International Journal of Innovative Research and Scientific Studies, 8(1) 2025, pages: 564-575

IJIRSS
International Journal of Innovative Research & Scientific Studies

ISSN: 2617-6548

URL: www.ijirss.com

Critical thinking and AI: Enhancing history teaching through ChatGPT simulations

Juan Santamaría-Velasco[1], Aracelly Núñez-Naranjo[2*], Ximena Morales-Urrutia[3]

[1]*Facultad de Jurisprudencia y Ciencias Políticas, Carrera de Derecho, Universidad Tecnológica Indoamérica, Ambato-Ecuador.*
[2]*Centro de Investigación en Ciencias Humanas y de la Educación-CICHE, Facultad de Ciencias de la Educación, Carrera de Educación Básica, Universidad Tecnológica Indoamérica, Ambato-Ecuador.*
[3]*Facultad de Contabilidad y Auditoría, Universidad Técnica de Ambato, Ecuador.*

Corresponding author: Aracelly Núñez-Naranjo (*Email: fernandanunez@uti.edu.ec*)

Abstract

This work investigates the incorporation of ChatGPT into history education to enhance critical thinking and promote student engagement. A qualitative research design was utilized in this study. The interactions of 40 students with ChatGPT, which mimicked conversations with Simón Bolívar, were examined. Thematic content analysis was used to assess these interactions. The results demonstrate significant progress in students' critical thinking skills, understanding of history, and overall participation. Students exhibited enhanced analytical capabilities and a deeper comprehension of historical events, particularly related to the concept of sustainable development. The results indicate that ChatGPT serves as a valuable resource for enhancing history education. Through the promotion of critical thinking and involvement, it contributes to the development of creative and inclusive educational settings. This research offers a detailed examination of the educational potential inherent in artificial intelligence, highlighting its capacity to revolutionize conventional history teaching methods and equip learners with the skills necessary to confront global challenges.

Keywords: AI-powered learning environments, Artificial intelligence in education, Critical thinking, Interactive pedagogy.

DOI: 10.53894/ijirss.v8i1.4403
Funding: This study received no specific financial support. The APC was funded by Universidad Tecnológica Indoamérica, Ecuador.
History: Received: 28 November 2024/**Revised:** 29 December 2024/**Accepted:** 13 January 2025/**Published:** 31 January 2025

Competing Interests: The authors declare that they have no competing interests.
Authors' Contributions: All authors contributed equally to the conception and design of the study. All authors have read and agreed to the published version of the manuscript.
Transparency: The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.
Institutional Review Board Statement: The Ethical Committee of the Universidad Tecnológica Indoamérica, Ecuador has granted approval for this study (Ref. No. UTI-VI-008-2024).
Publisher: Innovative Research Publishing

1. Introduction

The contemporary educational paradigm reveals an urgent necessity for the implementation of groundbreaking pedagogical methodologies, a realization that has gained substantial traction in recent discourse [1, 2]. These

methodologies ought to transcend mere engagement, delving deeper into the cognitive processes that foster a more nuanced comprehension of the subject matter presented. This imperative is especially pronounced within disciplines like history, where the intricate tapestry of human experience demands that students cultivate a robust awareness of the multifaceted nature of societal evolution and the legal constructs that have invariably influenced the trajectory of our collective existence [3]. The endeavor to grasp such complexity requires an educational framework that not only prioritizes retention of information but also emphasizes critical thinking and contextual analysis, thereby enriching the academic journey of learners.

The contemporary digital landscape represents a profound transformation in societal structures, intricately weaving itself into the fabric of the economy, culture, and educational paradigms [4]. This evolution poses significant challenges, particularly in maintaining genuine student engagement while simultaneously nurturing the development of critical thinking skills essential for navigating an increasingly complex world [5]. In this context, the advent of sophisticated tools driven by cloud computing, notably artificial intelligence, emerges as a beacon of potential innovation. Specifically, the incorporation of technologies such as ChatGPT within educational frameworks heralds the opening of novel avenues for the instruction of conventional disciplines, thereby reshaping pedagogical approaches to meet the demands of a rapidly evolving digital age [6]. The implications of such integration are far-reaching, suggesting a recalibration of traditional methodologies in favor of more dynamic, interactive learning experiences that resonate with the needs and capabilities of the modern learner.

The integration of cloud computing within educational frameworks emerges as a significant advancement, characterized by its capacity to facilitate immersive dialogues with historical figures [7]. This innovative approach empowers students to engage dynamically with the complexities of historical narratives, fostering a richer and more sophisticated comprehension of the discipline. Ultimately, the incorporation of artificial intelligence into pedagogical practices signifies a transformative opportunity to elevate the educational experience, aligning it with the evolving needs of contemporary society [8].

The exploration of interactive engagement with historically simulated figures through artificial intelligence is a key concern in education, especially in history. This innovative approach aims to redefine traditional learning, encouraging greater student involvement and participation. The investigation's primary objective is to demonstrate how these technological interventions can captivate student interest, changing passive learning into active dialogue. Employing a multifaceted analytical framework, this study explores the impact of AI-driven interactions on student motivation and educational outcomes. It involves a diverse group of participants over a significant period to assess the broader effects of this pedagogical shift. Preliminary findings indicate a notable increase in student engagement, highlighting AI's potential to revitalize educational practices and enhance learning experiences. This research seeks to contribute to discussions on innovative educational strategies, promoting a more immersive and participatory approach that connects with today's students.

The application of artificial intelligence tools, notably ChatGPT, stands as a compelling illustration of modern educational methodologies [9]. Engaging in simulated dialogues with historical figures, such as Simón Bolívar amid the backdrop of Ecuador's quest for independence, presents a distinctive avenue for enriched learning experiences. This innovative technique transcends the conventional role of students as mere recipients of knowledge; rather, it invites them into a dynamic exchange, empowering them to pose inquiries and delve into diverse viewpoints. Such an interactive format fosters a profound engagement with the subject matter, unveiling insights and contexts that often elude more traditional pedagogical approaches. The interplay between technology and education thus cultivates a fertile ground for intellectual exploration, enhancing the overall educational landscape.

This inquiry is based on the belief that immersing learners in an innovative approach can reveal profound comprehension while fostering genuine enthusiasm for the curriculum. Engaging with historically recreated personas powered by artificial intelligence (AI) in cloud computing enhances the educational journey and promotes more lasting knowledge retention. This innovative interaction shifts traditional learning paradigms, encouraging dynamic exchanges that enrich the student experience. The implications of this method suggest transformative potential, redefining educational engagement and intellectual curiosity.

The incorporation of artificial intelligence technologies in education, especially for simulating historical figures in history, reveals new opportunities and presents significant challenges. While prior studies highlight AI's transformative potential in education, there remains a notable lack of research on its effects on enhancing critical thinking skills, especially in history [10].

The integration of artificial intelligence in online learning platforms offers opportunities to improve education through personalized experiences tailored to individual needs and cognitive styles [11, 12]. Focusing on the impact of these technologies on learner engagement and instructional dynamics in critical analysis fields like history. It emphasizes a balanced process, recognizing the benefits while being mindful of ethical concerns. Key considerations include student privacy and autonomy, necessitating dialogue to ensure that artificial intelligence enhances educational outcomes without compromising learner rights. Ultimately, the blend of technology and pedagogy relies on a commitment to educational integrity and fostering environments that support intellectual growth.

The exploration of historical interactions through artificial intelligence is a complex endeavor involving educational, technological, and cognitive dimensions. It emphasizes the dynamic between learners and AI-generated historical figures, aiming to enhance comprehension and analytical skills. The research seeks to clarify how these engagements promote not just factual absorption but also critical thinking. The premise is that dialogues with virtual representations can transform education, fostering a deeper understanding of historical contexts. Utilizing qualitative assessments and participant

reflections, this study aims to reveal the complexities of these interactions, contributing to educational innovation in history.

The exploration of ChatGPT's efficacy in reconstructing historical dialogues in education is a significant inquiry spanning pedagogical, cognitive, and technological aspects. This study aims to clarify the implications of this innovative method on student engagement and critical thinking skills. Using a rigorous methodology, it examines student interactions with the AI interface to uncover their comprehension levels and analytical abilities. The investigation seeks to provide insightful revelations on the pedagogical benefits and transformative potential of AI-driven simulations in modern education. By carefully analyzing student responses and behaviors, the findings will enhance the understanding of how such methodologies can reshape learning experiences and improve the educational landscape. This investigation significantly impacts the knowledge of artificial intelligence in education. It clarifies theoretical constructs and provides practical insights that can alter teaching methods, especially in history.

The exploration of innovative pedagogical frameworks in the history of education merges technology, cognition, and social consciousness. Harnessing the transformative potential of artificial intelligence can redefine student engagement in historical and legal narratives. This manuscript follows a systematic framework. Section 2 examines the literature on artificial intelligence in education and its effects on critical thinking. Section 3 describes the methodologies, including qualitative designs and thematic analysis. Section 4 presents the research findings discussed in Section 5. Finally, Section 6 reflects on the study's implications, limitations, and future research directions.

2. Background

The exploration of educational methodologies is a fundamental concern in academia, as it interweaves social, psychological and technological dimensions that resonate with students and educators. It is innovative for history teaching, leveraging artificial intelligence to redefine student engagement with historical and legal narratives. It aims to facilitate an understanding of the human experience. Its implications extend beyond improving pedagogy; encourages critical thinking, emotional resonance, and a passion for historical research among students. This research seeks to illuminate paths that improve learning experiences and contribute to a more informed and empathetic society.

2.1. AI in Education: Conceptualization and Development of AI

The field of artificial intelligence is a convergence of technologies aimed at replicating human cognitive functions, incorporating capabilities such as logical reasoning, adaptive learning, sensory interpretation and linguistic understanding. Numerous subfields emerge within this domain, particularly machine learning and natural language processing, which have particular relevance to education [8, 13]. Since its inception, the goal of AI has been to not only mirror but surpass human cognitive processes, allowing machines to perform tasks more efficiently. The transformative potential of AI is highlighted, reshaping learning and interaction while challenging our concept of intelligence.

The evolution of artificial intelligence is a complex story tied to technological progress since the 1950s. This field has experienced transformative phases, alternating between intense enthusiasm and periods of critique and stagnation, known as "AI winters" [14]. Today, significant advancements in algorithms, enhanced computational power, and access to vast datasets have revitalized AI, leading to its widespread use in various sectors, particularly education. This integration prompts a reevaluation of teaching methods and the potential for improved learning outcomes in a digital age [15].

The evolution of artificial intelligence is a complex phenomenon that intertwines social, technological, and economic aspects across various sectors [16]. Characterized by cycles of rapid advancement and retreat, known as "AI springs" and "winters," the recent resurgence in AI is driven by innovations in supercomputing and Big Data analytics [17]. These advancements have significantly enhanced AI capabilities and sparked renewed interest in global research. As we navigate this evolving landscape, it's crucial to examine the implications of these changes on current and future technological interactions [15].

The integration of artificial intelligence in education is a complex phenomenon that combines technological advancements with pedagogical needs. This shift is driven by the demand for personalized learning and improved teaching methods. AI’s ability to customize educational experiences to fit individual preferences and cognitive styles marks a significant change in education, making learning more adaptable, inclusive, and effective [1]. As educators and institutions adapt to this new landscape, the impact of AI in creating a personalized and optimized educational experience becomes more relevant, necessitating a close look at its potential and challenges in modern academic settings.

The integration of Artificial Intelligence (AI) into Technology-Enhanced Learning (TEL) in Higher Education marks a significant evolution with various implications for academic institutions and students. This shift raises challenges such as academic integrity, data protection, and future consequences [18]. However, AI offers substantial benefits in education, including the creation of vibrant learning communities through chatbots, automated grading systems, personalized learning methods, and improved plagiarism detection. This complex situation highlights the dual-edged nature of technological progress, balancing opportunities and challenges and urging a reassessment of traditional educational paradigms [19].

2.2. Applications of AI in Education

The digital revolution is fundamentally changing education through innovations, with artificial intelligence (AI) at the forefront. AI enhances the learning experience by enabling adaptive tutoring systems that cater to individual learners' needs [20]. This technology analyzes student interactions, providing resources that engage and challenge them without causing cognitive overload. As a result, it fosters a personalized educational journey that boosts academic efficacy. However, integrating AI into education poses significant advantages and challenges [21]. Benefits include improved accessibility,

tailored learning paths, and insights into student progress, while challenges involve ethical concerns, data privacy, and the need for strong infrastructure to support these systems. Educational institutions must balance the opportunities and obstacles of AI adoption to create an inclusive and effective learning environment.

The integration of Learning Management Systems (LMS) with AI has transformed education by offering analytics on student performance and resource interaction [22]. By analyzing engagement data, these systems identify patterns and predict areas where students need extra help. This allows educators to take timely, targeted actions, significantly improving the educational process.

The integration of AI in education is a transformative frontier encompassing social, pedagogical, and technological aspects [23]. AI can analyze large datasets to extract insights into student engagement and learning dynamics. This exploration examines AI's role in enhancing educational experiences by systematically analyzing learner interactions with digital platforms. A quantitative approach is employed, using advanced analytics to investigate user behavior in various educational contexts. Findings reveal patterns in individual learning preferences and engagement levels, highlighting the need for personalized educational interventions [17]. Disparities in AI-driven solutions' efficacy are noted based on demographic factors, offering crucial insights for educators and policymakers to improve retention and achievement in digital learning.

The integration of interactive simulations and AI-enhanced educational games offers a revolutionary method for exploring complex subjects while developing essential skills. These tools engage students in immersive virtual environments filled with detail and dynamic interactions, going beyond simple information delivery [1]. They foster a deep understanding of content and enhance critical thinking, problem-solving, and informed decision-making. By engaging in these rich simulations, students gain the confidence and insight needed to tackle real-world challenges.

The emergence of AI-driven adaptive learning systems marks a significant transformation in contemporary education, merging social, technological, and pedagogical aspects. These systems are designed to create personalized learning experiences that address the unique needs of every learner. By utilizing extensive data analysis, AI algorithms identify individual strengths and areas for improvement, enabling the development of tailored educational pathways. This approach ensures students access relevant materials at the optimal time, with formats optimized for effectiveness, greatly enhancing their learning potential. Such advancements impact not just academic performance but also broader educational outcomes, fostering a more equitable learning environment [24].

Contemporary educational technologies greatly enhance student motivation and participation by fostering an engaging learning environment [25]. These tools promote exploration and active involvement, allowing learners to confront complex theories firsthand, thus making education captivating and effective. Advances in Artificial Intelligence are reshaping teaching methods, providing resources tailored to individual student profiles and offering analytics for continuous improvement in teaching practices [1, 26]. These innovations enrich education and equip students with the essential skills needed to succeed in a technologically advanced and interconnected world.

2.3. Advantages and Challenges of Implementing AI in Education

The integration of artificial intelligence in education marks a significant shift, influencing teaching and learning dynamics [21]. Central to this change is personalized education, where AI customizes content and pacing to fit individual learners' needs. This approach boosts learning efficacy and increases student engagement, as learners perceive their education as tailored to their goals [27]. Additionally, AI automates routine administrative and evaluative tasks, freeing educators from repetitive duties. This enables them to focus on meaningful interactions and innovative teaching methods, ultimately improving resource management and creating a more effective educational system [28].

Overdependence on AI-driven solutions challenges the intrinsic value of interpersonal engagement in education, risking the learning experience becoming secondary. It's crucial to view technology as a supportive resource, not a replacement for traditional teaching methods, allowing for a seamless integration of innovative tools while preserving essential interactions between learners and instructors. This balance promotes the benefits of AI while maintaining the human aspect of education.

The integration of AI in various sectors is transformative, especially in education, where its implementation is limited yet promising [29]. AI-driven educational systems can personalize learning, foster student connections, and improve access to digital resources, addressing high societal expectations of educational institutions [30]. However, traditional teaching methods often fall short of meeting the needs of a digital-centric society, becoming outdated for digital natives who prefer immediacy and connectivity. Recalibrating educational frameworks is essential to ensure they remain relevant and effective in the evolving learning landscape [31].

The integration AI in education presents challenges that involve ethical, privacy, and pedagogical considerations requiring careful analysis. As AI technologies become more prevalent, collaboration among educators, technology innovators, and policymakers is essential to maximize benefits while reducing risks. This effort should focus on enhancing learning experiences while addressing vital concerns of equity, access, and student data protection. A robust dialogue engaging various viewpoints is necessary to manage the complexities of this transformative process effectively.

2.4. Critical Thinking in Education

2.4.1. Theory of Critical Thinking

The cultivation of critical thinking is essential in education, enhancing students' ability to analyze information, evaluate arguments, and draw sensible conclusions [32, 33]. This skill is crucial for academic success and for tackling

complex challenges in personal and professional life, promoting active participation in civic matters. Fostering these skills impacts society, creating informed individuals who can contribute meaningfully to discussions.

Critical thinking is crucial in education, heavily influenced by Zaytsev [34], who advocated for reflection and inquiry in learning. His ideas have shaped modern teaching methods that prioritize dynamic and interactive practices. Critical thinking does not arise from passive knowledge absorption; it thrives in an engaging environment that encourages inquiry, analytical reasoning, and contemplation.

The evolution of teaching critical thinking presents a complex challenge tied to pedagogical innovation, technology, and modern educational research Gutierrez-Pachas, et al. [35]. This landscape features various instructional strategies like problem-based learning, structured debates, and case analyses, which enhance student engagement and immerse learners in authentic contexts that foster critical thinking development. Formative assessment plays a crucial role, providing ongoing feedback that encourages reflective practices and systematic learning enhancement. The synergy among these methods enriches education and promotes a deeper understanding of critical analysis in real-world situations, equipping students with essential skills for their future.

2.4.2. Promoting Critical Thinking Through Technology

The incorporation of technology, especially artificial intelligence, significantly enhances critical thinking skills among students [36]. This evolution includes innovations like tailored learning platforms and immersive simulations that improve instructional methods beyond traditional paradigms, creating a more learner-centered experience. These advancements increase access to diverse information and cultivate active participation in critical thinking tasks, enhancing engagement and contextual understanding of complex concepts [37]. The transformative potential of these tools reshapes learning dynamics and challenges students to navigate and synthesize knowledge meaningfully.

The ethical integration of AI in education and research presents diverse opportunities. It involves clear pedagogical strategies that enhance analytical skills and understanding of AI applications [38]. This exploration examines AI implementation dynamics and its impact on teaching and research methods, using a positivist approach that emphasizes quantitative measures through surveys and structured data collection. The participants include various education stakeholders, enabling a thorough analysis over time. Findings identify factors impacting AI integration effectiveness, including institutional support, technological access, demographics, and teaching methods. Notable disparities highlight the complex link between technology use and educational outcomes, underscoring the need for targeted interventions to enhance AI efficacy in academic settings. These outcomes necessitate a reassessment of policies related to AI in education and research.

The incorporation of AI through intelligent tutoring systems and simulation-based technologies marks a significant shift in education, greatly impacting skill development [33]. Intelligent tutoring systems tailor challenges and instructional content to suit each learner's needs, providing timely feedback that encourages reflection. Similarly, interactive simulations immerse students in complex scenarios within a safe environment, allowing them to apply theoretical knowledge, test various strategies, and see the immediate results of their actions. These experiences not only deepen comprehension but also spark curiosity, enabling students to ask relevant questions and evaluate solutions more critically.

The integration of artificial intelligence into critical thinking education presents challenges that need careful navigation. Successful use of these technologies relies on a structured pedagogical framework aligned with clear educational goals. Educators must be trained adequately to incorporate these tools into their teaching, improving learning while preserving the essential human connection in education [23]. Ethical concerns, such as privacy and algorithmic biases, also demand thorough examination. A robust analytical framework and regulatory guidelines are crucial to ensure ethical and equitable application of technology in education.

2.4.3. Innovative History Teaching through AI

The incorporation of AI in project-based pedagogy, especially in history, transforms traditional educational methods. This evolution features simulations and interactions with AI-reconstructed historical figures, enhancing engagement and immersive learning. The study analyzes AI integration's implications with educators and learners. Findings indicate improved student participation, comprehension, and a shift toward collaborative learning, highlighting the necessity of technology in understanding historical contexts and preparing learners for a complex world.

The integration of advanced technologies in education is rapidly advancing, featuring AI-driven platforms and immersive simulations that engage students by recreating significant historical events and complex legal scenarios [39]. This active learning enhances understanding by placing students in the midst of challenges faced by historical and legal figures [40]. Machine learning boosts analytical intelligence and decision-making through data-driven insights, while advanced pattern-recognition improves accuracy and reveals important discoveries [41]. However, these innovations present challenges such as ensuring fidelity in simulations, balancing tech engagement with human oversight, and addressing ethical concerns about historical representation. It's essential to prioritize educator guidance while fostering critical thinking among students.

The advent of machine learning technologies marks a pivotal shift in enhancing adaptability and fostering data-driven decision-making within intelligent systems, easing the need for precise programming. A major breakthrough in legal AI has been integrating pattern recognition into machine learning frameworks. This advancement has improved the accuracy and efficiency of these systems, revealing critical insights. Such developments highlight AI's transformative potential, reshaping traditional paradigms and introducing new methodologies for data analysis, ultimately redefining decision-making in complex environments [42].

The integration of artificial intelligence in education presents challenges that go beyond technology, focusing on ethical issues and changing how knowledge is shared. This study explores AI's impact on historical education to promote critical thinking among students. Employing various research methods, it assessed participants over time, revealing varied outcomes linked to teaching strategies that affect engagement and academic success. Sociocultural background differences highlight the connection between technology use and educational equity, stressing the importance of careful educator consideration of AI's complexities to improve knowledge and support informed citizenship.

3. Materials and Methods

This research utilized a qualitative research framework, emphasizing thematic content analysis. The study embraces a qualitative approach aimed at exploring the interactions between students and a ChatGPT programmed to mimic responses from Simón Bolívar. The primary objective is to ascertain how these interactions enhance comprehension of Ecuador's independence and foster critical thinking skills. A categorical analysis was performed, wherein the interactions were scrutinized according to established categories, including levels of critical thinking, historical comprehension, and extent of engagement, in order to assess the educational efficacy of the simulation.

3.1. Population

The investigation encompassed the involvement of 40 students meticulously chosen from a larger cohort of 200, all engaged in an introductory course focused on artificial intelligence and its pedagogical applications. The selection process aimed to create a representative and diverse sample reflective of the broader student population, ensuring that various backgrounds and perspectives were adequately captured. This study was framed within a quantitative methodology, employing surveys and structured interviews as primary data collection tools. The participant pool comprised individuals from different academic disciplines, ages, and socio-economic statuses, thus enhancing the richness of the findings. Preliminary outcomes suggest notable trends in the students' engagement and perceptions of AI's role in education, delineating key factors that may influence their learning experiences.

3.2. Data Collection Instruments

Utilizing a tailored ChatGPT model to simulate responses of Simón Bolívar marks a significant advancement at the intersection of technology and historical scholarship. This initiative was supported by a thorough examination of credible historical sources to ensure the dialogues reflect Bolívar's thoughts and philosophies accurately. An interactive simulation environment was developed within the course framework to facilitate these exchanges and document interactions for further analysis. This initiative enriches the educational experience, offering students a dynamic approach to understanding Bolívar's legacy. Through this methodology, the dialogues and historical contexts are brought to life, fostering appreciation for the foundational ideas that shaped a nation.

3.3. Data Collection

The immersive learning framework in education represents a significant advancement, focusing on interactions between students and an AI model of a historical figure. This approach emphasizes authenticity through validated sources, deepening understanding of historical narratives and exploring influences beyond standard teaching. Findings underscore the transformative power of experiential learning and technology's role in enhancing educational outcomes and participation, stressing the need for digital resource integration.

3.4. Fieldwork

The educational initiative was a curated effort, immersing participants in Simón Bolívar's thoughts on independence. Students were encouraged to ask deeper questions about history, with examples to stimulate critical reflection. Interactions took place anonymously, and every dialogue was recorded for analysis. The goal was to foster an environment for intellectual exploration, allowing participants to engage with historical complexities and revolutionary ideas.

3.5. Data Analysis

The data compilation, specifically the transcriptions from interactions, underwent a thorough thematic content analysis. Open coding allowed the research team to identify core themes and intricate subthemes, linked through axial coding to relevant theoretical constructs on critical thinking and historical pedagogy. With informed consent, ethical research standards were followed, maintaining confidentiality and anonymity. The study emphasizes the need for greater sample diversity and deeper exploration of human-AI interaction in educational contexts for future research, enhancing the understanding of the phenomena.

4. Results

The exploration of ChatGPT as an educational tool in historical pedagogy presents structured findings. A focus group of 40 students, selected from 200, was analyzed to provide insightful data. The examination clearly distinguishes between the narrative and the data shown in tables and figures. This discourse aims to highlight key observations while maintaining an objective and descriptive methodology.

4.1. Student-AI Interaction

The phenomenon of student engagement with artificial intelligence poses a complex challenge in education and human-computer interaction. This study analyzes these engagements, surveying 200 students and selecting 40 for in-depth study. Interactions within this group produced 1,200 unique exchanges, from factual inquiries to complex discussions. Findings highlight varied levels of cognitive demand on students navigating AI interactions.

4.2. Topics Discussed

The interactions revealed a wide thematic range, focusing on Bolívar's independence campaigns, political ideologies, and significant influence on South America's sociopolitical transformation. Additionally, military tactics were compared with those of other key historical figures.

4.3. Depth of Analysis

The exploration of critical analysis in education is vital, especially regarding the ethical considerations of leadership and moral dilemmas in decision-making during conflicts. These discussions highlight students' active participation in reflective and analytical thinking, evident in their classroom contributions. Valuable insights emerge, avoiding redundant visual depictions. Such dialogues promote a profound understanding of the complexities of leadership dynamics in difficult contexts.

Table 1.
Distribution of frequencies in axial categories of critical analysis.

Axial categories	Frequency
Reflection on interaction with AI	12
Analysis of motivations and objectives	8
Understanding and evaluation of challenges	6
Evaluation of strategies and decisions	5
Assessment of consequences and results	3
Interpretation of political and social views	4
Application and historical implications	1
Perspectives on freedom and autonomy	1

Note: Axial categories identified in the analysis of student interactions with AI.

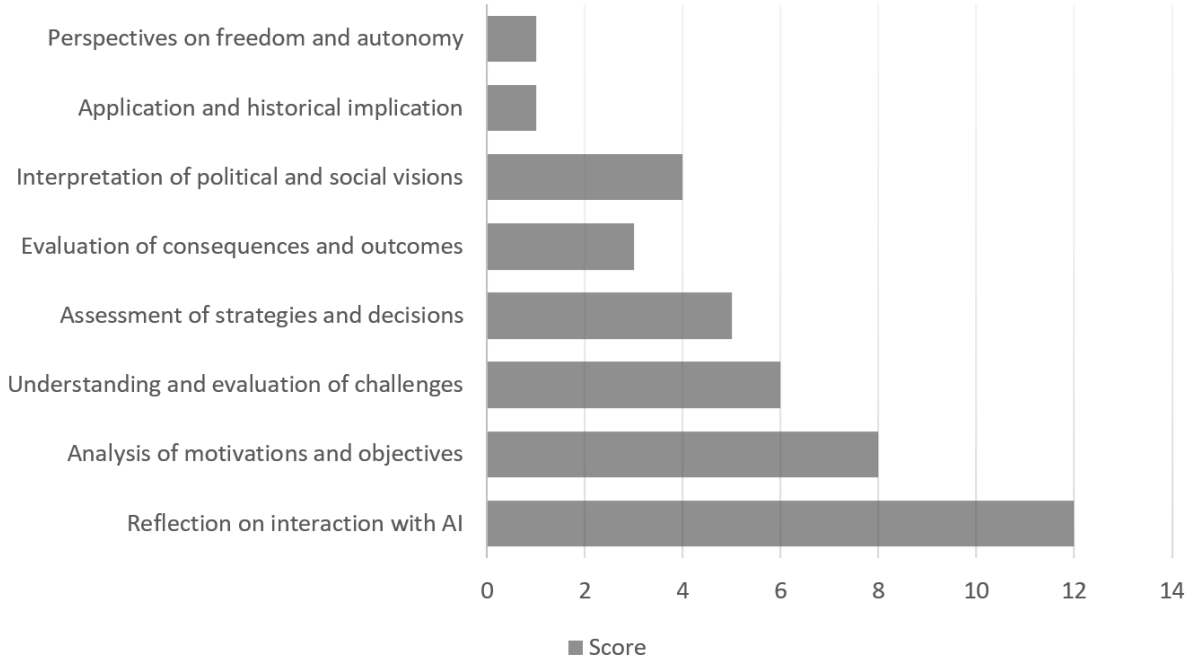

Figure 1.
Distribution of frequencies in axial categories.

Table 1 and Figure 1 present a summary of the frequencies of the axial categories, derived from axial coding. The category "Reflection on Interaction with AI" stands out, with a total of 12 mentions. This finding indicates that students focused their attention on the direct interaction with the AI, reflecting on its educational and personal implications.

Table 2.
Subcategories and frequencies of analysis in student interactions with AI.

Axial category	Subcategories	Frequency
Reflection on interaction with AI	Emotional impact	5
	Use of AI as an educational resource	4
	Perceptions of AI	3
Analysis of motivations and objectives	Reasons for independence	4
	Ideological influences	2
	Bolívar's personal aspirations	2
Understanding and evaluating challenges	Political and military obstacles	3
	Geographical and logistical challenges	2
	Internal difficulties and resistance	1
Assessment of strategies and decisions	Military tactics	2
	Political decisions	2
	Alliances and diplomacy	1
Evaluation of consequences and results	Long-term effects	2
	Impact on society	1
Interpretation of political and social visions	Concepts of freedom and justice	2
	Visions of unity and collaboration	2
Application and historical implications	Historical relevance	1
Perspectives on freedom and autonomy	Self-determination	1

Note: Breakdown of subcategories within the main axial categories.

Table 2 breaks down the subcategories from axial coding, with particular emphasis on "Reflection on Interaction with AI". This category includes "Emotional Impact", the educational use of AI, and perceptions of AI, with emotional impact being the most frequently mentioned. This suggests a significant emotional connection between students and the AI, indicating deep engagement and personal reflection.

In "Analysis of Motivations and Objectives", the focus is on the reasons behind historical events and key figures, especially Bolívar's motivations. "Understanding and Evaluating Challenges" addresses obstacles faced by Bolívar, including political, military, geographical, and logistical factors.

"Assessment of Strategies and Decisions" highlights the complexity of the independence struggle, analyzing military tactics, political decisions, and diplomacy. Other categories focus on the long-term consequences of independence, political visions, and the importance of concepts such as freedom and self-determination.

Table 3.
Subcategories and key conclusions from the analysis of student interactions with AI.

Axial category	Subcategories	Key conclusions
Reflection on interaction with AI	• Emotional impact • Use of AI as an educational resource • Perceptions of AI	Students experienced a significant emotional impact and valued AI as an innovative educational resource, although with varied perceptions regarding its effectiveness and authenticity
Analysis of motivations and objectives	• Reasons for independence • Ideological influences • Bolívar's personal aspirations	Independence was motivated by a desire for freedom and justice, influenced by Enlightenment ideals and Bolívar's personal aspirations to unify and liberate South America.
Understanding and evaluating challenges	• Political and military obstacles • Geographical and logistical challenges • Internal difficulties and resistance	Students acknowledged a variety of challenges in the struggle for independence, from colonial resistance to logistical issues and internal dissent.
Assessment of strategies and decisions	• Military tactics • Political decisions • Alliances and diplomacy	The importance of military tactics, strategic political decisions, and the use of diplomacy were emphasized as crucial factors for the success of independence.
Evaluation of consequences and results	• Long-term effects • Impact on society	The consequences of independence were mostly viewed as positive, with significant impacts on the social and political structure of the countries involved.
Interpretation of political and social visions	• Concepts of freedom and justice • Visions of unity and collaboration	Bolívar's political vision centered on freedom, justice, and regional unity, values that resonated with students in their analysis.

Axial category	Subcategories	Key conclusions
Historical application and implications	• Historical relevance	The historical relevance of Bolívar and South American independence was a recurring theme, highlighting its importance in shaping current nations.
Perspectives on freedom and autonomy	• Self-determination	Self-determination was a central theme, reflecting the importance of freedom and the capacity for self-government as legacies of the independence struggle

Note: Key subcategories alongside the main conclusions.

The Table 3 summarizes the key conclusions, emphasizing "Reflection on Interaction with AI" and its emotional impact, the value of AI as an educational tool, and the varied perceptions of its authenticity.

The analysis of motivations highlights students' understanding of the complexities behind independence, including the desire for freedom, ideological influences, and Bolívar's ambitions to unify South America. This demonstrates the students' ability to relate historical facts to broader ideological frameworks.

The evaluation of challenges and strategies underscores the recognition of the obstacles Bolívar faced and the appreciation for the tactics employed, reflecting a critical analysis of the decisions that drove the independence movements.

The contemplation of outcomes and ideological perspectives reveals the enduring repercussions of autonomy and Bolívar's principles in shaping contemporary South American states. The discourse on historical ramifications and liberation emphasizes the ongoing relevance of self-governance inherited from the quest for independence, highlighting the learners' ability to connect history with current realities and the lasting importance of these foundational values.

4.4. Student Engagement

The focus group showed significant intellectual engagement, averaging 30 interactions per participant. Reflective comments showcased a positive educational experience, highlighting ChatGPT's ability to foster interactive discussions on history. Findings are presented clearly, capturing students' sentiments while preserving the integrity of the group experience. The data reflects a deep understanding of dynamic student engagement and the transformative role of technology in education.

4.5. Critical Thinking

Thematic analysis indicated notable enhancements in critical thinking skills, especially in relation to the assessment of ethical dilemmas and historical contexts.

5. Discussion

The research conducted by Popenici and Kerr [43] and Fernández, et al. [44] investigates the growing incorporation of AI within the realm of higher education, specifically in teaching and learning. The authors analyze the influence of emerging technologies on student learning experiences and the evolution of teaching methods within institutions, emphasizing the transformative potential of AI on governance structures and the organizational framework of higher education establishments. This study aligns with the broader theme of AI applications in education and their possible effects on university management and student support systems. However, it differentiates itself by specifically examining the implementation of ChatGPT to enhance critical thinking in history instruction, offering a comprehensive analysis of student-AI interactions within a defined educational setting. While Popenici and Kerr [43] offers a broad examination of the potential effects of artificial intelligence, this study narrows its focus to a specific application, evaluating how a particular AI tool can improve the teaching of history and foster greater involvement among students.

The article by Shahid, et al. [42] focuses on infusing critical thinking skills into an artificial intelligence course, emphasizing the importance of developing analytical and reflective skills in computer science students. By introducing skills like part-whole analysis and comparison and contrast, Krishna [45] aims to improve students' ability to evaluate and understand AI concepts. This approach aligns with the goal of fostering critical thinking. However, this study distinguishes itself by applying an AI tool as a means to achieve this goal in the field of history, rather than focusing on teaching critical thinking skills within the context of an AI course. Likewise [9, 38] demonstrate how critical thinking skills can be integrated into AI teaching. In contrast, this study explores how AI itself can be a tool to promote critical thinking in a different disciplinary domain. From a practical perspective, this work highlights the value of AI as a resource for revitalizing historical pedagogy, suggesting that tools like ChatGPT can be key to designing more dynamic and engaging educational experiences. Theoretically, it supports the idea that AI technology constitutes an invaluable pedagogical resource for promoting advanced cognitive abilities in educational contexts.

However, this study is not without limitations, such as its focus on a geographically restricted sample centered on Ecuador's history, which may limit the applicability of its conclusions to other educational and cultural contexts. Subsequent research endeavors could enhance understanding by engaging in a more extensive examination that incorporates a variety of historical and cultural contexts, thus assessing the efficacy of ChatGPT across a broader spectrum of educational scenarios. Furthermore, it would be beneficial to explore the influence of ChatGPT implementation within student cohorts that possess diverse demographic characteristics.

This research builds upon the foundational studies that explore the role of artificial intelligence in education, specifically enhancing the discourse by concentrating on the development of critical thinking skills within the realm of

history. In contrast to earlier investigations, this analysis offers an in-depth examination of the interactions between students and AI within a clearly defined academic discipline.

6. Conclusions

This research provides evidence of the significant role that integrating ChatGPT into historical education can play. It highlights the tool's capacity to enhance students' critical thinking skills while simultaneously promoting greater levels of engagement and participation. By interacting with simulated figures from history, students demonstrated marked advancements in their analytical abilities and reflective thinking regarding historical events. The observed enhancements in these cognitive skills indicate that artificial intelligence resources such as ChatGPT can greatly influence students' intellectual growth, especially in intricate domains such as historical analysis.

The research offers a comprehensive analysis of ChatGPT's role in history education, showcasing its ability to enhance critical thinking and boost student engagement. Findings support the idea that ChatGPT serves as an effective instructional tool, improving students' understanding of historical content while promoting their active participation in learning. The study emphasizes ChatGPT's potential to transform history teaching by creating an educational environment that goes beyond simple information transmission. This method encourages a deeper analysis of historical narratives, nurtures empathy, and strengthens connections with the subject. Such changes in teaching practices may significantly alter how students engage with history and tackle complex scenarios.

This research emphasizes the importance of integrating advanced technologies like ChatGPT into education. The aim is to improve history instruction and prepare students to address complex challenges with a critical mindset. Educators must adopt these innovative tools to create an interactive and effective learning environment that meets the demands of today's technological landscape. This integration not only boosts educational outcomes but also fosters essential cognitive skills for developing future leaders and responsible citizens in the 21st century

6.1. Implications

This study highlights the transformative role of AI in fostering critical thinking and engagement in history education.

6.2. Limitations

The sample size was geographically limited, focusing on Ecuador's history. Future research should explore diverse historical and cultural contexts.

6.3. Future Research

Broader studies are needed to evaluate the impact of AI tools like ChatGPT in varying educational settings and demographic profiles.

References

[1] A. Núñez-Naranjo, F. C. Cumbicus, and J. M. Ocaña, "TIC as a didactic tool for the development of reading comprehension," presented at the International Conference on Management, Tourism and Technologies Cham: Springer Nature Switzerland. pp. 144-154, 2023.

[2] N. S. Alhazzani, "Enhancing mathematics teachers' pedagogical skills by using ChatGPT," *International Journal of Innovative Research and Scientific Studies*, vol. 7, no. 4, pp. 1614-1626, 2024. https://doi.org/10.53894/ijirss.v7i4.3460

[3] K. R. Munasi, "Evaluating the Integration of Education for Sustainable Development in the Life Sciences Curriculum: A Case Study of Grade 11 Teachers in Vhembe East District," *Sustainability*, vol. 16, no. 24, p. 10918, 2024. https://doi.org/10.3390/su162410918

[4] A. Zhang, Y. Gong, Q. Chen, X. Jin, Y. Mu, and Y. Lu, "Driving innovation and sustainable development in cultural heritage education through digital transformation: The Role of interactive technologies," *Sustainability*, vol. 17, no. 1, p. 314, 2025. https://doi.org/10.3390/su17010314

[5] A. Chang and J. O. Nkansah, "Literacy for sustainable education: A premise of pedagogical inclusiveness and multilingualism in higher education," *Sustainability*, vol. 16, no. 24, p. 10943, 2024. https://doi.org/10.3390/su162410943

[6] P. A. Quezada-Sarmiento and C. Suárez-Guerrero, "Cloud computing in the training process in Web programming," *Revista Ibérica de Sistemas e Tecnologias de Informação,(E42)*, pp. 10-19, 2021.

[7] R. L. Payton, "Awareness, education, and adoption of cloud computing for academic research," *ACM Inroads*, vol. 15, no. 4, pp. 82-91, 2024. https://doi.org/10.1145/3688397

[8] A. Núñez-Naranjo and A. Chancusig-Toapanta, "Technological tools as a trend in secondary education in times of COVID-19: Theoretical review," *RISTI - Revista Iberica de Sistemas e Tecnologias de Informacao*, vol. 2022, no. E50, pp. 142–154, 2022.

[9] Ö. N. Punar and Y. G. Ekşi, "Cultivating writing skills: The role of ChatGPT as a learning assistant—a case study," *Smart Learning Environments*, vol. 11, no. 1, p. 10, 2024. https://doi.org/10.1186/s40561-024-00296-8

[10] İ. Kandemir and E. Akdemir, "Ensuring sustainability in preschool education in rural areas during the pandemic lockdown period: Teachers' experiences," *Sustainability*, vol. 17, no. 1, p. 352, 2025. https://doi.org/10.3390/su17010352

[11] K. Seo, J. Tang, I. Roll, S. Fels, and D. Yoon, "The impact of artificial intelligence on learner–instructor interaction in online learning," *International Journal of Educational Technology in Higher Education*, vol. 18, pp. 1-23, 2021. https://doi.org/10.1186/s41239-021-00292-9

[12] S. Ghory and H. Ghafory, "The impact of modern technology in the teaching and learning process," *International Journal of Innovative Research and Scientific Studies*, vol. 4, no. 3, pp. 168-173, 2021. https://doi.org/10.53894/ijirss.v4i3.73

[13] A. Kumar, P. K. Meena, D. Panda, and M. Sangeetha, "Chatbot in python," *International Research Journal of Engineering and Technology*, vol. 6, no. 11, pp. 2395-0056, 2019.

[14] V. K. Quy, B. T. Thanh, A. Chehri, D. M. Linh, and D. A. Tuan, "AI and digital transformation in higher education: Vision and approach of a specific university in Vietnam," *Sustainability*, vol. 15, no. 14, p. 11093, 2023. https://doi.org/10.3390/su151411093

[15] A. Núñez-Naranjo, J. Sinailin-Peralta, and E. Morales-Urrutia, "Gamification: From motivation and challenges to improving academic performance in learning mathematics," in *International Conference on Management, Tourism and Technologies. https://doi.org/10.1007/978-3-031-44131-8_11*, 2023: Springer, pp. 106-113.

[16] Y. Duan, J. S. Edwards, and Y. K. Dwivedi, "Artificial intelligence for decision making in the era of Big Data–evolution, challenges and research agenda," *International Journal of Information Management*, vol. 48, pp. 63-71, 2019. https://doi.org/10.1016/j.ijinfomgt.2019.01.021

[17] H. Wang, "Theoretical model and practical pathway for digital transformation of classroom teaching in health education using big data technology," *Engineering Proceedings*, vol. 74, no. 1, p. 79, 2024. https://doi.org/10.3390/engproc2024074079

[18] E. Palmer *et al.*, "Findings from a survey looking at attitudes towards AI and its use in teaching, learning and research," *ASCILITE Publications*, 2023. https://doi.org/10.14742/apubs.2023.537

[19] A. Núñez-Naranjo, M. Castillo-Bustos, S. Parra-Real, and A. Yépez-Moreno, "Teaching leadership and pedagogical performance of the teaching staff," *Journal of Educational and Social Research*, vol. 14, no. 5, p. 306, 2024. https://doi.org/10.36941/jesr-2024-0140

[20] S. Syahrizal, F. Yasmi, and T. Mary, "AI-enhanced teaching materials for education: A shift towards digitalization," *International Journal of Religion*, vol. 5, no. 1, pp. 203-217, 2024. https://doi.org/10.61707/j6sa1w36

[21] E. Morales-Urrutia, J. Ocaña, H. Yánez Rueda, and A. Naranjo, "Methodological innovation for the teaching of TIC in Higher Education," *Iberian Journal of Information Systems and Technologies*, pp. 507–517, 2021.

[22] A. F. Núñez-Naranjo and J. Mora-Rosales, "Technological pedagogical strategies in the improvement of basic functions and management of mathematical operations," *Journal of Ecohumanism*, vol. 3, no. 5, pp. 1322-1335, 2024. https://doi.org/10.62754/joe.v3i5.3970

[23] M. Jian, "Personalized learning through AI," *Advances in Engineering Innovation*, vol. 5, no. 1, pp. 16–19, 2023. https://doi.org/10.54254/2977-3903/5/2023039

[24] A. Akavova, Z. Temirkhanova, and Z. Lorsanova, "Adaptive learning and artificial intelligence in the educational space," presented at the E3S Web of Conferences, EDP Sciences, 2023.

[25] A. Patiño, M. S. Ramírez-Montoya, and M. Buenestado-Fernández, "Active learning and education 4.0 for complex thinking training: Analysis of two case studies in open education," *Smart Learning Environments*, vol. 10, no. 1, pp. 1-8, 2023. https://doi.org/10.1186/s40561-023-00229-x.

[26] M. Kamruzzaman *et al.*, "AI-and IoT-assisted sustainable education systems during pandemics, such as COVID-19, for smart cities," *Sustainability*, vol. 15, no. 10, p. 8354, 2023. https://doi.org/10.3390/su15108354

[27] C. Wang, L. Tinsley, and B. Honarvar Shakibaei Asli, "Development of a virtual environment for rapid generation of synthetic training images for artificial intelligence object recognition," *Electronics*, vol. 13, no. 23, p. 4740, 2024. https://doi.org/10.3390/electronics13234740

[28] D. Oseda, R. K. Mendivel Gerónimo, J. M. Arias Huánuco, and A. Sánchez Castro, "Cooperative learning for geometric notions in kids of 5-years-old in kindergarten," *Educator's Horizon Journal*, vol. 42, no. 2, 2023. https://doi.org/10.21831/cp.v42i2.47055

[29] B. Woolf, "AI grand challenges for education," *AI Magazine*, vol. 34, no. 4, pp. 66–84, 2013. https://doi.org/10.1609/aimag.v34i4.2490

[30] A. Núñez-Naranjo, S. E. Chimarro Reinoso, and E. Morales-Urrutia, "Improving English language skills with a technological approach in teaching," presented at the International Conference on Information Technology & Systems, Cham: Springer Nature Switzerland, 2024.

[31] G. Romero-López, J. Guaña-Moya, K. Pinos-Romero, E. Fernández-Sánchez, and Y. A. Arteaga-Alcívar, "Digital natives and learning models," *Knowledge Hub*, vol. 7, no. 3, pp. 653-668, 2022. https://doi.org/10.23857/pc.v7i3.3754

[32] N. Imjai, T. Yordudom, Z. Yaacob, N. H. M. Saad, and S. Aujirapongpan, "Impact of AI literacy and adaptability on financial analyst skills among prospective Thai accountants: The role of critical thinking," *Technological Forecasting and Social Change*, vol. 210, p. 123889, 2025. https://doi.org/10.1016/j.techfore.2024.123889

[33] A. Rahmat, "Intellectual capital and knowledge management in higher education: Concept, implementation, and barriers," *Al-Ishlah: Jurnal Pendidikan*, vol. 14, no. 1, pp. 561-570, 2022. https://doi.org/10.35445/alishlah.v14i1.1952

[34] A. V. Zaytsev, "'Critical thinking' in the context of John Dewey's philosophy of education," *Vestn. Kostroma State Univ. Ser. Pedagog. Psychol. Sociokinetics*, vol. 3, pp. 222–225, 2019. https://doi.org/10.34216/2073-1426-2019-25-3-222-225

[35] D. A. Gutierrez-Pachas, G. Garcia-Zanabria, E. Cuadros-Vargas, G. Camara-Chavez, and E. Gomez-Nieto, "Supporting decision-making process on higher education dropout by analyzing academic, socioeconomic, and equity factors through machine learning and survival analysis methods in the Latin American context," *Education Sciences*, vol. 13, no. 2, p. 154, 2023. https://doi.org/10.3390/educsci13020154

[36] L. M. P. Rejas and C. R. Cisterna, "Critical thinking skills and teacher leadership: proposal with a gender perspective for teacher education," *Revista Venezolana de Gerencia*, vol. 28, no. 104, pp. 1667-1684, 2023. https://doi.org/10.52080/rvgluz.28.104.17.

[37] A. Tick, J. Beke, and J. Füstös, "Rocking up digital educational methodology in higher education-Is education 4.0 here?," *Journal of Higher Education Theory & Practice*, vol. 23, no. 15, 2023. https://doi.org/10.33423/jhetp.v23i15.6408.

[38] M. A. Rusandi, Ahman, I. Saripah, D. Y. Khairun, and Mutmainnah, "No worries with ChatGPT: Building bridges between artificial intelligence and education with critical thinking soft skills," *Journal of Public Health*, vol. 45, no. 3, pp. e602-e603, 2023. https://doi.org/10.1093/pubmed/fdad049.

[39] W. Zheng, "Intelligent e-learning design for art courses based on adaptive learning algorithms and artificial intelligence," *Entertainment Computing*, vol. 50, p. 100713, 2024. https://doi.org/10.1016/j.entcom.2024.100713.

[40] I. Gligorea, M. Cioca, R. Oancea, A.-T. Gorski, H. Gorski, and P. Tudorache, "Adaptive learning using artificial intelligence in e-learning: A literature review," *Education Sciences*, vol. 13, no. 12, p. 1216, 2023. https://doi.org/10.3390/educsci13121216.

[41] A. Namoun *et al.*, "Service selection using an ensemble meta-learning classifier for students with disabilities," *Multimodal Technologies and Interaction*, vol. 7, no. 5, p. 42, 2023. https://doi.org/10.3390/mti7050042

[42] A. Shahid, G. M. Qureshi, and F. Chaudhary, "Transforming legal practice: The role of AI in modern law," *Journal of Strategic Policy and Global Affairs*, vol. 4, no. 01, 2023. https://doi.org/10.58669/jspga.v04.i01.04.

[43] S. A. Popenici and S. Kerr, "Exploring the impact of artificial intelligence on teaching and learning in higher education," *Research and Practice in Technology Enhanced Learning*, vol. 12, no. 1, p. 22, 2017. https://doi.org/10.1186/s41039-017-0062-8.

[44] G. M. C. Fernández, N. C. R. Vallejo, and C. T. Moncayo, "Multiple intelligences and the development of reading skills," *Alfa Publicaciones*, vol. 4, no. 4, pp. 29-47, 2022. https://doi.org/10.33262/ap.v4i4.283.

[45] R. M. Krishna, "Infusing critical thinking skills into content of AI course," *ACM SIGCSE Bull*, vol. 37, no. 3, pp. 173-177, 2005. https://doi.org/10.1145/1151954.1067494