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Effectiveness of AI-Based Digital Comics in Enhancing Students' Understanding of Ghibah and Tabayyun in Islamic Education

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Abstract

This study aims to develop and examine the effectiveness of an Artificial Intelligence (AI)-based digital comic as a learning medium for the topics of ghibah and tabayyun in Islamic Religious Education (IRE). The research employed a Research and Development (R&D) method using the ADDIE model, which consists of the analysis, design, development, implementation, and evaluation stages. The study was conducted at SMP Negeri 7 Sekayu and involved 31 seventh-grade students as subjects for effectiveness testing, as well as three expert validators to assess the feasibility of the media. The validation results indicate that the AI-based digital comic falls into the "Very Valid" category, with an average percentage of 87%. In the practicality test, the media obtained an average score of 90%, categorized as "Very Practical," across the one-to-one, small group, and large group trials. Effectiveness testing shows a significant improvement in learning outcomes, as indicated by a shift in pretest scores from predominantly low categories to predominantly good and very good categories in the posttest. The N-Gain value of 0.79 falls within the high category, indicating that the media is effective in improving students' understanding of ghibah and tabayyun material. Overall, the AI-based digital comic is proven to be valid, practical, and effective as a learning medium for Islamic Religious Education. Future research is recommended to expand the scope of the material, test the media at different educational levels, or integrate more adaptive AI-based interactive features.

Keywords: *Digital Comic; Artificial Intelligence; Islamic Religious Education; Learning Media; Ghibah and Tabayyun*

Introduction

Islamic Religious Education (IRE) plays a strategic role in shaping students' character so that they are able to internalize moral, ethical, and spiritual values in their daily lives (Ayu et al., 2024). In the context of the digital era, where lifestyles, information dissemination, and social interactions are changing rapidly, IRE is required to present learning processes that are not merely conceptual but also contextual and relevant to students' lived experiences (Pramana & Wirian, 2025).The availability of innovative learning media is therefore a crucial factor in enhancing students' learning interest, engagement, and depth of understanding (Almardiah & Muis, 2025). This demand aligns with the advancement of educational technology, which offers creative approaches to overcoming the limitations of conventional teaching methods in traditional learning environments (Zaman, 2025).

One innovation that has developed rapidly is the use of digital comics as a learning medium. Previous studies indicate that digital comic media can improve students' literacy skills and learning motivation (Anggraeni & Nurharini, 2024). Digital comics present learning content through a combination of visual and narrative elements, making the material easier to understand compared to text-based media and supporting conceptual comprehension in a more engaging manner (Putu et al., 2024). Numerous empirical studies have reported that students who learn using digital comics demonstrate higher learning outcomes and reading interest than those in control groups (Sagita et al., 2021). The potential of this medium has become increasingly relevant in the modern era, as technological advancements, including digital design applications and graphic tools, enable the efficient production of varied and instructional comic content tailored to learning needs. Consequently, digital comics emerge as an innovative medium that is not only visually appealing but also effective and efficient in supporting teaching and learning processes across educational levels (Suwanda et al., 2024).

The utilization of Artificial Intelligence (AI) in the development of learning media represents a growing trend that offers both efficiency and effectiveness in education (Alfayumi, 2025). AI technology is capable of generating instructional materials such as visual designs, narrative structures, and interactive content automatically, thereby supporting more adaptive and immersive learning experiences than conventional approaches (Rohmah, 2024). Furthermore, AI provides opportunities for educators to create learning media that are more personalized, contextual, and responsive to individual student needs, thus facilitating differentiated and individualized learning processes (Respati, 2024)The integration of AI with digital media, including digital comics, animations, and interactive materials, has significant potential to enrich pedagogical approaches, particularly in conveying moral, religious, and ethical content that requires deep understanding and reflective engagement (Oktavianus et al., 2023).

Within the context of Islamic Religious Education, the topics of ghibah and tabayyun constitute fundamental concepts that are highly relevant to students' social lives in the digital era, where the rapid flow of information, misinformation, and online interactions has become increasingly pervasive (Nugroho et al., 2022). Ghibah, defined as speaking about others' shortcomings without justification or confirmation, is regarded as reprehensible behavior from an Islamic perspective (Syifaullah & Sunandar, 2025), Meanwhile, tabayyun, which refers to the obligation to verify and clarify information before disseminating it, is frequently emphasized as an ethical response to the spread of misinformation within contemporary Muslim societies (Effendy et al., 2023). However, several studies indicate that although students have been taught these values, their conceptual understanding is not always accompanied by critical awareness in practice. This is particularly evident in social media interactions, where the principle of tabayyun is often neglected (Adawiyah et al., 2025). These findings suggest the need for appropriate learning media that can facilitate deeper understanding and practical application of the values of ghibah and tabayyun in students' daily lives.

Accordingly, learning media that can present these values in an engaging, relevant, and comprehensible manner are required. AI-based digital comics offer a promising alternative, as they are capable of delivering concrete and contextual visual narratives that can stimulate students' moral awareness. Through storylines closely related to adolescents' real-life experiences, digital comics can support both conceptual understanding and the development of ethical attitudes toward the issues of ghibah and tabayyun.

Based on this background, the present study aims to examine the effectiveness of AI-based digital comics in enhancing students' understanding of ghibah and tabayyun within Islamic Religious Education learning. This study is expected to contribute to the development of innovative instructional media that not only support cognitive achievement but also foster character development in accordance with Islamic values.

Method

Research Design

This study employed a Research and Development (R&D) methodology by implementing the ADDIE development model. The ADDIE model is widely adopted as an R&D framework for developing instructional media due to its systematic and comprehensive structure (Safitri & Aziz, 2022). Through the ADDIE model, researchers are able to carry out five principal stages, namely analysis, design, development, implementation, and evaluation, thereby ensuring that the developed instructional product aligns with students' learning needs and the educational context.

Furthermore, the ADDIE model has been proven to be flexible and adaptable to various types of learning media, including electronic modules, interactive media, animations, and instructional videos. For instance, a study on the development of ADDIE-based interactive e-modules for fiqh learning reported that the resulting media were valid, practical, and effective in improving students' understanding (Nengsih et al., 2025).

Research Subjects and Location

This research was conducted at SMP Negeri 7 Sekayu, Musi Banyuasin Regency, South Sumatra Province. The school was selected because it possesses adequate facilities to support the use of digital technology, including well-equipped classrooms, computer resources, and internet access. These conditions enabled the effective implementation of Artificial Intelligence (AI)-based digital comic media. The study was carried out over the course of one academic semester or within a shorter period as required by the development and implementation processes.

The research subjects consisted of 31 seventh-grade students who served as the primary users of the developed media. The students participated in the trial implementation and provided feedback regarding the quality and effectiveness of the AI-based digital comic. The object of the study was the AI-based digital comic media designed to deliver an interactive and adaptive learning experience. Media effectiveness was evaluated through pretest and posttest instruments to measure improvements in students' understanding. In addition, questionnaires, interviews, and observations were employed to assess learning motivation, user experience, and responses from both teachers and students.

Research Procedure

Table 1. Research Stages

Stage	Activities
Analysis	Identifying teachers' and students' needs through observations, interviews, and questionnaires, followed by determining the focus of AI-based digital comic development.
Design	Determining learning content and media format, as well as developing flowcharts and storyboards prior to design evaluation.
Development	Developing the AI-based digital comic, conducting expert validation involving media, content, and language specialists, and revising the product based on feedback.
Implementation	Conducting one-to-one and small group trials, followed by implementation evaluation to identify potential challenges in media usage.
Evaluation	Carrying out field testing and assessing media effectiveness through pretests, posttests, and student response questionnaires.

Data Analysis Techniques

a. Validity test

After the digital comic media had been fully developed, the product was subjected to expert validation. The evaluation focused on several key aspects, including content appropriateness, media design quality, and pedagogical suitability. A five-point Likert scale ranging from 1 to 5 was employed in the validation process to capture experts' judgments systematically. The validation score was then calculated using the following formula:

$$X = \frac{\text{Total Score}}{\text{Ideal Score}} x100\%$$

The resulting scores were interpreted to determine the level of media validity and to identify areas requiring revision prior to implementation. This validation process ensured that the developed digital comic media met academic standards, instructional objectives, and learners' characteristics.

Table 2. Validity Criteria

Range	Category
21%–40%	Less Valid
41%–60%	Fairly Valid
61%–80%	Valid
81%–100%	Highly Valid

b. Peacticality test

The practicality test was conducted in a sequential manner. The first stage was the One-to-One Test, which involved three students with varying cognitive ability levels who interacted directly with the developed product. After using the media, the students completed a questionnaire based on their usage experience. The next stage was the Small Group Test, which involved six students and followed the same testing and data collection procedures. The mean score of practicality was calculated using the following formula:

$$X = \frac{\text{Total Score}}{\text{Ideal Score}} x100\%$$

The results of these stages were used to determine the level of practicality of the digital comic media and to identify any necessary revisions prior to broader implementation.

Table 3. Practicality Criteria for the Role-Play Video

Range	Category
0%–20%	Very Impractical
21%–40%	Less Practical
41%–60%	Fair
61%–80%	Practical
81%–100%	Very Practical

(Riduwan, 2020:88)

c. Effectiveness test

The effectiveness of the media was evaluated using a quasi-experimental design with a one-group pretest–posttest model. This design was employed to measure changes in students' learning outcomes before and after the implementation of the AI-based digital comic media. The improvement in learning outcomes was analyzed using the normalized gain (N-Gain) calculation formula.

$$N - Gain = \frac{Skor\ Posttest - Skor\ Pretest}{Skor\ Maksimum - Skor\ Pretest} x100\%$$

Description:

- N-Gain : Normalized Gain Score
- Sposttest : Posttest Score
- Spretest : Pretest Score

The gain score is interpreted based on the following criteria:

Table 4. N-Gain Criteria

Category	Value (g)
Low	$g < 0.3$
Medium	$0.3 \leq g < 0.7$
High	$g \geq 0.7$

Results and Discussion

Figure 1 Halaman Awal Komik

Figure 2Materi Komik

Figure 3Materi Komik

Several of the images presented above represent the developed product in the form of a digital comic on the topics of tabayyun and ghibah, designed using Artificial Intelligence (AI) technology. This digital comic was developed to present Islamic Religious Education (PAI) material in a more engaging, interactive, and easily comprehensible manner through a storyline closely related to students' daily lives. Each comic panel was systematically structured to ensure that moral messages were clearly conveyed, supported by consistent visuals that were relevant to the learning context. The initial version of the digital comic was subsequently prepared for a quality assessment stage; therefore, an expert validation process was conducted to evaluate the feasibility of the media before it was implemented with students.

Validity Test

The validity test was conducted to ensure that the Artificial Intelligence (AI)-based digital comic media developed has theoretical and practical feasibility before being used in the learning process. This validity assessment covered three main aspects, namely content, media, and language, each of which was evaluated by experts in their respective fields. The content expert assessed the suitability of the comic

content with the basic competencies of Islamic Religious Education, particularly on the topics of ghibah and tabayyun. This assessment included the depth of the material, conceptual accuracy, and its relevance to students' real-life contexts. Through this evaluation, the media is expected to present Islamic ethical values accurately, systematically, and in an easily understandable manner.

Furthermore, the media expert evaluated the quality of the visual display, design attractiveness, visual consistency, and interactivity of the AI-based digital comic. This evaluation is important to ensure that the media has sufficient visual appeal to enhance students' motivation and learning experience. In addition, the language expert assessed the appropriateness of language use in the comic, including aspects of standard language usage, sentence clarity, readability, and the suitability of language style to the characteristics of Grade VII students. All feedback provided by the experts was then analyzed and used as the basis for revising the product. This process ensures that the developed digital comic meets high validity standards and is ready to be tested further in the practicality and effectiveness testing stages. The following table presents the summary of expert validation results.

Table 4 Summary of Validation Test Results

No.	Validator	Maximum Score	Obtained Score	Percentage	Category
1	Content Expert	50	45	90%	Very Valid
2	Media Expert	65	55	85%	Very Valid
3	Language Expert	60	51	85%	Very Valid
	Average			87%	Very Valid

Based on the results of the validation test summary, the AI-based digital comic media received very positive evaluations from all validators. The content expert awarded a score of 45 out of a maximum of 50, with a percentage of 90%, indicating that the comic content, material depth, and alignment with basic competencies and learning objectives are highly appropriate. The media expert awarded a score of 55 out of 65, or 85%, indicating that the aspects of visual appearance, design, navigation, and technical feasibility of the media fall into the very valid category and are suitable for use in learning.

Furthermore, the language expert awarded a score of 51 out of 60, with a percentage of 85%, indicating that the language used in the comic, including sentence structure, readability level, and suitability to students' characteristics, meets good linguistic standards. Overall, the average validity reached 87% and falls into the Very Valid category. These results confirm that the AI-based digital comic meets the content, media, and language criteria and is therefore appropriate to proceed to the practicality testing and classroom implementation stages.

Practicality Test

At the first stage of the practicality test, namely the One to One Test, the AI based digital comic media was tested on four students with diverse academic abilities. This stage aimed to identify initial issues related to the clarity of instructions, ease of navigation, and comfort of individual media use. Based on responses collected through questionnaires, students demonstrated a positive level of acceptance toward the storyline, visual appearance, and integration of AI features in the digital comic. These results indicate that the product met the basic practicality criteria and was appropriate to proceed to the next testing stage with a broader sample.

The next stage was the Small Group Test, which involved eight students and was conducted to evaluate the consistency of user experience when the media was used in small learning groups. At this stage, student interaction with the media and its effectiveness in facilitating understanding of the concepts of tabayyun and ghibah were observed. Questionnaire results showed an increase in practicality scores compared to the individual test, indicating that the media functioned well in a more collaborative learning

environment. Subsequently, a large group test or field test was conducted involving a greater number of students to obtain a more realistic overview of the media practicality in actual classroom conditions. The results of the large group test reinforced previous findings that the AI based digital comic media was practical to use, easy to understand, and capable of optimally supporting student engagement in learning. The results of the practicality test are presented below.

Table 5. Summary of Practicality Test Results

No.	Test Subjects	Percentage	Category
1	One to One	91%	Very Practical
2	Small Group	89%	Very Practical
3	Large Group	91%	Very Practical
	Average	90%	Very Practical

Based on the results of the practicality test of the AI based digital comic media, it can be concluded that the media achieved a very high level of practicality across all testing categories. In the one to one test stage, the media obtained a percentage score of 91 percent, categorized as Very Practical, indicating that the four students as initial users were able to use the media easily without encountering significant difficulties in navigation or content comprehension. This finding confirms that the interface design, storyline structure, and interactive features of the digital comic were aligned with student characteristics and provided a comfortable learning experience.

Furthermore, in the small group test involving eight students, the media achieved a percentage score of 89 percent and remained in the Very Practical category. This result demonstrates the consistency of practicality despite an increase in the number of users. Students in small groups continued to experience ease of use in terms of visual appearance, feature availability, and relevance of the content to learning needs. In the subsequent large group test, the media again achieved a percentage score of 91 percent and maintained the Very Practical category. These results strengthen the conclusion that the AI based digital comic media is not only practical for individual and small group use but also effective for implementation on a larger classroom scale without reducing its functionality or quality.

Overall, the developed media obtained an average practicality score of 90 percent with a Very Practical category, indicating that the AI based digital comic is highly feasible for use as a learning medium. The consistently high percentages across all testing stages confirm that this media provides ease of use, comfort, and a positive learning experience for students, while fulfilling the practicality requirements necessary for the implementation of innovative learning media in schools.

Effectiveness Test

The effectiveness test was conducted to determine the extent to which the Artificial Intelligence based digital comic media was able to improve students' understanding of the topics of ghibah and tabayyun. This testing employed a one group pretest posttest design, in which students were given a test before and after the use of the media. The primary objective of this test was to identify significant changes in learning outcomes following the instructional intervention and to ensure that the developed learning media was not only valid and practical but also effective in supporting the learning process. In addition, effectiveness analysis was carried out using the N Gain calculation to determine the level of improvement in students' learning outcomes based on low, medium, or high categories. The results of the effectiveness test of the developed product are presented below.

Table 6. Summary of Students' Pretest and Posttest Results

Score Interval	Number of Pretest	Number of Posttest	Pretest Percentage (%)	Posttest Percentage (%)	Category
0–59	23	0	74.19%	0.0%	Very Low
60–69	8	0	25.81%	0.0%	Low
70–79	0	2	0.0%	6.45%	Fair
80–89	0	10	0.0%	32.26%	Good
90–100	0	19	0.0%	61.29%	Very Good

The results of the effectiveness test of the Artificial Intelligence based digital comic media indicate a significant change in the distribution of students' scores before and after the use of the media. In the pretest phase, most students were classified in the very low ability category at 74.19 percent, while 25.81 percent were in the low category, and none of the students reached the fair, good, or very good categories. This condition indicates that students' initial understanding of the topics of ghibah and tabayyun was still limited and required a more innovative and contextual learning intervention. After the implementation of the AI based digital comic media in the posttest phase, a drastic change in score distribution was observed. Students who were previously in the very low and low categories shifted entirely to higher categories, with 6.45 percent reaching the fair category, 32.26 percent the good category, and the majority, 61.29 percent, achieving the very good category. This improvement demonstrates that the developed digital comic media was able to provide a more engaging learning experience, support the visualization of abstract concepts, and increase student engagement in the learning process of Islamic Religious Education, particularly on the topics of ghibah and tabayyun.

Overall, the comparison between pretest and posttest scores indicates a significant improvement in students' understanding after the learning media intervention. The highly contrasting changes in score distribution serve as an initial indication that the AI based digital comic media has high effectiveness in improving student competence. To measure the level of improvement quantitatively and more objectively, the next step was to calculate the N Gain to determine the category of improvement in students' learning outcomes. The results of the N Gain calculation are presented below.

Table 7. Summary of Mean Pretest, Posttest, and N Gain

Mean Pretest	Mean Posttest	N Gain	Category
49.67	89.51	0.79	High

The effectiveness analysis of the AI based digital comic media was further strengthened through the N Gain calculation to obtain a more comprehensive measure of the improvement in students' understanding. Based on the results, the average pretest score was 49.67, while the average posttest score increased significantly to 89.51. This substantial increase indicates that the developed learning media was able to produce a positive impact on students' understanding of the concepts of ghibah and tabayyun. The N Gain value of 0.79 falls within the high category, indicating that the improvement in learning outcomes occurred not only in absolute terms but also proportionally relative to students' initial abilities. This finding confirms that the AI based digital comic media is effective in addressing initial learning gaps and in promoting optimal mastery of the learning material.

Thus, these findings confirm that the use of AI based digital comic media not only enhances students' conceptual understanding but also produces a significant instructional impact based on quantitative indicators. These results provide strong evidence that the media is suitable for use as an innovative learning alternative, with effectiveness analysis supported by N Gain calculations to objectively demonstrate the level of improvement in learning outcomes.

Discussion

This study was conducted at SMP Negeri 7 Sekayu and involved 31 seventh grade students as the primary subjects in the effectiveness testing, as well as expert validators consisting of subject matter experts, media experts, and language experts in the validation stage. This procedure aligns with the development process of instructional media at the junior high school level as applied in similar Research and Development based studies (Panjaitan & Rasyid, 2023). The results indicate that the development of Artificial Intelligence based digital comic media on the topics of ghibah and tabayyun had a positive impact on improving the quality of Islamic Religious Education learning. These findings are consistent with previous studies reporting that digital comics in Islamic education effectively enhance student motivation, conceptual understanding, and learning outcomes (Putri & Ilahiyah, 2025). The media was designed to provide a more visual, narrative, and contextual learning experience, thereby helping students to understand Islamic ethical values more easily and meaningfully. This is in line with the characteristics of educational comic media that have been proven effective in conveying moral and ethical messages through narrative and visual approaches (Apostolou & Linardatos, 2023; Firdaus et al., 2025).

At the validity stage, the AI based digital comic media achieved a Very Valid category from all three expert validators, with an average score of 87 percent. This result indicates that the product is feasible for implementation without major revisions and supports previous research findings stating that digital comic media with high validity scores can be directly applied in learning activities (Al-ghifary et al., 2024; Wewengkang & Ramadhan, 2024). The material validity score of 90 percent, media validity score of 85 percent, and language validity score of 85 percent confirm that the narrative content, visual design, and language use meet pedagogical and communicative standards. These findings are consistent with studies emphasizing the importance of alignment between content accuracy, visual design quality, and linguistic appropriateness in digital learning media (Habibi & Agustini, 2022; Suwandinata & Suranata, 2023). This condition also indicates that the product aligns well with the characteristics of junior high school students, effectively conveys moral values, and presents an attractive and comprehensible visual appearance. Such results are consistent with studies showing that educational comics are effective in delivering ethical values and learning concepts through engaging narrative and visual strategies (Indriana et al., 2024; Na et al., 2023). In the context of SMP Negeri 7 Sekayu, where students demonstrate relatively good digital literacy, the high validity scores serve as a strong indicator of the media readiness for further implementation. This finding is supported by previous research indicating that students digital literacy levels contribute significantly to the successful implementation of digital learning media (Arimbawa et al., 2024; Listiana et al., 2025).

Furthermore, during the practicality testing stage, the digital comic media was evaluated through three phases, namely the one to one test, the small group test, and the large group test. The one to one test involving four students resulted in a practicality score of 91 percent, while the small group test with eight students obtained a score of 89 percent. The large group test involving 31 students achieved a score of 91 percent. The overall average practicality score of 90 percent indicates that the media is highly practical for use in Islamic Religious Education learning, particularly in terms of ease of access, visual appearance, navigation, and user comfort. These findings demonstrate that the AI based digital comic media can adapt well to the learning environment at SMP Negeri 7 Sekayu, which is supported by adequate technological facilities, thereby minimizing potential technical obstacles during implementation.

In the effectiveness testing stage, the digital comic media produced a significant improvement in students understanding of the topics of ghibah and tabayyun. The pretest results showed that most students were classified in the low achievement category, with 74.19 percent scoring within the 0 to 59 range. However, after the use of the digital comic media, a substantial shift in score distribution was observed. A total of 61.29 percent of students reached the Very Good category with scores ranging from 90 to 100 in the posttest, while 32.26 percent achieved the Good category with scores ranging from 80 to 89. The mean score increased markedly from 49.67 in the pretest to 89.51 in the posttest.

This improvement was further supported by an N Gain value of 0.79, which falls into the High category, indicating that the digital comic media was highly effective in enhancing students understanding. These findings suggest that the integration of Artificial Intelligence technology into learning media is capable of facilitating the comprehension of abstract concepts in Islamic Religious Education, particularly those related to social behavior and ethical values. In the context of SMP Negeri 7 Sekayu, where students require engaging and digitally relevant learning media, AI based comics provide a more immersive learning experience that fosters motivation and supports long term memory retention.

Overall, the findings of this study demonstrate that AI based digital comic media is not only valid and practical but also highly effective for use in Islamic Religious Education learning in schools with characteristics similar to SMP Negeri 7 Sekayu. The media successfully bridges pedagogical needs and modern technological developments, thereby offering an alternative solution for teaching Islamic values that are often perceived as abstract and difficult for students to understand. Consequently, this study makes a significant contribution to the innovation of digital learning media that aligns with the demands of twenty first century education.

Conclusion

Based on the results and discussion, it can be concluded that the development of Artificial Intelligence based digital comic media on the topics of ghibah and tabayyun at SMP Negeri 7 Sekayu is proven to be feasible and suitable for use as instructional media in Islamic Religious Education. The validation results provided by subject matter experts, media experts, and language experts indicate a Very Valid category with an average score of 87 percent, demonstrating that the media meets the required standards in terms of content accuracy, visual presentation, and language quality. In addition, the practicality testing conducted through three stages, namely the one to one test, small group test, and large group test, resulted in a Very Practical category with an average score of 90 percent. These findings indicate that the media is easy to use, easy to understand, and well accepted by students.

The effectiveness of the media is also reflected in the improvement of students learning outcomes. The average pretest score of 49.67 increased to 89.51 in the posttest, with an N Gain value of 0.79, which falls into the High category. This improvement indicates that the AI based digital comic media is capable of helping students understand the topics of ghibah and tabayyun in a more visual, narrative, and contextual manner. The findings further suggest that the integration of Artificial Intelligence technology into digital comic media has strong potential to support Islamic Religious Education learning in a way that is more engaging and aligned with the characteristics of the digital generation.

Nevertheless, this study has several limitations, including the implementation of the trial in only one school and the limited scope of instructional content, which focused solely on two topics in Islamic Religious Education. Therefore, future research is recommended to expand the implementation to more diverse school contexts, develop content covering other competencies within Islamic Religious Education, and explore more adaptive Artificial Intelligence features to enhance the responsiveness of the media to students learning needs.

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