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Development of E-Modules on Earth and Solar System Concepts Using SSI Approach with Embedded Islamic Values

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Abstract:

This study aims to provide a complete e-module on Islamic ideas about the earth and solar system to enhance instructional practices in schools. This study employs the ADDIE framework for development, utilising a questionnaire as a research instrument and incorporating three expert validators: subject matter experts, media specialists, and integration specialists. The product to be developed is an integrated e-module on Islamic concepts within the Earth and Solar System curriculum, designed for seventh-grade students in junior high and Islamic junior high schools. The assessment outcomes indicated that the material expert achieved a score of 85%, the media expert attained 83.3%, and the integration expert received 89.5%. The evaluation determined that the integrated e-module on Islamic concepts concerning the earth and solar system is very suitable for enhancing students' educational experiences in schools.

Keywords: ADDIE Model, Earth and Solar System, E-Module, Islamic Values, Science Learning

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Introduction

The rapid advancement of technology and information in the 21st century demands that individuals develop into high-quality human resources (Nuryunita Dewantari 2022).The ability to solve complex problems has become a key determinant of success in professional, social, and familial contexts, both in the present and the future. Nevertheless, classroom practices have not yet placed sufficient emphasis on cultivating higher-order problem-solving skills (Eko Julianto,c 2022)

Science education, as a discipline closely connected to daily life, plays a pivotal role in equipping students with essential competencies in this modern era (Essa & Ardauyah, 2023). Among the most consistently taught science topics is Earth and the Solar System. To effectively teach this subject, learning media must be carefully selected to ensure their relevance to the material being delivered (Damayanti et al. 2024). However, challenges persist, including the lack of engaging models and media, as well as limited opportunities for students to actively participate in learning (Rachman &c Setiyawati 2023). Current instructional resources are often limited to textbooks, which are seldom updated and inadequately reflect students' local contexts or everyday experiences (Rachman and Setiyawati 2023)

At the same time, advances in information and communication technology have created new opportunities for the development of digital-based learning media. One such medium is the interactive electronic module, or e-module, which provides flexible learning experiences that can be tailored to individual student needs and supports self-directed learning regardless of time and place (Hastiningrum and Haryanto 2020; Anggriani et al. 2024). Despite these advantages, the development of technology-based learning materials for Earth and Solar System content remains limited, particularly those that embed real-world contexts through the Social Scientific Issues (SSI) approach.

The SSI approach enhances learning by linking scientific content with real-life issues, often involving societal debates or controversies. By doing so, SSI encourages students to engage critically with contemporary issues, fostering curiosity and promoting argumentation that connects scientific knowledge to broader social concerns (Siska et al., 2020; Setyaningsih et al., 2019). Nevertheless, SSI-based learning materials have not been widely implemented, especially within contexts that also incorporate Islamic values.

In response to these gaps, this study seeks to design and develop an e-module that integrates Social Scientific Issues with Islamic values in the context of Earth and Solar System learning. The resulting e-module is expected to provide a meaningful, relevant, and effective learning medium that supports students in developing a holistic understanding of scientific concepts, societal issues, and Islamic principles.

Methods

2.1 Research design

Development model research represents a form of applied research that emphasizes the creation of new products or the refinement of existing ones. The choice of a development model serves as an approach to determine the most effective solution for achieving specific objectives, following a cyclical process that begins with problem identification and concludes with the attainment of development goals (Rejeki, Leksono, and Rohman 2023). In this study, the development of e-modules employed the ADDIE model, which comprises five sequential stages: (1) analysis, (2) design, (3) development, (4) implementation, and (5) evaluation.

The ADDIE model, later modified by Molenda (2015), was selected as the methodological foundation for this research. This decision was based on the model's systematic framework and its broad applicability as a reference for instructional design and development (Molenda 2015).

2.2 Data collection

The data collection in this study was conducted through expert validation using a Likert-scale questionnaire as the assessment instrument. The instrument was designed based on dimensions aligned with the objectives of e-module development. Validation involved three categories of experts:

a) content experts, who evaluated the appropriateness of the material, its presentation, and its alignment with both Islamic values and socio-scientific issues (SSI);
b) media experts, who assessed the graphic design, multimedia features, as well as the practicality and usability of the e-module; and
c) Islamic values integration experts, who examined the accuracy and integration of Qur'anic verses and Hadith within the material and their potential influence on students' religiosity.

Each expert was given a pre-validated evaluation form to assess the appropriateness of each aspect. In addition, the experts provided suggestions and feedback, which were used as the basis for product revision.

2.3 Data Analysis

Data analysis was carried out using descriptive quantitative techniques based on the validation results from each expert. The scores obtained for each assessment criterion were then converted into percentages using the following formula:

$$Result \frac{score\ abtained}{maximum\ score}\ x\ 100$$

Table 1.Eligibility Category

Score %	Description
81-100%	Highly Recommended
80-61%	Recommended
60-41%	Enough Recomended
40-21%	Not Recomended
>21%	Very Not Recomended

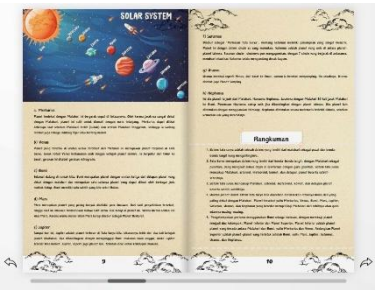
The evaluations from the three categories of experts were averaged to determine the overall feasibility level of the SSI-integrated e-module with Islamic values. In addition, the experts' suggestions and comments were analyzed qualitatively and utilized as a reference for revising the product.

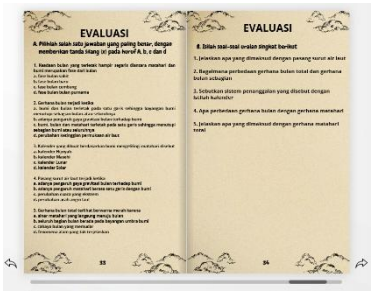
Results and Discussion

Findings

The outcome of this research is an SSI-based e-module integrated with Islamic values, developed using the Earth and Solar System topic as the learning material, which is intended for junior high school/MTs students.

Table 2. Products developed

	Description
	First view of the cover Material: Earth and Solar System Author : Annisa Syafira & Annisa Hikmah Wati
	Second menu Table of Contents and Technician Use of E-Modules
	Introduction and Learning Objectives menu
	Scientific Social Issues Corner Menu
	Material Discussion and Summary Menu



Evaluation Menu

Glossary and Bibliography Menu

E-modules are utilized in learning activities to foster greater student interest and motivation (Lastri, 2023). Moreover, presenting e-modules in digital format enhances the learning process by making it more engaging, independent, and interactive, thereby strengthening student motivation and participation. Through the integration of Islamic values into SSI-based science learning, students are expected not only to develop solid scientific literacy but also to cultivate Islamic character, enabling them to better address the challenges of the contemporary era.

Analysis

3.1 Data Analysis Results

The products developed were then evaluated by experts, including material, media, and integration specialists. Once the data were obtained, it could be determined whether the product was deemed feasible or not. The feasibility test assesses the effectiveness or validity of an instrument. A medium is considered effective if it attains a high score, indicating validity, whereas a medium with a lower score is regarded as having weak validity (Claudia oktaviani, 2020). Based on a comprehensive evaluation by experts regarding the use of SSI e-modules integrated with Islamic values, the results demonstrate suitability, as explained in the following sub-sections.

3.2.1 Material Expert

The evaluation conducted by content experts aimed to assess the accuracy and appropriateness of the material presented in the developed e-module. This evaluation covered four main components: content feasibility, presentation, integration of material, and socio-scientific issues (Herawati & Muhtadi, 2020). The assessment of the SSI-based e-module integrated with Islamic values was carried out by three content experts. The results of their evaluation are presented as follows

Table 3. Assessment by material expert

Aspects	Score	Maximum Score	Percentage %	Criteria
Content Feasibility	160	192	83,3	Very Feasible
Presentation	69	80	86,2%	Very Feasible
Material Linkage with Integration	31	32	96,8%	Very Feasible
SSI	94	416	83,9	Very Feasible
Total	354	416	85	Very Feasible

The results presented in the table show that the lowest score in the e-module evaluation by content experts was obtained for the item "Aspects of content feasibility", with a score of 83.3%. Nevertheless, the overall average score reached 85%, which is categorized as highly feasible. Accordingly, the evaluated content was revised to reflect the most recent developments in the field (Hariyanto and Mu'arifuddin 2018).

3.2.1 Media Expert

Media validation aims to assess the feasibility of e-modules from the media side (Herawati and Muhtadi 2020). Media specialists completed an evaluation form to assess the overall quality of the media. Media validation encompasses three assessed dimensions: graphic elements, multimedia components, and practicality and functionality.

Table 4. Assessment by media experts

Aspects	Score	Maximum Score	Percentage %	Criteria
Graphics	105	128	82	Very Feasible
Multimedia	94	112	83,9	Very Feasible
Practicality and Operation	41	48	85,4	Very Feasible
Total	240	288	83,3	Very Feasible

The table above indicates that the lowest score in the e-module evaluation by media experts was recorded for the "Graphics aspect", with a score of 82%. However, the overall average score reached 83.3%, which falls under the category of highly feasible. The e-module was considered simple yet practical, and based on the results of a limited product trial, it was declared effective (Muhlisin, Rahmawati, and Rahayu 2022).

3.2.3 Integration Expert

According to the assessment by integration experts, Islamic values and Qur'anic verses were clearly embedded within the e-module, demonstrating its capacity to effectively instill Islamic principles (Aprilia and Wahyuni 2023).

Table 5. Assessment by integration expert

Aspects	Score	Maximum Score	Percentage %	Criteria
Compatibility of Qur'anic verses and Hadith	43	48	89,5	Very Feasible
Integration of Qur'anic verses into the material	30	32	93,7	Very Feasible
Learner Religiosity	15	16	93,7	Very Feasible
Total	88	96	91,6	Very Feasible

The table above indicates that the lowest score in the e-module evaluation by integration specialists was recorded for the item 'Aspects of applicability of Al-Qur'an and Hadith verses', with a score of 89.5%. However, the average assessment was 91.6%, which is classified as extremely practicable.

3.2 Product Revision Result

At the product revision stage, improvements were made by carefully considering and analyzing the evaluation results. The final outcome of this research is an e-module integrated with Islamic values, which has been refined based on expert recommendations. Suggestions from the content experts included aligning the learning objectives with cognitive levels C4–C6, inserting questions in each sub-chapter, and adding supplementary pages. The media experts recommended reducing the file size, as the module was relatively large and required substantial internet access. Meanwhile, the integration experts advised providing detailed explanations for each Qur'anic verse, rather than only presenting the verse and its translation. All of these suggestions were incorporated by the researchers, resulting in a product deemed feasible and ready for implementation.

Conclusion

The findings of this study demonstrate the successful development of an e-module that integrates Islamic principles within the context of Earth and Solar System material. The product was evaluated by three categories of experts: material experts, media experts, and integration experts. The evaluation results yielded scores of 85% from material experts, 83.3% from media experts, and 89.5% from integration experts. These results indicate that the SSI-based e-module, enriched with Islamic values in the context of Earth and Solar System content, is highly feasible and considered appropriate for enhancing the learning process of students in schools.

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