



## ARTIFICIAL INTELLIGENCE, SOCIAL SCIENCES LEARNING INNOVATION CATALYST

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### *Abstract*

Digital technology and artificial intelligence (AI) development has opened up new educational opportunities, including social education studies. In this digital era, improving learning quality is becoming increasingly urgent. Social education studies, which aim to shape students' understanding of society, geography, and citizenship skills, face various challenges, ranging from a lack of student engagement to limited resources. AI technology offers innovative solutions through personalized learning, quick feedback, and a dynamic learning environment. AI-based learning supports lifelong education, providing easy access to online resources for all age groups. This research aims to analyze the potential of AI in social education studies by identifying relevant AI applications, evaluating the impact of AI implementation, and developing AI-based learning models. In addition, the study identifies challenges, formulates strategies to overcome them, and formulates policy recommendations for educators and technology developers. The method used is qualitative analysis through a literature review from journals, books, and related articles in the last ten years. The study results show that AI has great potential to improve the quality of social learning studies by providing programs tailored to student needs, analyzing learning history, and developing better learning materials. Examples of AI applications in education include ChatGPT for natural language processing, AI-based learning systems, virtual assistants, and educational data analysis. With wise application, AI can improve student engagement, material comprehension, and analytical skills and prepare them for a connected and adaptive future to changing times.

***Keywords: Artificial Intelligence, Social Sciences Education, Learning Innovation.***

### INTRODUCTION

Technological developments in the digital era have significantly impacted various aspects of life, including education. One of the innovations that stands out is using Artificial Intelligence/AI. Initially developed for computing and data analysis, AI has penetrated various fields, including social sciences. In social science learning, AI has great potential to become a catalyst for innovation that increases the Learning Process's effectiveness and enriches students' learning experiences.

Social science is a discipline that studies complex aspects of human society, including geography, sociology, anthropology, and economics. Learning in this field often requires a holistic and interactive approach to

understanding abstract and dynamic concepts. This is where the role of AI becomes very relevant. AI can be used to develop adaptive and personalized learning tools and methods, allowing students to learn according to their abilities and needs.

Artificial Intelligence has become ubiquitous in daily life. Numerous instances demonstrate the ways in which artificial intelligence (AI) has impacted many facets of human existence, such as Web information retrieval, news and entertainment consumption, identity-based surveillance systems, financial market performance, welfare recipients, and traffic and pedestrian patterns.(Williamson, 2024)

Additionally, AI can help with more efficient data collection and analysis, allowing educators to gain deep insights into student performance and development. In this way, educators can design more effective and responsive learning strategies. AI can also support collaborative learning through digital platforms that enable interaction and discussion between students from various backgrounds, enriching their perspectives and understanding of social science.

(Chassignol et al., 2018) gives a balanced definition of artificial intelligence as a subject of study and theory. Artificial intellect (AI) is a branch of computer science that focuses on finding solutions to cognitive issues associated with human intellect, including learning, pattern recognition, and problem-solving. AI is a theoretical framework that directs the creation and application of computer systems that possess human abilities, such as speech recognition, visual perception, decision-making, and language translation.

However, the application of AI in social studies education also presents its challenges. One of the main challenges is ensuring that this technology does not replace the role of educators but instead strengthens it. Apart from that, issues related to privacy and ethics in the use of data also need serious attention to ensure that integrity and fairness in education are maintained.

Therefore, this research aims to explore the potential of AI as a catalyst for innovation in social science learning. This research will examine various applications of AI in the learning context, the benefits they offer, and the challenges that must be overcome to maximize the potential of AI in education. Thus, this research is hoped to significantly contribute to developing innovative and effective learning methods and strategies in the digital era.

## METHOD

This study investigates the use of AI in social science education through a literature review methodology. With the purpose of comprehending the use of AI in educational contexts and the related advantages and

difficulties, this approach entails gathering, evaluating, and synthesizing a variety of pertinent literature sources.

## DISCUSSION

### A. AI Applications in Social Science Learning

*Artificial Intelligence*(AI) covers various disciplines such as engineering, mathematics, computer science, philosophy, and linguistics. Due to its multidisciplinary nature, AI experts have not yet agreed on a general definition of AI. AI will have many applications as research advances, including Social Science (IPS) learning. The application of AI in social studies facilitates the teaching and learning process and helps make more effective decisions regarding learning strategies and student evaluation. (Aggarwal & Agrawal, 2024)

Timms notes that AI has enormous potential to transform various societal sectors, including education. In social studies learning, AI has begun to be adopted to improve student learning experiences by personalizing content and teaching methods. Based on the narrative and framework proposed by(Chassignol et al., 2018), AI has been applied in social studies learning, especially in terms of educational administration, creating learning materials, and more in-depth assessments, which directly impact the quality of student learning.

More specific applications of AI in social studies learning include various forms, such as developing learning content tailored to student needs and using intelligent tutor systems to provide immediate feedback and more accurate student assessments. Examples of AI applications include interactive learning environments (ILEs) that can help students understand concepts in social studies in more depth, as well as intelligent tutoring systems that can be used for various subjects at different educational levels.(Chassignol et al., 2018)AI also plays a role in tracking student performance in social studies and improving available pedagogical tools, which enriches the student learning experience.

AI significantly impacts social studies learning by encouraging deep understanding through more detailed explanations and personalizing content according to student abilities. Technologies such as virtual reality (VR) and simulations allow students to experience social studies learning more objectively, helping them understand social, cultural, and historical dynamics more interactively and holistically. Although there are concerns about the potential negative impact of AI, in the context of social studies learning, the benefits offered by AI are likely to be more significant, such as increasing information retention and student learning motivation (Chen et al., 2020)

Several countries, such as China, England, Thailand, Korea, and the European Union, are setting educational standards involving AI, including those in the social studies curriculum. Organizations such as the Association for the Advancement of AI (AAAI) and the Computer Science Teachers Association (CSTA) have developed national guidelines for teaching AI at the K-12 level, which are relevant to equipping students with AI literacy in social studies contexts (Yetişensoy & Rapoport, 2023)

It can be said that social studies learning aims to prepare students to become active members of society, both now and in the future, making AI literacy an integral part of social studies education. Social studies provides the knowledge, skills, and values necessary for students to participate actively in a society increasingly connected by AI technology. Social studies learning also helps students understand the role of AI in society to become conscious and wise citizens who utilize AI for broader social interests. (Yetişensoy & Rapoport, 2023)

AI in social studies learning offers various benefits, such as personalization of learning, more accurate assessments, and efficient data management. However, human intelligence remains essential, especially in the aspects of creativity, empathy, and critical thinking, to ensure that social studies learning does not lose the crucial human dimension in the educational process (Ulimaz et al., 2024)

## B. Benefits of AI in Learning

AI has a significant positive impact on learning, especially in adjusting the curriculum and student learning experiences. AI-based curriculum adaptation enables dynamic adjustments to student needs using real-time data analysis, facilitating learning personalization and student progress monitoring. (Apriadi & Sihotang, 2023)

**Efficiency and learning speed:** AI-based social studies learning can help students save time by automating specific tasks, such as assessments and data analysis. In addition, based on student progress, social studies learning can provide learning experiences tailored to their needs, which can give immediate feedback, allowing students to deepen their understanding of social concepts more quickly. (Rebolledo Font de la Vall & González Araya, 2023)

**Personalized learning experiences:** A lot of AI-powered social studies learning resources employ algorithms to monitor students' progress and adjust course contents based on their aptitudes and preferred methods of learning. Because they receive content that is catered to their learning style and speed, students benefit from an enhanced and more effective learning experience. (Kessler, 2018)

**Capacity to study several subjects at once:** Students can study history, geography, and sociology at the same time with some AI-based social studies learning resources. It helps students who want to learn more about social and cultural issues for personal or academic reasons.

**Accessibility:** AI-based social studies learning resources can be easily accessed from any internet-connected device as they are frequently offered online or as mobile applications. Students can now study whenever and wherever it's convenient for them thanks to this.

**Cost-effectiveness:** A lot of AI-based social studies learning resources are available for free or at a reduced price, which makes them more economical than more conventional teaching strategies like in-person instruction or individual tutoring

Cultural exposure and social insight: AI-based social studies learning tools can expose students to a variety of social and cultural factors, including conventions, traditions, and social dynamics, through interactive lessons and real-life scenarios. By doing this, kids are able to comprehend and value various societies and cultures on a deeper level.

AI-based resources for social studies education have several advantages for both educators and learners. Using this application, teachers can uncover areas for growth, provide real-time feedback, and customize each student's learning more quickly and easily. AI-based resources allow students to study social studies in an engaging manner that fits their learning style and level of experience. Social studies teachers can offer more transformative learning experiences and aid students in understanding social studies by using AI-based tools into their conventional teaching techniques.

### C. Challenges in implementing AI

#### 1. Limitations of AI algorithms

Current AI algorithms are not yet perfect and still have limitations in understanding complex patterns in social data. Even though AI technology is very advanced, there are still limitations in understanding natural language, social context, and human reasoning. This is a challenge in creating AI that can interact naturally and provide practical social studies learning feedback to students. Further research in natural language processing and emotional intelligence is urgently needed.

Organizational systems, including those for gathering, monitoring, storing, using, archiving, and destroying data, are closely connected to data governance. The leadership and management of the company set the direction for the organization's data governance rules and processes, supported them, and communicated them. All the instruments required to guarantee general needs like availability, completeness, accuracy, integrity, consistency, auditability,

and security should be included in regulations. (Owoc et al., 2021)

#### 2. Privacy and security of student data

Government schools are often responsible for training prospective government and civil servants. Technology and AI can automatically carry out administrative tasks, such as student data management, scheduling, and financial administration.

The use of AI in education requires collecting large amounts of student data, so the issue of data privacy and security becomes critical. Adequate regulations and technology are needed to protect students' data. (Siti Masrichah, 2023), The use of AI in collecting and analyzing personal data poses risks to individual privacy. Robust protection of personal data and appropriate privacy policies are essential to ensure that sensitive information is not misused or accessed without permission. Additionally, AI systems are vulnerable to cyberattacks and data manipulation. Security in AI implementations must be a top priority, including data protection, computing infrastructure security, and thorough security testing.

#### 3. High costs of AI development and research

AI development and research require significant time, expertise, and computing costs. This is an obstacle for many educational institutions with limited resources. Cross-sector support and collaboration are needed to overcome cost barriers. In Indonesia, one of the main barriers to using AI is the high cost of installing AI devices, so not all education sectors can afford to invest in this technology. (Suryokta et al., 2023)

#### 4. Lack of AI literacy among teachers

Many social studies teachers are still not familiar with the concept and implementation of AI in learning. Training and outreach are needed to increase AI literacy among teachers and enable them to use it effectively in social studies learning. The government has started a new literacy initiative that focuses on three main aspects: digital literacy, technological literacy, and human literacy, which are

considered essential to face the industrial era 4.0

Some educators see AI as a tool that can help them provide a more personalized and adaptive learning experience for their students. However, the application of AI in the learning process can significantly impact teachers as long as students use it. (Safitri et al., 2023)

In the Society 5.0 era, educators must have digital skills and the ability to think creatively. They must also be more innovative in teaching by keeping up with current developments. In an increasingly modern era, educators must also be able to use various applications that support learning. (Nur et al., 2022)

#### 5. Dependence on technology and cyberspace

High dependence on digital technology such as smartphones, laptops, and tablets can have an impact on mental health, including causing anxiety, restlessness, and sleep disorders. (Gumelar, 2023) The study referred to by Gumelar shows that dependence on the internet and technology can cause behavioral disorders such as obsession with technology, anxiety when not using digital devices, and loss of control over technology use. These findings suggest that the more often someone uses technology, the more likely they are to experience mental health problems.

#### D. AI Learning Innovation

Innovations in technology-based education open the door to more inclusive access to education, overcoming geographic and economic barriers so that students worldwide can access quality learning without needing to be physically present in a particular location. (Hasnah et al., 2023) Innovation in the learning process is a must, not only to meet students' learning needs in facing future challenges but also to support the vision of Society 5.0, namely a human-focused, sustainable, and driven by technology. (Hasnah et al., 2023)

AI allows teachers to implement innovative teaching strategies. With the flipped classroom paradigm, for instance, students watch

videos on a subject on their own and use what they've learned during in-class activities. AI-based solutions can also be used to improve blended learning, which blends traditional classroom instruction with online learning. Artificial Intelligence (AI) has significant opportunities to enhance pedagogical approaches via features including Natural Language Processing (NLP), machine learning, and deep learning. (Jianzheng & Xuwei, 2023)

Through interactive situations, automatic dialogue completion, knowledge and style transfer, and AI-generated material review, artificial intelligence (AI) has the potential to enhance classroom instruction. These features can then promote individualized learning, boost productivity, and enhance student learning outcomes. (Jianzheng & Xuwei, 2023)

## CONCLUSION AND RECOMMENDATIONS

### I. Conclusion

Technological developments in the digital era, especially Artificial Intelligence (AI), have significantly impacted various aspects of life, including education. In the context of Social Science (IPS) learning, AI offers excellent potential as a catalyst for innovation that can increase the effectiveness of the learning process and enrich students' learning experiences. With its capabilities in data analysis and personalization of learning, AI is essential in supporting the educational process by providing adaptive and interactive tools and methods.

Social Sciences, which include geography, sociology, anthropology, and economics, require a holistic and interactive approach. AI enables the development of learning tools tailored to individual student needs, provides immediate feedback, and supports learning experiences through digital platforms that facilitate collaboration between students from various backgrounds. Technology such as virtual reality (VR) and simulations also enrich students' understanding of social, cultural, and historical dynamics.

However, the application of AI in social studies education is not without challenges. Some of the main challenges include the limitations of AI algorithms in understanding social context and natural language, as well as privacy and security issues of student data. The high costs of AI development and research are also an obstacle for educational institutions, especially in countries with limited resources like Indonesia. In addition, teachers' low level of AI literacy requires attention to utilize this technology effectively in learning. Dependence on technology also has the potential to cause mental health problems if not appropriately managed.

Therefore, this research aims to explore the potential of AI in social studies learning, including the applications, benefits, and challenges faced. It is hoped that the findings from this research can significantly contribute to developing innovative and effective learning methods and strategies while ensuring that integrity and fairness in education are maintained in this digital era.

## II. Recommendation

To effectively integrate AI into educational settings, institutions should prioritize advanced research to evaluate AI's impact on student learning outcomes and address potential risks. Collaborating with technology companies and universities can facilitate the development of innovative learning tools and create opportunities for hands-on experiences through internships and exchange programs. Developing an AI-based learning platform that offers personalized and interactive educational experiences can significantly enhance student engagement and learning. Institutions must also establish a robust system for continuous evaluation and adjustment of AI implementation, ensuring that the technology supports and enriches the educational process while maintaining the central role of educators.

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