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Enhancing History Education with AI-Based LMS: Supporting the Independent Curriculum in High Schools

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ABSTRACT

The integration of Artificial Intelligence (AI) in education offers new opportunities for enhancing learning engagement and effectiveness. This study aims to develop an AI-based Learning Management System (LMS) content to support the implementation of the Independent Curriculum in high schools. The research follows the ADDIE model (Analysis, Design, Development, Implementation, Evaluation) to create learning videos, infographics, podcasts, and digital books using AI applications such as Leonardo.ai, CapCut, Zepeto, and Canva. Expert validation and implementation trials were conducted to assess the effectiveness and usability of the developed LMS content. Validation results confirm that the AI-based LMS content enhances interactivity and engagement in learning. Implementation trials, conducted through pre-test and post-test sessions with two grade ten classes at SMA Negeri 1 Indralaya, show a 4.82% improvement in students' learning outcomes. Observations indicate that students adapt well to AI-based learning content and that the LMS platform supports both individual and small group learning effectively. The incorporation of AI in learning media development increases student motivation and the overall effectiveness of the learning process. The AI-based LMS content provides a modern and relevant educational experience, aligning with the demands of digital-era learning. This study confirms that AI-based LMS content effectively supports the implementation of the Independent Curriculum in high schools, leading to improved student learning outcomes. The integration of AI in education presents innovative solutions to conventional learning challenges, enhancing the quality of education in the digital era.

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1. INTRODUCTION

The Independent Curriculum is designed to provide freedom for students and teachers to develop learning that suits students' needs. This curriculum aims to develop students' potential and learning interests, as well as reduce academic burdens (Ingtias et al., 2022; Widya et al., 2024). The Independent Curriculum began to be implemented in Indonesia in 2021 as a replacement for the 2013 Curriculum. Implementing the Independent Curriculum requires a holistic and innovative approach that can be strengthened by a Learning Management System (LMS) ((Picasouw et al., 2023; Trenggono Hidayatullah et al., 2023). Although the Covid-19 pandemic has subsided, LMS remains an inseparable part of modern education. LMS is a digital platform as a container for organizing and presenting hybrid learning that includes attendance, materials, assignments, and evaluations, as well as interaction with students (Kurniati et al., 2023; Rachmatullah et al., 2023).

The rapid advancement of artificial intelligence (AI) has transformed various sectors, including education, by enabling machines to think, learn, and act similarly to humans across a range of tasks, from simple processes to complex problem-solving (Abimanto & Mahendro, 2023; Yulianti et al., 2023; Dewi Anggraeni et al., 2023). In education, AI-powered Learning Management Systems (LMS) offer the potential to personalize learning experiences, catering to individual student needs and improving engagement and accessibility (Sahronih et al., 2023; Karyadi et al., 2023).

The integration of AI into LMS-assisted learning, such as Moodle, has already demonstrated its effectiveness in structuring interactive and engaging lessons, such as those on the entry and development of Islamic religion and culture in Indonesia (Rimatuzzahriah et al., 2023; Kirana et al., 2024). AI-based LMS content also enhances educators' ability to track student progress more effectively, offering real-time insights into learning outcomes (Sandy et al., 2023; Satriani et al., 2023).

LMS platforms are widely used in schools across South Sumatra, including SMA Negeri 1 Indralaya, a technology-driven institution with a strong IT infrastructure. An initial survey of 216 students revealed that 49.8% had prior experience using LMS, while 63.5% believed that AI integration in LMS would be beneficial. To support AI-driven learning, this study will develop AI-generated LMS content such as animated videos, podcasts, graphics, and digital books, utilizing applications like Leonardo for 3D animations (Prayoga et al., 2023), CapCut for animated videos (Hasibuan & Febrina, 2023), HeyGen for video podcasts, Microsoft Bing for 3D animated images (Nahariah & Armita, 2022), Canva for infographics and mind maps (Tonra et al., 2023; Rahmawati et al., 2024), and Google Bard for scriptwriting.

These AI applications enhance visualization, enabling students to explore historical reconstructions, classical artworks, and past civilizations in a more immersive and engaging way. Given the potential of AI-based LMS content, this research aims to develop an innovative digital learning environment that aligns with the Merdeka Curriculum standards at SMA Negeri 1 Indralaya. By leveraging AI technology, the study seeks to create an inclusive, adaptive, and student-centered learning environment that optimizes individual learning potential and enhances the quality of education in the digital era.

2. METHODS

This study employs the Research and Development (R&D) method, where two distinct models are used as a guideline for the subsequent analytical-developmental steps: the ADDIE model and TAM (Technology Acceptance Model). The ADDIE model is used to organise the content development processes, following the five main research stages it presents from analysis, design, development, implementation, to evaluation (Sukarini et al., 2021; Yu et al., 2021). Meanwile, the TAM model serves to evaluate the extent to which users, in this case, the students and teachers involved, receive and apply the AI-based LMS content developed earlier using the ADDIE model (Huang & Mizumoto, 2024;

Natasia et al., 2021). As for the research subject, this study was conducted at SMA Negeri 1 Indralaya, with the main participants being tenth-grade students from class X5 (ten-five) and X9 (ten-nine).

In the ADDIE model, the first stage involves conducting a needs analysis achieved through interviews, mainly with the teachers, carried out to identify the main issues encountered during the learning process (Ali, G et al., 2024). In addition to interviews, a needs analysis questionnaire was also distributed to the student participants. The next stage after needs analysis was completed was the design stage, during which data collection, the creation of flowcharts and storyboards, and the preparation of expert validation sheets in the form of questionnaires were conducted. These questionnaires are intended as assessment instruments for content, media, and language experts regarding the implementation quality of the AI-based LMS content being developed.

In the development stage, the main learning materials were prepared, followed by the creation of the intended AI-based LMS content. Following this, expert validation was conducted which included validation of media, materials, and language aspects of the developed learning material. The next stage was implementation, where individual (one-to-one) and small-group tests were carried out with student participants using a questionnaire. This step was aimed to identify any potential shortcomings in the use of the AI-based LMS content in their learning. Through this process, direct feedback from students was obtained, technical readiness was evaluated, and the effectiveness and user response to the developed AI-based LMS were assessed.

After individual and small group tests were conducted, a field test was carried out involving the two classes. In this case, pre-test and post-test questions, each consisting of 40 questions, were used to measure students' learning outcomes after their learning with the AI-based LMS developed earlier. The final stage of this study in line with the ADDIE model is evaluation, where the research instruments were analysed through two types of evaluative process: formative and summative. Formative evaluation was conducted during the development process to identify strengths and weaknesses in the AI-based LMS content through feedback from the student participants and the teachers involved, allowing for adjustments before a wider implementation. Meanwhile, summative evaluation was conducted after the content had been implemented, using pre-test and post-test instruments to assess the content's effectiveness in improving students' learning outcomes. The results from both evaluations are expected to provide insights into the quality and feasibility of the content and its impact on history learning.

3. FINDINGS AND DISCUSSION

In this study, an AI-based Learning Management System (LMS) content was developed to support the implementation of the Independent Curriculum in high school contexts, particularly in history classes. This LMS was designed to provide a more interactive learning experience tailored to the characteristics of the students. One of the key aspects of this LMS development is the innovative design of the learning content being applied. The learning content developed herein includes various formats, such as instructional videos, infographics, digital books, and podcasts, all relevant to the history curriculum. Below is a more detailed explanation of the development stages of the AI-based LMS content using two models, the ADDIE model and the TAM model.

3.1 Analysis

The first, primary stage of the ADDIE development model guiding the research process in this study is analysis, consisting of further specific analytical steps, which served as an important foundation for aligning the underlining research design with the students' conditions and characteristics. Analysing both the learning needs and characteristics of the students allowed the AI-based LMS content to be designed as more targeted and effective. At this initial stage, problem analysis, curriculum analysis, and needs analysis were carried out to ensure that the LMS content developed

truly supports the implementation of the Independent Curriculum in high school learning environments.

Table 1. Results of the needs analysis

No.	Question	Result	Analysis
	What teaching methods have been used so far in the history learning process in class?	37.1% or 39 students answered the discussion	This indicates that discussion remains the main method of delivering history material, although it may lack variety.
	What teaching methods or approaches do you expect when delivering history lessons in class?	33.3% or 34 students answered field trip	This reflects students' expectations for more contextual methods and direct field experiences.
	What kind of learning media do you prefer the most?	34.3% or 35 students answered visual	This indicates students' preference for the use of images, videos, and diagrams in understanding the material.
	What difficulties or challenges do you often encounter in the history learning process?	37.2% or 38 students answered media uninteresting learning	This suggests the need for innovation in using more interactive and engaging media to increase student interest.
	What learning style suits you best?	41.1% or 42 students answered auditory (listening) 18.6% or 19 students answered kinaesthetic (physical activities) 40.1% or 41 students answered visual (through diagrams, charts or other data representations)	This highlights the diversity of learning styles among students and the need to provide a variety of teaching methods.
	How effective is the LMS in helping you achieve your learning goals?	43.1% or 44 students answered quite effective	This shows that the LMS has made a positive contribution, but there is still room for improvement in its use.
	What type of LMS content is most helpful to you in understanding the lesson material?	22.5% or 23 students answered texts, images, videos	This underscores the importance of presenting a comprehensive and engaging variety of content.
	Do you feel that AI-based learning content is more interactive compared to traditional learning content?	43.1% or 44 students answered quite agree	This indicates that the integration of AI in learning has received positive feedback from students.

Based on the data gathered from 102 students who completed the needs analysis questionnaire, several important findings were revealed regarding their methods and preferences in history learning. Discussion remained the most commonly used method in history lessons, though students expressed a liking for more contextual approaches such as field trips. Additionally, they also preferred visual learning media, such as images and videos, indicating a need for more engaging and interactive contents. Many students also felt that the current learning media were unappealing, which highlights the need for innovation. Lastly, their apparent learning styles varied, with the majority favouring auditory and visual learning styles, demanding diverse and more adaptive teaching methods.

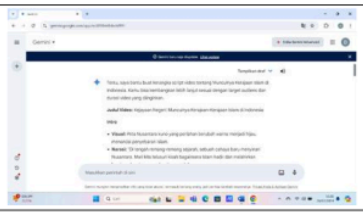
Using a new, different learning approach like the LMS here was considered fairly effective by students, although there remained room for improvement in its application. It was noted that AI-based content provided greater interactivity compared to traditional methods, and the variety of content such as text, images, and videos significantly aided students' understanding of the subject matter. With these needs and preferences in mind, it is hoped that the development of AI-based content within the Learning Management System (LMS) will meet student expectations and enhance the quality of their learning.

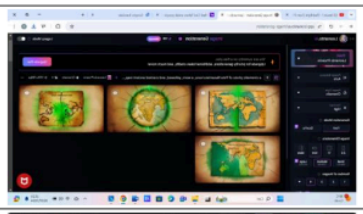
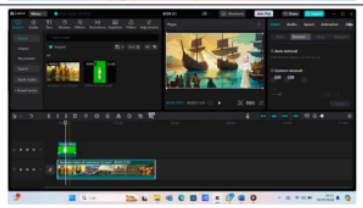
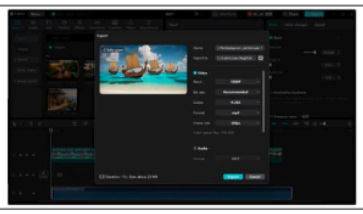
3.2 Design

In the design stage, material content was planned in accordance with the supporting data previously collected. This data included the Learning Outcomes and the Learning Objectives Pathway for Stage E in history lessons for Year 10, focusing on the topic "the process of the arrival and development of Islam and its culture in Indonesia." Once the subject matter had been chosen, relevant data were collected through a literature review of historical sources. The sources used included history reference books, academic articles, conference papers, archival documents, and various other historical sources. This step ensured that the content developed was based on a solid, accurate, and relevant academic foundation, aligned with the needs of the implemented curriculum.

Subsequently, a flowchart was developed to visually represent the structure and progression of the AI-based Learning Management System (LMS) content. In parallel, a storyboard was constructed as a critical component of the content design process. This storyboard facilitated the detailed planning of the layout and presentation of various instructional elements, including text, images, videos, simulations, and interactive components. The primary objective of this preparatory phase was to ensure coherence among all content elements, aligning them effectively with the intended learning outcomes. This approach aimed to enhance the overall learning experience by making it more engaging, interactive, and accessible to learners. An example of one of the instructional video storyboards developed is presented below.

Table 2. Storyboard of the video-type LMS content

Project Title: The Arrival and Birth of Islamic Kingdoms in Indonesia		
Meeting: 2		
Part of: 1 - End		
1.		In the first stage, the researchers created visualisation text depicting human activities during the "Emergence of Islamic Kingdoms in Indonesia" period, using the Gemini AI website.

2.		In the second stage, the researchers used the Leonardo.ai Pro website to convert the visualisation text into 3D images. Motion was then added to transform the images into a silent moving video.
3.		In the third stage, the researchers edited the video using the CapCut Pro application. All videos were combined, and elements such as background music, text, overlays, audio, and animated cartoons were added using the Zepeto application, tailored to students' needs.
4.		At this stage, the editing process was completed, and the final version was exported.

3.3 Development

In the development stage, the initial layout design of the LMS materials was prepared, and the learning content was created using AI, including videos, infographics, podcasts, and digital books tailored to the subject matter. Each content element was designed to cater to various learning styles, ensuring that students could more easily grasp the material being delivered. Additionally, both the materials and the content were designed in such a way to enhance interactivity and student engagement in the learning process, in line with the results of the needs analysis conducted earlier. The AI applications used at this stage included Leonardo.ai, Canva, Zepeto, CapCut, Fliki.ai, Runway.ai, Gemini.ai, and ChatGPT.

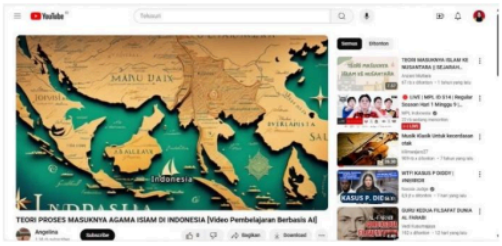


Figure 1. AI-Based history learning video

Figure 1 shows an example of a learning video created with the help of AI applications such as Leonardo.ai, Runway.ai, Fliki.ai, Gemini.ai, ChatGPT, and Zepeto. These applications were used to generate visual illustrations that supported the historical narrative, making the material more easily digestible by students. This video is part of the AI-based LMS content developed in this study to help students better understand history in a more interactive and engaging way.

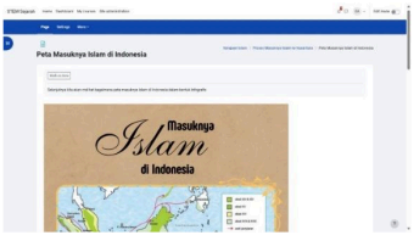


Figure 2. Infographic on the LMS page

Similarly, Figure 2 displays an infographic that has been integrated into the LMS, designed using Canva, allowing for the creation of visually appealing and informative history material. The infographic design showcases various important aspects of the development of Islam, Islamic kingdoms and its culture in Indonesia, making it easier for students to understand the historical context in a more engaging and interactive manner. In addition to learning videos and infographics, podcasts and digital books were also created to make history learning more diverse and appealing.

Once all the AI-based LMS content types were fully developed, the next step was to set up the Moodle LMS. This process involved integrating the content that had been created into a parent platform, including uploading the learning videos, infographics, podcasts, and digital books to Moodle. This allows students to access all learning materials in one well-organised place, facilitating their learning process in an easy, concentrated manner.

Moodle LMS is also equipped with various features that enhance the learning experience, such as the assignment feature, which allows teachers to assign tasks to students and manage the submission of assignments easily. The attendance feature is used to record student attendance in each learning session, while the file feature enables the storage and sharing of documents and learning materials. Forum is another important feature in Moodle that provides a space for students and teachers to discuss and ask questions about the subject matter. Additionally, Moodle has a URL feature that allows teachers to link to relevant external learning resources.

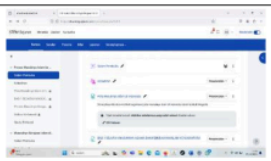
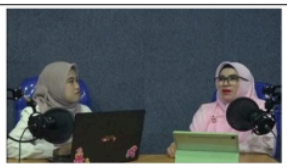
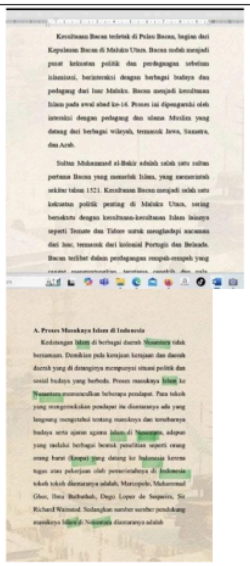
After the content upload process was completed in the LMS platform, the next step was validation by related experts. This research involved validation by three types of experts: subject matter expert, media expert, and language expert. The following are the results of the experts' validation of the AI-based LMS content, which covers the development of Islam in Indonesia.

Table 3. Results of expert validation process

No	Aspect validated	Validation	Category
1.	Material	89%	Very valid
2.	Media	84.2%	Very valid
3.	Language	72.3%	Valid

Based on the validation results shown in Table 3, the AI-based LMS content developed herein to support history learning in high schools had overall met high validity. It can be concluded that this AI-based LMS content is suitable for use in the learning process with some refinements, particularly in the language aspect, to further improve communication effectiveness and student comprehension. Table 4, meanwhile, presents the detailed revisions made based on the experts' comments and suggestions.

Table 4. Comments and revision from expert validators

Comments and revision	Before	After
Spelling errors were found in the sequence of student activities when accessing the LMS.		
There was a lack of subtitles in the AI-based podcast video.		
Punctuation, paragraphing, and spelling—especially for place names, religions, figures, as well as capitalisation of conjunctions and prepositions—need revision.		
The content of the infographics requires improvement.		

The subtitles are not accurate and must be adjusted to match the exact sentences.		

3.4 Implementation

After the development stage was completed, implementation testing was conducted in three phases: individual (one-to-one) test, small group test, and field test. The results from small group and individual tests are presented in Table 5, which includes assessments of the effectiveness of the AI-based LMS content as well as feedbacks from student representatives on their learning experiences. The collected data provide a clear picture on how well the developed content meets students' needs and expectations in supporting the implementation of the Independent Curriculum in high schools.

Table 5. Results of the individual and small group implementation tests

No.	Test	Result	Category
1.	Individual (One-to-one)	95.3%	Very practical
2.	Small group	88.8%	Very practical

In Table 5, we can see that during the individual test, the AI-based LMS content achieved an average acceptance score of 95.33%, which falls into the "very practical" category. This indicates that the developed content is very easy for students to use. In the small group test, meanwhile, an average acceptance score of 88.83% was achieved, also classified as "very practical." This shows that, even on a small group scale, the developed LMS content performed well and effectively supported the learning process. Overall, these results demonstrate that the AI-based LMS content has met the expected standards of practicality, both for individual use and in small group settings.

Next, the field test phase was conducted to evaluate the effectiveness of using AI-based LMS content on a larger scale. This test involved all the student participants from both X5 and X9 classes at SMA Negeri 1 Indralaya, who provided diverse feedback in return. Observations were made on students' interactions with the developed LMS content, their level of engagement during the learning process, and the ease of navigating the platform. Afterward, pre-test and post-test instruments were used to measure students' learning outcomes. Figure 3 shows their scores during the pre-test.

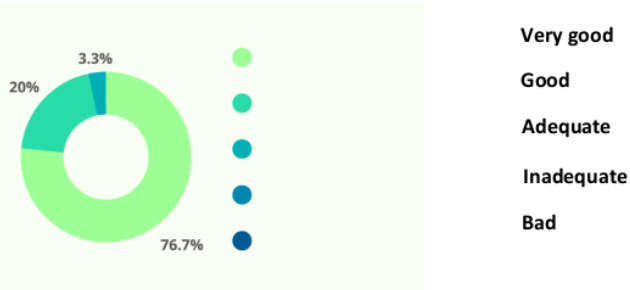


Figure 3. Recapitulation of students' pre-test results

The diagram in Figure 3 shows that 76.7% of the students, or 46 individuals, scored in the "very good" category, with a score range of 81-100. Meanwhile, 12 of them, or 20%, obtained scores in the "good" category, with a range of 61-80. Two students, meanwhile, or 3.3%, fell only into the "adequate" category, with scores ranging from 41-60.

Figure 4. Recapitulation of students' post-test results

On the other hand, after the post-test session, as can be seen in Figure 4, we can see that 56 students, or 93.3%, achieved scores in the "very good" category within the 81-100 range. Meanwhile, 4 students, or 6.7%, scored within the 61-80 range in the "good" category. It can be concluded, then, that the students' learning outcomes classes X5 and X9 had indeed improved after learning history through the developed AI-based LMS content.

3.5 Evaluation

The evaluation phase in this study includes formative and summative evaluations. Formative evaluation was carried out throughout the process, from analysis to implementation. During the analysis stage, it was found that history learning requires a more interactive and engaging approach for students. Then, at the design stage, adjustments were made to the design of the AI-based LMS content to better suit students' needs. During the development stage, expert validation of the LMS content was conducted, followed by revisions based on expert suggestions. After that, one-to-one and small group trials were carried out, which received positive responses from students, although some revisions were necessary, especially regarding the LMS interface. During the summative evaluation stage, pre-test and post-test instruments were used to assess the effectiveness of the AI-based LMS in learning.

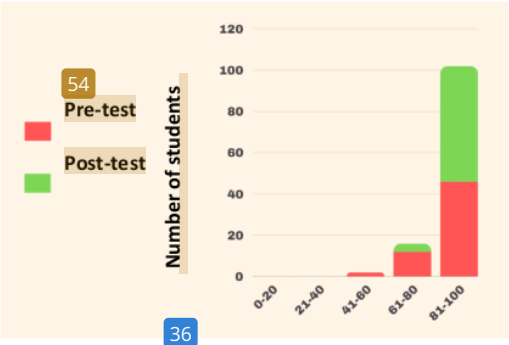


Figure 5. Comparison of students' pre-test and post-test results

The diagram in Figure 5 presents a comparison of students' pre-test and post-test scores before and after implementing the previously-developed AI-based LMS content in their classroom learning process. Comparing the pre-test and post-test results, it can be seen that students' learning outcomes increased by 4.82% after they studied using AI-based LMS content. Their average pre-test score was 81.91, while the average post-test score reached 86.73. This increase was calculated using the formula {(86.73 - 81.91) x 100%}, which resulted in a value of 4.82%.

Table 6. Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pretest Score	.108	60	.080	.933	60	.003
Postest Score	.092	60	.200*	.972	60	.191

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Kolmogorov-Smirnov Normal Distribution > 0.05, can be continued with descriptive statistical analysis.

Table 7. Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest Score	75.4833	60	6.36594	.82184
	Postest Score	85.3833	60	7.30473	.94304

Table 8. Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Pretest Score & Postest Score	60	.912	.000

Table 9. Paired Samples Test

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	Pretest Score - Postest Score	-9.90000	3.01802	.38963	-10.67964	-9.12036	-25.409	59	.000

The results of the paired t-test showed that there was a statistically significant difference between the pretest and post-test scores. The posttest average was 9.9 points higher than the pretest, with a very strong correlation (0.912). With a p-value of 0.000, it can be concluded that the increase did not occur by chance, and the intervention carried out between the pretest and posttest had a significant effect.

Discussion

This research and development study was primarily focused on developing a particular learning aid, namely an AI-based LMS content that discusses the arrival and development of Islam, Islamic kingdoms, and its culture in Indonesia. The disadvantage of using AI is that it supports more carelessness among educators and students. This occurs as a consequence of AI completing many tasks automatically. Then, it is related to Human Work. The possibility of the loss of the role of administration in schools does not rule out the possibility when artificial intelligence (AI) is used for administrative matters in schools, campuses, including institutions and many more. As previously stated, there are problems related to artificial intelligence when investigated widely and in learning environments. Of course, artificial intelligence (AI) has a beneficial impact on a number of areas of human life, including education. However, we must understand that every creative thought, especially one involving technology, will always have positive and negative implications. Therefore, it is fitting that we as educators utilize modern technology carefully and correctly. In the end, artificial intelligence (AI) is just a tool to facilitate and accelerate human action, not to take the position of humans in an important role as educators (Susanti, A. I., 2024) .

The study adopts the ADDIE development model and the TAM model as the base research guidelines. In the analysis stage, needs analysis, student characteristics, curriculum, and available resources were examined. Specifically regarding the curriculum and learning resource analysis, which was carried out through interviews with a history teacher at SMA Negeri 1 Indralaya, the results revealed that the school has indeed implemented the Independent Curriculum (Kurikulum Merdeka), which corresponds with the goal of this study to develop teaching media that supports the curriculum's implementation, especially in high school contexts.

In addition, the school focuses on student development through various activities, such as extracurricular programs and a variety of competitions. The school also ensures that facilities, such as classrooms and learning equipment, are well-maintained to support students' comfort. In terms of rules, the school enforces strict policies regarding mobile phone use, with students not being allowed to bring them to school. However, the school provides alternatives with other technological facilities, such as a computer lab used for learning activities.

As for the teaching methods, teachers pay close attention to students' different learning styles, such as using more visual media for students with a visual learning style, providing verbal explanations and discussions for auditory learners, and conducting practical activities or educational games for kinaesthetic learners. Even though this diverse teaching approach is already applied, LMS or e-learning has not yet been used for grade ten students in this school, thus there is a significant potential for integrating this technology to support various learning styles in one neat package. The next step after curriculum and resource analysis was needs analysis, where Google Forms was used as an instrument to gather data from the student participants.

The needs analysis results show that most students agreed on discussion being the most frequently used method in history learning, although they rather passively wanted more activities such as field trips. Additionally, students often struggled because the media used was not engaging enough and the available historical sources were limited. Many students were comfortable with an auditory learning style (listening), although some also preferred a visual or kinaesthetic learning style by performing physical activities. The use of a Learning Management System (LMS) was considered fairly effective, although there were still technical issues. Students preferred LMS content containing text, images, and videos, as well as a group learning feature.

After completing all the analysis stages, the next steps were a part of the design stage. In this stage, a flowchart was created to guide the media development process. This was then followed by making storyboards for the instructional video content and drafted questions that would be used for the podcast. Additionally, materials were gathered to be processed into infographics and digital books.

These steps ensured that every element of the learning media was structured and aligned with students' needs, thereby enhancing the expected learning effectiveness.

The next stage after design was development, where the design of the instructional videos, infographics, podcasts, and digital books were put into real products, all created with AI-supported applications. The initial process of creating the instructional video began by preparing a text that described visual representations of people during the early spread of Islam in Indonesia. This text was then processed into 3D images using the Leonardo.ai application. Once the visualization was completed, these design pieces were put together into video using CapCut, adding various elements such as background music, text, overlays, audio, and cartoon animations created through the Zepeto app.

Afterwards, Canva was utilised to design visually appealing and informative elements for the creation of the infographics (Rahmawati et al., 2024; Tonra et al., 2023). Subsequently, the podcast production began with recording interview sessions with resource persons. Once the recording was complete, the next step was to edit the results using CapCut. During the editing stage, the recorded content could be refined by adding elements such as background music, sound effects, and cutting unnecessary parts to ensure a better narrative flow (Hasibuan & Febrina, 2023; Syahmewah, 2023). Once finished, the content for the digital book was written, with Canva being used to design an engaging and interactive layout. Canva allows users to easily add visual elements like images, graphics, and text (Septiyani & Setiawan, 2023). Once the design is finished, the digital book content can be published using AnyFlip, which enables users to create digital books that can be read interactively.

The final product of this AI-based LMS content development were then incorporated into the previously prepared Moodle LMS. This LMS content was next evaluated for feasibility by experts in the fields of subject matter, media, and language. This validation process aimed to assess to what extent the developed learning media meets the expected standards based on expert evaluations and feedback. Revisions were made to the AI-based LMS content in accordance with the suggestions, criticisms, and feedback provided by the experts to improve its quality. Ease of accessing LMS for educators and students anytime, anywhere via any device (PC, laptop, or Smartphone) (Firman, F., Muhsin, M. A., & Goestina, G., 2021).

The next step after expert validation was to implement the content, as part of the implementation stage of the ADDIE model, through three phases of tests: individual test, small group test, and field test. In the individual test, the LMS content received an acceptance score of 95.3%, indicating excellent ease of use. The small group test also showed positive results with a score of 88.8%, falling into the very practical category. In the field test phase, the instruments used were pre-test and post-test questions. The pre-test results showed that 56 students (93.3%) obtained very good scores, while 4 students (6.7%) were in the good category. The post-test results revealed that 46 students (76.7%) achieved very good scores, 12 students (20%) were in the good category, and 2 students (3.3%) were in the adequate category.

At the last stage, evaluation, two types of evaluative process were conducted: formative and summative evaluation. Formative evaluation was carried out throughout the development process, from analysis to implementation, to ensure that each step proceeded as planned. Meanwhile, summative evaluation was conducted by comparing the pre-test and post-test results of the students. The average pre-test score was recorded at 81.91, while the average post-test score reached 86.73. The 4.82% increase shows that the AI-based LMS content made a significant contribution to improving students' learning outcomes.

Study demonstrates a rather great potential in enhancing history education in Indonesia. This study not only succeeded in creating interactive and engaging learning media but also made a significant contribution to improving students' learning outcomes. With the evaluation results showing clear progress, it is hoped that this content can be widely adopted in various educational institutions, thereby enhancing the overall quality of history education, particularly in high school contexts.

4. CONCLUSION

The development of AI-based LMS content has proven to be a valuable tool in supporting the implementation of the Independent Curriculum in schools. This study demonstrates that by integrating AI technology, learning materials such as videos, infographics, podcasts, and digital books become more interactive, engaging, and practical, enhancing the overall learning experience. The implementation tests conducted in this research show that AI-based LMS content significantly improves students' learning outcomes, fostering a more dynamic and technologically integrated educational environment. Moreover, the use of AI strengthens the role of technology in education, making learning approaches more adaptive and relevant to contemporary advancements.

Despite these promising results, this study has certain limitations. The research was conducted within a single school setting, limiting its generalizability to broader educational contexts. Additionally, while improvements in student engagement and learning outcomes were observed, further longitudinal studies are needed to assess the long-term impact of AI-based LMS content.

Future research should focus on expanding the sample size across different schools and analyzing AI-based LMS integration in diverse subject areas. Additionally, investigating the role of AI-driven personalized learning and its effect on student motivation and performance would provide deeper insights into its potential applications. As AI continues to evolve, further exploration of its role in curriculum development will be essential in shaping modern, inclusive, and effective learning environments that cater to the needs of students in the digital era.

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