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AI-POWERED LEARNING MODELS TO FOSTER STUDENT CREATIVITY IN SOCIAL STUDIES EDUCATION

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ABSTRACT

In the face of technological advancements in the industry 4.0 era and the transition toward the industry 5.0 era, the education sector must innovate in designing learning models that are not only effective but also relevant. Artificial Intelligence (AI) offers new opportunities for creating learning models that are more interactive, adaptive, and innovative. The purpose of this research is to explore the utilization of AI in developing Social Studies learning models that can enhance students' creativity. By integrating AI technologies such as learning chatbots, data visualization, interactive simulations, and automated assessment systems, the goal is to create a more interactive, contextual learning environment that supports creativity development. This study employs a mixed-methods approach with an action research design. The results indicate that the AI-based learning model developed significantly improved students' creativity compared to the control group that used traditional methods. The AI applied in Social Studies learning encourages students to enhance their creative thinking skills, problem-solving abilities, and 21st-century skills such as collaboration, communication, and digital literacy.



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INTRODUCTION

The rapid technological development in the era of Industrial Revolution 4.0 has presented the education sector with challenges to continuously innovate in creating effective and relevant learning models that meet contemporary demands. As times evolve, human roles have shifted under technological influence, transforming work methods, patterns, and even educational delivery models ([Prasetyo & Sutopo, 2017](#)). The advancement of science and technology has opened extraordinary opportunities for many people, including those in education. These developments enable individuals to explore new potential and optimize technology use. The Industrial Revolution 4.0 era offers more engaging learning experiences, with technology indirectly changing the role of teachers in knowledge delivery. Additionally, student facilities have become a supporting factor in accessing applications that enhance learning activities ([Astuti et al., 2019](#)).

A technology drawing significant attention in the Industrial Revolution 4.0 era is Artificial Intelligence (AI), which holds enormous potential across various aspects, including education. Indonesia has leveraged artificial intelligence in multiple sectors including education, manufacturing, services, healthcare, and products ([Rukmayuninda Ririh et al., 2020](#)). AI technology can be classified into three roles: a) Mundane Tasks, useful for computer vision recognition, natural language processing, speech recognition, planning, common sense, and robotics; b) Formal Tasks, such as those applied in mathematics, logic, geometry, integration, games, and verification; c) Expert Tasks, used in engineering, scientific analysis, finance, and various other creative fields ([Abdillah et al., 2018](#)). While this application has many uses, it becomes ineffective if not used according to its purpose. Therefore, in this context, AI applications will be used and implemented in social studies education.

In the context of social studies learning, AI applications can provide more interactive and relevant learning experiences for students. One interesting AI capability is its ability to analyze large data sets quickly and accurately, producing results that offer deeper insights into various social, political, and economic issues central to social studies. Teachers can more easily access relevant resources and information, enabling them to develop more dynamic curricula responsive to recent developments in social studies. Furthermore, AI can be used to present personalized learning materials according to each student's needs and interests. The application of AI in social studies learning can also facilitate collaboration between students and teachers in new ways ([Devianto & Dwiasnati, 2020](#)). For example, AI-based learning platforms can facilitate online discussions, collaborative projects, and joint research among students, teachers, and even social studies experts outside the school.

Social Studies is a field that plays an important role in building students' understanding of society, culture, history, and social dynamics. However, social studies learning is often considered less engaging and less contextual for students ([Suroiya & Prasetya, 2021](#)). Therefore, a new approach is needed that can integrate AI technology to increase student engagement and creativity in studying social studies. This research aims to explore the utilization of AI technology in social studies learning models with the primary objective of developing student creativity. Creativity is a crucial skill in the 21st century, where students are required to think critically, solve problems, and generate new ideas to face complex global challenges.

By integrating AI technologies such as interactive simulations, educational chatbots, data visualization, and automated assessment systems, it is expected that the social studies learning process will become more engaging and contextual, encouraging students to think creatively and develop other 21st-century skills such as collaboration, communication, and digital literacy. In this research, we will examine the challenges and opportunities in implementing AI-based learning models in the Indonesian educational context. Several research findings closely related to the use of social studies learning media in enhancing student creativity from an Islamic perspective indicate that sincerity, compliance with sharia, beneficial products, use of permissible methods, ethical and moral systems, *ijtihad* (independent legal reasoning), and rejection of imitation serve as the primary foundations in enhancing creativity ([Daud et al., 2012](#)). By possessing creative qualities, social studies teachers will be able to lead their respective classrooms in appropriate ways, enabling them to face daily changes, prepare for the future, and follow existing developments necessary for classroom success. This is also explained by [Kaf & Yilmaz \(2017\)](#), who found that creative drama methods have a significant impact on student achievement and attitudes toward social studies learning.

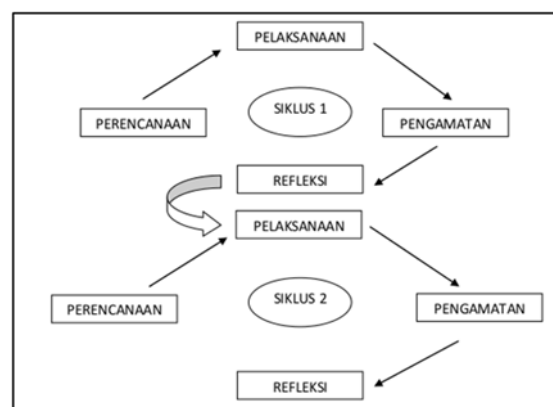
Moreover, when viewed within the constructivist framework that underpins the curriculum, the effectiveness of creative drama methods aligns with the cognitive learning approach, which states that learning occurs through active rather than passive processes. The concept of creativity in the context of elementary school social studies education emphasizes the importance of developing students' creativity in exploring new ideas ([Ucus, 2017](#)). However, various teaching strategies, activities, and practices are needed for teachers to encourage and facilitate student creativity in elementary school social studies learning.

Research indicates that with interactive learning systems, the visual and conceptual similarity effects of AI models develop human-AI creativity systems, offering opportunities and potential benefits of technology to foster creativity and innovation ([Karimi et al., 2020](#)).

Developing AI models by externalizing three cognitive operation models (expanding, limiting, and integrating) can be associated with divergent and convergent thinking ([Jeon et al., 2021](#)). The studies described above demonstrate that the learning media used have an influence on the growth and development of student creativity. The difference in focus of the presented research is the utilization of AI technology in social studies learning, thus enabling the identification and cultivation of positive aspects of AI technological development in helping construct social studies material. Additionally, students can also explore information in depth and innovate material through AI technology.

RESEARCH METHODS

This research employs a mixed methods approach that combines qualitative and quantitative methods. This approach aims to gain a deeper understanding of AI-based learning and measure its impact on students' creativity and skills. In this research, data collection techniques involve obtaining quantitative data, which is then strengthened and validated through qualitative data in the form of observations, interviews with respondents, and document analysis ([Sugiyono, 2018](#)). The study uses an action research design divided into several stages: planning, action, observation, and reflection ([Kemmis, S., and McTaggart, 1988](#)). The planning stage focuses on developing an AI-based social studies learning model, followed by implementation and evaluation of the mode.



(Figure 1: Action research model)

The subjects of this research are ninth-grade students from SMP Muhammadiyah 5 Surabaya, divided into experimental and control groups. Class IX E serves as the experimental group and Class IX F as the control group, with 33 students in each class. Additionally, curriculum specialists, teachers, and the school principal are involved as participants to provide input and evaluation on the implementation of the learning model. Data collection techniques include: a) Observation during the learning process to monitor engagement, interaction, and creativity of students in AI-based social studies learning; b) Semi-structured interviews

conducted with students, curriculum specialists, teachers, and the school principal to obtain feedback and perspectives on the implementation of the learning model; c) Creativity tests administered to students before and after the implementation of the learning model to measure development; and d) Analysis of documents such as lesson plans, teaching materials, and student work to evaluate the effectiveness of the learning model.

RESEARCH RESULTS AND DISCUSSION

The purpose of this research is to explore and develop a social studies learning model by integrating Artificial Intelligence (AI) to enhance student creativity, as well as to analyze the impact, challenges, and prospects of its implementation in educational environments. The findings of this study align with the 4P theory of creativity (person, process, product, press) proposed by Rhodes (1961). This theory emphasizes the importance of creating a supportive environment (press) aimed at developing individual creativity (person) through creative thinking processes (process) that ultimately produce creative and innovative products (product). The AI-based social studies learning model is expected to provide a supportive environment for students to explore their creativity.

Table 1. Average Creativity Test Scores of Students

Class	Average Score	
	Pretest	Posttest
Experimental Class (AI-Based Learning Model)	65.2	92.7
Control Class (Traditional Learning Model)	63.8	78.4

Notes:

- Creativity values are scores from creativity tests given to students before (pretest) and after (posttest) the implementation of the learning model.
- Creativity scores use a specific range of values, for example 0-100.
- The table shows individual creativity scores of students in the experimental and control classes, as well as the average creativity scores in each class.

From the table above, it can be seen that the average creativity score of students in the experimental class using the AI-based learning model increased from 65.2 in the pretest to 92.7 in the posttest. Meanwhile, the average creativity score of students in the control class using traditional learning methods only slightly increased, from 63.8 in the pretest to 78.4 in the posttest.

Table 2. Assessment of Student Essay Answers with AI-Based Automated Assessment System

Assessment Aspect	Average Score
Concept Accuracy	88.5
Depth of Analysis	92.3
Originality of Ideas	89.8

This table shows the average assessment scores of student essay answers using an AI-based automated assessment system integrated into the learning model. The data indicates that with AI applications, students achieved an overall average of 88.5 in concept accuracy, 92.3 in depth of material analysis, and 89.8 in originality of ideas developed by students. Overall, implementing an AI-based automated assessment system encourages students to conceptualize or construct and deepen the material presented by the teacher.

Table 3. Student Perceptions of the AI-Based Learning Model

Statement	Percentage of Agreement
The learning model is interesting and interactive	96%
Helps understand social studies concepts better	90%
Encourages creative thinking	97%
Increases learning motivation	93%

The table of student perceptions of the AI-based social studies learning model shows student responses and evaluations of the effectiveness of the learning model in creating an engaging learning environment, enhancing concept understanding, encouraging creativity, and motivating learning. Meanwhile, based on classroom observations and in-depth interviews conducted with curriculum specialists, teachers, and the school principal, it was revealed that the AI-based learning model facilitates the development of student creativity by generating new ideas, exploring different perspectives, and creating innovative solutions. The technology utilization model creates motivation that actively involves students in the learning process, fosters student enthusiasm, and assists teachers in processing assessment data. Although triangulation of quantitative and qualitative data also identified several challenges and limitations that must be addressed for better implementation in the future.

CONCLUSION

Research findings indicate that developing social studies learning models based on Artificial Intelligence (AI) can enhance students' creativity and skills. The integration of AI technologies such as educational chatbots, data visualization, interactive simulations, and

automated assessment systems creates an interactive, contextual learning environment that supports creativity development. Evaluation results show that students in classes using AI-based learning methods demonstrated significant creativity improvement, achieving an average post-test score of 92.7, compared to the control group using traditional methods, which obtained an average score of 78.4. This learning model can serve as an educational innovation that enhances critical thinking, collaboration, communication, and improves the quality and creativity of 21st-century learners.

Based on the research findings, discussion, and conclusion, the author offers the following recommendations: (1) Provide intensive training for teachers on using AI technology in education and develop pedagogical competencies to effectively integrate AI. (2) Enhance technological infrastructure in schools, including internet connectivity, computer equipment provision, and development of user-friendly AI-based learning applications or platforms. (3) Foster collaboration between schools, government, and the technology industry to develop curricula with AI-based learning models tailored to educational needs and challenges in the digital era. (4) Conduct further research to explore AI technology applications, particularly generative artificial intelligence and machine learning, in developing more adaptive and personalized learning models.

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