

The above verse explains that everyone should behave well in public and describes the traits of people who have faith and knowledge. The verse also states that those with faith and knowledge will be elevated by Allah SWT. The Madrasah Tsanawiyah education programme incorporates a number of religious values-based learning strategies drawn from the Quran and Hadith.

The Qur'an and Hadith provide guidance for mankind in aspects of religious life, worship, society, and science, where the Qur'an is considered an important source of knowledge in various fields such as social, economic, education, and general science (Iryani, 2017; Rumondor & Putra, 2020). The integration of science, including in the field of biology, becomes crucial without guidance from the Qur'an (Rofi'i *et al.,* 2016; Shofa et *al.*, 2020), as this can hinder the progress and quality of humanity (Herlanti & Fadilah, 2021). Teachers should utilise technological advances in the classroom by creating innovative teaching aids and media to increase student engagement and enhance the effectiveness of course delivery (Artiani, 2020; Rozi & Hasanah, 2021; Susanto & Akmal, 2019).

Inayahtur Rahma (2019) highlights the significance of instructional materials in executing the classroom learning process. Teaching resources that are engaging will encourage students to pay attention to the content, making it easier to explain and aiding in their understanding of the lessons being taught. Modules are an intriguing type of learning resource, as noted by (Sugianto *et al.*, 2017). Modules are teaching materials that contain materials and images that are attractively packaged to facilitate understanding of concepts and materials for students. Science learning will be easier to understand if the learning process is able to provide learning experiences to students to increase their awareness of the importance of learning science (Supardi,

2017).

Natural Science (IPA) involves a systematic way to explore and understand nature, not only as a collection of facts, concepts, or principles, but as an evolving process of discovery (Kemdikbud, 2013). Colburn (2000) states that the Inquiry learning model is designed to stimulate the development of students' intelligence and skills through systematic investigation. In this approach, students are encouraged to ask questions, discover, and solve problems, thus training their critical thinking skills (Sahania, 2020). This model is often combined with the use of modules to facilitate a more structured learning process (F. H. Marbun, 2017; Sarah & Ngaisah, 2016; Sodikun *et al.,* 2016).

Modules are self-study packages that include a number of learning experiences that are methodically planned and created to help students meet their learning objectives and comprehend the material being covered in the continuing education process (Asrizal, 2018). The use of inquiry-based modules is anticipated to serve as a substitute to support students' autonomous learning and pique their interest in learning (Habsari, 2016; Sarah & Ngaisah, 2016).

Instructors feel that they require books that supplement the learning that is being done, according to observations and discussions with science instructors and students at MTs Islamiyah Palangka Raya City. This is because the books that are typically used come in package form, and these schools lack libraries, making it impossible to find learning resources in the form of modules. Then based on the response questionnaire shows that 88.8% of students stated that teachers more often use teaching resources and materials used so far only in the form of packaged books in the library, with a limited number of books to meet student needs. With these conditions, students' interest in learning science decreases due to the lack of interesting teaching materials, so students tend to be more passive during learning activities. In order for students to participate more actively in the learning processes taking place in the classroom, teachers must provide them with instructional materials that are visually appealing.

Research has demonstrated that inquiry-based learning with modules serving as instructional resources enhances the learning process. Research by Rahma & Azhar (2021) demonstrates how inquiry-based modules can effectively improve the learning results of students. In addition, research conducted by Nurohmatin (2017) with the title Development of Biology "Modules Integrated with Islamic Values to Empower Critical Thinking of Class XI Students of SMA Al-Kautsar Bandar Lampung" demonstrates that this module receives a high rating for meeting the evaluation criteria, indicating that it is efficient and appropriate for use in the teaching and learning process.

The researcher chose this module because it is easy to learn and in accordance with the needs of students. In addition, students read it more often and are more interested because the module allows them to learn anytime and from anywhere. A total of 83.3% of students liked the development of learning resources in the form of modules, in accordance with the needs analysis. Modules with attractive images and visuals can help motivate students to get the most out of their education. Through this module, students can also access additional learning materials, especially related to the function and structure of plants that have been combined with religious ideas. This learning is expected to help students to better understand the ideas presented in Plant Tissue Structure and Function.

According to the foregoing explanation, creating engaging learning materials in the form of integrated science modules utilizing inquiry learning techniques combined with religious values is a different way to address the issues discovered through observations and interviews. Because it encourages students to think critically, work independently, and be unbiased, truthful, and transparent, the inquiry learning model can raise the standard of instruction. It also gives students the chance to discover their own interests and strengths. This module is related to the first Pancasila student profile, which is noble, faithful, and devoted to God Almighty. This module was created using images from the Plant Tissue Structure and Function curriculum combined with spiritual principles and adjusted to the Learning Outcomes (CP) and Flow of Learning Objectives (ATP). In addition, the values of integrity, accountability, diligence, and environmental stewardship will be discussed throughout the module. Religious education aims to provide students with the following: (1) a rational understanding of Islam in daily life and spiritual insight, particularly in relation to natural verses; (2) natural knowledge; (3) an appreciation of the superiority of Islamic knowledge; (4) the development of creativity and an understanding of Islamic norms through imaginative experiences; (5) assistance in thinking logically and guiding thought processes within an Islamic framework; and (6) the ability to apply Islamic perspectives to modern situations. Learning about Plant Tissue Structure and Function,

which is interwoven with religious beliefs, is intended to spark students' curiosity and motivate them more through this science module.

RESEARCH METHOD

The 30 April–30 June school year 2023–2024 saw the conducting of this study at MTs Islamiyah in Palangka Raya City. The approach used in this study is called research and development, or R&D for short. The 4-D development model, which includes the phases of define, design, develop, and disseminate, is utilized in this study together with Thaigarajan's research design (Thiagarajan et al., 1974). This model was chosen because it has a systematic and simple structure. In addition, the stages are more practical to implement. Several studies that developed products using the 4-D model showed that this model produces products and learning with a high level of feasibility.

The defining, designing, developing, and disseminating phases are the four main steps in the 4-D model. The define stage seeks to evaluate the issues that arise during classroom instruction. To assist in the learning process, the study's findings might be used to formulate the learning needs of the students. In order to identify fundamental issues and ascertain the proper learning demands within the learning setting, preliminary studies were carried out through observations of scientific classrooms and interviews with science teachers. At the design stage, the module is prepared which includes making tests, selecting image media, determining the format, and designing the appearance of the module.

At the Develop stage, product trials were conducted to evaluate the feasibility of the designed module. Product validation involved two material experts, two design experts, and two religious value integration experts. After the validation process by experts, the product was tested in individual tests involving three students, small group tests with nine students, and field tests with one science teacher and eighteen students. To collect data during the product trial, a questionnaire developed by the researcher based on reference with answer options in the form of a 4-point Likert scale was used. The following formula was then used to handle the questionnaire data:

$$(X)=\frac{(\Sigma x)}{(n)}$$

Description:
(X) = Average Score
(∑×) = Number of Scores
(n) = Number of Items

The following table 1 is used to convert the results once the percentage of product feasibility has been determined:

Table 1. Product Feasibility Category

Criterion Score	Range
$3{,}2 \leq X \leq 4$	Very Valid
$2{,}5 \leq X < 3{,}2$	Valid
$1{,}75 \leq X < 2{,}5$	Less Valid
$1 \leq X < 1{,}75$	Very Less Valid

After testing the modified product, the next step is the dissemination. The purpose of this stage is to disseminate the module so that it can be used in learning activities.

RESULTS AND DISCUSSION

The result of this research is the development of an inquiry-based integrated science module for class VIII Secondary School students covering the structure and function of plant tissues combined with religious values. The development model used is the 4-D development model, with a design according to Thaigarajan *et al*. (1974) consisting of the stages of Define, Design, Develop and Disseminate.

In the Define stage, an initial analysis was conducted to identify and ascertain the fundamental challenges faced in science learning in grade VIII. The researchers used direct observation at MTs Islamiyah school in Palangka Raya City and interviews with science teachers as the method of analysis. Based on the preliminary data, students struggled to understand the composition and purpose of plant tissues. Findings from interviews with science teachers indicated that textbooks and lecture-style teaching were used along with question and answer sessions and other forms of media to facilitate learning.

Developing a module design or draft is the goal of the planning stage (design). First, tests are compiled and media is chosen based on the findings of the preliminary analysis and character analysis of the students. Next, select a format and use Canva to create a preliminary design. This is how the inquiry-based integrated scientific cover module on the composition and properties of plant tissues combined with religious principles looks.

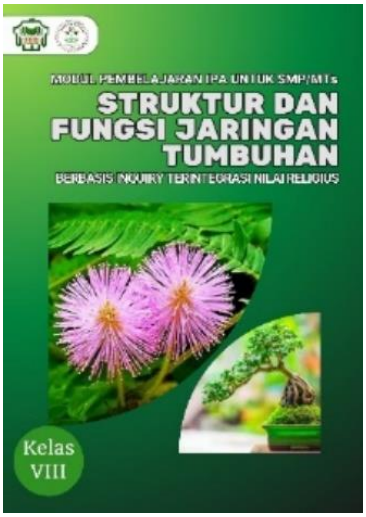

Figure 1. Cover of Integrated Science Module

The development stage is the process of validation and testing of the draft module produced from the previous design stage. The validation process involves two material experts, who are Biology lecturers, two design experts who are lecturers who teach learning media courses, and two religious value integration experts who are lecturers who understand religious value integration.

1. Material Expert Validation Results

The material in the module, which is assessed from the perspective of subject-matter specialists, is the focus of validation carried out by material experts. Table 2 below displays the findings from the examinationn of the science module content about the composition and capabilities of plant tissues.

Table 2. Material Expert Validation Results

No	Validator	Acquisition Score	Maximum Score	Average	Criteria	Total Average	Criteria
1	V1	54	56	3,85	Very Valid	**3,78**	**Very Valid**
2	V2	52	56	3,71	Very Valid		

The Inquiry-Based Integrated Science Module material on the Structure and Function of Plant Tissues Integrated with Religious Values was validated to two validators based on the findings of the material expert validation in Table 2. Two stages of validation were conducted using validator 1, yielding an average value of 3.85 using very valid criteria. Validator 2 then performed a single stage of validation and, based on the average result of 3.71, concluded that stage 2 validation was not necessary. As a result, the aggregate average score met the "Very Valid" requirement at 3.78. Experts on the subject have suggested enhancing indicators, including wisdom-based questions, enhancing tables, and modifying how religious values are included into the content.

2. Design Expert Validation Results

Design experts evaluate the feasibility of the product in terms of the design used in the module development. The following Table 3 displays the outcomes of the validation conducted by specialists in design:

Table 3. Design Expert Validation Results

No	Validator	Acquisition Score	Maximum Score	Average	Criteria	Total Average	Criteria
1	V1	106	112	3,78	Very Valid	**3,71**	**Very Valid**
2	V2	102	112	3,64	Very Valid		

The design expert validation yielded an average result of 3.78 with very valid criteria for validator 1, and an average result of 3.65 with extremely valid criteria for validator 2, according to Table 3's data. A very valid criterion of 3.71 was attained by the inquiry-based integrated scientific module on the structure and function of plant tissues, based on the combined average of the two validators. It is evident from this that the inquiry-based integrated scientific module on the fungus and structure of plant tissues incorporated religious values has introduced the use of visually appealing graphic designs, like pictures, diagrams, and infographics, to draw in viewers and aid in comprehension. Recommendations for improvement from design experts are (1) tidying up the writing, (2) Writing spaces should be widened to facilitate understanding of each sentence read, (3) Module design needs to be made more regular and consistent, and (4) Selection and combination of colours must be adjusted and made more attractive.

3. Results Of Expert Validation Of Religious Value Integration

Validation conducted by religious value integration experts focuses on the integration of the material contained in the module with verses from the Quran. The results of the religious value integration review are presented in table 2 below.

Table 4. Religious Value Expert Validation Results

No	Validator	Acquisition Score	Maximum Score	Average	Criteria	Total Average	Criteria
1	V1	35	40	3,50	Very Valid	**3,45**	**Very Valid**
2	V2	34	40	3,40	Very Valid		

According to Table 4's expert validation results for religious value integration, validator 1 received an average score of 3.50, whereas validator 2 received a score of 3.40. 3.45 is the overall average result, meeting the "Very Valid" criterion. The religious value integration validator has made some recommendations for improvement, including adjusting how the module's learning material is integrated.

4. Individual Trial Results

After the module has been approved for use by experts in material science, design, and religious value integration, it is given to three students for testing. The table below displays the outcomes of each individual trial.

Table 5. Individual Trial Results

No	Validator	Acquisition Score	Maximum Score	Average	Criteria	Total Average	Criteria
1	MF	76	84	3,61	Very Valid	**3,49**	**Very Valid**
2	NI	74	84	3,52	Very Valid		
3	RAY	70	84	3,33	Very Valid		

The average score for each individual test was 3.49, according to Table 5's data analysis findings. This mean is inside the extremely legitimate range. On the individual test, pupils did not leave any feedback or recommendations.

5. Small Group Trial

After the individual test, the next step is to conduct a small group test. Respondents in the small group amounted to 8 people, who were given development products in the form of modules to be assessed. The data analysis from small group trials produced the following findings.

Table 6. Small Group Trial

No	Responden	Acquisition Score	Maximum Score	Average	Criteria	Total Average	Criteria
1	AAH	78	84	3,71	Very Valid	**3,59**	**Very Valid**
2	MY	74	84	3,52	Very Valid		
3	NAR	76	84	3,61	Very Valid		
4	MMR	80	84	3,80	Very Valid		
5	MRI	70	84	3,33	Very Valid		
6	AK	72	84	3,42	Very Valid		
7	NS	78	84	3,71	Very Valid		
8	RR	76	84	3,61	Very Valid		

The average percentage of achievement obtained from the analysis of small group trials of teaching materials in the form of modules is 3.59 which is included in the very valid category.

6. Field Trial Results

At the field test stage, the module was tested involving 18 students and 1 science teacher. Data from the field test results are shown in Table 7. **Table 7.** Field Trial Results

No	Responden	Acquisition Score	Maximum Score	Average	Criteria	Total Average	Criteria
1	AAH	78	84	3,71	Very Valid	**3,76**	**Very Valid**
2	MF	80	84	3,80	Very Valid		
3	MY	76	84	3,61	Very Valid		
4	NA	80	84	3,80	Very Valid		
5	AK	78	84	3,71	Very Valid		
6	MA	82	84	3,90	Very Valid		
7	MRI	74	84	3,52	Very Valid		
8	MA	80	84	3,80	Very Valid		
9	MS	82	84	3,90	Very Valid		
10	RAY	80	84	3,80	Very Valid		
11	FM	80	84	3,80	Very Valid		
12	NS	76	84	3,61	Very Valid		
13	NAR	76	84	3,61	Very Valid		
14	NS	82	84	3,80	Very Valid		
15	NI	78	84	3,71	Very Valid		
16	R	82	84	3,90	Very Valid		
17	RR	80	84	3,80	Very Valid		
18	MMR	82	84	3,90	Very Valid		

The average percentage of students' questionnaire assessment of the e-module in the field trial is 3.76 which indicates that the module is in a very valid qualification. Table 8 below displays the findings of the teachers' assessment of science:

Table 8. Science Teacher Assessment Results

No	Responden	Acquisition Score	Maximum Score	Average	Criteria
1	MR	43	48	3,58	**Very Valid**

The development product in the form of a module reached a very valid qualification with a percentage of 3.58, based on the assessment of the Natural Science (IPA) subject teacher through a questionnaire. The average evaluation from teachers and students in the field trial was 3.67. Since the average shows that the module is at a very good qualification and the subject teacher did not suggest any changes, the developer decided not to make changes.

CONCLUSION

The findings of this study were used to create an inquiry-based integrated science module for eighth grade students of Secondary School. The module contains material on the structure and function of plant tissues associated with religious values. The science module on the structure and function of plant tissues has been successfully made and is ready to be implemented, based on the results of expert validation and feasibility testing. Based on very valid criteria, product validation by material experts obtained an average score of 3.78, design experts obtained an average score of 3.71, and religious value experts obtained an average score of 3.45. With extremely valid criteria, the average value of student responses to the module was found to be 3.76, and the average value of teacher responses was found to be 3.62. The outcomes of the module trials were 3.49 for the individual trials, 3.59 for the small group testing, and 3.67 for the field tests.

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