

## Development of STEM E-Book Integrated with Religion Values

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**ABSTRACT** : *Education plays an important role in shaping the character and progress of a country. Technological developments should be used to make innovations in achieving educational goals. One of them is to use electronic books because of the flexibility of learning, interactivity, ease of searching, and ease of updating. This research is a type of research and development (R&D) that uses the ADDIE development model (Analysis, Design, Development, Implementation, and Evaluation). The purpose of this research is to create a STEM E-Book integrated with religious values in thematic courses (IPAS) PGMI UMRI students. In the validation level, a) Learning media expert validator obtained a score of 94.13% with the category "very valid", b) Material expert validator obtained a score of 95.53% with the category "very valid", c) Integration expert validation obtained a score of 100% with the category "very valid", and d) Student response to E-Book media obtained a score of 86.30% with the category "very good".*

**Keywords:** *E-Book, STEM, Religion Values, Digital Education Course*

### 1. INTRODUCTION

Education, as a crucial domain in human life, will continue to exist for all time. Its role in shaping the character of a nation makes it continuously evolving in various countries. More than that, education is an indicator of a nation's progress and is a scientific legacy that is passed down from generation to generation. Ki Hajar Dewantara revealed that education is an effort to improve human personality and mindset. In practice, educational efforts include the delivery of material, guidance, direction, and various other methods to achieve these educational goals (Brown, 2019). Educational institutions must be able to produce students who can solve problems flexibly, have communicative and collaborative skills, think critically, and creatively (Retni, 2023).

Nationally, the main goal of education is to foster the potential of students so that they can become people who have faith and piety in God Almighty, have good morals, maintain health, have broad knowledge, good skills, are able to think creatively, independently, and become democratic and responsible citizens. To increase gratitude and connect religious principles with events in the surrounding environment, dimensions of the Pancasila Student Profile can be created.

Meanwhile, social aspects can be elaborated in products to develop diversity and global cooperation by narrating and illustrating the existence of cooperation and mutual cooperation in diversity in solving problems (Sulthon, 2023). These national goals emphasize that education is not only about mastering knowledge concepts or cognitive aspects, but also involves dimensions of spiritual and social attitudes that will form Indonesian citizens who have noble character and high dignity (Muslich, 2007).

With the development of technology, educational goals can be achieved in various ways. Technology has significantly changed the world of education. It enables real-time and self-paced learning, as well as learning tailored to individual learning styles, and students can

access materials anytime and anywhere according to their schedules and preferences. Digital skills are becoming increasingly important for education due to technological advancements. Students must understand how to use digital tools, online learning platforms and other digital resources to support their learning and improve their performance (Marini, 2023).

One of the utilization of technological developments in education is the use of E-Books in learning. E-Book is a digital book that has an interactive format with colored text and additional features. E-Books are electronic books that can be accessed through laptops, computers, or other handheld devices (Torson in Retno, 2017). The utilization of E-Books in learning brings many benefits, including greater accessibility, learning flexibility, interactivity, searchability, easy updates, portability, and supporting collaboration.

E-books can be saved in various formats, such as pdf, htm, and flipbook. E-books can be used as teaching materials in many educational institutions because they are easy to use and meet learning needs (Afifah et al., 2018). In the learning process, the use of electronic books is expected to increase students' interest in learning (Krisnaesanti et al., 2018). Electronic books have features that include learning objectives, competencies, materials, and activities carried out during the learning process (Novalia, et al., 2020).

The STEM approach incorporates the four subject areas of science, technology, engineering and math in education. STEM was originally established by the National Science Foundation in the 1990s. Because it integrates four fields of science or at least two fields of science in a learning process, it is intended that learning becomes more meaningful and does not cause boredom. In line with that, the advantage of STEM compared to separate learning is that it can increase interactions that form certain experiences for students in constructing their learning experiences (Diana, 2020). STEM excellence has been shown to have a strong role in a person's success in the educational environment, as well as in their career goals and trajectory. (Nurin, 2023).

STEM learning is needed by students to improve various 21st century skills. Many students in various countries believe that STEM can guarantee their future careers. It trains students to create solutions to a problem from multiple perspectives. In addition, as cross-disciplinary learning, STEM can be taught with several learning strategies such as problem-based learning (Purwaningsih, 2020). STEM incorporates teamwork and problem solving using questioning techniques coupled with research, and students engage in the process of inquiry, design, and/or investigation. (Seyedh, 2017).

The use of E-Books in digital education courses is highly correlated with the learning objectives of digital education courses, one of which is to develop skills in using various digital tools and platforms to support the learning and teaching process. PGMI students are expected to compete with current technological developments while maintaining the goals of national education, namely forming students who have faith and piety in God Almighty. This scientific integration research investigates the problem of "Development of STEM E-Books Integrated with Religious Values at PGMI Muhammadiyah Riau University".

## **2. METHODOLOGY**

The research methodology consists of analyzing, designing, and developing illustrated e-books based on the learning outcomes of digital education courses using research and development methods and the ADDIE model development stages. E-Book STEM integrates religious values and project-based design. learning intended for students who have the insight and experience (skills) to implement STEM e-books integrated with religious values in MI or SD subjects (Science, Social Studies, MTK, Science, Physical Education). Robert Maribe Brach developed the ADDIE model through five stages of product development: Analysis, Design, Development, Implementation, and Evaluation. The development research was

conducted before the evaluation stage. Furthermore, the book was validated by two validators. The validators conducted an assessment using a validation sheet, which included material and media validation. (Putri, 2021).

Data collection techniques information in this study was collected through in-depth interviews, observation, questionnaires, and documentation. The informants in this study were PGMI students at Muhammadiyah Riau University who participated in the MK digital education lecture process. Data validation was carried out using the ADDIE R&D model by reviewing the results of interviews, observations, questionnaires, and documentation to ensure the consistency and accuracy of the data. Furthermore, the research results were reviewed by expert informants to ensure that the research results were accurately reflected in the research report and the research was published in an accredited national or international journal. Quantitative data was obtained from the scores given in the questionnaire. Quantitative data analysis was calculated to determine the percentage of validity and practicality of the media with the following formula:

$$\text{Percentage} = \frac{\text{score obtained}}{\text{maximum score}} \times 100\%$$

The results in the form of percentages that have been obtained are then interpreted in qualitative form (Ridwan, 2013):

**Table 1. Criteria for Validity Test Results and Practicality of E-Book Media**

No	Interval	Kriteria
1.	81%-100%	Very valid/very practical
2.	61% - 80%	Valid/practical
3.	41% - 60%	Quite valid / quite practical
4.	21% - 40%	Less valid / less practical
5.	0% - 20%	Not valid / not practical

### 3. RESULTS AND DISCUSSION

This study developed a STEM E-Book Integrated with Religious Values using the ADDIE model, which consists of five stages, namely:

#### A. Analysis Phase

At this stage, identification is carried out to determine the needs of PGMI students and curriculum in digital education courses, review the existing STEM curriculum, and determine how religious values can be integrated. The needs analysis is intended to find out what students and teachers need today. It is expected that this needs analysis will produce a product that is suitable for online learning. In addition, researchers made observations of applications that will be used in the development of e-book products in the future (Akhmad, 2022).

#### B. Planning Stage (Design)

The planning stage was carried out to determine the structure and content of the E-Book according to the program and needs as well as plans to integrate religious values into each chapter and topic of the digital education course.

#### C. Development Stage

This process is carried out to ensure that the E-Book media that has been made is valid. The validation results will be used to revise the E-Book in accordance with the validator's recommendations and comments. The product is said to be valid if it is in accordance with the guided structure. The results show that the electronic book has met all the criteria made for the validation of electronic books. This is in

accordance with Kirana's research (2020) which states that electronic books that fall into the valid category are very feasible to use as alternative learning resources in school learning.

### 1. Learning Media Expert Validation

The purpose of this study was to determine the benefits of grammar, language, and media utilization used to create an e-book blog. During the validation process, media expert validators provided criticism and input. After all criticisms were corrected and revalidated, the results are presented in the table. The following table shows the results of E-Book validation by learning media experts:

**Table 2. E-Book Validation Results by Learning Media Experts**

No	Assessment Aspect	Item No.	Score obtained	Maximum Score	Percentage	Criteria
1.	Graphics	1, 2, 3, 4, 5	19	20	95%	Very Valid
2.	Language	6, 7, 8	12	12	100%	Very Valid
3.	Media utilization	9, 10	7	8	87,5%	Very Valid
<b>Overall score</b>						<b>38</b>
<b>Percentage %</b>						<b>94,13%</b>
<b>Criteria</b>						<b>Very valid</b>

Based on the table above, the graphical aspect scored 95% in the "highly valid" category, the language aspect scored 100% in the "highly valid" category, and the media utilization aspect scored 87.5% in the "highly valid" category. Thus, the average percentage for the highly valid category is 94.13%.

Dapat It can be seen that the E-Book designed on the graphical component includes clear images, type and size of letters that can be read (clear), regular layout, the colors used can attract the attention of students. Depdiknas also states the same thing that the components of kegrafikkan that must be considered to be able to produce good learning media are font size and type, display design and images, layout (Depdiknas, 2008).

### 2. Learning Material Expert Validation

Furthermore, learning material expert validation was conducted. The purpose is to obtain an assessment of the quality of the material, language elements, and presentation elements in the E-Book media. The results of the learning material expert validation are presented in table 3 below:

**Table 3. Results of E-Book Validation by Learning Material Experts**

No	Assessment Aspect	Item No.	Score obtained	Maximum Score	Percentage	Criteria
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1.	Contents	1, 2, 3, 4,5	19	20	95%	Very Valid
2.	Presentation	7, 8,9	11	12	91,66%	Very Valid
3.	Contextualized Assessment	6, 10	8	8	100%	Very Valid
Overall score						38
Percentage %						95,53%
Criteria						Very valid

Based on the table above, it can be seen that the content aspect obtained 95% with "very valid" criteria, the presentation aspect obtained 91.66% with "very valid" criteria, and the contextual assessment aspect obtained 100% with "very valid" criteria. As a result, the average learning material expert validation result is 95.53% with the criteria of "very valid", based on the results of data and analysis of learning material expert validation.

### 3. Integration Expert Validation

The next step is validation by integration experts. The results of validation by integration experts are presented in table 4:

**Table 4. Results of E-Book Validation by Integration Experts**

No	Assessment Aspect	Item No.	Score obtained	Maximum Score	Percentage	Criteria
4.	Integration Fit	1, 2, 3, 4	16	16	100%	Very Valid
5.	Development of Islamic values	5, 6,7	12	12	100%	Very Valid
6.	Ability to add insight	8, 9, 10	12	12	100%	Very Valid
Overall score						40
Percentage %						100%
Criteria						Very valid

Table 4 above shows that the elements of integration suitability, development of Islamic values, and ability to add insight each obtained the highest score of 100% with the criteria of "very valid". As a result, the integration expert validation results obtained an average score of 100% with the criteria of "very valid".

The results obtained prove that the E-Book produced is in accordance with all aspects of the validity test, namely the integration suitability component, the Islamic values development component and the ability to add insight component.

## D. Implementation Stage

At this stage, the E-Book media is used to find out how students use the media.

### 1. **Student Response to E-Book Media**

After that, the response questionnaire was distributed to ten PGMI students. The results showed an average of 86.31% of the respondents, which met the criteria of "very good". The results showed that the media display assessment component received a percentage of 80% in the "good" category, the attraction component received a percentage of 90% in the "very good" category, the media operation component received a percentage of 100% in the "very good" category, and the material content component received a percentage of 85% in the "very good" category. The following table shows the results of student research:

Assessment Aspect	Item No.	Score obtained	Maximum score	Percentage	Criteria
Media Display Aspect	2, 7	160	200	80%	Good
Aspect of Interest	5, 6, 10	270	300	90%	Very good
Media Operation Aspect	3	50	50	100%	Very good
Material Content Aspect	1, 4, 8, 9	340	400	85%	Very good
<b>Overall score</b>					<b>820</b>
<b>Percentage %</b>					<b>86,30%</b>
<b>Criteria</b>					<b>Very good</b>

### E. Evaluation Stage

The student response questionnaire shows the evaluation stage. The evaluation results show that the e-book can be used very well in learning activities for digital education courses. The average student response questionnaire result of 86.31% with very good criteria also shows that this is a very good result. This shows that electronic books are easy for students to use for learning (Sari & Widowati, 2023). According to Alwan (2018), learning through electronic books or e-books is very suitable for modern students because it can be accessed anytime and anywhere. According to Aisyah and Sucahyo (2022), using electronic books can improve concept understanding.

## 4. CONCLUSIONS

Based on the results of research and discussion, it can be concluded that the STEM book integrated with religious values developed is valid, practical, and effective, so PGMI students at Muhammadiyah Riau University use it.

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