International Academic Institute for Science and Technology

International Academic Journal of Science and Engineering
Vol. 13, No. 1, 2026, pp. 140-147.

ISSN 2454-3896

International Academic Journal of Science and Engineering

www.iaiest.com

Developing Critical Algorithmic Literacy Through the Analysis of Historical Revisionism in Generative Artificial Intelligence Outputs

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Abstract

GenAI technology is broadly used in practice within education, science, and information distribution in general, although occasionally GenAI systems have factual errors, unsupported claims, omissions, biases, and distorted representations of history. The present research paper emphasizes the importance of the critical algorithmic literacy skill for Uzbek university students regarding the problem of historical revisionism in GenAI products. It should be noted that within this paper, the quasi-experimental method was chosen with the usage of the experimental and control groups. While students participating in the experimental group were trained in developing their skills to be critically literate towards algorithms in terms of verifying the truthfulness of claims, comparing sources, identifying bias, understanding the context, and evaluating the ethical considerations, the control group studied digital literacy in general. In addition, a set of 50 historical prompts regarding the history of Uzbekistan, Central Asia, and the world was created, resulting in 150 GenAI-generated narratives analyzed using such indicators as factual inaccuracy, omission, unsubstantiated assertion, narrative falsification, weak basis in sources, and cultural re-framing. According to the results, the experimental group progressed from 52.4% to 84.7%, while the control group increased its performance scores from 51.8% to 63.2%. As for indicator-based scores, a high improvement in skills to verify factual information (54.1% vs. 86.5%) and identify biases in the presented information (50.8% vs. 83.9%) was demonstrated. This study indicates that analysis of outputs generated by GenAI may aid learners in transitioning from passive AI utilization to critical judgment and ethical usage of AI. The suggested model is applicable for AI-supported education in Uzbekistan due to cultural sensitivity toward the examination of historical facts.

DOI: 10.71086/IAJSE/V13I1/IAJSE1315
Received: 27 December 2025/Revised: 21 January 2026/Accepted: 18 February 2026/Published: 30 March 2026

Keywords: Generative Artificial Intelligence, Critical Algorithmic Literacy, Historical Revisionism, AI Bias Detection, Factual Verification, Uzbek Higher Education, Digital Critical Thinking.

Introduction

Generative AI is one of the most critical technologies in education, research, and knowledge creation today. Today, these AI-based applications have become prevalent in preparing academic summarizations, generating explanations, aiding educational processes, translation purposes, and explaining concepts to students. Generative AI is becoming useful in higher education as a means for accessing information instantly and facilitating personalized, self-guided, and research-led learning (Uvarajan, 2025). While the use of generative AI technology offers several benefits, it poses some risks for the accuracy, neutrality, and reliability of the knowledge produced by these machines (Karthika, 2026; Rimada et al., 2025). Because AI-based tools rely on pattern matching within data sets, the information created could occasionally be incorrect, inaccurate, simplistic, lacking in context, or biased. The problem could become particularly concerning when using generative AI tools for explaining historical incidents, political ideologies, cultures, and national stories because knowledge about history must be accurate, sourced correctly, understood, and interpreted properly.

One major concern is the possibility of historical revisionism in AI-generated outputs. Historical revisionism in this context refers to the distortion, selective presentation, omission, or cultural reframing of historical events in a way that changes public understanding of the past. The use of generative AI could end up oversimplifying complex historical events, downplaying the importance of local stakeholders, neglecting regional perspectives, or promoting skewed versions of history by not striking a proper balance between various accounts. Such content could appear authentic to students given that they tend to be composed fluently and confidently. This will require the capability on the learner's part to interrogate and critique the same (Krishnamoorthy, 2026). Therefore, critical algorithmic literacy has become essential in modern higher education. It enables students to understand how AI systems generate information, recognize bias and misinformation, compare AI outputs with reliable sources, and evaluate the social and cultural implications of algorithmic knowledge production.

Digital educational technologies and education through AI are rapidly gaining relevance in Uzbekistan with respect to the increasing use of technological teaching methods by universities. It is essential for university students not just to be able to work with AI software but also to be able to critically analyze the reliability of AI-produced information (Jagadhabi et al., 2025). In particular, this issue is highly topical regarding those disciplines that are associated with history, culture, identity, and socio-economic development, since biased representation of information may distort the perception of the studied subject. Thus, the cultivation of algorithmic literacy in Uzbekistani university students can promote not only responsible use of AI technologies and digital literacy but also active reflection regarding historical information. Hence, the aim of this study is to create and evaluate the proposed critical algorithmic literacy framework in terms of identifying historical revisionism produced through generative AI.

Objectives of the Study

1. The creation of a critical algorithmic literacy framework designed to enable university students to critically analyze revisionism, distortion of facts, omission, and biases within AI-generated outputs.
2. The testing of the ability of Uzbek university students to detect inaccuracies, biases, oversimplification, or cultural recontextualization of history within AI-generated outputs.
3. The assessment of the impact of the developed framework on the improvement of critical thinking and source verification abilities of university students in utilizing AI for academic purposes.

This paper adopts a structured approach. In Section I, the introduction highlights the application of generative artificial intelligence in education, followed by the problem of historical revisionism, misinformation, and the biased perception of history that can be created due to the application of artificial intelligence-generated text. Section II offers an overview of the literature on GenAI literacy, AI biases, misinformation, historical information, and digital critical thinking. Section III provides information about the methodological approach adopted in the present study involving quasi-experimentation, identification of experimental and control groups, pre-test/post-test process, and rubric scoring guidelines. Section IV provides information on the data set employed in experiments involving 50 historical prompts and 150 GenAI outputs. Section V describes the results and analysis obtained through the experiment, in which improvement in performance was observed by the experimental group, increasing from 52.4% to 84.7%. Section VI

shows the discussion and recommendations. In Section VII, conclusions are drawn with regard to the importance of responsible AI utilization, teacher intervention, and GenAI literacy among Uzbek college students.

Related Work

Generative artificial intelligence is an emerging topic in education due to its capability to produce explanations, summaries, essays, stories from history, and research-based answers. Current research points out the educational potential of GenAI in supporting learning, fostering creativity, designing assessments, and producing knowledge, but it also notes the risk of producing incorrect or misleading information confidently. In her paper, Serrano, (2026) elaborates on the importance of GenAI literacy skills for social studies educators and defines the kinds of GenAI mistakes related to epistemology. In his paper, Lim, (2025) asserts that the role of history education should be reconsidered due to increasing reliance on artificial intelligence-produced explanations about past events. Both authors emphasize the role of GenAI as a knowledge producer that could mislead people about what constitutes the truth and proper evidence.

In academia, too, algorithmic literacy is gaining increasing importance. For instance, Hershkovitz et al., (2025) focused on task-oriented GenAI literacy and suggested that there is a need for skills that allow framing, validating, and applying AI-generated output responsibly. Similarly, Bridges et al., (2025) stressed the significance of critical AI literacy in library and information science education. They emphasized that there is a need for teaching learners about the concepts of AI-generated knowledge, sources, and information validity. Additionally, Vendrell & Johnston, (2026) contended that it is possible to use generative AI to develop critical thinking abilities among learners, provided the right approach and design principles are used.

A few authors have analyzed the connection between generative AI and bias, misinformation, and epistemic authority. Cooper et al., (2024) were concerned about the status of generative AI as an epistemic authority within universities, as AI output is used uncritically and without verification of sources. Dierickx et al., (2026) looked at fact-checking as an epistemological tool in times of GenAI and showed that the definition of "fact" changes in light of the fact that the information originates from probabilistic processes. Machin-Mastromatteo, (2025) also analyzed some ethical and scientific issues related to generative AI. Finally, Gopal et al., (2025) described how GenAI is changing research methods and the formation of knowledge.

The problem of AI bias has been intensely considered in the current research literature. In particular, Roe et al., (2025) have described a method for using metaphors in the learning process to develop critical AI literacy and to enable learners to comprehend AI biases. The research by De Roock, (2024) considers topics such as generative AI, writing, and linguistic white supremacy, suggesting that AI can reproduce dominant linguistic and cultural hierarchies through its output. Badawy, (2025) explores the issues of algorithmic sovereignty and democratic resilience, thereby pointing out other governance problems related to generative AI. Moreover, Ezeji & Uwizeyimana, (2025) have considered the topic of generative AI in relation to governance, political knowledge, elections, and democracy.

Moreover, historical scholarship and digital history research have begun exploring the impact of artificial intelligence on history. Spina, (2026) highlighted the transition from digitization to computation in historical scholarship and how AI can transform the processes of archiving, evidencing, and interpreting historical facts. In her work, Washburn, (2025) analyzed AI in history classes and found that new approaches to assessing learners were required for evaluating the way in which the use of artificial intelligence was affecting learners' interaction with the subject. Similarly, Abdipour, (2026) proposed that history education should be geared towards encouraging critical thinking towards the narratives created using AI. Such works are important to historical revisionism because AI could create simplified versions of history, ignore marginalized histories, or frame history in terms of dominant data.

Critical literacy and digital critical thinking play an essential role as a theoretical basis of the study. In a posthuman world, Leander & Burriss, (2020) discussed critical literacy, which is marked by the convergence of human reading and texts created using machines. Aquino, (2026) related Freire's theory of critical pedagogy to the time of artificial intelligence and maintained that education should prepare students to be critical towards power, knowledge, and technology. Previous study demonstrated that GenAI-based pedagogy promotes greater creativity, critical thinking, and ethical reasoning when combined with guided instruction (Rana et al., 2025). Colby, (2025) talked about writing pedagogy using generative AI, emphasizing the necessity of reflective engagement with it.

While previous research works have explored issues such as GenAI literacy, AI hallucinations, algorithmic biases, misinformation, epistemological authority, and digital critical thinking, few researchers have considered the topic of historical revisionism within the context of literacy problems. While much of the current research centers around AI literacy and ethics or fact-checking in general, not many empirical studies have attempted to develop educational

programs to help learners identify the distortion of historical facts through the use of GenAI. Specifically, there is an absence of an educational approach that will help students learn how to recognize distortion of historical facts, selective omission, recontextualization of information, baseless assertions, and biased interpretations in GenAI texts. Hence, this study attempts to fill in the existing research gap with regard to historical revisionism detection in GenAI.

Methodology

In this research study, a quasi-experimental methodology was employed to determine the efficacy of a critical algorithmic literacy approach that would enable the identification of historical revisionism in GenAI-produced materials. The target audience of the study included Uzbek university students since artificial intelligence-based learning tools have become increasingly common in educational institutions. Hence, students need the ability to assess the validity, cultural framing, biases, and possible inaccuracies of historical information generated by AI technologies. This study involved pre-test and post-test designs of two groups: one experimental and another control. While the experimental group received training grounded in a critical algorithmic literacy framework, the latter underwent digital literacy education that did not involve an analysis of the identified issue.

In order to be part of the research, two groups of college students specializing in different subjects were recruited from several higher educational institutions in Uzbekistan. They specialize in humanitarian sciences, social sciences, education, as well as IT/programming specialties. In terms of their education level and the experience of using digital learning tools, two matched groups of students were created. Before starting the training activities, a pre-test task was presented to each of the groups as a way to assess their ability to identify historical distortions, biases, and inaccuracies that appear when using the technology of AI.

Historical prompts related to the history of Uzbekistan, history of Central Asia, world history, culture, and politics were used. Using ChatGPT and other platforms of generative AI, these prompts were fed to create AI-generated texts. The next step involved identifying possible revisionism in the texts created by AI through such features as factual mistakes, simplifications, omissions, poor referencing, dominant discourse, and recontextualization. Such outputs would be used as the main training and testing materials for both groups.

Experimental group students were taught how to evaluate AI-generated outputs of historical narratives using the suggested approach with its five essential steps: fact-checking, comparing to scholarly sources, identifying unsupported claims, finding out whether the alternative perspective has been left out, and checking whether the output is balanced or not. The control group students would learn general principles of digital literacy, including searching the Internet, applying information found on the web, and detecting misinformation.

Multiple data gathering tools were employed during this study. Pre-test and post-tests were utilized to determine students' prior and post-intervention performance. A rubric evaluation sheet was used to evaluate students' capabilities in recognizing problems related to revisionism in AI-generated outputs. The rubric had several components including factual truthfulness, sources, recognizing biases, context understanding, and ethical interpretation among others. Learner reflections were gathered using learner reflection sheets to gauge how students perceive the reliability of GenAI software and the effect of intervention on learners' evaluative behavior. Additionally, subject matter experts in history, education, and AI provided validation regarding the prompt, rubric components, and the training module.

Statistical analyses on the collected data were performed by employing descriptive and inferential statistics. The mean scores and standard deviation were calculated for both groups in the pretest and posttest phases. Paired sample t-tests were employed to assess the extent of the improvement made by each group, whereas the independent sample t-test was used to measure the difference between the two groups in terms of their posttest performances. The effect size was estimated by computing Cohen's d. Students' qualitative feedback gathered through their reflections was qualitatively analyzed to gauge changes in terms of their awareness of critical skills, verification of information sources, and self-confidence in assessing AI-generated accounts of history.

Dataset and Experimental Setup

The dataset that has been used for this study was created with the help of a prompt-based generative AI output generation approach. In total, 50 prompts covering historical topics were created to understand the way that generative AI generates historical narratives and the presence or absence of problems related to revisionism. Prompts have been divided into three broad topic areas, namely historical topics in Uzbekistan, historical development in Central Asia, and global historical topics. Historical topics in Uzbekistan include cultural heritage, national identity, historical

figures, education reform, and socio-economic transformation. Historical development in Central Asia includes topics like regional history, migration, empire building, trade routes, and cultural exchanges.

For each of the historical prompts, three outputs obtained through the use of AI were recorded. To evaluate the variety of the generated answers, the differences in explanations given by different AI models, and identify any inaccuracies or omissions, the outputs of ChatGPT and other large language models were analyzed. As a result, the final sample contained 150 AI-generated historical outputs. Outputs in the dataset were analyzed and annotated according to an established rubric for detecting revisions. The rubric involved a checklist that consisted of possible errors such as statements containing erroneous facts, selective omission, partiality towards certain cultures and ideologies, baseless assertions, false narration, weak evidence from sources, oversimplification, and imbalance in providing context. Each piece of output got only one mark out of five based on their accuracy.

Expert validation was used to make the dataset credible. For that purpose, three experts from fields of history, education, and artificial intelligence analyzed the prompt set, outputs generated by AI, and the annotation rubric. Experts' feedback helped improve prompts and exclude duplicates. Furthermore, some changes were made to the annotation rubric based on their suggestions to increase inter-rater reliability. The revised dataset was used in pretest, training, and post-test exercises involving Uzbek university students.

The experimental design involved two groups of students – one was the experimental group and another was the control group. In the experimental group, training was imparted based on the critical algorithmic literacy model. In the control group, training was imparted for digital literacy in general. Both the experimental and control groups were made to analyze certain AI-generated historical texts before and after the instructional intervention. Pre-test focused on identifying factual inaccuracies, bias, omissions, unproven assertions, and distortion of history.

The data processing and inferential statistics were done using Python 3.10, Pandas, NumPy, Microsoft Excel, and SPSS. Python and Pandas software were used in organising the dataset, coding annotation, computing scores, and conducting descriptive analysis. Data verification and computation of student scores were manually done using Microsoft Excel. The use of SPSS software was used to conduct the inferential statistics. Mean, standard deviation, and percentage of improvement were computed for both groups. Paired sample t-tests were used in comparing pre-test and post-test scores of the two groups. An independent sample t-test was used in comparing the post-test scores of the experimental group and the control group. The effect size was computed using Cohen's d statistic.

Results and Analysis

The findings suggest that the application of the proposed critical algorithmic literacy approach had a positive impact on the students' capabilities to detect historical revisionism within artificial intelligence outputs. In terms of each evaluated indicator, the experiment group made a greater progress than the control group, including their algorithmic literacy level, revisionism identification success rate, capabilities for verifying information facts, and the ability to identify biases. Prior to intervention, the two groups demonstrated similar capabilities, thus confirming their comparability at the starting point. After being subjected to intervention, the experimental group demonstrated a statistically significant improvement in mean precision scores, increasing from 52.4% to 84.7%, whereas the control group managed only to improve their result to 63.2% from 51.8%.

Table 1: Pre-Test and Post-Test Performance Comparison

Group	Pre-Test Score (%)	Post-Test Score (%)	Mean Difference	Improvement (%)
Experimental Group	52.4	84.7	32.3	61.64
Control Group	51.8	63.2	11.4	22.01

The experimental group achieved a noticeable improvement in terms of post-test results, thus proving that the suggested approach was successful in assisting students in developing the skills needed for transitioning from uncritical use of AI to critical evaluation of its history-related content (see table 1). The control group showed some improvement; however, it was not as significant since the training did not emphasize revisionism but rather was concerned only with general digital literacy skills.

The improvements achieved by both the experimental and control groups before and after the tests are shown in fig. 1. The experimental group improved to a higher degree than the control one; while in the first group, the progress made was from 52.4% to 84.7%, in the second, from 51.8% to 63.2%. It could be stated that the suggested framework for critical algorithmic literacy is more efficient.

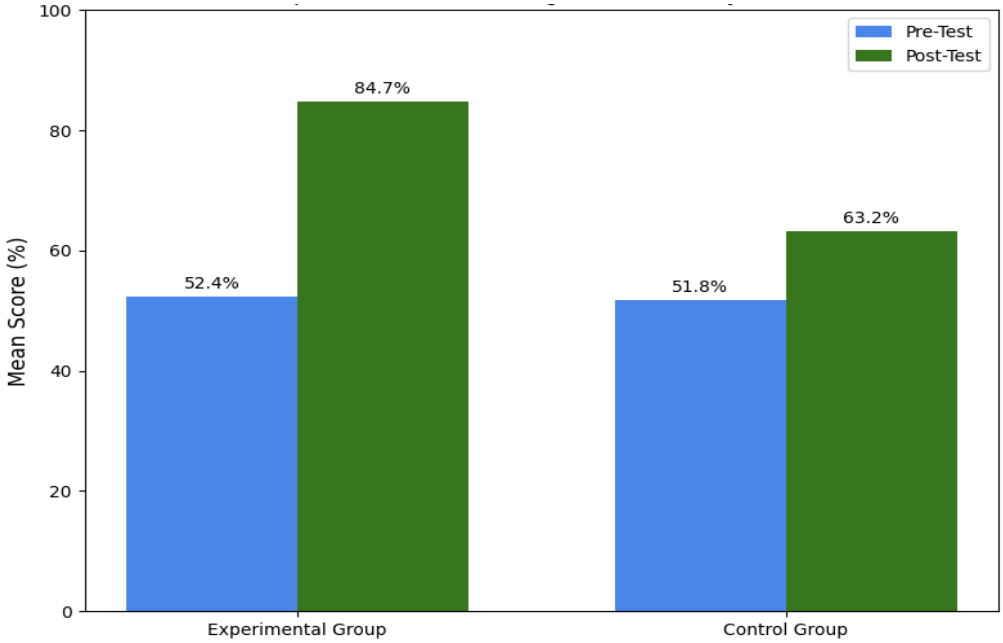


Fig. 1: Improvement in Critical Algorithmic Literacy Scores

Table 2: Indicator-Wise Performance of Students

Evaluation Indicator	Experimental pre-test (%)	Experimental post-test (%)	Control pre-test (%)	Control post-test (%)
Algorithmic Literacy Score	52.4	84.7	51.8	63.2
Revisionism Detection Precision	49.6	82.3	48.9	60.4
Factual Verification Ability	54.1	86.5	53.7	64.8
Bias-Identification Ability	50.8	83.9	50.2	61.5
Source Comparison Skill	51.5	85.2	52.1	62.7

The analysis of each individual indicator shows that the most noticeable increase happened in table 2 in the area of factual verification skill, which rose from 54.1 percent to 86.5 percent. It appears that the students' capacity to verify the historical facts produced by the AI became greater. The same can be said regarding bias-identification ability, which rose from 50.8% to 83.9%.

Discussion

The results from this study indicate that there is an improvement in the ability of students to critically assess the output from generative artificial intelligence as a consequence of critical algorithmic literacy training. Compared with the control group, the experimental group performed better in terms of algorithmic literacy, verifying facts, detecting revisionism, identifying bias, and comparing sources. It is evident from the outcome that students can benefit from teaching artificial intelligence literacy in addition to its technical aspect in an academic context. In educational technology, the value of generative AI lies in its ability to provide fast responses and personalized information to learners, whose competence to challenge these lies in their understanding of the accuracy, authenticity, and cultural bias of such information.

By analyzing historical content created by an AI, the students were able to go past the stage where they would consider the content provided by the machine as a final and trustworthy explanation. Prior to receiving the educational intervention, many students viewed GenAI answers as such. Following their education on GenAI, the experimental group demonstrated greater ability to detect inaccuracies, lack of historical context, unsubstantiated claims, and bias in the narratives provided by GenAI systems. It follows from this that GenAI can indeed function as an educational tool, provided that learners are trained to compare AI outputs to reliable sources in order to critically assess their contents.

Teacher assistance continues to be crucial in this regard. The students require help in understanding the historical context of events, as well as in examining various opinions regarding the matter, without developing dependence on the results of GenAI work. This is even more important when referring to the education system of Uzbekistan because, in most cases, historical analysis involves issues related to the nation's identity, culture, experience, and multilingualism. There may come a case when the results of using generative artificial intelligence will be unable to fully reflect the historical aspect of events, especially bearing in mind that information used by GenAI is mainly sourced from around the world. Consequently, culturally sensitive interpretation becomes a must. The results of the research paper indicate that GenAI needs to be applied in education responsibly.

Conclusion and Future Scope

This study shows that the critical algorithmic literacy framework created contributes significantly to the development of students ' abilities to identify revisionism, misrepresentation, omission, unsupported claims, and algorithmic biases in outputs generated using generative artificial intelligence. The findings from the experiment showed that the experimental group demonstrated considerable improvement compared to the control group because the improvement rate in the experimental group went from 52.4% to 84.7%, while in the control group, it went from 51.8% to 63.2%. From this finding, it can be deduced that skill-based training is more effective than generic digital literacy training. Moreover, there was considerable improvement in the students' ability to verify facts and detect biases because the improvement rate was from 54.1% to 86.5% and from 50.8% to 83.9%, respectively. This framework will be very useful in education in the age of artificial intelligence, digital citizenship, and applications of generative AI in Uzbekistan, as it will help learners not just to use AI-generated content but also to analyze it in terms of evaluating their validity against the historical record generated by the application. This study highlights the significance of the instructor support, culturally sensitive interpretations and confirmation from source documents while using genAI tools in educational context. Further research might be carried out based on this current study in terms of using a sample of participants recruited from different Uzbek universities, comparative analysis in relation to artificial intelligence outputs in Uzbek, Russian and English languages, and the process of retention during long term period in literacy improvements.

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