

ARTIFICIAL INTELLIGENCE-BASED MATHEMATICS LEARNING MEDIA INTEGRATED WITH ISLAMIC VALUES: WHAT'RE THE EXPERTS THINK ABOUT?

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ABSTRACT

This study aims to develop an Islamic-integrated mathematics learning media based on Artificial Intelligence (AI), with the expectation of enhancing learning effectiveness in the digital era. The research employed the ADDIE development model, which consists of the stages of analysis, design, and development. The participants in this study were three experts who validated the developed media, named "SAFINAH." The instruments used included validation sheets based on a Likert scale to assess the validity aspects of the media, both in terms of content and appearance. Data collection techniques involved expert evaluations, while data analysis was conducted by calculating the percentage of validity scores. The results showed that the "SAFINAH" media achieved a validity score above 88%, categorized as very valid, indicating that the media is suitable for use in the learning process. The impact of this study is expected to contribute to educational innovation by integrating Islamic values with AI-based technology and encourage the creation of more interactive learning media that align with students' needs in the digital age.

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INTRODUCTION

Mathematics is a universal science that plays a crucial role in the development of other disciplines and in shaping logical, critical, and systematic thinking. Therefore, mathematics education at all levels must equip students with analytical and problem-solving skills (Rival & Rahmat, 2023). As time progresses, mathematics education must adapt to technological advancements. The integration of technology has become a vital necessity, especially in driving educational progress. Outdated systems that no longer meet current demands must be updated promptly. In this context, technology plays a key role in educational transformation, particularly in developing more efficient and effective learning media (Permana et al., 2024; Silmi & Hamid, 2023).

Technology-based learning media have great potential to enhance student engagement. Its benefits, such as accessibility, flexibility, high interactivity, as well as features like personalization, collaboration, and gamification, make the learning process more engaging and effective (Wiliyanti et al., 2024). The shift from traditional print-based to interactive electronic media opens vast opportunities for both teachers and students to utilize various digital tools for teaching and learning. Consequently, many studies in Indonesia and globally have focused on developing more effective technology-based learning media tailored to students' needs (Pangestu & Rahmi, 2022).

Among technological advancements in education, Artificial Intelligence (AI) has emerged significantly. AI has rapidly evolved and impacted the education sector (Diantama, 2023). In learning contexts, AI provides interactive and adaptive experiences, allowing students to learn according to their individual needs and capabilities (Pasaribu et al., 2024). Moreover, AI supports teachers in delivering instruction, offering real-time

feedback, and simplifying administrative tasks, thereby increasing learning efficiency and effectiveness (Mambu et al., 2023).

In support of technology integration in education, various digital platforms are now available. One such platform is Google Sites. While not AI-based, it serves as an effective medium for presenting interactive, accessible learning content. Google Sites enables teachers to create structured websites that accommodate diverse learning materials, including Word, PDF, PowerPoint, and educational videos from YouTube or Google Drive (Ciung et al., 2022).

Google Sites also supports collaboration through access permissions, allowing control over who can edit or view content. This makes it a practical and flexible tool for structured content delivery (Suryana et al., 2023). In this study, Google Sites was chosen due to its flexibility, ease of use, and low demand on data and device memory. It also supports interactive elements, such as online simulations, which enhance the achievement of learning objectives (Adzkiya & Suryaman, 2021).

In mathematics education, the teacher's role extends beyond conveying concepts. Teachers are also responsible for instilling positive values, including Islamic values, to shape students' character. Mathematics teachers must ensure that students not only understand mathematical content but also develop strong moral and religious character (Imamuddin & Isnaniah, 2023). Integrating Islamic values in mathematics education fosters a holistic learning experience, connecting cognitive learning with spiritual and moral growth (Hikmah & Haqiqi, 2021).

However, based on field observations in several State Islamic Senior High Schools (MAN) in Palu City, the current learning media include PowerPoint, educational videos, and online quiz applications. Yet, there is no indication of AI-based media integrated with Islamic values being used in

mathematics instruction. This gap is likely due to several challenges, including limited teacher competence in AI applications and the lack of specific training on integrating AI with Islamic values in teaching.

Previous studies have explored instructional media using various approaches. For example, one study developed Google Sites-based science learning media integrated with Islamic values and reported positive outcomes in students' conceptual understanding (Wulandari et al., 2024). Another focused on moral development through religion-based learning materials (Novita et al., 2024), while a separate study found that integrating Islamic values into instruction improved academic performance (Sari et al., 2023). In contrast, several studies developed AI-based learning media without incorporating religious content (Mambu et al., 2023; Pasaribu et al., 2024). Others utilized Google Sites as a platform but did not integrate AI or Islamic values (Ciung et al., 2022; Suryana et al., 2023). To date, no prior research has explicitly developed mathematics learning media that simultaneously integrates artificial intelligence, the Google Sites platform, and Islamic values.

Thus, developing AI-based mathematics media integrated with Islamic values is an innovative step addressing technological and spiritual educational needs. This integration provides an interactive, accessible, and meaningful learning experience. It is expected to enhance student knowledge and instill spiritual values throughout the learning process.

In response to these needs, this study aims to develop mathematics learning media using Google Sites, named SAFINAH, focusing on statistics, particularly measures of central tendency. This media integrates AI technology with Islamic values. The novelty of this research lies in combining AI, Islamic values, and mathematics learning in a single

digital platform, Google Sites, which has not been the focus of previous research. The primary objective is to develop interactive and accessible learning media that enhance conceptual understanding and spiritual character. This study aims to produce valid and feasible instructional media for Madrasah Aliyah mathematics teachers and contribute theoretically to developing an integrative AI-Islamic education model.

METHOD

This study employed a Research and Development (R&D) approach. According to Borg and Gall, development research focuses on the design and validation of products used in educational settings (Jamaludin et al., 2024). R&D is utilized to create and evaluate educational tools, such as learning media, software, and instructional methods, to address challenges in the learning process and support the advancement of educators (Tanjung & Sri, 2023).

To guide the development process, this study adopted the ADDIE model, which comprises five systematic stages: Analysis, Design, Development, Implementation, and Evaluation (F. Hidayat & Nizar, 2021). However, due to time constraints, the research was limited to the first three stages: Analysis, Design, and Development.

The ADDIE model has been widely used to develop various types of instructional media across disciplines, demonstrating its adaptability to different learning content and development goals (Latip, 2022). Each stage in the model is interdependent and must be followed sequentially to ensure the integrity of the process. Its structured and straightforward nature makes the ADDIE model easy to understand and implement (Elyondri & Azizah, 2023). Moreover, evaluation is conducted at the end of each stage to allow for iterative revisions, making it especially suitable for producing valid educational materials (Waruwu, 2024).

The Analysis stage began with identifying the existing problems and determining relevant solutions based on the research background. A needs analysis was conducted through field observations involving mathematics teachers and students at Madrasah Aliyah in Palu City. The objective was to identify instructional challenges, particularly those related to the use of technology-based media and the integration of Islamic values. The findings from this stage served as the foundation for developing media that are interactive and spiritually meaningful.

The Design stage commenced after problem identification. This stage involved developing the instructional framework, including a storyboard and a prototype of the learning media. The design process encompassed the selection of content, the integration of interactive features, and the embedding of Islamic values into each section of the material. The outcome of this stage was a design document that provided a clear guideline for the next phase of development.

The Development stage consisted of three primary activities. First, the product was built using Google Sites to deliver accessible and interactive learning content. This involved designing the site layout, programming features such as quizzes, embedding videos, and linking to AI tools such as chatbots or ChatGPT. Second, mathematics learning content was developed and contextually integrated with Islamic values to enhance both cognitive understanding and spiritual growth. Third, expert validation was conducted to assess the quality and feasibility of the learning media. This included content, design, and technical

reviews conducted by instructional media and subject-matter experts.

To support data collection, instruments were designed to gather both qualitative and quantitative information. The validity of the instruments is crucial to ensure the accuracy of the results (Mulyasari et al., 2023). In this study, the instruments were used to assess the feasibility and validity of the SAFINAH website-based media, which was developed to teach statistics topics on measures of central tendency. Data were collected through expert questionnaires that evaluated the learning media and offered feedback for improvement.

Expert validation involved three qualified individuals, two university lecturers and one high school mathematics teacher, selected based on their academic backgrounds, experience, and expertise in instructional design and Islamic education. The experts assessed the content, design, and alignment of the media with Islamic values using a validation sheet that employed a four-point Likert scale:

1 = Very Inadequate

2 = Inadequate

3 = Good

4 = Very Good

Quantitative validation scores were analyzed using the following formula (Nurwidiyanti & Sari, 2022):

$$p = \frac{f}{N} \times 100\%$$

Where:

P = Percentage value

F = Total score obtained

N = Maximum score

The percentage score was then categorized based on the following criteria:

Table 1. Product Validity Criteria (N.F. et al., 2022)

| Score Range | Criteria |
|-------------|--------------------|
| 81% – 100% | Very Valid |
| 61% – 80% | Valid |
| 41% - 60% | Sufficiently Valid |
| 21% - 40% | Less Valid |
| 0% – 20% | Invalid |

A product is considered valid if it achieves a minimum score of 0.61. If the score falls below this threshold, revisions are necessary to ensure its feasibility for instructional use.

In addition to quantitative assessments, qualitative feedback was collected from validators through direct face-to-face discussions. This allowed for clarification and deeper evaluation of specific aspects of the media. The qualitative input provided constructive suggestions, such as enhancing text-background contrast for readability and incorporating more contextual Islamic examples. These recommendations were incorporated into the revision of the SAFINAH learning media before finalization.

Since this study was limited to the initial stages of ADDIE, no student or teacher trials were conducted. Therefore, the feasibility of the media is based solely on expert judgment. Further research is recommended to evaluate the effectiveness of the media in real classroom settings.

RESULT AND DISCUSSION

This study aims to develop and assess the validity of a mathematics learning medium integrated with Islamic values, utilizing the SAFINAH chatbot. The validity is evaluated based on content, design, interactivity, and integration of Islamic values. The development process follows the ADDIE model, which includes the stages of analysis, design, development, and revision. The instructional media was created using the

Google Sites platform and resulted in a website-based product called "SAFINAH."

In the analysis stage, classroom observations conducted in several schools revealed that although many innovative learning media tools are available, none explicitly integrate artificial intelligence (AI) with Islamic values. This finding underscores the need for learning media that not only employ modern and interactive technology but also support the spiritual development of students.

In the design stage, a conceptual framework was developed for the SAFINAH website using Google Sites. The design involved preparing learning materials, structuring content layout, and determining an appropriate delivery format. This stage ensured that the media was pedagogically sound and suitable for digital platforms.

In the development stage, the media was implemented on Google Sites, incorporating AI elements such as a chatbot to respond to students' questions related to central tendency topics (mean, median, and mode), as well as access to ChatGPT for broader inquiries. These features enhanced interactivity and supported autonomous learning. The integration of Islamic values was manifested through the inclusion of principles such as justice and honesty, as reflected in relevant Qur'anic verses and hadiths (Silvatama et al., 2023).

The media underwent expert validation involving two content experts (teachers and lecturers) and one media expert (lecturer). A validation sheet was employed to measure the feasibility and quality of the

media, particularly in terms of content, design, and technical implementation.

Suggestions from validators served as the basis for revisions.

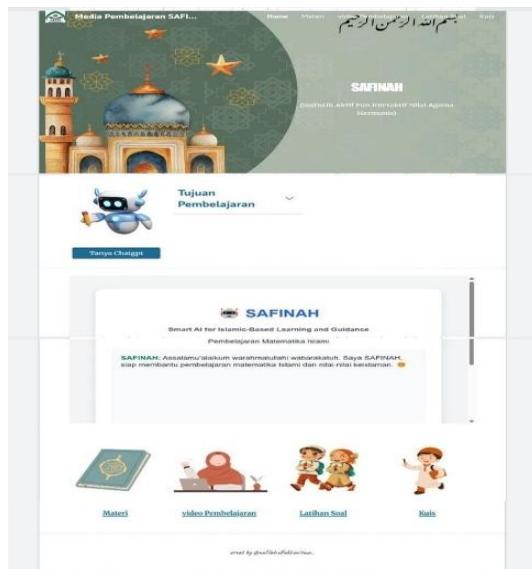


Figure 1. The homepage view of the SAFINAH website.

In the revision stage, improvements were made according to expert feedback. Validator 1 suggested adding Qur'anic verses or hadiths directly relevant to statistical concepts. Consequently, the introduction section was revised to include Surah Al-Qamar: 49, which emphasizes order and balance—concepts related to statistics. Validator 2 recommended enhancing the clarity of data presentation by incorporating contextual illustrations and more detailed

explanations. These suggestions were implemented to improve visual engagement and comprehension. The media expert confirmed the quality of the design and user interface, and encouraged further development of similar media for other topics.

The following images show the appearance before and after the revisions were made.

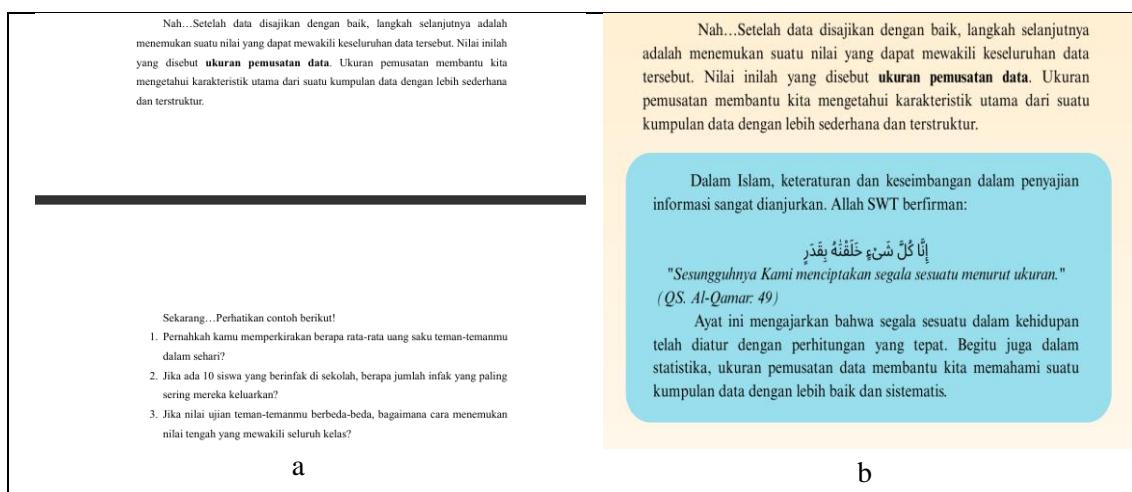


Figure 2. Revision of material validator 1 in the picture (a) before revision; (b) after revision

Figure a shows the display before revision, in which the material did not include any Qur'anic verses or hadiths explicitly related to statistics. Figure b shows the

revised version, which includes Surah Al-Qamar: 49, emphasizing order and balance in the presentation of information.

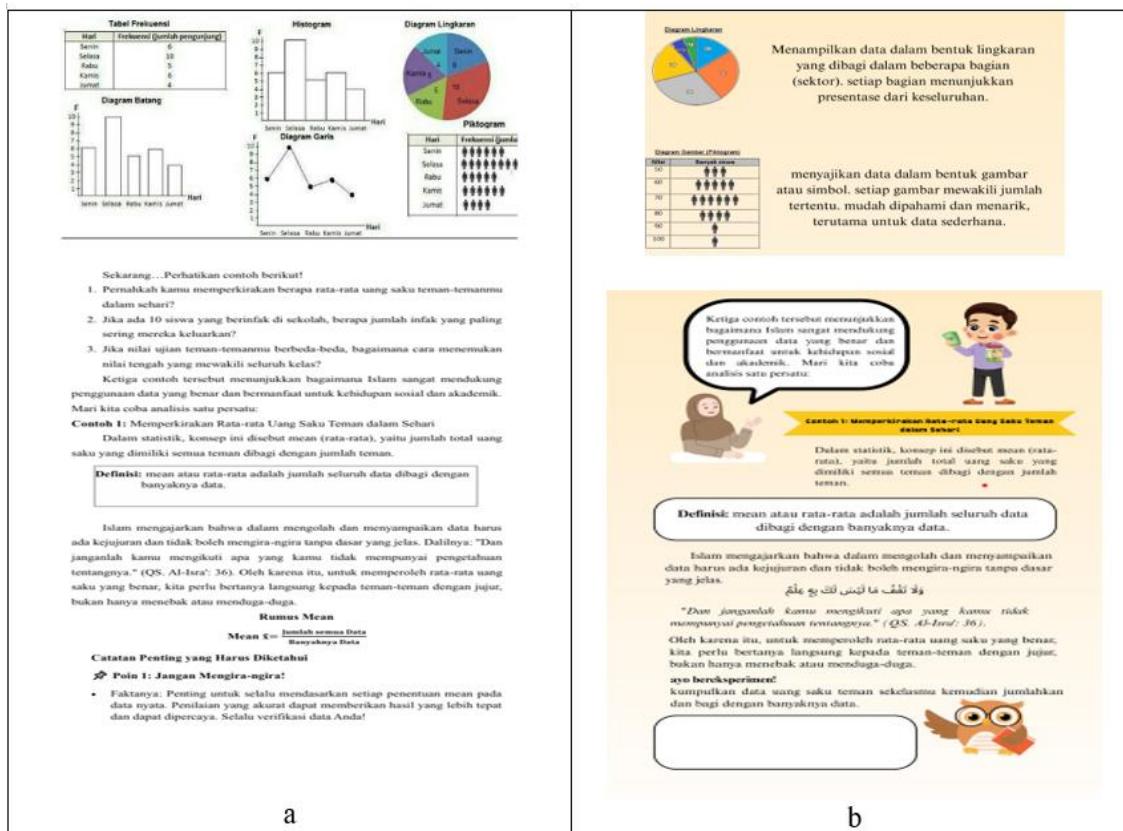


Table 2. Validation Results

| Aspect | Ideal Score | Actual Score | Feasibility Percentage | Category |
|------------|-------------|--------------|------------------------|------------|
| Media | 40 | 40 | 100% | Very valid |
| Material 1 | 36 | 35 | 97,22% | Very valid |
| Material 2 | 36 | 32 | 88,89% | Very valid |

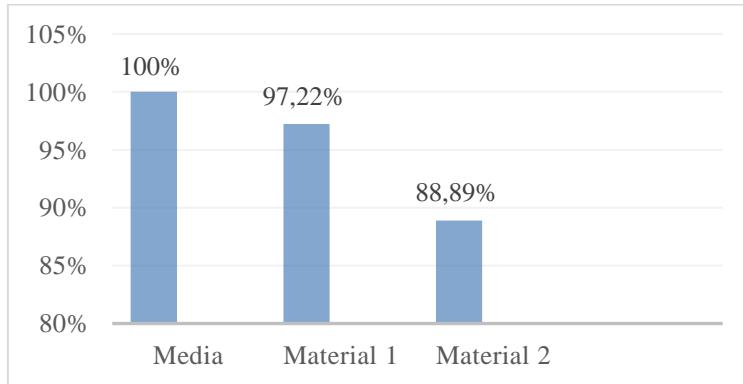


Figure 4. Chart validation result

The validation results presented in Table 2 confirm that SAFINAH, the mathematics learning media developed on Google Sites, achieved a very high feasibility score exceeding 88%. This suggests strong content validity and indicates that the media is ready for implementation in educational settings without requiring further revisions. Compared to prior findings, which reported an average validation score of 85.5% (Saputra et al., 2022), SAFINAH demonstrates a significant quality improvement.

A primary distinction between SAFINAH and previous educational media lies in its developmental approach. While earlier studies predominantly focused on the visual appeal and interactivity of the media, SAFINAH incorporates the integration of Islamic values alongside artificial intelligence (AI). This results in a more complex, multidimensional learning resource. The validation results reveal that SAFINAH excels across four key aspects: content quality, visual aesthetics, interactivity, and the integration of Islamic values. The highest ratings were observed in the content and religious integration aspects.

The inclusion of relevant Qur'anic verses and hadiths significantly enhanced the spiritual dimension of the learning experience. Moreover, the visual components of SAFINAH received a perfect score (100%), owing to improvements in design and illustrations, while the interactive aspects were commended for their effective use of chatbot features and ChatGPT, which fostered independent learning..

The integration of AI technologies with Islamic principles positions SAFINAH as not only an academically effective learning medium but also one that supports character development. AI in education can help reduce learning disparities and promote inclusivity (Kamalov et al., 2023). This aligns with the design of SAFINAH, which emphasizes both accessibility and religious contextualization, a feature that is rare among educational technologies, which typically focus on cognitive or technical aspects. As such, SAFINAH contributes to a holistic educational experience that simultaneously nurtures intellectual, affective, and moral development. This approach is consistent with contemporary educational discourses that emphasize character-based education in

the digital age, aiming to cultivate students who are intellectually proficient and morally grounded (I. K. Hidayat, 2024).

Despite its promising potential, the implementation of SAFINAH faces certain limitations. One notable challenge is its reliance on internet connectivity, which may impede adoption in regions with inadequate digital infrastructure. Furthermore, the current content is limited to the topic of measures of central tendency, which restricts its immediate applicability across the wider mathematics curriculum. The pilot testing conducted was also limited to a specific context, highlighting the need for broader trials in diverse learning environments. Additionally, the use of advanced features like ChatGPT requires a certain level of digital literacy from both students and instructors, which could pose a barrier in areas with lower technological proficiency.

Field observations during the analysis phase indicated that while the use of digital media in education is on the rise, there is still a lack of tools that explicitly integrate AI and religious values. This observation highlights both a gap in the market and an opportunity to develop instructional tools that promote both cognitive and spiritual growth.

This idea is supported by findings suggesting that value and character-based education can enhance the overall quality of learning (Muallifah, 2024). SAFINAH, developed using Google Sites and enhanced with real-time chatbot feedback and ChatGPT integration, exemplifies how technology can be utilized to create a more interactive, independent, and meaningful learning experience.

Revisions made based on expert validation emphasized the importance of incorporating Qur'anic verses and relevant hadiths into the statistical content. These revisions strengthened the spiritual depth of the material, aligning with scholarly perspectives that emphasize the importance

of education that fosters not only academic competencies but also moral and spiritual character (Khamidah & Maunah, 2023).

In conclusion, this study highlights the considerable potential of AI-integrated, value-based learning media in improving the quality of education, particularly in shaping students' character. The findings contribute to the growing body of knowledge regarding the need for innovative instructional tools that integrate technological advancements with spiritual values. While the current scope of implementation and testing remains limited, this research provides a foundational reference for future efforts to develop comprehensive, character-oriented educational tools. Further studies are needed to assess the broader impact of SAFINAH in diverse educational contexts and to strengthen the empirical foundation for AI-driven, value-integrated learning technologies.

CONCLUSION

Based on the results obtained, the development of the SAFINAH mathematics learning media using Google Sites was successfully implemented through the ADDIE model, although only the first three stages, Analysis, Design, and Development, were completed. Validation by two subject experts and one media expert confirmed that the media is highly valid and appropriate for use in the learning process, with a feasibility score exceeding 88%. These results suggest that SAFINAH not only meets the required feasibility standards but also has the potential to enhance the effectiveness of mathematics learning, especially when integrated with Islamic values.

This study underscores the importance of applying a structured development approach and engaging multidisciplinary experts to ensure the quality of educational media. Additionally, integrating Islamic values into digital learning resources offers a

unique approach that supports cognitive development while also fostering character and spirituality in students. However, the study is limited by the absence of the implementation and field evaluation phases. Therefore, further research is needed to assess the impact and effectiveness of SAFINAH in real-world learning environments, which will enrich empirical evidence and support the development of sustainable, contextually relevant educational media.

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AUTHOR CONTRIBUTIONS

Author One is responsible for conceptualization, writing the original draft, editing, and visualization. **Authors Two and Three**, as advisors, provided guidance, literature review writing, methodology analysis, as well as validation and supervision. Each author made a significant contribution to the success of this research.

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