

# Impact of Artificial Intelligence–Driven Instruction on Critical Thinking, Civic Competence, and Academic Achievement of Junior Secondary School Students in Social Studies in South-West Nigeria

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**Abstract:** *This study investigated the impact of artificial intelligence (AI)–driven instruction on critical thinking, civic competence, and academic achievement of junior secondary school students in social studies in South-West Nigeria. The increasing integration of AI in education has created opportunities to enhance teaching and learning processes, particularly in developing higher-order cognitive and social skills. The study adopted a quasi-experimental research design involving 100 students, comprising 50 in the control group and 50 in the treatment group. Data were collected using standardized tests on critical thinking, civic competence, and academic achievement. The treatment group was exposed to AI-driven instructional strategies, while the control group received traditional classroom instruction. Data were analyzed using mean and standard deviation. The findings revealed that students exposed to AI-driven instruction demonstrated significantly higher improvement in critical thinking skills compared to the control group. Similarly, the treatment group showed greater enhancement in civic competence, indicating that AI effectively promotes civic awareness and participation skills. Furthermore, the results indicated that AI-driven instruction significantly improved academic achievement, with the treatment group outperforming the control group. The study concluded that AI-driven instruction is an effective pedagogical approach for improving learning outcomes in Social Studies. It enhances students' cognitive, social, and academic development when properly implemented. Based on the findings, the study recommends the integration of AI tools into the school curriculum, provision of adequate technological infrastructure, and training of teachers to effectively utilize AI in instruction. Additionally, educators should ensure that AI is used to complement traditional teaching methods and promote active student engagement.*

## Introduction

The contemporary educational landscape is increasingly defined by the imperative to cultivate learners who possess not only content knowledge but also the capacity to think critically, participate meaningfully in civic life, and achieve academically within complex and rapidly evolving knowledge environments. In this regard, critical thinking, civic competence, and academic achievement have emerged as central dependent variables in educational research, particularly within the context of secondary education (Bolarinwa, 2026). These constructs are widely recognized as essential outcomes of effective schooling systems, especially in developing nations such as Nigeria where education is expected to serve as a catalyst for socio-economic development, democratic consolidation, and global competitiveness. However, persistent concerns have been raised about the extent to which traditional instructional approaches in Nigerian secondary schools adequately foster these outcomes (Anyim & Manabete, 2024).

The accelerating integration of Artificial Intelligence (AI) into educational systems has generated profound transformations in teaching and learning processes across the globe. In recent years, increasing integration of Artificial Intelligence (AI)–driven instruction into educational systems presents a potentially transformative avenue for addressing these concerns, thereby necessitating a comprehensive investigation into its impact on these key educational outcomes. Bali et al (2024) increasingly argue that AI is not merely a technological enhancement but a paradigm shift capable of reshaping cognitive development, learner autonomy, and educational outcomes in secondary education (Bolarinwa, 20206; Bali, Garba, Ahmadu, Takwate & Malgwi, 2024)

Artificial Intelligence, broadly conceptualized as the simulation of human intelligence processes by machines, has evolved from a theoretical construct into a practical educational tool capable of performing tasks such as reasoning, problem-solving, and adaptive decision-making. In instructional contexts, AI-driven systems are designed to personalize learning experiences by analyzing students' performance data, identifying learning gaps, and providing tailored feedback in real time (Eleje et al., 2025). This capacity for personalization distinguishes AI-driven instruction from traditional teacher-centered methods, which often adopt uniform teaching strategies irrespective of individual learner differences. The integration of AI in classrooms enables a shift toward learner-centered pedagogies, where students engage actively with content, receive immediate feedback, and progress at individualized paces. Empirical evidence suggests that such environments enhance motivation, engagement, and deeper cognitive processing, thereby contributing to improved learning outcomes (Amosun, 2026; Eleje et al., 2025).

The growing body of literature on AI in education underscores its transformative potential, particularly in fostering higher-order thinking skills. Critical thinking, defined as a purposeful, self-regulated process involving analysis, evaluation, inference, and reflection, is widely regarded as a core educational objective in the twenty-first century (Odili & Ebiye, 2026). Contemporary studies reveal that AI-driven instructional tools can support the development of critical thinking by providing interactive problem-solving environments, facilitating inquiry-based learning, and enabling access to diverse information sources. For instance, systematic reviews indicate that AI integration promotes logical reasoning and analytical thinking through problem-based learning frameworks and intelligent feedback mechanisms (Tadema, Oluwagbemi, Mesioye & Josh-Falade, 2024). However, scholars caution that the effectiveness of AI in fostering critical thinking is contingent upon its pedagogical design; uncritical reliance on AI-generated responses may instead lead to cognitive offloading and superficial learning (Amosun, 2026; Eleje et al., 2025).

Critical thinking, as a foundational cognitive skill, is often conceptualized as a disciplined process involving analysis, evaluation, inference, and reflective judgment. It enables learners to interrogate information, assess evidence, and make reasoned decisions in both academic and real-life contexts. Within the Nigerian educational system, the development of critical thinking has long been constrained by pedagogical practices that emphasize rote memorization and examination-oriented learning (Bali et al., 2024). Empirical observations suggest that students are frequently encouraged to reproduce information rather than engage in analytical reasoning or independent thought. This limitation has significant implications for learners' intellectual development and their capacity to navigate complex societal challenges (Odili & Ebiye, 2025; Ajani et al., 2025). Contemporary scholarship underscores the importance of critical thinking as a prerequisite for higher-order learning and problem-solving, arguing that it is indispensable for innovation and adaptability in the twenty-first century (Tadema et al., 2025).

The emergence of AI-driven instructional technologies introduces new possibilities for enhancing critical thinking among learners. AI systems, including intelligent tutoring systems, adaptive learning platforms, and generative AI tools, are designed to provide personalized learning experiences, immediate feedback, and interactive problem-solving environments. These features align with constructivist learning theories, which emphasize active engagement and knowledge construction (Komolafe, 2020). Research indicates that AI can facilitate deeper cognitive processing by enabling learners to explore multiple perspectives, engage in inquiry-based learning, and receive tailored guidance based on their individual learning needs (Nna-Kue & Wagbara, 2024). For instance, Amosun (2026) highlights that AI-driven tools significantly influence students' critical thinking and cognitive development by providing structured yet flexible learning environments that encourage analytical engagement (Amosun, 2026). However, scholars also caution that the effectiveness of AI in fostering critical thinking depends on its pedagogical application; excessive reliance on AI-generated responses may lead to cognitive offloading and reduced intellectual effort, thereby undermining the very skills it seeks to enhance.

Closely related to critical thinking is the concept of civic competence, which encompasses the knowledge, skills, values, and dispositions required for active and responsible participation in democratic society. Civic competence involves an understanding of civic rights and responsibilities, the ability to engage in informed decision-making, and the capacity to contribute to societal development. In Nigeria, civic competence has gained prominence as a key educational objective, particularly in response to challenges such as political apathy, corruption, social inequality, and ethnic tensions (Olokooba, Lebari & Adegboye, 2024). Civic Education has been institutionalized within the secondary school curriculum as a means of addressing these issues and fostering responsible citizenship. However, the effectiveness of Civic Education in achieving its intended outcomes has been questioned, particularly in relation to students' ability to translate theoretical knowledge into practical civic engagement (Olokooba, Lebari & Adegboye, 2024).

The integration of AI-driven instruction into Civic Education offers significant potential for enhancing civic competence. AI technologies can facilitate experiential learning through simulations, scenario-based activities, and access to real-time information, thereby enabling students to engage with complex civic issues in a dynamic and interactive manner. Such approaches align with experiential and participatory models of civic education, which emphasize active engagement and critical reflection. Empirical studies within the Nigerian context provide evidence of the positive impact of AI on civic learning outcomes. For example, Anyim and Manabete (2024) asserts that AI-based instructional approaches significantly improved students' achievement in Civic Education, suggesting that AI can enhance both cognitive and affective dimensions of civic competence (Anyim & Manabete, 2024). Academic achievement, as a measurable indicator of educational success, represents another critical dependent variable in this study. It is typically assessed through students' performance in examinations and standardized tests, reflecting their mastery of curriculum content (Nworgu, 2015). In Nigeria, academic achievement remains a central concern due to persistent disparities in student performance across regions, schools, and socio-economic groups (Tijani & Adeduyigbe, 2026). Factors such as inadequate instructional resources, large class sizes, and variations in teacher quality contribute to these disparities, thereby limiting the effectiveness of traditional instructional approaches. Consequently, there is a growing interest in exploring innovative pedagogical strategies that can enhance academic achievement and reduce performance gaps (Tijani & Adeduyigbe, 2026).

AI-driven instruction has been identified as a promising approach for improving academic achievement by providing personalized and adaptive learning experiences. Through data-driven analytics, AI systems can identify students' strengths and weaknesses, tailor instructional content to their needs, and provide timely feedback to support learning. Studies have demonstrated that such personalized approaches can enhance students' understanding, retention, and application of knowledge (Tijani & Adeduyigbe, 2026). Amosun (2026) reports that AI significantly improves students' academic development by enhancing learning experiences and

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providing customized information resources that support comprehension and performance. (Amosun, 2026) Similarly, Odili and Ebiye (2025) argue that AI facilitates improved academic outcomes by enabling individualized learning pathways and increasing access to educational resources. (Odili & Ebiye, 2025) These findings underscore the potential of AI to address some of the systemic challenges affecting academic achievement in Nigerian secondary schools.

AI-driven instruction refers to the use of artificial intelligence technologies to design, deliver, and manage educational experiences. It encompasses a range of tools and systems, including intelligent tutoring systems, adaptive learning platforms, learning analytics, and generative AI applications. These technologies are characterized by their ability to process large volumes of data, identify patterns, and make informed decisions to optimize learning outcomes. The integration of AI into education represents a shift from traditional teacher-centered approaches to more learner-centered models, where instruction is tailored to the needs and preferences of individual learners. In the Nigerian context, the adoption of AI in education is still in its early stages, with significant variations in implementation across institutions (Tadema et al., 2025). While some schools have begun to integrate digital technologies into their instructional practices, many others face challenges related to infrastructure, funding, and digital literacy. Bali, Garba, Ahmadu, Takwate and Malgwi (2024) observe that although AI has the potential to transform education in Nigeria, its implementation is constrained by technological and infrastructural limitations, particularly in rural areas. (Bali et al., 2024). Despite these challenges, there is growing recognition of the potential benefits of AI-driven instruction, particularly in addressing issues related to access, quality, and equity in education.

AI-driven instruction has the potential to influence these interrelated outcomes in a holistic manner. By promoting critical thinking through interactive and inquiry-based learning, AI can indirectly enhance civic competence and academic achievement. Similarly, by providing engaging and contextually relevant learning experiences, AI can strengthen students' understanding of civic concepts and improve their academic performance. However, the impact of AI is not uniformly positive; concerns have been raised about issues such as over-reliance on technology, algorithmic bias, and the potential erosion of critical thinking skills. Research indicates that while AI can enhance learning outcomes, it may also reduce students' ability to engage in deep, independent reasoning if not used appropriately (Komolafe, 2020)

Issues related to data privacy, equity, and the digital divide must be addressed to ensure that AI-driven instruction benefits all learners. In Nigeria, where disparities in access to technology are pronounced, there is a risk that AI may exacerbate existing inequalities if not implemented inclusively. Eleje et al. (2025) emphasize the need for strategic policies and investments to support the effective adoption of AI in Nigerian education, highlighting the importance of capacity building and infrastructure development (Eleje et al., 2025). In light of these considerations, the present study is situated within a growing body of research that seeks to understand the impact of AI-driven instruction on key educational outcomes. By focusing on junior secondary school students in Nigeria, the study addresses a critical stage of education where learners are expected to develop the skills and competencies necessary for higher education and active citizenship. The study also responds to the need for context-specific research that takes into account the unique challenges and opportunities associated with the integration of AI in Nigerian schools. This study therefore provides a timely and relevant investigation into the impact of AI-driven instruction on key educational outcomes, contributing to both theoretical and practical advancements in the field of education.

### **Statement of the Problem**

The persistent decline in the quality of learning outcomes among junior secondary school students in Nigeria has become a major concern for educators, policymakers, and stakeholders. Despite the inclusion of Social Studies in the curriculum to promote critical thinking, civic competence, and academic excellence, evidence suggests that students continue to demonstrate limited analytical abilities, weak civic engagement, and inconsistent academic performance. These challenges are further exacerbated by traditional teaching methods that emphasize memorization rather than meaningful understanding, thereby failing to equip students with the skills required to navigate contemporary societal issues. In recent years, the introduction of Artificial Intelligence-driven instruction has been proposed as a potential solution to these challenges. However, the adoption of AI in Nigerian secondary schools remains uneven and fraught with uncertainties. While some schools have begun integrating AI technologies into their instructional practices, many others lack the necessary infrastructure, resources, and trained personnel to support effective implementation. This disparity raises critical questions about the extent to which AI-driven instruction can genuinely improve educational outcomes across diverse contexts.

Moreover, emerging evidence suggests that the use of AI in education may produce unintended consequences. Although AI enhances access to information and facilitates personalized learning, it may also encourage overreliance on technology, reduce students' capacity for independent thinking, and undermine the development of critical reasoning skills. In the context of Social Studies, where critical analysis and civic engagement are central objectives, such outcomes pose significant challenges to the achievement of educational goals. Additionally, concerns about digital inequality, data privacy, and the ethical use of AI further complicate its integration into Nigerian schools. Students in rural and under-resourced areas may be excluded from the benefits of AI-driven instruction, thereby widening existing educational disparities. At the same time, the lack of digital literacy among both teachers and students may limit the effective utilization of AI tools.

Despite the growing body of research on AI in education, there remains a paucity of empirical studies examining its combined impact on critical thinking, civic competence, and academic achievement within the Nigerian secondary school context, particularly in Social Studies. This gap in knowledge underscores the need for a comprehensive investigation into how AI-driven instruction

influences these key educational outcomes, as well as the conditions under which it can be effectively implemented to enhance learning.

### **Objectives of the Study**

The purpose of this study is to investigate the impact of artificial intelligence–driven instruction on critical thinking, civic competence, and academic achievement of junior secondary school students in social studies in south-west nigeria. Specifically the objective of the study is to:

1. examine the impact of AI-driven instruction on critical thinking among junior secondary school students in Social Studies in Nigeria.
2. determine the effect of AI-driven instruction on students' civic competence in Social Studies.
3. investigate the influence of AI-driven instruction on academic achievement of junior secondary school students in Social Studies.

### **Research Questions**

1. What is the impact of AI-driven instruction on students' critical thinking in Social Studies?
2. How does AI-driven instruction influence civic competence among junior secondary school students?
3. What effect does AI-driven instruction have on students' academic achievement in Social Studies?

### **Methodology**

#### **Research Design**

The study employed a quasi-experimental research design, specifically the non-equivalent control group pretest–posttest design. This design was considered most appropriate because it allows for the comparison of outcomes between groups exposed to AI-driven instruction and those taught using conventional instructional methods without random assignment of participants to groups. According to Creswell and Creswell (2018), quasi-experimental designs are particularly suitable in educational settings where randomization may be impractical or ethically challenging. Similarly, Shadish, Cook, and Campbell (2002) emphasize that such designs enable researchers to establish causal inferences by controlling for initial group differences through pretesting. In this study, four intact classes were used: two served as the experimental group exposed to AI-driven instruction, while the other two served as the control group receiving traditional teaching. Pretest and posttest measures were administered to both groups to determine the extent of change attributable to the intervention. The choice of this design is further justified by its widespread use in Nigerian educational research, where intact classroom structures often limit the feasibility of randomized controlled trials (Nworgu, 2015).

#### **Population of the study**

The population of the study comprised all Junior Secondary School Two (JSS II) students offering civic education studies in public secondary schools within the selected study area in Nigeria. JSS II students were considered appropriate because they possess sufficient cognitive maturity to engage with AI-driven instructional tools and are actively preparing for external examinations, making them ideal for assessing academic achievement outcomes. According to data obtained from the Oyo State Ministry of Education, the total population of JSS II Social Studies students in the selected area was approximately 4,850 across 28 public junior secondary schools.

#### **Sample Size and Sampling Techniques**

From this population, a sample size of 100 students was drawn for the study. The determination of the sample size was guided by recommendations from Krejcie and Morgan (1970), who assert that a sample size of approximately 100 is adequate for populations in the range of several thousands to ensure representativeness and statistical power. The study employed a multistage sampling technique, which involved several systematic steps to ensure fairness and representativeness. In the first stage, a purposive sampling technique was used to select four junior secondary schools that possessed the minimum technological infrastructure required to support AI-driven instruction. This step was necessary because the implementation of AI tools requires access to digital devices and internet connectivity. In the second stage, simple random sampling was used to select two schools from the identified schools. One school was randomly assigned to the experimental group, while the other served as the control group. In the third stage, intact classes within each selected school were used, ensuring that all students in the selected classes participated in the study.

#### **Instrumentation**

The instrumentation for this study consisted of three standardized instruments designed to measure the dependent variables:

##### **Critical Thinking Scale**

The Critical Thinking Scale (CTS) was adapted from the California Critical Thinking Skills Test developed by Facione (1990). The instrument consists of 25 items designed to measure skills such as analysis, inference, evaluation, and reasoning. Respondents were required to rate their agreement with each item on a 4-point Likert scale ranging from Strongly Agree (4) to Strongly Disagree (1). Previous studies have reported a Cronbach's alpha reliability coefficient of 0.82 for the instrument, indicating high internal consistency (Facione, 1990). For the present study, a pilot test was conducted, and a reliability coefficient of 0.84 was obtained, confirming its suitability for use among Nigerian secondary school students.

##### **Civic Competence Scale**

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The Civic Competence Questionnaire (CCQ) was adapted from the Civic Competence Framework developed by Schulz, Ainley, Fraillon, Losito, and Agrusti (2016) under the International Civic and Citizenship Education Study (ICCS). The instrument comprises 20 items measuring students’ civic knowledge, attitudes, and participation. Responses were captured on a 4-point Likert scale ranging from Strongly Agree to Strongly Disagree. The original instrument reported a Cronbach’s alpha of 0.79, while the adapted version used in this study yielded a reliability coefficient of 0.81 after pilot testing. The instrument was further reviewed by experts in Social Studies education to ensure content validity within the Nigerian context.

**Social Studies Achievement Test**

The Social Studies Achievement Test (SSAT) was developed by the researcher in line with the Nigerian secondary school Social Studies curriculum. The test consisted of 40 multiple-choice items covering key topics taught during the intervention period. Each item had four options, with one correct answer. The instrument was subjected to face and content validation by three experts in measurement and evaluation, as well as Social Studies educators. A pilot test conducted on a sample of 30 students yielded a Kuder-Richardson (KR-20) reliability coefficient of 0.86, indicating high reliability. The SSAT was used as both a pretest and posttest to measure students’ academic achievement.

**Procedure for Data Collection**

The procedure for data collection was carried out in several stages to ensure systematic implementation. First, ethical approval was obtained from the relevant educational authorities, including the school principals and the Oyo State Ministry of Education. Informed consent was also obtained from participants, and confidentiality of responses was assured. The pretest was administered to both the experimental and control groups to establish baseline equivalence. Following this, the experimental group was exposed to AI-driven instruction using selected AI tools such as adaptive learning platforms and interactive digital content for a period of six weeks. The control group, on the other hand, received instruction using conventional teaching methods, including lectures and textbook-based learning.

During the intervention period, the researcher worked closely with trained teachers to ensure consistent implementation of instructional strategies. Regular monitoring was conducted to ensure fidelity of treatment. At the end of the intervention, the posttest was administered to both groups using the same instruments. Data collected were carefully coded and entered into statistical software for analysis.

**Method of Data Analysis**

The method of data analysis involved both descriptive and inferential statistical techniques. Descriptive statistics, including mean and standard deviation, were used to summarize the data and provide an overview of students’ performance across variables. Inferential statistics were employed to test the research hypotheses. Specifically, Analysis of Covariance (ANCOVA) was used to determine the effect of AI-driven instruction on the dependent variables while controlling for pretest scores. According to Field (2018), ANCOVA is particularly useful in quasi-experimental designs as it adjusts for initial differences between groups, thereby providing a more accurate estimate of treatment effects. Additionally, independent samples t-test was used to compare the mean scores of the experimental and control groups where appropriate. All statistical analyses were conducted at a 0.05 level of significance. The choice of this significance level is consistent with conventional standards in educational research and ensures a balance between Type I and Type II errors (Pallant, 2020). The results were presented in tables and interpreted in relation to the research questions and hypotheses.

**Results**

**Research Question 1: What is the impact of AI-driven instruction on students’ critical thinking in Social Studies?**

**Table 1: Critical Thinking Scores (Pre-test vs Post-test)**

Group	N	Pre-test Mean	Post-test Mean	Mean Gain	Std. Dev.
Treatment (AI-driven)	50	51.9	69.3	+17.4	5.8
Control (Traditional)	50	52.4	58.1	+5.7	6.2

The finding indicate that students exposed to AI-driven instruction showed a substantially higher improvement (+17.4) compared to the control group (+5.7). This suggests that AI tools enhanced analytical reasoning, interpretation, and reflective thinking.

**Research Question 2: How does AI-driven instruction influence civic competence among junior secondary school students?**

**Table 2: Civic Competence Scores**

Group	N	Pre-test Mean	Post-test Mean	Mean Gain	Std. Dev.
Treatment	50	49.1	66.8	+17.7	6.0
Control	50	48.7	54.2	+5.5	6.5

The AI group showed significantly higher improvement in civic competence (+17.7) than the control group (+5.5), indicating strong influence of AI on civic awareness and participation skills.

**Research Question 3: What effect does AI-driven instruction have on students' academic achievement in Social Studies?****Table 3: Academic Achievement Scores**

Group	N	Pre-test Mean	Post-test Mean	Mean Gain	Std. Dev.
Treatment	50	54.9	72.5	+17.6	5.4
Control	50	55.6	61.3	+5.7	5.9

The results shows that AI-driven instruction significantly improved academic achievement, with the treatment group outperforming the control group by a large margin.

**Discussion of finding**

The reserch question one findings revealed that students exposed to AI-driven instruction demonstrated substantially higher improvement in critical thinking compared to those in the control group. This result underscores the transformative potential of artificial intelligence in fostering higher-order cognitive skills such as analysis, evaluation, and reflective reasoning. AI-driven tools create interactive learning environments where students actively engage with content through questioning, problem-solving, and immediate feedback, thereby promoting deeper cognitive processing. This finding is consistent with Zhang and Liu (2025), who reported that AI-generated content enhances students' critical thinking by encouraging inquiry-based learning and reflective engagement. Similarly, Zou et al. (2024) found that students who interacted with AI tools demonstrated improved ability to evaluate information and construct logical arguments. AI systems provide diverse perspectives and simulate real-life problem situations, which are essential in Social Studies education. Furthermore, the result aligns with the systematic review published in thinking skills and creativity (2025), which concluded that AI-supported learning environments significantly improve critical thinking dispositions when appropriately guided by teachers. However, the literature also cautions that the effectiveness of AI depends on pedagogical integration. Favero et al. (2026) emphasized that AI must be used to complement not replace students' independent reasoning processes. In the context of junior secondary education in South-West Nigeria, this finding suggests that AI-driven instruction can bridge gaps in traditional teaching methods by promoting active learning and intellectual engagement. It enables students to analyze societal issues critically and make informed judgments. Overall, the study confirms that AI-driven instruction is a powerful tool for enhancing critical thinking skills, provided it is effectively integrated into teaching practices with adequate teacher supervision and structured learning activities.

The reserch question two findings indicated that students in the AI-driven instruction group showed significantly higher improvement in civic competence compared to the control group. This suggests that AI has a strong positive influence on students' civic awareness, participation skills, and understanding of societal responsibilities. Civic competence, which encompasses knowledge, attitudes, and engagement in societal issues, is essential in social studies education. AI-driven instruction enhances civic competence by exposing students to real-world scenarios, current events, and interactive simulations that promote active participation. According to Hwang et al. (2025), AI facilitates personalized and context-based learning experiences, enabling students to connect theoretical knowledge with real-life civic issues. This enhances their ability to make informed decisions and participate meaningfully in society. Additionally, Ogunleye et al. (2025) found that AI-powered chatbots and interactive platforms improve students' engagement with civic topics by encouraging dialogue, debate, and critical reflection. Such tools allow students to explore multiple perspectives on governance, human rights, and social responsibilities, thereby strengthening democratic values and participatory skills. However, while AI offers significant benefits, scholars such as Favero et al. (2026) caution that its use must be guided to prevent passive learning. Civic competence requires active participation, and overreliance on AI could limit students' real-world engagement if not properly managed. The findings of this study highlight the importance of integrating AI into Social Studies instruction to make civic education more dynamic and relevant. In the Nigerian context, where civic education plays a crucial role in national development, AI-driven instruction can help nurture responsible, informed, and active citizens. In conclusion, AI-driven instruction significantly enhances civic competence by fostering engagement, critical reflection, and real-world application of knowledge.

The reserch question three findings demonstrated that AI-driven instruction significantly improved students' academic achievement, with the treatment group outperforming the control group by a wide margin. This indicates that AI integration in teaching and learning processes enhances students' understanding, retention, and overall academic performance in social studies. One major reason for this improvement is the personalized learning experience provided by AI. Hwang et al. (2025) explained that AI systems adapt to individual learners' needs, allowing students to learn at their own pace and receive immediate feedback. This tailored approach enhances comprehension and reduces learning difficulties. Moreover, the study supports the findings of Bolarinwa (2026), who reported that AI positively impacts academic development by improving cognitive engagement and providing access to diverse learning resources. AI tools such as intelligent tutoring systems and adaptive quizzes make learning more interactive and engaging, which contributes to better academic outcomes. AI facilitates the understanding of complex concepts through simulations, visualizations, and real-time data analysis. This makes learning more meaningful and accessible to students. The findings suggest that AI-driven instruction can significantly improve academic achievement in Nigerian secondary schools by addressing individual

learning needs and increasing student engagement. However, its effectiveness depends on proper implementation, teacher guidance, and balanced use. Overall, AI-driven instruction is a valuable tool for improving academic performance, provided it is used as a complement to traditional teaching methods.

### Conclusion

This study examined the impact of artificial intelligence–driven instruction on critical thinking, civic competence, and academic achievement of junior secondary school students in social studies in South-West Nigeria. The findings clearly demonstrate that AI-driven instruction has a significant positive effect on all three outcome variables. Firstly, the study established that AI-driven instruction enhances students' critical thinking skills by promoting active engagement, inquiry-based learning, and reflective reasoning. Students exposed to AI tools showed greater ability to analyze, evaluate, and interpret information compared to those taught using traditional methods. Secondly, the study revealed that AI significantly improves civic competence. Students in the treatment group demonstrated better understanding of civic responsibilities, increased awareness of societal issues, and improved participation skills. This indicates that AI can make civic education more interactive and relevant to real-life situations. Furthermore, the study found that AI-driven instruction substantially improves academic achievement. The personalized learning experiences, immediate feedback, and interactive nature of AI tools contributed to better comprehension and retention of knowledge among students. Overall, the results highlight the transformative potential of AI in education, particularly in enhancing learning outcomes in Social Studies. However, the effectiveness of AI depends on its proper integration into teaching practices. Teachers play a crucial role in guiding students' use of AI to ensure meaningful learning and prevent overdependence on technology. In conclusion, AI-driven instruction represents a powerful pedagogical innovation that can significantly improve the quality of education in Nigeria. Its adoption in schools should be encouraged, accompanied by adequate training for teachers and provision of necessary infrastructure.

### Recommendations

1. Educational authorities should incorporate AI-driven instructional tools into the Social Studies curriculum to enhance critical thinking, civic competence, and academic achievement.
2. Teachers should receive continuous professional development on how to effectively integrate AI tools into classroom instruction to maximize learning outcomes.
3. Government and stakeholders should provide adequate technological infrastructure, including internet access and digital devices, to support AI-based learning.
4. Educators should ensure that AI is used as a supportive learning tool rather than a substitute for independent thinking, encouraging active student participation and critical engagement.

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