

Implementing AI in Developing Teaching Modules to Support the Independent Curriculum

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Abstract: The development of Artificial Intelligence (AI) has had a significant impact across various fields, including education. One of its potential applications lies in the development of teaching modules aligned with the principles of the Merdeka Curriculum. This study aims to describe the implementation of AI in the process of designing and developing teaching modules at SMA Bina Insan Palu. The research employs a qualitative approach with a case study design. Data were collected through in-depth interviews, participatory observation, and document analysis of teaching modules, and were then analyzed using data reduction, data presentation, and thematic conclusion-drawing techniques. The findings reveal that the use of AI supports teachers in creating more creative, interactive, and contextual learning materials. Moreover, AI facilitates the development of Project-Based Learning (PjBL) relevant to the Pancasila Student Profile and enables the application of varied and adaptive assessments through AI-based questions and interactive quizzes. AI also contributes to enhancing teachers' creativity in designing digital learning media while saving time in preparing teaching modules. However, teachers' limited digital literacy and the need for intensive training remain major challenges in optimizing AI implementation. The study concludes that AI serves as a pedagogical partner in the development of teaching modules, supporting rather than replacing the role of teachers. To ensure AI utilization is aligned with the goals of the Merdeka Curriculum, strategic efforts are needed in the form of improving digital literacy, providing intensive training for educators, and ensuring adequate technological infrastructure.

Keywords: Artificial Intelligence; Teaching Module; Merdeka Curriculum.

Abstract: *Perkembangan kecerdasan buatan (Artificial Intelligence/AI) telah memberikan dampak signifikan di berbagai bidang, termasuk pendidikan. Salah satu peluang pemanfaatannya adalah dalam pengembangan modul ajar yang selaras dengan prinsip Kurikulum Merdeka. Penelitian ini bertujuan untuk mendeskripsikan implementasi AI dalam proses penyusunan dan pengembangan modul ajar di SMA Bina Insan Palu. Penelitian ini menggunakan pendekatan kualitatif dengan desain studi kasus. Data dikumpulkan melalui wawancara mendalam, observasi partisipatif, dan analisis dokumen modul ajar, kemudian dianalisis menggunakan teknik reduksi data, penyajian data, dan penarikan kesimpulan secara tematik. Hasil penelitian menunjukkan bahwa pemanfaatan AI mendukung guru dalam menyusun materi ajar yang lebih kreatif, interaktif, dan kontekstual. Selain itu, AI memfasilitasi pengembangan Project Based Learning (PjBL) yang relevan dengan Profil*

Pelajar Pancasila serta memungkinkan penerapan asesmen variatif dan adaptif melalui soal berbasis AI dan kuis interaktif. AI juga berkontribusi pada peningkatan kreativitas guru dalam merancang media pembelajaran digital sekaligus menghemat waktu penyusunan modul ajar. Namun demikian, keterbatasan literasi digital guru dan kebutuhan akan pelatihan intensif menjadi tantangan utama dalam optimalisasi implementasi AI. Simpulan penelitian menegaskan bahwa AI berperan sebagai mitra pedagogis dalam pengembangan modul ajar, mendukung, bukan menggantikan, peran guru. Agar pemanfaatan AI selaras dengan tujuan Kurikulum Merdeka, diperlukan upaya strategis berupa peningkatan literasi digital, pelatihan intensif bagi pendidik, serta penyediaan infrastruktur teknologi yang memadai.

Kata kunci : Artificial intelegensi; Modul Ajar; Kurikulum merdeka.

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Introduction

The rapid development of digital innovation in recent years has made artificial intelligence (AI) a key factor in transforming education in the 21st century. Globally, AI is considered to have great potential in addressing various significant challenges in education, including increasing the efficiency of lesson planning, personalizing the learning process, and automating teacher administrative tasks (Caniago et al., 2025). This technology is capable of simulating human intelligence to perform various complex functions, even potentially taking over some human roles in carrying out specific tasks more effectively and efficiently. (Fatmawati & Raharjo, 2024) However, the use of AI also requires careful risk and ethical management to prevent dependence on or misuse of the technology.

Recent international studies indicate a significant increase in academic attention to AI applications in education after 2022. Global research is focused on personalized learning, real-time feedback, and automated instructional design. Systematic review 2025 (Luo et al., 2025) confirms that the use of AI in learning is experiencing a sharp upward trend, but is accompanied by new challenges such as potential algorithmic bias, data privacy issues, and limited AI literacy among educators. Research by Hu, Zhu, Pei, & Gu adds that large language models (LLMs) are now increasingly effective in supporting teachers in designing lesson plans, conducting pedagogical reflection, and preparing Lesson Plans (RPPs) and teaching modules with quality comparable to those designed by experienced teachers. (Hu et al., 2025).

Although numerous international studies highlight the potential of AI in improving learning efficiency, literature examining its implementation in the context of Indonesia's Independent Curriculum remains limited. Existing research primarily addresses aspects of digital literacy, instructional leadership, or teacher readiness for

Society 5.0, but has not specifically explored how AI can be utilized as a co-designer in developing teaching modules that align with the principles of the Independent Curriculum: differentiated, contextual, and oriented toward the Pancasila Student Profile. On the other hand, research by R. Oktavia (2025) in the Education Journal revealed a competency gap among teachers in developing teaching materials and implementing differentiated learning in the era of Industry 5.0. Only a small proportion of teachers felt ready and consistently implemented these strategies, demonstrating the need for an integrated approach in teacher training to support the implementation of the Independent Curriculum that utilizes AI. (Rufa Hera & Rita Oktavia, 2025).

Research conducted by Yusdin Gagaramusu et al. found that teachers are able to create more interactive learning modules tailored to student characteristics, despite still facing challenges related to technological literacy. This suggests that the presence of AI can facilitate teachers' work, particularly in creating learning modules. (Gagaramusu et al., 2025). Similar research was conducted by Puardmi Damayanti et al., who tested 50 teachers, with the result that almost half of the participants were able to produce modules with the help of AI. (Damayanti et al., 2025a) This demonstrates the function of AI as an effective tool for teachers in carrying out their duties.

Theoretically, this research is based on three integrated frameworks. First, the theory of AI application in education emphasizes that this technology has the potential to enrich instructional design and increase learning effectiveness, but its success is highly dependent on technological literacy and ethical use by teachers. Second, empirical findings on LLM in learning demonstrate its ability to support teachers in designing teaching modules, adjusting assessments, and managing a more personalized learning process, but still require human validation as a human-in-the-loop to ensure contextual results. Third, the human-centered education policy framework positions teachers as the primary actors in the control and utilization of technology, so that AI plays a role not as a substitute, but as a supporter of teacher professionalism in the learning process (Bora & Kölemen, 2025), (Qureshi, 2025).

In the national context, the implementation of the Independent Curriculum encourages teachers to innovate and develop differentiated teaching modules that are relevant to students' needs and integrate the dimensions of the Pancasila Student Profile. (Damayanti et al., 2025b) However, initial observations at Bina Insan High School in Palu indicate that most teachers still face difficulties in interpreting learning outcomes (CP) and learning objectives (TP), as well as in designing adaptive assessments. Although some teachers have begun using AI to assist in the development of teaching modules, the process remains experimental and lacks

systematic work guidelines. This situation emphasizes the need for a structured and pedagogically sound AI integration model.

Based on these conditions, this study aims to develop a workflow for developing AI-assisted teaching modules at SMA Bina Insan Palu that aligns with the principles of the Independent Curriculum. This study also designs quality indicators for the teaching modules, including alignment between CP and TP, the application of differentiation, formative assessment, and integration of the Pancasila Student Profile Strengthening Project (P5). In the human-in-the-loop approach, AI plays a role in assisting with analysis, suggestions, and recommendations, but the teacher remains the primary director, assessor, and decision-maker.

Methods

This research uses a qualitative approach with a case study design to explore the application of artificial intelligence (AI) in the development of teaching modules that support the implementation of the Independent Curriculum. Participants included the school principal, three core subject teachers, and one curriculum staff member, selected through purposive sampling to obtain in-depth and relevant information regarding the use of AI in the planning and development of teaching materials. Participant selection was based on their expertise or knowledge regarding the use of AI in teaching modules, and participant selection was limited to prevent the discussion from becoming too broad. (Nababan & Meida, 2024).

Data collection was conducted through semi-structured interviews to explore the experiences of teachers and curriculum managers. Questions such as participants' understanding of the use of AI and how often participants use AI in creating teaching modules were asked to obtain sufficiently in-depth data about what was being researched. (Merriam, 2009). Participatory observation of AI-based teaching module design activities was conducted within a period of 1-2 months, as well as learning practices, and document analysis covering teaching modules, lesson implementation plans (RPP), internal school policies, and evidence of the use of AI technology in the material preparation process.

Data were analyzed using a thematic approach with the Miles and Huberman interactive analysis model. (Miles, M.B., Huberman, a. m., & Saldana, 2015) The thematic approach was used to identify and group important themes from research data, such as interviews, observations, and documents related to the implementation of AI in the development of teaching modules. Themes emerged from the process of recording, coding, and categorizing data, both deductively (based on theory/framework) and inductively (based on field data). Data validity was maintained through triangulation of sources and techniques, as well as member checking with participants (Oktarisma et al., 2023).

Source triangulation is done by collecting data from various sources such as teachers, principals, and school curriculum staff and checking the consistency and credibility of information by asking the same questions to different sources, so that a complete and unbiased picture is obtained. Technical triangulation is done by conducting in-depth interviews, direct observation of the learning process, and documentation studies such as analysis of test results or student assignments and comparing the results of interviews with observations, as well as looking at evidence in learning documents for the same data source, while the member checking process runs as follows: Researchers summarize the results of the initial analysis or interpretation of the data and then communicate them to the participants and Participants are allowed to provide clarification, corrections, or add information to avoid bias or misinterpretation (Nurfajriani et al., 2024). Developer of AI-based teaching modules. This research focuses on the process of utilizing AI in developing teaching modules and does not emphasize quantitative analysis of student learning outcomes.

Results And Discussion

Result

The results of this study indicate that the application of artificial intelligence (AI) in developing teaching modules to support the implementation of the Independent Curriculum at SMA Bina Insan Palu was effective and had a positive impact on the learning process. The use of AI has been proven to increase teacher efficiency in designing and developing teaching modules tailored to student needs and characteristics. With this technological support, teachers can save time while producing more engaging, relevant materials, and in line with the principles of differentiated learning that are the hallmark of the Independent Curriculum.

An Islamic Religious Education (PAI) teacher at Bina Insan High School in Palu stated that the use of AI-based technology is very helpful in adapting learning materials to local contexts and Islamic values. Through AI, teachers can gain inspiration for learning ideas, enrich reference sources, and modify materials to make them more relevant to students' daily lives (Mahbubi, 2025). This aligns with the objectives of the Independent Curriculum, which emphasizes freedom of learning, creativity, and the development of noble character in students.

In practice, teachers utilize various AI-based platforms, such as ChatGPT to assist with writing scripts or lesson outlines, and Canva AI to design more visually appealing modules. Both platforms enable teachers to produce teaching modules that are not only informative but also interactive and engaging for students. "With the help of AI platforms like ChatGPT and Canva AI, it's easier for me to prepare

creative and contextual modules, making learning more engaging for students," said one Islamic Religious Education teacher.

The use of AI also makes it easier for teachers to analyze learning outcomes, formulate learning objectives, and produce teaching modules that are more innovative, interactive, and tailored to student characteristics. Furthermore, the use of AI supports the integration of project-based learning and contributes to the formation of the Pancasila Student profile by providing contextual and relevant teaching materials to students' needs. A PAI teacher at SMA Bina Insan Palu explained that the use of AI in developing teaching modules greatly facilitates teachers in various aspects of learning. "AI helps me analyze student learning outcomes more quickly and accurately. This allows me to formulate learning objectives that are more targeted and relevant to students' needs," he said.

This statement is supported by what the Principal of SMA Bina Insan Palu said, "We at SMA Bina Insan Palu strongly support the use of AI in the learning process, especially in the development of teaching modules. AI technology has been proven to make it easier for teachers to analyze student learning outcomes more quickly and accurately. This greatly helps teachers to formulate learning objectives that are more appropriate and in accordance with student characteristics. We also provide training and supporting facilities so that teachers can optimize the use of AI in teaching. With this AI integration, we are confident that the quality of learning will further improve and be better prepared to face the demands of the Independent Curriculum and the challenges of the digital era."

This statement demonstrates institutional awareness of the importance of technology adaptation in education. The principal emphasized that the use of AI not only assists teachers with the technical aspects of developing teaching modules but also promotes overall improvements in the quality of learning. With adequate training and facilities, teachers can develop digital literacy skills and effectively integrate technology into teaching and learning activities.

Furthermore, schools' commitment to using AI reflects the educational institution's readiness to face the digital transformation demanded by the Independent Curriculum era. The implementation of AI is not seen merely as a trend but as an innovative strategy to improve learning effectiveness and the relevance of materials to the needs of today's students.

This statement reinforces the school leadership's full support for the implementation of AI as a learning aid to improve the effectiveness and relevance of the teaching and learning process. This support demonstrates a strong commitment from school management to drive technology-based educational transformation. The use of AI is viewed not only as a technical innovation but also as part of a strategy to

improve educational quality, oriented towards student needs and current developments.

Through the implementation of AI, schools strive to create a more adaptive and efficient learning environment, aligning with the principles of the Independent Curriculum, which emphasizes competency-based learning. Furthermore, support from school leaders is crucial in building teacher readiness to innovate and optimally integrate technology into the learning process. With supportive policies, facilities, and training, teachers have the opportunity to develop more engaging and relevant teaching modules for today's learning context.

Based on this commitment and support, the following table illustrates the implementation results and tangible impact of AI utilization in developing teaching modules at SMA Bina Insan Palu. The table demonstrates how the use of AI significantly contributes to improving the quality of the learning process and developing teacher professionalism at the school.

Table 1. Implementation and Impact of AI Utilization in Developing Teaching Modules at SMA Bina Insan Palu

Aspects of Implementation and Forms of AI Utilization	Impact on Teaching Modules
Preparation of teaching materials: Teachers use AI like Canva to create learning materials and illustrations.	Teaching materials become more creative, interactive, and interesting for students.
Learning project development: AI helps teachers design PjBL that suits the profile of Pancasila students.	The teaching module contains project activities based on real cases, thereby improving students' critical thinking skills.
Assessment and evaluation: AI is used to create practice questions, interactive quizzes, and adaptive assessments.	The assessment process is varied and adapted to the abilities of each student.
Teacher creativity: AI inspires new ideas in creating digital learning media.	Teaching modules become more innovative and relevant to technological developments.
Time efficiency: AI speeds up the process of preparing and revising teaching modules.	Module creation time is reduced, so teachers can focus more on teaching strategies.

The use of artificial intelligence (AI) in education has brought significant changes to the process of creating and developing teaching modules. In the context of developing teaching materials, teachers can now utilize various AI-based platforms, such as Canva AI, to help design learning content and illustrations (Maulah et al., 2025). This technology makes it easier for teachers to create engaging visual displays, systematically structure materials, and produce content tailored to student characteristics. As a result, teaching materials become more creative, interactive, and engaging because they are presented in a more dynamic and contextual manner (Kusmantoro, 2025).

Furthermore, AI plays a crucial role in the development of Project-Based Learning (PjBL) projects. With the help of AI, teachers can design learning projects aligned with the values of the Pancasila Student Profile, for example, by providing project ideas based on real-world problems relevant to the students' environment. The presence of AI in this process helps teachers tailor project themes to students' abilities and needs, resulting in more applicable learning modules. This encourages increased critical thinking, collaboration, and problem-solving skills among students.

In terms of assessment and evaluation, AI is being utilized to design practice questions, interactive quizzes, and adaptive grading systems tailored to individual student abilities. This technology enables teachers to provide more varied and personalized forms of evaluation (Sajudin, 2025). AI can also provide automated feedback that helps students quickly understand their strengths and weaknesses. This makes the assessment process more objective and effective in measuring each student's learning achievements. Furthermore, AI encourages increased teacher creativity in developing digital learning media. This technology can inspire new ideas, such as creating learning videos, interactive animations, or technology-based simulations (Jayadi et al., 2024). With AI support, teachers can create more innovative and relevant learning modules, ensuring that learning is not only focused on knowledge transfer but also on strengthening students' digital competencies.

Finally, in terms of time efficiency, the use of AI has been proven to accelerate the process of developing and revising teaching modules. AI can assist with text editing, developing learning structures, and refining language and presentation. This efficiency allows teachers to save time creating materials, allowing them to focus more on learning strategies and directly assisting students. Thus, the use of AI not only improves the quality of teaching modules but also supports teacher effectiveness and productivity in learning activities.

Discussion

Preparation of Teaching Materials

The research findings, as summarized in the table, show that the implementation of artificial intelligence (AI) in the development of teaching modules at SMA Bina Insan Palu has had a significant impact on various aspects of learning. First, in the aspect of compiling teaching materials, teachers utilize AI technology such as Canva AI to produce more creative, interactive, and engaging materials. The use of AI enables educators to design multimedia-based learning content, including illustrations, infographics, and concept visualizations, making the material easier for students to understand. The resulting teaching modules are more engaging because they are equipped with infographics, interactive images, and adaptive example questions.

Observations at Bina Insan High School in Palu show that teachers actively utilize artificial intelligence (AI) technology in developing teaching materials. The use of applications such as ChatGPT and Canva AI significantly assists teachers in creating more creative, interactive teaching modules that align with the principles of the Independent Curriculum. Teachers can easily produce multimedia-based learning materials complemented by illustrations, infographics, and activities that encourage active student engagement.

In practice, teachers use AI to collect and process information and data related to lesson materials that will be compiled into modules. AI also provides suggestions on material structure and delivery methods that are appropriate to the diverse needs of students. This facilitates teachers in developing differentiated and contextualized teaching materials aligned with the Pancasila Student Profile. An interview with a PAI teacher at Bina Insan High School in Palu stated, "Using AI like Canva AI has really helped me create more creative and interactive teaching materials. With this technology, I can create illustrations, infographics, and concept visualizations that make it easier for students to understand the lessons. The resulting teaching modules are not only rich in content but also equipped with interactive images and sample questions that can be tailored to students' learning needs. This makes the learning materials more engaging and effective."

This aligns with what one of the curriculum staff stated: "From a curriculum management perspective, the use of AI in developing teaching modules significantly supports the learning innovation process in schools. AI enables us to design multimedia-based modules that align with student characteristics and the Merdeka Curriculum standards. Furthermore, this technology facilitates the integration of project-based learning by providing contextual and relevant teaching materials,

thereby supporting the formation of the Pancasila Student profile while simultaneously improving the quality of learning at SMA Bina Insan Palu."

The results of this interview reflect how AI has a positive impact on the preparation of teaching materials and curriculum management that are appropriate to the needs and characteristics of students at SMA Bina Insan Palu. This finding is in line with (M & Mohamad Lutfi, 2025) which explains that the use of artificial intelligence (AI) provides significant support for teachers in developing learning tools that are more creative, adaptive, and relevant to student characteristics. Furthermore, the study highlights the importance of using digital technology and interactive media in the process of developing teaching materials. Through the assistance of AI, teachers can enrich learning with contextually designed illustrations, images, and visual content, thereby strengthening student understanding and increasing student engagement in the learning process.

The use of artificial intelligence (AI) in education has significantly contributed to the development of digital teaching materials that are more creative, adaptive, and relevant to the demands of the Independent Curriculum. Research conducted by Fatmawati & Raharjo, (2024) shows that AI is being utilized to analyze the curriculum and Learning Outcomes so that the teaching materials developed align with competency standards. Through AI-based technologies such as ChatGPT and Canva AI, teachers can develop teaching materials, create learning illustrations, infographics, and adaptive sample questions tailored to students' ability levels. Furthermore, AI integration also accelerates the process of developing teaching materials through automatic analysis of curriculum data and supports personalized learning based on students' learning profiles (Alfikri et al., 2025). Thus, AI not only enhances teacher creativity but also produces interactive, engaging, and contextual teaching materials, while simplifying the design of adaptive assessments relevant to students' needs.

Learning Model Development

In the development of learning projects, artificial intelligence (AI) plays a crucial role in helping teachers design Project-Based Learning (PjBL) activities that are relevant and aligned with the Pancasila Student Profile. Through the use of AI, teachers can integrate various reference sources, design learning scenarios based on real-life cases, and adapt projects to local contexts and student needs. The resulting learning modules focus not only on delivering theory but also include practical activities that encourage students to solve problems creatively and collaboratively.

Observations of the learning model development process at SMA Bina Insan Palu show that the application of artificial intelligence (AI) has brought significant innovations to the design and implementation of learning that supports the

Independent Curriculum. AI is used as a tool to develop more adaptive, personalized, and contextual learning models tailored to individual student needs. Teachers are actively using AI systems that not only help design learning content but also recommend a variety of teaching methods, such as project-based learning, problem-based learning, and blended learning. AI can analyze academic data and student learning behavior, allowing teachers to tailor learning steps to each student to increase engagement and conceptual understanding.

According to a PAI teacher at Bina Insan High School in Palu: "For me, AI plays a vital role in helping develop Project-Based Learning (PjBL) projects that we implement in class. With AI's help, I can access various relevant reference sources more easily and quickly, allowing me to design learning scenarios based on real-life cases that are close to students' lives," he said. He also added, "AI allows us to adapt learning projects to local contexts and the needs of learners' characteristics, so that the projects are not just theory, but also implement practical activities. Students are encouraged to solve problems creatively and collaboratively, which is very much in line with the profile of Pancasila Students. Thus, learning becomes more meaningful and fosters various critical and creative competencies."

This assertion shows that the integration of AI in PjBL produces more contextual and interactive teaching modules, while strengthening learning approaches that encourage the development of students' 21st-century character and skills. This finding is in line with research (Mayasari et al., 2024). This study demonstrates that integrating AI into the curriculum significantly improves students' critical thinking skills through the application of project-based learning. Therefore, the use of AI in this context bridges the gap between theory and classroom practice, while simultaneously supporting the achievement of the Independent Curriculum's goal of developing students with character, adaptability, and global competitiveness.

In the context of learning projects, the use of artificial intelligence provides opportunities for students to explore a wider range of information sources, design materials, and produce more innovative project products. Through AI support, learning outcomes can be presented more engagingly through data visualizations, infographics, and digital reports. Furthermore, AI supports personalized learning by providing material recommendations and difficulty levels tailored to each student's abilities, making the project completion process more effective and aligned with student characteristics. Thus, AI acts as a digital assistant that supports teachers and students in producing learning projects that are innovative, interactive, and relevant to developments in educational technology (Zebua, 2025).

Assessment and Evaluation

In developing adaptive assessments, teachers utilize AI to create questions and exercises with varying levels of difficulty tailored to each student's abilities. This simplifies the evaluation of learning outcomes while providing more targeted feedback. Observations at SMA Bina Insan Palu revealed that the application of artificial intelligence (AI) in assessment and learning evaluation has shown positive progress in supporting the implementation of the Independent Curriculum. Teachers are using various AI applications to help develop more varied, adaptive assessment instruments tailored to student needs and characteristics, such as Quizizz AI and Zepp Quiss for creating learning quizzes. The use of AI also accelerates the processing of student evaluation results, allowing teachers to more easily monitor student learning progress.

Interviews with Islamic Religious Education (PAI) teachers at Bina Insan High School in Palu revealed that the use of artificial intelligence (AI) has helped teachers develop adaptive assessments tailored to students' learning abilities. The teachers explained that using AI allows them to create questions and exercises with varying levels of difficulty, ensuring each student receives challenges tailored to their individual abilities.

This finding is in line with (Fadillah et al., 2024) Teachers are leveraging artificial intelligence (AI) technology in the learning process, particularly in the development of adaptive-based questions and exercises. Through the use of AI algorithms, materials and questions can be recommended individually according to each student's ability level (Hasan et al., 2025). Furthermore, AI is also used to develop interactive quizzes and support automated assessments through Learning Management Systems (LMS) and digital education platforms such as Ruangguru and Zenius. This technology facilitates the provision of real-time and adaptive practice questions, quizzes, and learning evaluations, making the assessment process more efficient and focused.

Likewise with research (Haryono et al., 2025) which explains that the workshop on developing Deep Learning-based teaching modules with the support of artificial intelligence (AI) technology has proven effective in improving teacher competency, improving the quality of teaching modules, and encouraging the transformation of learning to be more interactive, adaptive, and relevant to the demands of the Independent Curriculum and developments in the digital era.

Teacher Creativity

Observations at Bina Insan High School in Palu show that the use of artificial intelligence (AI) significantly increases teacher creativity in developing teaching modules that support the Independent Curriculum. Teachers appear to have more freedom to experiment with various learning formats and media thanks to the

support of AI technology, such as creating visual content, interactive videos, and engaging and dynamic learning simulations. For example, an Islamic Religious Education (PAI) teacher created an AI-based learning video that combines visualizations of Quranic verses with thematic explanations.

A PAI teacher at Bina Insa High School in Palu explained that one form of innovation they have implemented is the creation of AI-based learning videos. The videos combine visualizations of Quranic verses with thematic explanations relevant to the subject matter. For example, in a lesson on honesty, the teacher displays excerpts from Quranic verses relevant to the value of honesty, then adds narration and visual animation using AI tools to make the presentation more lively and easier for students to understand.

Furthermore, the Islamic Education Teacher said, "AI has been a huge help in preparing our materials. It used to take a long time to create presentations and videos, but now the process is faster and the results are still high-quality. Furthermore, I can tailor the video content to the students' personalities, for example, by adding examples relevant to their lives.

In line with (Sudrajat et al., 2023) who stated that the use of artificial intelligence (AI), such as ChatGPT, provides significant support for teachers in the planning and development of learning media. This technology helps teachers determine learning content that aligns with the theme and learning outcomes, design presentation slides and visual illustrations, and produce engaging multimedia content, such as interactive quizzes, adaptive questions, and digital media-based materials (Hasan et al., 2024). AI has proven to be able to provide inspiration in the creation of digital learning media. Teachers are no longer limited to conventional approaches but are instead encouraged to produce innovative and relevant modules in line with technological developments.

Based on observations and interviews at Bina Insan High School in Palu, it can be concluded that the use of artificial intelligence (AI) has a significant impact on increasing teacher creativity in developing teaching modules aligned with the Independent Curriculum. AI technology provides teachers with greater freedom to experiment with various learning formats and media, such as creating visual content, interactive videos, and engaging and dynamic learning simulations.



Figure 1. Use of Zep Quiss

Time Efficiency

Before utilizing artificial intelligence (AI), teachers at SMA Bina Insan Palu needed approximately two weeks to manually complete a single teaching module. However, with AI support, the module development process can be shortened by up to 40%, as evidenced by initial observations and document analysis used as secondary sources in this study. This time savings allows teachers to utilize the remaining time to design active learning strategies and reflect on student learning outcomes, resulting in a more effective and reflective learning process.

Interviews with teachers at Bina Insan High School in Palu support these findings. One teacher stated that before using artificial intelligence (AI), developing teaching modules was a time-consuming process, requiring manual work, from finding references and writing materials to developing evaluation questions. He explained: "Previously, completing a single teaching module could take almost two weeks, because I had to organize everything myself—from the materials, media, to the assessments. But after using AI assistance, the processing time is much shorter, about half the time."

Consistent with the findings of Hamna et al., the use of AI tools such as ChatGPT and Canva AI significantly accelerates the process of developing materials and designing teaching modules. Automated features in material analysis and content creation allow teachers to save time searching for and organizing teaching materials. AI can provide instant content and illustration recommendations, resulting in faster module designs that align with expected learning outcomes (Dian Muhtadiyah Hamna, 2025). In addition to improving time efficiency, utilizing AI also allows teachers to focus more on developing innovative learning methods and enhancing interaction with students. However, adapting to this technology requires increased digital literacy among teachers to effectively optimize AI features.

Overall, the implementation of AI in the development of teaching modules has a positive impact on the efficiency of teachers' working time and the quality of

teaching materials, supporting the implementation of the Independent Curriculum, which demands innovative and adaptive learning.

Conclusion

Thus, it can be concluded that the implementation of artificial intelligence (AI) in the development of teaching modules not only serves as a technical aid but also serves as a pedagogical innovation that expands the role of teachers in designing learning that is more adaptive, contextual, and relevant to students' needs. The application of AI has the potential to be expanded more broadly across various subjects through a differentiated approach, integration of local values and culture, and strengthening the Pancasila Student Profile through project-based learning. In the long term, AI can be optimized to build a more personalized learning ecosystem by adapting to the needs, learning styles, and abilities of each student. However, the success of this implementation requires systematic support in the form of ongoing training for teachers, school policies that encourage the ethical and responsible use of technology, and the provision of adequate digital infrastructure. Based on the findings of this study, it is recommended that further studies focus on measuring the impact of AI use on student learning outcomes, the effectiveness of adaptive assessments, and strategies for improving teachers' digital literacy in various school contexts. Consequently, further research is recommended to measure the impact of AI use on learning outcomes, the effectiveness of adaptive assessments, and strategies for developing teacher capacity so that AI use can be optimized in various educational contexts.

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