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THE USE OF CLAUDE AI TO IMPROVE PRE-SERVICE TEACHERS' ABILITY IN DESIGNING TEACHING MODULES

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Abstract: This study aims to analyze the use of Claude AI in improving the ability of pre-service teachers to design teaching modules. Claude AI is an artificial intelligence-based application developed to assist users in generating text, analyzing information, and supporting various academic and professional needs efficiently and contextually. In the context of education, the utilization of this technology represents a relevant innovation to enhance the quality of instructional planning in the digital era. The research method employed is a qualitative approach using the Systematic Literature Review (SLR) type. The SLR process was conducted through stages of identification, selection, evaluation, and synthesis of various scientific literature relevant to the use of AI in education, particularly in the development of teaching modules. Data were obtained from Google Scholar and Publish or Perish, focusing on publications from the last five years. The results indicate that the use of Claude AI can assist pre-service teachers in designing teaching modules in a more systematic, creative, and efficient manner. In addition, Claude AI supports idea generation, content development, and the creation of more varied learning assessments. Therefore, the integration of AI technology in education has great potential to enhance the professional competence of pre-service teachers, particularly in developing innovative and adaptive instructional planning in response to current developments.

Keywords: Claude AI; teaching modules; pre-service teachers; artificial intelligence; Systematic Literature Review (SLR).

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INTRODUCTION

The utilization of technology in the era of digital transformation in education has been growing significantly. Advances in information technology have brought about major changes in the world of education, including in the learning process at the primary school level. Today, technology has begun to develop rapidly across various sectors. *Artificial Intelligence* (AI) has become one of the technologies that is now widely recognized and used. *Artificial Intelligence* (AI) is another term for artificial intelligence; it is a computer system capable of performing tasks that generally require human skills and abilities (Kirana et al., 2024). The emergence of *Artificial Intelligence* (AI) has brought a new dimension to the world of education (Nugroho et al., 2025). In the field of education, *Artificial Intelligence* (AI) has great potential to transform the way we access and obtain information, enhance

learning experiences, and support decision-making in every educational process (Wirahmadayanti et al., 2025).

Education should be responsive to the changing times and technological developments. Especially in today's digital era, teachers are expected to leverage information technology in the learning process to make it more interactive and aligned with the needs of students (Nugraha, 2018). Teachers are one of the key components in schools, playing a strategic role in the ongoing learning process (Hazmi, 2019). Teachers play a pivotal role in the success of education, serving as the bridge between subject matter and students. Teachers with high human resource quality and professional pedagogical competence serve as one of the determining factors of educational quality (Bagou & Suking, 2020). In the context of modern learning, the role of teachers has become increasingly complex, as they are expected to integrate technology, develop innovative learning strategies, and instill character values aligned with the challenges of the times.

The development of teaching modules is one of the primary responsibilities of teachers that requires innovation and creativity. A teaching module is a programmed instructional material that is organized and presented in a comprehensive, systematic, and precise manner (Norhafizah & Salito, 2025). A good teaching module does not merely contain a sequence of subject matter; it also encourages students to think critically, understand concepts, and apply knowledge in everyday life. In a teaching module, teachers not only present the core material but also add conceptual explanations, examples, practice questions, and assessments to measure students' understanding. Therefore, the development of a teaching module requires thorough planning, ranging from needs analysis, determination of core competencies, formulation of indicators, to the selection of presentation strategies appropriate to the needs and characteristics of students. A teaching module is an instructional material systematically developed based on a curriculum, designed so that students can study it independently. In its development, teachers must first conduct a needs analysis to identify student characteristics, prior knowledge, and the core competencies to be achieved. With such an analysis, the resulting teaching module will be more relevant, contextual, and appropriate to students' developmental levels in the cognitive, affective, and psychomotor domains. In addition to the teaching module, instructional materials developed by teachers also play an important role in providing meaningful learning experiences. The development of teaching modules is one of the important aspects that can support the learning process to be more optimal.

An innovation attracting considerable attention is the emergence of Large Language Models (LLMs) such as Claude AI. These models have the potential to revolutionize the way teachers prepare and develop teaching modules (Baidoo-anu & Ansah, 2023). The digital revolution has significantly transformed the world of education, with artificial intelligence (AI) technology emerging as one of the most promising innovations. In this context, Large Language Models (LLMs) in the form of Claude AI have attracted the attention of educators and educational researchers due to their extraordinary potential in automating and optimizing various aspects of the learning process, including the development of teaching modules

(Aydin & Karaarslan, 2023). The ability of LLMs to understand and generate human-like text opens new opportunities for teachers to enhance their efficiency and creativity in developing learning materials (Abidin, 2017).

Claude AI is an Artificial Intelligence system developed by Anthropic, a research company. Claude AI is designed to assist humans in completing various tasks automatically, particularly to think in accordance with its tagline *Your Thinking Partner* and *AI for Problem Solver*. Developed with sophisticated *natural language processing* technology, Claude AI can understand context, providing relevant answers, and processing information quickly. One of the many advantages of Claude AI lies in its ability to generate text that is claimed to be far more natural and easily comprehensible to humans (Martins, 2024). Furthermore, Claude AI is also designed to learn from previous interactions, so that each use can progressively improve the quality of outputs provided. This makes Claude AI highly beneficial across various situations and needs, such as education, research, business, and technology development. Claude AI has several key features that distinguish it from other AI systems. First, the ability to deeply understand human language. Second, the capability to automatically generate high-quality content, whether articles, summaries, or professional documents. Third, easy integration with various digital platforms allows users to utilize this AI in a wide range of work scenarios.

However, the use of Claude AI in the development of teaching modules also raises questions and concerns. One of the main issues is the extent to which the use of Claude AI affects the quality of teachers' pedagogical competence in education. Therefore, a more in-depth analysis is needed regarding the use of Claude AI in enhancing teachers' ability to develop teaching modules. Although Claude AI can accelerate the process of developing teaching modules, there is concern that it may negatively impact pedagogical competence — for instance, there is a risk of diminished originality if teachers become overly reliant on Claude AI. When teachers simply copy outputs from Claude AI without reflection and modification according to learning needs, the quality of teaching modules may decline and become less contextual.

The primary objective of this study is to provide a thorough understanding of the design of teaching modules using Claude AI. Teachers need to understand how to construct effective prompts, verify the accuracy of the content, and adapt the language and teaching methods accordingly.

METHOD

This study employs the Systematic Literature Review (SLR) method, which is a systematic and structured research approach used to collect, examine, and analyze various literature relevant to a particular topic. The Systematic Literature Review (SLR) method refers to a specific research procedure aimed at identifying and evaluating research findings related to a specific focus of inquiry (Kasmiati, 2025). Through this method, researchers can identify,

examine, evaluate, and interpret various available studies to gain a deeper understanding of a phenomenon (Triandini et al., 2019). In addition, the Systematic Literature Review (SLR) is also used to synthesize research findings so that the resulting information becomes more comprehensive, objective, and balanced, thereby serving as a foundation for policy-making (Sari et al., 2026). Thus, the Systematic Literature Review (SLR) method plays an important role in constructing a comprehensive knowledge synthesis, identifying research gaps, and providing strong scientific evidence in a particular field of study.

In general, the preparation of research using the Systematic Literature Review (SLR) method consists of three main stages: the *planning stage*, the *conducting stage*, and the *reporting stage* (Wahono, 2015). The planning stage includes the process of identifying the need for a systematic review, developing the review protocol, and evaluating the protocol that has been developed. The conducting stage encompasses the activities of searching for primary sources, selecting and filtering relevant literature, collecting data from these sources, assessing the quality of the literature, and synthesizing the data obtained. The reporting stage focuses on the preparation and dissemination of the main findings and ideas generated from the systematic review process. The stages of research using the Systematic Literature Review (SLR) method are illustrated in Figure 1.

Figure 1. Research Stages Using the SLR Method

The Systematic Literature Review (SLR) method requires efforts to keep the research focus on track. One of the steps taken is the formulation of research questions (*research questions*) that will subsequently be answered through the synthesis of various literature sources. The formulation of research questions in this study refers to the OFTA principle, namely Object, Focus, Objective, and Aspect. The Object (O) of this study is the use of Claude AI in the field of education, particularly in the process of designing teaching modules. The Focus (F) is directed at analyzing the use of Claude AI to enhance pre-service teachers' competency in designing teaching modules. The Objective (T) of this study is to analyze how the use of Claude AI can assist pre-service teachers in developing more effective, systematic, and creative teaching modules. Meanwhile, the Aspects (A) examined include the role of Claude AI in supporting the development of teaching modules, its influence on the creativity and pedagogical competence of pre-service teachers, and its relationship with pre-service teachers' ability to understand the structure and components of teaching modules in accordance with learning needs.

Based on the OFTA principle described above, the formulation of research questions falls within the research protocol development stage (Scheme 2), which is accompanied by protocol evaluation (Scheme 3). The research questions for this study are presented in Table 1 below.

Table 1. Description of Protocol Evaluation Questions

ID	Question	Protocol Evaluation
RQ1	What is the role of Claude AI in assisting pre-service teachers in designing teaching modules?	Analyzing the role of Claude AI in the process of developing teaching modules.

The search process for primary sources (Scheme 4) was conducted with the aim of obtaining sources relevant to answering RQ1 and RQ2. The sources used in this study consist of national and international journals discussing the use of Artificial Intelligence, particularly Claude AI, in the fields of education and teaching module development. The search was conducted using search engines such as Google Scholar to trace digital records including citations, scientific articles, and journal publishers related to the research topic. The primary source selection stage (Scheme 5) consists of *inclusion criteria* and *exclusion criteria*. These criteria include scientific articles discussing the use of Claude AI in education, published within a relevant time range, not in the form of conference proceedings, and manuscripts accessible through Google Scholar. Subsequently, the data extraction process from the primary sources (Scheme 6) was conducted by reviewing articles that met the inclusion and exclusion criteria. Data with a strong connection to research questions RQ1 and RQ2 were then selected through the quality assessment stage (Scheme 7) as a basis for answering the research questions.

Table 2. Quality Assessment Based on Inclusion and Exclusion Criteria

ID	Quality Assessment Criteria	Meets Requirements: Yes (Y) / No (N)
QA1	Does the article discuss the use of Artificial Intelligence or Claude AI in education?	
QA2	Does the article include a discussion of teaching modules or learning tools?	
QA3	Does the article discuss the competency or abilities of pre-service teachers in learning?	
QA4	Is the manuscript accessible through Google Scholar?	
QA5	Is the article relevant to the use of Claude AI in enhancing the ability to design teaching modules?	

Data synthesis (Scheme 8) is the data analysis stage used as a guide for interpreting various research findings from the primary sources. The purpose of data synthesis is to gather

relevant evidence to answer RQ1 and RQ2. Evidence showing that Claude AI can assist pre-service teachers in designing teaching modules may appear limited if it comes from only a single study. However, if multiple studies yield similar findings, this will further strengthen the conclusion regarding the role of Claude AI in enhancing pre-service teachers' ability to develop teaching modules effectively, creatively, and systematically. The data synthesis process generally uses both quantitative and qualitative data; however, in Systematic Literature Review (SLR) research, narrative synthesis is commonly employed. The results of the synthesis are then used to review the various roles of Claude AI in education, particularly in supporting pre-service teachers in designing teaching modules.

RESULT AND DISCUSSION

Table 3. Selected Articles

No	Title	Author(s)	Publisher	Issue	QA1	QA2	QA3	QA4	QA5
1	Effectiveness of ChatGPT, Gemini, and Claude AI Features in Assisting Teachers to Develop Teaching Materials	Muttaqin Kholis Ali, Al Muhtadibillah Ali, and Arrahmil Hasanah	PEDAGOGIC: Indonesian Journal of Science Education and Technology	Volume 6, No. 1, 2026	Y	Y	Y	Y	Y
2	Development of Application-Based Interactive Media Assisted by Claude AI Using the ADDIE Model in Physical Education Subject for Grade 5 Elementary School at SDN Kendal Sari 1 Jombang	Arindra Yudhianto	Universitas PGRI Adibuana Surabaya	December 5, 2025	Y	Y	Y	Y	Y
3	The Use of ChatGPT and Paperpal AI-Based Tools to Enhance Teachers' Competency in Developing	Nurtaqiya, M. Naim, Muhammad Ridwan Prasetya, Dian Anugrah, Pajriani, and Nurmila	Pedagogy: Journal of Mathematics Education	Volume 10, No. 3, 2025	Y	Y	Y	Y	Y

No	Title	Author(s)	Publisher	Issue	QA1	QA2	QA3	QA4	QA5
	Modules and Teaching Materials								
4	Training on AI-Based Mathematics Teaching Module Development for Elementary School Teachers	Aulia Usman, Af Idatul Amalia, Dede Mukhtar Safari, Lutfina Mirbatun Nissa, Nazwa Putri Lestari, and Rahmat Ependi	Jurnal Indonesia Mengabdi	Vol. 7, No. 2, pp. 166–174, December 2025	Y	Y	Y	Y	Y
5	Utilization of Artificial Intelligence (AI) in Developing Teaching Modules for Teachers at SMA Antartika Sidoarjo	Erna Puji Astutik, Annisa Dwi Sulistyaningtyas, and Nur Fathonah	PANCASONA: Community Service in Social Sciences and Humanities	Vol. 4, No. 2, July 2025	Y	Y	Y	Y	Y
6	Training on the Use of Artificial Intelligence for Developing Teaching Modules and Interactive Learning Planning for Elementary School Teachers	Refiona Andika, Risda Amini, Yullys Helsa, and Yarisda Ningsih	Publikan Journals UNM: Journal of Educational Publications	Volume 15, Number 1, 2025	Y	Y	Y	Y	Y
7	Assistance in Developing AI-Based Teaching Materials in Elementary Schools	Khusnul Fatonah, Muhammad Rijal Fadli, and Ahmad Fuad	INTEGRITAS: Journal of Community Service	Vol. 9, No. 2, August–December 2025	Y	Y	Y	Y	Y
8	Preparing Future Educators in the Era of Artificial Intelligence: Experiences of Elementary Pre-Service Teachers with	Muhammad Ikhlas, Lutfia Yasmin, Delvia Muharramah, and Kuswanto	Journal of Community Service and Educational Research	Volume 3, No. 4, April–June 2025, pp. 5190–5199	Y	N	Y	Y	Y

No	Title	Author(s)	Publisher	Issue	QA1	QA2	QA3	QA4	QA5
	Generative AI Applications								
9	Level of Artificial Intelligence Utilization in Developing Teaching Materials	M. Ajai Diwo Sakta	Program Studi Pendidikan Guru Madrasah Ibtidaiyah, Faculty of Tarbiyah, IAIN Curup	August 13, 2025	Y	Y	Y	Y	Y
10	Training on Developing Learning Modules for SLB Teachers with Artificial Intelligence (AI): Transformation of Special Education Competence in the Digital Era	Pivit Septiary Chandra, Arya Luthfi Permadi, Weni Puji Hastuti, Wasiah Sufi, Munawir Siahaan, Dhanang Fawaiz Akbar, and Achmad Fauzi	DEVELOPMENT: Journal of Community Engagement	Vol. 4, No. 4, 2025	Y	Y	Y	Y	Y

Qualification of Scientific Manuscripts

The search engine process yielded a total of 10 articles in the form of scientific research manuscripts concerning the use of Claude AI in education, specifically related to pre-service teachers' competency in designing teaching modules. The retrieved articles were then evaluated based on the required qualifications in accordance with the inclusion and exclusion criteria.

These criteria include scientific articles discussing the use of Artificial Intelligence, particularly Claude AI, in the field of education; articles containing discussions on teaching modules or learning tools; articles addressing the competency or abilities of pre-service teachers; manuscripts accessible through Google Scholar; and articles relevant to the use of Claude AI in enhancing the ability to design teaching modules. The results of the article qualification process indicate that the selected scientific manuscripts have met the quality assessment criteria and are capable of answering the research questions, namely QA1, QA2, QA3, QA4, and QA5.

Table 4. Journal Index and DOI of Selected Articles

No	Title	Journal Index	Digital Object Identifier (DOI)
1	Effectiveness of ChatGPT, Gemini, and Claude AI Features in Assisting	Sinta 4	http://doi.org/10.54373/ijset.v6i1.1649

	Teachers to Develop Teaching Materials		
2	Development of Application-Based Interactive Media Assisted by Claude AI Using the ADDIE Model in Physical Education Subject for Grade 5 Elementary School at SDN Kendal Sari 1 Jombang	Not Accredited	https://unipasby.ac.id/
3	The Use of ChatGPT and Paperpal AI-Based Tools to Enhance Teachers' Competency in Developing Modules and Teaching Materials	Sinta 4	https://doi.org/10.30605/pedagogy.v10i3.6926
4	Training on AI-Based Mathematics Teaching Module Development for Elementary School Teachers	Sinta 6	https://doi.org/10.30599/7gpak021
5	Utilization of Artificial Intelligence (AI) in Developing Teaching Modules for Teachers at SMA Antartika Sidoarjo	Not Accredited	https://doi.org/10.36456/0chjx435
6	Training on the Use of Artificial Intelligence for Developing Teaching Modules and Interactive Learning Planning for Elementary School Teachers	Sinta 3	https://ojs.unm.ac.id/index.php/pubpend
7	Assistance in Developing AI-Based Teaching Materials in Elementary Schools	Sinta 4	https://doi.org/10.36841/integritas.v9i2.7512
8	Preparing Future Educators in the Era of Artificial Intelligence: Experiences of Elementary Pre-Service Teachers with Generative AI Applications	Sinta 5	https://doi.org/10.31004/jerkin.v3i4.1373
9	Level of Artificial Intelligence Utilization in Developing Teaching Materials	Not Accredited	https://e-theses.iaincurup.ac.id/9130/
10	Training on Developing Learning Modules for SLB	Sinta 5	https://doi.org/10.46773/djce.v4i4.2831

Research Findings and Discussion

Based on the review of 10 scientific articles that met the inclusion and exclusion criteria, several findings were obtained regarding the benefits, challenges, and impacts of using Claude AI and Artificial Intelligence on pre-service teachers' competency in designing teaching modules. These findings were analyzed to answer the research question (RQ1) regarding the role of Claude AI in assisting pre-service teachers in designing teaching modules.

Benefits of Using Claude AI in Designing Teaching Modules

The results of the synthesis indicate that the use of Claude AI provides various benefits in the process of developing teaching modules. The majority of the articles explain that Artificial Intelligence can assist teachers and pre-service teachers in developing learning materials more quickly, systematically, and efficiently. Research by Muttaqin Kholis Ali et al. explains that Claude AI effectively assists teachers in developing teaching materials, as it is capable of generating ideas, structuring subject matter, and aligning the content of learning with students' needs (Ali et al., 2024). In addition, a study by Nurtaqiya et al. (2024) demonstrates that the use of ChatGPT and Paperpal AI-based tools helps improve teachers' ability to develop modules and teaching materials in a more practical and innovative manner. Other articles also indicate that Claude AI assists teachers in: a) formulating learning objectives, b) developing indicators and assessments, c) generating examples of learning activities, d) simplifying the language of the material, and e) accelerating the process of developing learning tools. These findings suggest that Claude AI serves as a *teaching assistant* capable of enhancing the work efficiency of pre-service teachers in designing teaching modules.

Challenges in Using Claude AI for Teaching Module Development

Despite its benefits, several articles also identified challenges in the use of Claude AI. The primary challenge found is the teachers' lack of understanding in formulating effective prompts, resulting in outputs that are sometimes misaligned with learning needs (Walter, 2024). Furthermore, several studies indicate that excessive reliance on AI may reduce teachers' creativity and critical thinking skills if the AI-generated output is used directly without evaluation and adjustment.

Additional challenges include a) limited digital literacy among teachers, b) insufficient training in the use of AI in education, c) the possibility of inaccurate information being generated, and d) the risk of diminished originality in teaching modules if teachers simply copy the AI-generated content (Zhai et al., 2024). Several articles also emphasize that the use

of Claude AI still requires oversight and validation from teachers to ensure that the content of the teaching module remains contextual, aligned with the curriculum, and relevant to the characteristics of the students.

Impact of Claude AI Use on Teacher Competence

Based on the results of the analysis, the use of Claude AI has a positive impact on the enhancement of pre-service teachers' competence, particularly in pedagogical and professional competence. The articles reviewed indicate that the use of AI assists pre-service teachers in: a) enhancing creativity in developing learning materials, b) understanding the structure of teaching modules in a more systematic manner, c) developing innovative learning ideas, and d) improving their ability to utilize digital technology in education. Research on the experiences of elementary pre-service teachers with Generative AI applications also demonstrates that the use of AI can increase pre-service teachers' readiness to face educational transformation in the digital era. Furthermore, training in the use of AI for teaching module development provides new experiences for teachers to develop more interactive and adaptive learning tailored to students' needs. However, several articles emphasize that AI cannot fully replace the role of teachers. Teachers retain primary responsibility for adapting learning content, understanding student needs, and engaging in pedagogical reflection on the developed teaching modules.

Relevance of Findings to Research Questions

The results of the data synthesis indicate that all reviewed articles were able to address the research question (RQ1) regarding the role of Claude AI in assisting pre-service teachers in designing teaching modules. Claude AI has been shown to play a role in enhancing the efficiency, creativity, and pedagogical competence of pre-service teachers in developing learning tools. Furthermore, the research findings also indicate that the use of Claude AI has a positive impact on the digital competence of pre-service teachers and their readiness to engage in technology-based learning. Nevertheless, the use of AI still requires oversight, digital literacy skills, and a sound pedagogical understanding to ensure that the outputs produced are not only generated quickly, but are also of high quality and aligned with the needs of students.

CONCLUSION

Based on the results of the Systematic Literature Review (SLR) conducted on 10 scientific articles, it can be concluded that the use of Claude AI plays an important role in assisting pre-service teachers in designing teaching modules more effectively, systematically, and creatively. Claude AI can support the process of developing learning materials, formulating learning objectives, creating assessments, and generating innovative learning ideas, thereby improving the work efficiency of teachers. In addition to its benefits, the use of Claude AI also presents several challenges, such as limited digital literacy, the risk of over-reliance on AI, and the potential decline in the originality of teaching modules if not accompanied by critical evaluation from teachers. Therefore, the use of Claude AI needs to be balanced with

pedagogical competence and critical thinking skills to ensure that learning outcomes remain relevant and of high quality. Overall, the use of Claude AI has a positive impact on the enhancement of pedagogical and professional competence of pre-service teachers, particularly in facing the challenges of education in the digital era. With appropriate utilization, Claude AI can serve as a supporting technology that helps teachers create more innovative, interactive, and student-centered learning experiences.

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