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Development of Artificial Intellegence-Based Akidah Akhlak Teaching Materials for Islamic Senior High Schools in Indonesia

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Abstract

The rapid development of technology, particularly Artificial Intelligence (AI), has opened new opportunities to enhance the quality of education, including Islamic religious education. The Akidah Akhlak subject is still predominantly taught using conventional methods, which are often monotonous and less engaging for the digital generation. Therefore, there is a need for innovative, interactive, and adaptive teaching materials. This study aims to develop AI-based teaching materials to improve student engagement, understanding, and learning outcomes in Akidah Akhlak. This research employs a Research and Development (R&D) approach with both qualitative and quantitative designs. The ADDIE model (Analyze, Design, Develop, Implement, Evaluate) is applied to develop the teaching materials, supported by the Quizizz platform as an interactive tool for learning and formative assessment. Data were collected through interviews, observations, documentation, pre-tests and post-tests, and student questionnaires, then analyzed using thematic analysis for qualitative data and statistical tests for quantitative data. The results indicate that the AI-based teaching materials are highly feasible, with expert validation reaching 84% and student response at 83%. Pre-test and post-test analyses showed a significant improvement in student understanding, with the average N-Gain score increasing from 53.16 to 81.53, demonstrating high effectiveness. The findings imply that AI-based teaching materials not only enhance the quality of Akidah Akhlak learning but also provide an interactive teaching alternative that aligns with the needs of the digital generation. This study serves as a reference for Islamic educational institutions in leveraging technology to enrich students' learning experiences.

Keywords: Development, Teaching Materials, Akidah Akhlak, Artificial Intelligence, Islamic High School.

Abstrak

Perkembangan teknologi, khususnya Kecerdasan Buatan (AI), telah membuka peluang baru dalam meningkatkan kualitas pembelajaran, termasuk dalam pendidikan agama Islam. Mata pelajaran Akidah Akhlak masih banyak diajarkan dengan metode konvensional yang cenderung monoton dan kurang menarik bagi generasi digital, sehingga diperlukan inovasi dalam pengembangan bahan ajar yang interaktif dan adaptif. Penelitian ini bertujuan untuk mengembangkan bahan ajar berbasis AI yang dapat meningkatkan keterlibatan, pemahaman, dan hasil belajar siswa dalam mata pelajaran Akidah Akhlak. Penelitian ini menggunakan pendekatan Penelitian dan Pengembangan (R&D) dengan desain kualitatif dan kuantitatif. Model ADDIE (Analyze, Design, Develop, Implement, Evaluate)

diterapkan dalam pengembangan bahan ajar, yang didukung oleh platform Quizizz sebagai media interaktif untuk pembelajaran dan penilaian formatif. Data dikumpulkan melalui wawancara, observasi, dokumentasi, pre-test dan post-test, serta angket tanggapan siswa, kemudian dianalisis menggunakan analisis tematik untuk data kualitatif dan uji statistik untuk data kuantitatif. Hasil penelitian menunjukkan bahwa bahan ajar berbasis AI layak digunakan, dengan validasi ahli mencapai 84% dan respons siswa sebesar 83%. Analisis pre-test dan post-test menunjukkan peningkatan pemahaman siswa yang signifikan, dengan rata-rata skor N-Gain meningkat dari 53.16 menjadi 81.53, menunjukkan efektivitas tinggi. Implikasi penelitian ini menunjukkan bahwa penggunaan bahan ajar berbasis AI tidak hanya meningkatkan kualitas pembelajaran Akidah Akhlak, tetapi juga memberikan alternatif metode pengajaran yang interaktif dan relevan dengan kebutuhan generasi digital. Penelitian ini dapat menjadi acuan bagi lembaga pendidikan Islam dalam memanfaatkan teknologi untuk memperkaya pengalaman belajar siswa.

***Kata Kunci**: Pengembangan, Bahan Ajar, Akidah Akhlak, Kecerdasan Buatan, Madrasah Aliyah*

INTRODUCTION

The rapid advancement of technology, particularly in the field of Artificial Intelligence (AI), has had a significant impact on various sectors, including education (Era & Gupta, 2023; Hamal et al., 2022). Over time, the education sector has faced increasing challenges to adapt to the needs of a generation that is becoming more connected to digital technology (Hosna et al., 2025; Mospan & Sysoieva, 2022). One of the ongoing challenges in educational transformation is the development of teaching materials that can provide an interactive, engaging, and adaptive learning experience for students (Lamuhtadun & Hosna, 2023). One subject that particularly requires innovative approaches is Akidah Akhlak (Islamic Theology and Ethics) (Hanifah Salsabila et al., 2023), where learning has traditionally been carried out using methods that are often static and fail to fully utilize available technological advancements (Thakur, 2017). The use of technology, especially Artificial Intelligence, in the development of teaching materials for the Akidah Akhlak subject presents a solution that can improve the quality of education (Ginting et al., 2022; Jingshan, 2023). Educational institutions with a strong foundation in Islamic education face the challenge of blending traditional values with the growing demands of an increasingly digital age (Amalia et al., 2024; Budiyono et al., 2024; Madkan et al., 2025; Mustikamah et al., 2025). Therefore, this research aims to develop AI-based teaching materials for Akidah Akhlak that provide a more interactive, engaging, and relevant learning experience tailored to the needs of students in the digital era.

While in recent years, the application of Artificial Intelligence (AI) has been widely implemented in the fields of science, mathematics, and language education, the application of AI in the development of religious teaching materials, particularly for Akidah Akhlak, remains limited (Hidayah & Humaidi, 2022; Tanjung, 2022). This highlights the need for a new approach that can accommodate technological advancements without compromising the essence of Islamic teachings. Several studies have explored the use of artificial intelligence to improve the efficiency of religious education. For example, the use of chatbots and large language models (LLMs) has been shown to provide quick responses to basic fiqh questions, but often lacks depth in spiritual interpretation and local contextualization (Herlanti et al., 2025; Nurazizah et al., 2024; Sulaeman et al., 2025). Research in Indonesia has largely focused on developing digital module-based teaching materials, augmented reality (AR), or interactive multimedia for Islamic Religious Education subjects (Arif et al., 2025; Fauziyah et al., 2025; M. Arif Susanto, 2024;

Mumtahana et al., 2025). However, most of these media are static or one-way, without the adaptive features that characterize AI. Globally, AI has been used to monitor student behavior development through big data analysis (learning analytics). However, the application of AI to internalize qualitative and esoteric moral values remains a major challenge in the literature(Jubba et al., 2022; Nada Nabilah et al., 2024; Permadi et al., 2025; Samdani et al., 2025). Although AI has been used for language or science learning, there is a gap in the literature regarding the development of adaptive and personalized (AI-based) Akidah Akhlak teaching materials for high school students in Indonesia (Effendi et al., 2025; Hidayatullah & Hafidz, 2024; Maarif et al., 2025; Tanjung et al., 2023). Most AI research in the field of religion only touches on cognitive aspects, while affective aspects (character/*Akhlak* formation) through AI have not been widely explored (Nun et al., 2025; Rafida et al., 2024; Shah, 2023). This study fills that gap by designing teaching materials that not only convey text but are also capable of personalizing learning according to the moral profiles and ethical challenges faced by Gen-Z students in Indonesia.

This research aims to develop AI-based teaching materials that are more interactive and adaptable to the individual needs of students in learning Akidah Akhlak. With this development, it is expected that learning will become more engaging, relevant, and effective, addressing the limitations of traditional learning methods that are often monotonous and fail to engage students actively. This study also seeks to evaluate the effectiveness of these AI-based teaching materials in enhancing students' understanding and involvement in the Akidah Akhlak subject.

This study will fill the gap in the existing literature, where most previous research has primarily focused on the application of technology in general education, while the use of AI in Islamic religious education has received limited attention. (Akgun & Greenhow, 2021; Az Zahra et al., 2023; Bakhrudin All Habsy et al., 2024; Gukalenko et al., 2021; Irzavika et al., 2024; Ivanova et al., 2020; Maola et al., 2024; Oktavian et al., 2024; Putra et al., 2024; Silfiya & Siagian, 2024). This study is expected to make a significant contribution to the field of Islamic education, particularly in the use of artificial intelligence to develop teaching materials that can enhance the quality of religious learning. The specific objectives of this research are: (1) To develop AI-based teaching materials for the Akidah Akhlak subject that are interactive and adaptable to students' needs; (2) To measure students' responses to the use of AI-based teaching materials and compare them with conventional teaching methods; and (3) To evaluate the effectiveness of AI-based teaching materials in improving students' understanding of Akidah Akhlak content. Through this research, it is expected to provide valuable insights into the potential use of artificial intelligence in Islamic education, particularly in the Akidah Akhlak subject. This study aims to make a meaningful contribution to modernizing Islamic religious education and provide recommendations on how technology can be effectively integrated into learning at madrasahs and other Islamic schools.

RESEARCH METHOD

This study adopts a Research and Development (R&D) approach with both qualitative and quantitative designs, focusing on the development of AI-based teaching materials for the Akidah Akhlak subject. This approach was chosen because the study aims to create a product (teaching materials) that can be directly implemented in the field and to evaluate the

effectiveness of AI-based teaching materials in the learning process. The study utilizes the ADDIE development model (Analyze, Design, Develop, Implement, Evaluate), which allows for the development of teaching materials that meet the dynamic needs of learning (Spatioti et al., 2022). In this research and development, the ADDIE development model was used. The ADDIE development procedure is as follows; Analyse: This analysis stage is the main stage that needs to be carried out by researchers identifying several real learning conditions and ideal learning conditions, including problem analysis, material analysis, and specification of learning objectives at the Salafiyah Syafi'iyah Tebuireng Jombang Islamic Senior High School. Design: This planning stage is the stage for preparing the materials needed to develop learning media based on the prepared materials. Researchers will prepare a digital platform that will later be used to develop teaching materials for the Aqidah and Akhlak subject. Development: The core development stage involves assessing the developed media against the previously developed design, then validating it with expert media and learning material experts. After the validation stage, revisions can be made based on the validator's suggestions to improve the developed media. Implementation: This implementation stage is the stage where the development of artificial intelligence-based Akidah Akhlak teaching materials is used as material or a tool for delivering learning materials to students. Evaluate: The evaluation phase is the final stage. It is at this stage that the development of the AI-based Akidah Akhlak teaching materials, which have been used as learning media for delivering the material, is evaluated to improve and identify the strengths and weaknesses of the media used to deliver the material to students.(Russell & Norvig, 2021)

The subjects of this study were 38 students of Class XI of the Religious Affairs Department at the Salafiyah Syafi'iyah Tebuireng Jombang Islamic Senior High School.Data collection is conducted through interviews, observations, and documentation. Interviews are conducted with key informants, including Akidah Akhlak teachers and several students, to gain insights into their views on the implementation of AI-based teaching materials. These interviews also aim to provide insights into the effectiveness of learning with new technology in a global context. Additionally, classroom observations are conducted to monitor student interactions with AI-based teaching materials and to observe how these materials are applied in daily learning activities within diverse educational settings. Quizizz, an interactive technology-based platform, is used to support the development of teaching materials and provide formative assessment through quizzes that can be tailored to students' levels of understanding (Arzety et al., 2025; Yong & Rudolph, 2022). Documentation is used to collect additional data regarding the curriculum, previously used teaching materials, and the learning processes applied in the educational system. The data obtained from interviews, observations, and documentation are used to analyze student engagement and the success of technology implementation in the teaching and learning process.

The data collected will be analyzed using both qualitative and quantitative data analysis methods. For qualitative data, thematic analysis will be conducted to identify patterns and themes that emerge from interviews and observations, which reflect the experiences of students and teachers in using AI-based teaching materials. For quantitative data, statistical tests will be performed on the pre-test and post-test results given before and after the implementation of AI-based teaching materials through the Quizizz platform. This test aims to measure significant

changes in students' understanding of Akidah Akhlak content after using AI-based teaching materials. This quantitative analysis technique helps assess the effectiveness of learning in an objective manner, while qualitative analysis provides a deeper understanding of the perceptions and experiences of students and teachers regarding this innovative learning approach.

RESULTS AND DISCUSSION

Development Process of AI-Based Akidah Akhlak Teaching Materials

The development of AI-based Akidah Akhlak teaching materials adheres to the ADDIE model, a robust and systematic instructional design framework that stands for Analysis, Design, Development, Implementation, and Evaluation (Szabo, 2022). First introduced by Reiser and Mollanda in 1967, this model has become a cornerstone in the field of instructional design and is widely employed for its structured approach to creating effective and impactful learning experiences (Sahaat et al., 2020). The process of developing AI-based Akidah Akhlak teaching materials proceeds through the following stages:

Analysis Stage

The initial stage of developing AI-based Akidah Akhlak teaching materials involves conducting a preliminary study in the form of problem analysis identified by the researcher during the research process. The analysis consists of several aspects, including; Problem Analysis: At this stage, two aspects will be addressed: the issues faced by students and the characteristics of the students themselves. The first aspect is the analysis of the problems experienced by students. This process aims to understand in detail and more profoundly the issues occurring at the Madrasah Aliyah. Additionally, this stage is carried out to create a pleasant learning environment that will make it easier for students to understand the learning material. This is important as the learning process can significantly affect student outcomes. Based on the analysis conducted by the researcher, several students feel bored and less active during lessons, particularly in Akidah Akhlak. This is because educators tend to use conventional teaching methods.

The next aspect is the analysis of students' characteristics. The learning environment lacks innovation, causing students to feel bored and be less engaged in the learning process. Material Analysis: The material analysis conducted on the students aims to select the learning content that needs to be emphasized in order to enhance students' understanding. This material analysis is aligned with the school curriculum, ensuring it adheres to the core and basic competencies, as well as the materials in Akidah Akhlak education, which will serve as the basis for creating the teaching modules. Learning Objectives Analysis: The development of AI-based Akidah Akhlak teaching materials aims to facilitate active, enjoyable, engaging, and participatory learning for students. By utilizing artificial intelligence technology, the learning process becomes more dynamic and is expected to be more effective and relevant to the needs of students in the digital era. This approach creates a more personalized learning experience for students while also enhancing their motivation to learn.

Design Stage

In the second stage, the design of AI-based Akidah Akhlak teaching materials, the researcher follows the process outlined below: Media Selection: The media selected for developing AI-based Akidah Akhlak teaching materials is Quizizz. Quizizz is a highly effective

online tool in the context of modern classroom learning. Its ability to create interactive quiz games allows educators to design engaging questions for students. As an alternative to traditional presentation media, such as PowerPoint, Quizizz offers an advantage in terms of interactive feedback. The "Create Lesson" feature allows educators to integrate interactive elements into their teaching presentations. This feature can combine presentation slides with quizzes, including multiple-choice or essay questions, and also utilize polling or surveys. Quizizz provides a rich and dynamic tool for teachers to create a more engaging learning environment. Designing the Media: To design the Quizizz media, the first step is to create an account, select the quiz type, enter questions and answers, and configure quiz settings such as time limits and themes relevant to the Akidah Akhlak material for class XI Madrasah Aliyah. Quizizz enables quizzes to be presented interactively with a variety of question types and exciting features.

Development Stage

The subsequent stage involves the development of AI-based Akidah Akhlak teaching materials, incorporating refined and tailored content. This phase is critical for gathering validation results and ensuring that the materials meet the intended academic and instructional goals. During this stage, the researcher seeks formal approval for the developed media through a structured validation process, engaging expert validators who possess specialized knowledge in areas directly related to the media's content and design. These expert validators play a pivotal role in assessing the quality, relevance, and accuracy of the materials, offering invaluable insights based on their expertise. The validation process is a collaborative effort, involving two expert validators—one specializing in content and the other in instructional design—as well as student evaluations. This comprehensive validation procedure ensures that the materials are not only pedagogically sound but also engaging and effective for the intended learners. The experts assess various facets of the teaching media, including its educational value, clarity, interactivity, and overall alignment with the learning objectives.

Implementation Stage

In the implementation stage, the AI-based Akidah Akhlak teaching materials will be tested on a larger scale. This trial will be conducted in a class of XI Religious Studies students. The large-scale trial is intended to assess the feasibility of the AI-based Akidah Akhlak teaching materials after undergoing expert media validation. Based on the characteristics and issues already outlined, this large-scale trial will use AI-based learning media.

Evaluation Stage

The researcher will carry out improvements to the media and review any shortcomings in the media, as well as document the results of the trials. Each step in the development process will undergo evaluation. After all stages of the development model are completed, the evaluation stage is the final phase of media development. The evaluation process helps minimize errors or deficiencies that may arise during each development stage.

Feasibility Testing Process for the Development of AI-Based Akidah Akhlak Teaching Materials

This process provides a detailed explanation of the feasibility and viability of the developed product. The feasibility evaluation of the AI-based Akidah Akhlak teaching materials is carried out by two specialized expert validators: one with expertise in content and the other

in instructional design. The careful selection of these expert validators is grounded in their qualifications, ensuring that their knowledge and experience align closely with both the development of teaching media and the specific content of Akidah Akhlak incorporated into the teaching materials.

In addition to expert evaluations, feasibility testing is further enriched by feedback from student participants. This is essential because the combination of media validation and student input offers a comprehensive assessment of the quality, effectiveness, and overall validity of the teaching materials being developed. Through this multifaceted approach, the researcher ensures that the product not only meets academic standards but also resonates with the end-users-students-ensuring it is both pedagogically sound and practically effective in enhancing the learning experience.

Below is the process of feasibility testing for the development of AI-based Akidah Akhlak teaching materials in Akidah Akhlak lessons for class XI.

Validation by the Content Expert

The following table presents the results of the validation by the content expert.

Table 1. Validation Results by Content Expert

No	Indicators	Assessment Criteria				
		SL	L	CL	KL	TL
	Total Score	15	24	3		
	Feasibility Percentage $\mathbf{P = \frac{\sum x}{\sum xi} \times 100\%}$	$P = \frac{42}{50} X100\%$				
	Total Percentage	84%				

Explanation:

P = Feasibility Percentage

$\sum x$ = Total score obtained from the validators

$\sum xi$ = Ideal score

Based on table 1 the quantitative data presented from the content expert in the validation process, it shows that there are three indicators rated as "very feasible," four as "feasible," and one as "fairly feasible." The resulting feasibility percentage is 84%, which indicates that the material is considered highly feasible.

The qualitative data gathered from the responses of the content expert during the validation process indicates that, as an expert in the field of instructional content, a thorough review and assessment of the material used in the interactive learning media (Quizizz) was conducted. This media was developed using the ADDIE model. After reviewing the feasibility of the content, the depth of the material, its relevance to the basic competencies (KD), and its alignment with the developmental level of students, the following conclusions were made: The material has been systematically organized and aligns with the applicable curriculum, The depth and breadth of the material are in accordance with the targeted competency achievements, The questions designed in Quizizz effectively represent the learning indicators and cover a variety of cognitive domains, The language used is communicative, suitable for the characteristics of the students, and does not lead to ambiguous meanings, The material supports the

achievement of the learning objectives and can be effectively used in evaluating learning outcomes.

Validation by the Instructional Media Design Expert

The following table presents the validation results from the instructional media design expert:

Table 2. Validation Results by Media Design Expert

No	Indicators	Assessment Criteria				
		SL	L	CL	KL	TL
Total Score		10	32			
Feasibility Percentage $\mathbf{P = \frac{\sum x}{\sum xi} \times 100\%}$		$P = \frac{42}{50} X100\%$				
Total Percentage		84%				

Explanation:

P = Feasibility Percentage

$\sum x$ = Total score obtained from the validators

$\sum xi$ = Ideal score

Based on table 2 the quantitative data presented from the media expert validation, it shows that two indicators received a "very feasible" rating, and eight indicators were rated as "feasible." The resulting feasibility percentage is 84%, indicating that the media is highly suitable for use.

The qualitative data gathered from the instructional media design expert's feedback during the validation process indicates that Quizizz serves as an effective interactive evaluation tool in the development of learning. Based on the review of aspects such as appearance, interactivity, accessibility, content suitability, and ease of use by students, it was concluded that:

Quizizz meets the criteria as a valid and appropriate evaluative tool for the learning process, as it is designed to support effective assessment within instructional activities. The media features an attractive and responsive interface that enhances student engagement through a game-based learning approach, allowing learners to participate actively and enjoyably. In addition, the development of questions and learning content is aligned with the stated learning objectives and effectively supports both the implementation and evaluation stages of the ADDIE instructional model. Furthermore, the media can be accessed easily by students using various devices, including computers, tablets, and smartphones, which provides flexibility and convenience in learning activities across different learning environments.

Student Responses to the Use of AI-Based Akidah Akhlak Teaching Materials

The feasibility of the product, based on the validation results from two validators, both the content expert and the instructional media design expert, is also supported by student feedback on the product. This can be seen in the following table:

Table 3. Product Feasibility Validation Results from Content Experts and Instructional Media Design Experts

No	Item Answer										Score (X)	Percentage (%)
	1	2	3	4	5	6	7	8	9	10		
Total Score	166	158	155	160	151	160	153	160	163	160	1586	1586
Percentage	$PRPD = \frac{1586}{1900} x\ 100\%$											
Total Percentage	83%											

Based on table 3 the quantitative data obtained from student assessments, it shows that students rated the use of the AI-based Akidah Akhlak teaching materials at 83%. This result indicates that the students' response to the use of the AI-based teaching materials is highly favorable and suitable for implementation in the learning process.

Effectiveness of the Development of AI-Based Akidah Akhlak Teaching Materials

Table 4. Effectiveness of the Development of AI-Based Akidah Akhlak Teaching Materials

Tests of Normality

	Class	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Student Learning Outcomes	Pre-Test (Experiment)	.106	38	.200*	.966	38	.306
	Post-Test (Experiment)	.103	38	.200*	.965	38	.274

Based on table 4 the output above, it is known that the significance values (sig) for both Kolmogorov-Smirnov and Shapiro-Wilk tests are greater than 0.05. Therefore, it can be concluded that the research data follows a normal distribution. To further clarify the results of the normality test for the experimental and control groups, the Normal Probability Plot is presented. The decision-making criteria are as follows: Data is considered normally distributed if the data points scatter around the diagonal line and follow the direction of the diagonal line. Data is considered not normally distributed if the data points scatter far from the direction of the line or do not follow the diagonal.

The following is the Normal Probability Plot:

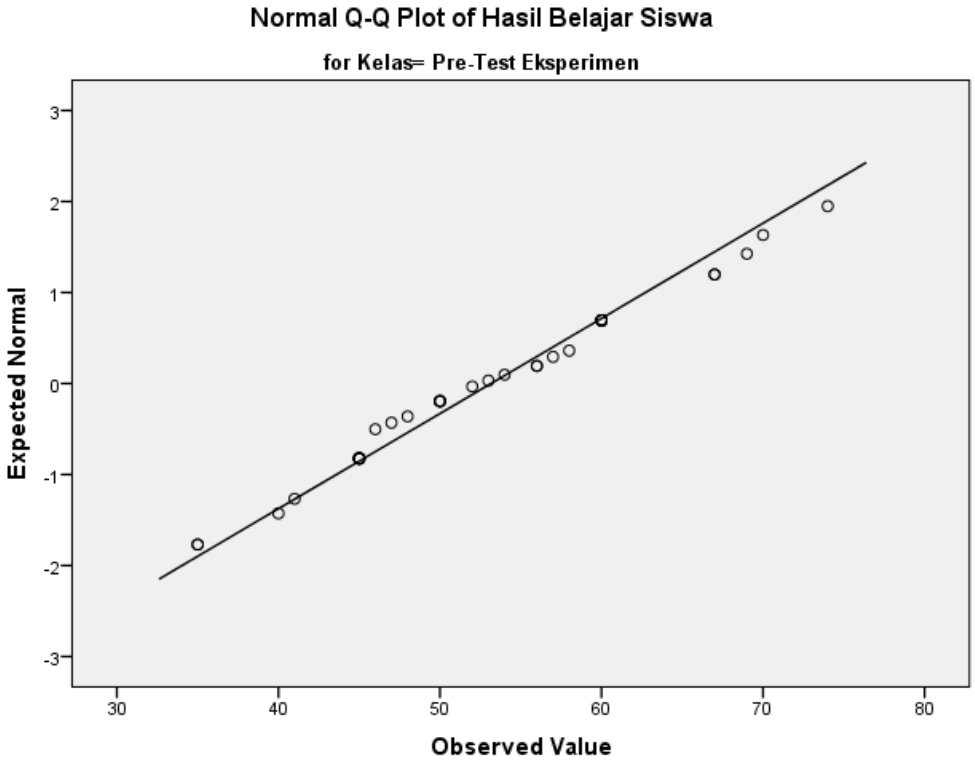

Figure 1. Normal Probability Diagram of Student Learning Outcomes for Pre-Test Eksperimen

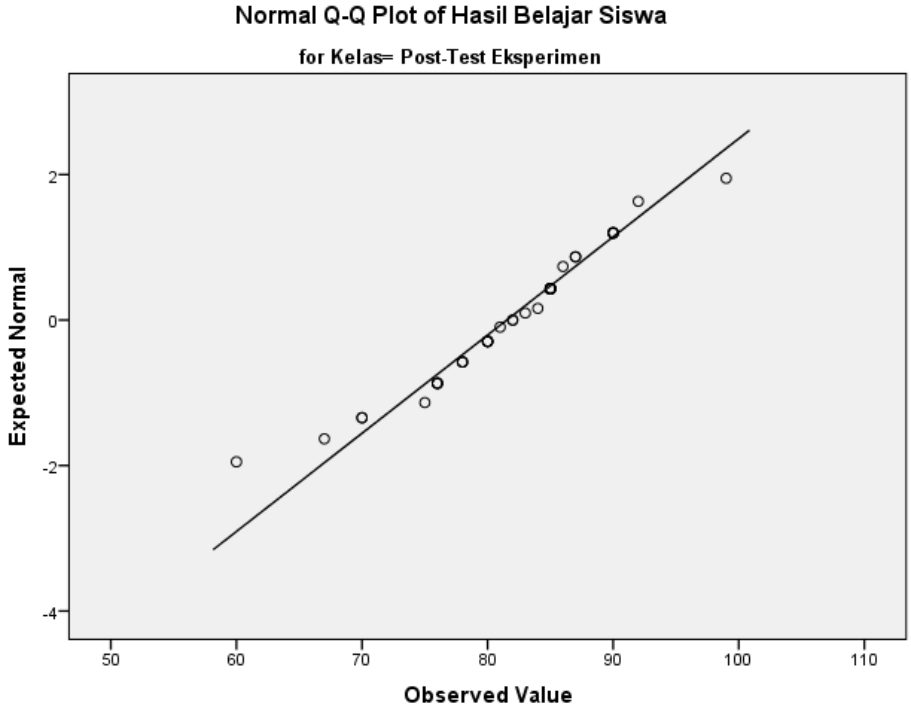

Figure 2. Normal Probability Diagram of Student Learning Outcomes for Post-Test Eksperimen

Based on the Normal Probability Plot above, it shows that the data is normally distributed, as the data points scatter around the diagonal line and follow the direction of the diagonal. Next, a Test of Homogeneity of Variances is conducted:

Table 5. Test of Homogeneity of Variances

Test of Homogeneity of Variances

Student Learning Outcomes			
Levene Statistic	df1	df2	Sig.
4.282	1	74	.042

Based on table 5 the output above, the significance value (sig) for the Homogeneity Test is sig 042 > 0,05. It can be concluded that the data is homogeneous. Since the data is normally distributed and homogeneous, the next step is to conduct an Independent Sample T-Test for the results of the Pre-Test and Post-Test in the experimental group. The decision criteria for the Independent Sample T-Test are as follows:

Table 6. Independent Sample T-Test for Pre-Test and Post-Test results

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Student Learning Outcomes	Equal variances assumed	4.282	.042	-14.456	74	.000	-28.36842	1.96240	-32.27859	-24.45825
	Equal variances not assumed			-14.456	69.635	.000	-28.36842	1.96240	-32.28267	-24.45418

Based on table 6 the output above Sig (2-tailed) .000 < 0.05 Therefore, there is a significant difference between the Pre-Test and Post-Test results of the experimental group. To determine the effectiveness of the learning outcomes from the Pre-Test and Post-Test, an N-Gain Score test is used. The results of the N-Gain Score test can be seen in the table below, which refers to the N-Gain value in percentage (%). The N-Gain Score calculation is shown below:

Table 7. N-Gain Score Test Results

N-Gain Score Calculation Results		**N-Gain Score Calculation Results**	
No.	**Pree-Test Eksperimen**	**No.**	**Post-Test Eksperimen**
	N-Gain %		**N-Gain %**
1.	67.00	1.	80.00
2.	57.00	2.	78.00

3.	54.00	3.	78.00
4.	46.00	4.	85.00
5.	45.00	5.	78.00
6.	67.00	6.	92.00
7.	60.00	7.	83.00
8.	53.00	8.	90.00
9.	60.00	9.	85.00
10.	41.00	10.	85.00
11.	52.00	11.	82.00
12.	74.00	12.	82.00
13.	60.00	13.	80.00
14.	58.00	14.	76.00
15.	45.00	15.	84.00
16.	35.00	16.	90.00
17.	45.00	17.	87.00
18.	40.00	18.	75.00
19.	45.00	19.	85.00
20.	35.00	20.	67.00
21.	56.00	21.	85.00
22.	50.00	22.	85.00
23.	69.00	23.	90.00
24.	47.00	24.	80.00
25.	45.00	25.	70.00
26.	50.00	26.	85.00
27.	60.00	27.	99.00
28.	56.00	28.	80.00
29.	45.00	29.	70.00
30.	50.00	30.	86.00
31.	60.00	31.	81.00
32.	48.00	32.	76.00
33.	60.00	33.	60.00
34.	50.00	34.	90.00
35.	60.00	35.	76.00
36.	45.00	36.	76.00
37.	70.00	37.	80.00
38.	60.00	38.	87.00
Average	**53.16**	**Average**	**81.53**
Minimum	**30.00**	**Minimum**	**60.00**
Maximum	**74.00**	**Maximum**	**99.00**

Based on table 7 the results of the N-Gain Score test above, it shows that the average N-Gain Score for the Pre-Test before using the AI-based Akidah Akhlak teaching materials was 53.16, which leads to the conclusion that it was not effective. The minimum Pre-Test score was 30.00, and the maximum Pre-Test score was 74.00.

In contrast, the average score for the Post-Test after using the AI-based Akidah Akhlak teaching materials was 81.53, which indicates that the development of the AI-based Akidah

Akhlak teaching materials is highly effective. This can be seen from the minimum Post-Test score of 60.00 and the maximum Post-Test score of 99.00.

Discussion

This study aimed to develop and evaluate Artificial Intelligence (AI)-based teaching materials for Aqidah Akhlak learning at the Madrasah Aliyah level using the ADDIE development model. The findings demonstrate that the developed teaching materials are valid, feasible, and effective in improving students' learning outcomes, motivation, and engagement. These results are discussed in relation to relevant learning theories, previous research, and the theoretical and practical contributions of the study.

From a theoretical perspective, the use of the ADDIE model in this study aligns with instructional design theory, which emphasizes a systematic and learner-centered approach to material development. Reiser and Mollenda argue that ADDIE provides a structured framework that ensures learning materials are developed based on learners' needs and evaluated continuously. The analysis stage in this study revealed that conventional teaching methods in Aqidah Akhlak learning often result in passive student participation and low motivation. This finding supports constructivist learning theory, which posits that knowledge is actively constructed by learners through meaningful interactions rather than passively received from teachers. The integration of AI-based media addresses this issue by creating interactive and engaging learning experiences.

The selection of Quizizz as an AI-supported learning medium is also theoretically grounded. Quizizz applies principles of game-based learning and formative assessment by providing immediate feedback, competition elements, and adaptive questioning. According to motivation theory, particularly self-determination theory, learners are more motivated when learning environments support autonomy, competence, and relatedness. The interactive features of Quizizz encourage students to actively participate, make decisions independently, and receive instant feedback, thereby increasing intrinsic motivation. The positive responses from students in this study confirm that AI-based tools can create a more engaging and enjoyable learning environment.

The findings of this study are consistent with previous research indicating that technology-enhanced learning improves student engagement and learning outcomes. Several prior studies have shown that digital and AI-assisted learning media can increase students' motivation and academic achievement, especially when combined with interactive features such as quizzes, games, and multimedia content. Research on game-based learning platforms such as Kahoot and Quizizz has demonstrated their effectiveness in increasing student participation and learning performance. However, most of these studies focus on general subjects or use digital media solely as evaluation tools. In contrast, this study integrates AI-based media systematically into the development of Aqidah Akhlak teaching materials, making it an integral part of the learning process rather than a supplementary tool.

The validation results from material experts and instructional design experts further support the quality of the developed teaching materials. Both expert validations yielded feasibility scores of 84%, categorized as "very feasible." These results indicate that the content, structure, language, and media design are appropriate for students' cognitive levels and aligned

with curriculum standards. This finding is consistent with instructional media theory, which emphasizes that effective learning materials must meet content validity, pedagogical appropriateness, and usability criteria. The systematic validation process ensures that the teaching materials are not only theoretically sound but also practically applicable in real classroom settings.

Student responses also provide strong empirical support for the effectiveness of the developed materials. The student response percentage of 83% indicates a very positive perception of AI-based teaching materials. Students reported that learning became more interesting, interactive, and easier to understand. This finding aligns with learner-centered learning theory, which highlights the importance of students' perceptions and experiences in determining learning success. When students perceive learning as enjoyable and relevant, they are more likely to engage deeply and achieve better learning outcomes.

One of the most significant findings of this study is the effectiveness of AI-based teaching materials in improving learning outcomes. Statistical analysis showed that the data were normally distributed and homogeneous, allowing for further inferential testing. The Independent Sample T-Test revealed a significant difference between pre-test and post-test scores, with a significance value of 0.000 (< 0.05). This result confirms that the implementation of AI-based teaching materials had a statistically significant impact on students' learning outcomes. Furthermore, the N-Gain score analysis showed an increase from an average of 53.16 (ineffective category) in the pre-test to 81.53 (very effective category) in the post-test. These findings are consistent with learning effectiveness theory, which states that learning media that promote interaction, feedback, and engagement tend to produce higher learning gains.

Compared to previous studies, this research offers several interesting and novel contributions. First, while earlier studies mainly focused on the use of digital media for assessment or supplementary activities, this study integrates AI-based media into the entire instructional design process using the ADDIE model. This comprehensive approach ensures that AI is not merely an add-on but a core component of teaching material development. Second, this study specifically focuses on Aqidah Akhlak learning, a subject within Islamic Religious Education that is often perceived as abstract and value-oriented. The successful integration of AI-based teaching materials demonstrates that technology can be effectively used even in subjects that emphasize moral and spiritual development (Hamzah et al., 2024; Saari & Chik, 2025). The theoretical gap addressed by this study lies in the limited application of AI-based instructional design in Islamic Religious Education, particularly in Aqidah Akhlak learning at the Madrasah Aliyah level (Nasar et al., 2025; Nursyam et al., 2025).

Previous research has largely emphasized cognitive subjects such as science and mathematics, leaving religious education underexplored in terms of AI integration (Pham & Sampson, 2022; Wale, 2024). This study bridges that gap by providing empirical evidence that AI-based teaching materials can enhance not only cognitive outcom es but also student engagement and motivation in religious education contexts. In terms of practical implications, this study provides educators with a validated and effective model for integrating AI-based media into Aqidah Akhlak learning (Kabalmay et al., 2025; R & Thohir, 2024). Teachers can use platforms like Quizizz to create interactive learning experiences that align with curriculum goals and students' digital literacy (Faizah et al., 2025; Nirmala et al., 2025). The findings suggest

that AI-based teaching materials can serve as an innovative solution to address student boredom and passivity commonly found in conventional learning environments. Additionally, this study supports the broader educational goal of preparing students for the digital era by integrating technology into religious education without compromising core values (Asrori et al., 2025; Madkan et al., 2025). Despite its contributions, this study also opens opportunities for future research. Further studies could explore the long-term impact of AI-based teaching materials on students' character development and moral behavior, which are central goals of Aqidah Akhlak education. Future research could also compare different AI-based platforms or investigate their effectiveness across diverse educational levels and contexts. Moreover, qualitative studies could provide deeper insights into students' learning experiences and perceptions of AI integration in religious education.

In conclusion, the findings of this study confirm that AI-based teaching materials developed using the ADDIE model are valid, feasible, and highly effective in improving learning outcomes in Aqidah Akhlak education. By aligning with constructivist learning theory, motivation theory, and instructional design principles, this research demonstrates that AI integration can transform traditional religious education into a more interactive, engaging, and effective learning experience. The study contributes to both theory and practice by addressing a significant gap in AI-based instructional design within Islamic Religious Education and offering a practical model for future implementation.

CONCLUSION

Based on the results of research conducted on the development of artificial intelligence (AI)-based Akidah Akhlak teaching materials, several important things can be concluded as follows: This study shows that the teaching materials developed are able to meet students' needs in understanding Aqidah Akhlak material in a more interesting, interactive, and technology-based manner. There was positive feedback from students, with higher motivation to learn Aqidah and Akhlak after using artificial intelligence (AI)-based learning materials. The use of AI-based learning materials has proven to be more effective in improving students' understanding of Aqidah Akhlak material compared to the learning process before using AI. This study reveals that AI integration is capable of personalizing moral dilemmas in real-time according to students' psychological profiles. This finding challenges the long-held assumption that AI is rigid and devoid of values. On the contrary, AI can actually be a more effective ethical mirror in triggering self-reflection compared to conventional lecture methods, thus having a significant impact on the internalization of moral values on an individual level. This study shows that the use of AI does not diminish the authority of teachers, but rather strengthens the depth of spiritual interaction in the classroom. These findings dispel concerns that technology will degrade the teacher-student relationship. On the contrary, with AI handling the cognitive burden of the material, teachers have more space to focus on spiritual guidance and exemplary behavior.

This study makes a significant contribution to the discourse on the development of Islamic Education curricula in the digital age. This study confirms the theory about the effectiveness of digitizing teaching materials in increasing student engagement. By presenting empirical data from Islamic high schools in Indonesia, this study reinforces the argument that

technology integration is no longer just a complement, but a fundamental necessity to maintain the relevance of Akidah Akhlak values amid the rapid flow of digital information. This study challenges the conventional view that Artificial Intelligence (AI) is reductionist and has the potential to erode spiritual values in religious education. On the contrary, the results of this study show that AI, if developed through appropriate ethical-theological parameters, is actually capable of personalizing Aqidah Akhlak learning in accordance with the psychological profile of individual students. This refutes the skepticism that AI is only capable of processing cognitive data without touching on affective-spiritual aspects.

This study is limited to a small sample size and specific cases in certain Islamic high schools. Therefore, the findings in this study cannot be generalized to all Islamic educational institutions in Indonesia, which have different demographic characteristics and technological infrastructure. This study does not cover representative variations in terms of education levels and differences in gender variables and the age range of students. This limits our understanding of how AI interacts with diverse user profiles. The methods used in this study have limitations in exploring the long-term effectiveness of using AI-based teaching materials. The evaluation of these teaching materials is highly dependent on the stability of internet access and the availability of hardware at the research location, which may not reflect the real conditions in remote areas of Indonesia. Further research with a larger sample and wider variation is needed to produce a more comprehensive and in-depth understanding, which will support the formulation of more appropriate policies.

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