

Students' Critical Thinking Skills And Artificial Intelligence Instructional Strategies Of Teachers In Social Studies

Karl Angelo M. Punzalan ¹, Reymund M. Ferry, PhD, EdD.¹
sirkarangelo29.punzalan@gmail.com
0009-0001-1497-4899

1 – Golden Gate College

Publication Date: July 24, 2026

DOI: 10.5281/zenodo.21529445

Abstract

This study assessed the students' critical thinking skills and the utilization of artificial intelligence instructional strategies in Social Studies teaching among public junior high school teachers in the Division of Tanauan City and Sto. Tomas City. Specifically, it aimed to determine the level of the students' critical thinking skills in the use of Artificial Intelligence, the extent of utilization of AI used by the teachers in developing the students' critical thinking skills, relationship between the assessments on the students' level of critical thinking and the extent of utilization of the AI instructional strategies, the ethical challenges encountered by the teachers in using AI tools, and the development of a proposed policy brief.

The study employed a descriptive research design using a researcher-made questionnaire and interview as instruments. Respondents were 92 out of 119 public junior high school Social Studies teachers in the Division of Tanauan City and Sto. Tomas City. Data were analyzed using frequency, percentage, rank, weighted mean, and Pearson's r Coefficient.

Findings revealed that students demonstrate an above-average level of critical thinking skills when using various Artificial Intelligence (AI) tools as assessed by the teachers. The utilization of Artificial intelligence tools instructional strategies were moderately utilized, as assessed by the Social Studies teachers in their teaching. Also, there was a significant and very strong positive relationship between the students' level of critical thinking skills and the extent of AI instructional strategy utilization by teachers. Social Studies teachers in SDO Tanauan City and Sto. Tomas City experienced several challenges in the utilization of Artificial Intelligence tools, particularly in relation to data privacy protection, academic integrity, and the potential dependency of students on AI technologies. The proposed policy brief can help the Social Studies teachers to be guided on how to properly integrate and utilize different AI tools in the teaching and learning process. Also, through the help of this, it will ensure that AI driven technological tools are used responsibly, ethically, and effectively in Social Studies education.

Keywords: *Artificial Intelligence, Social Studies, Critical Thinking*

INTRODUCTION

In the 21st century, education systems around the world have been undergoing rapid transformation due to the exponential growth of technology. Among the most important advancements in technology is the introduction of Artificial Intelligence (AI), which is increasingly becoming integrated into various fields, including education. On a global scale, AI has been widely used in transcending and innovating the face of education by offering multiple solutions for instructional planning, assessment, and personalized learning experiences. The utilization and implementation of AI in the four corners of the classroom is no longer a futuristic abstract idea; instead, it is a developing reality that holds the potential to enhance the quality and efficacy of the teaching and learning process.

Nationally, the Philippines has increasingly emphasized the need for technology integration across all levels of education. As outlined in the Basic Education Plan (2020-2022) of the Department of Education (DepEd), it is important to leverage technology to enhance the quality of instruction, including the use of digital tools to support assessment and instruction planning (DepEd, 2022). However, while Science, Technology, Engineering, and Mathematics (STEM) subjects have often been at the forefront of technology integration, Social Studies remains underexplored in this regard. This gap is concerning, given the subject's crucial role in developing critical thinking, social responsibility, and historical awareness among students.

Additionally, numerous case studies examined the integration of AI in the context of the Philippines. As a developing nation grounded with educational innovation yet persistent infrastructure problems, the country exemplifies the apprehension between technological aspiration and implementation realities (Toquero, 2020; Barrot et al., 2021). Following the Commission on Higher Education's (CHED) flexible learning guidelines, the Philippine education system, which serves millions of students at both basic and higher education levels, has gradually emphasized technology modernization (Joven et al., 2020).

With the Basic Education-Learning Continuity Plan (BE-LCP) requiring technology integration across educational levels, the global health crisis accelerated the adoption of technology (Alvarez, 2020), highlighting the need for tailored strategies and improved faculty preparation in digital instruction. (Zhang, 2024; Co, 2025). AI methods for remote learning were experimentally implemented at this time, although there is still a dearth of thorough documentation of these efforts. (Barrot et al., 2021; Alibudbud, 2021).

The introduction of AI in the field of education provides a colossal technological advancement, bringing the core of educational experience into a new dimension. With its ability to deliver personalized learning experiences and meet a wide range of educational needs, AI's role transcends conventional teaching approaches. It improves educational processes by fostering critical thinking and computing skills, which are closely related to educational robots and machine learning.

Utilizing AI in the context of education provides a relevant and timely solution to address the above-mentioned challenges. AI tools can generate routine tasks, provide various content, and offer analytical insights to help teachers create and design their lessons, especially when these tools are integrated properly. In addition, the integration of AI tools can support social studies teachers in crafting lesson plans and designing assessment tools that promote higher-

order thinking skills, where content and concepts range from historical narratives to contemporary societal issues. This is very crucial in social studies education because teaching the subject requires an objective analysis of each content while maintaining a pedagogically sound and engaging classroom discussion.

In spite of growing interest with regard to researches about adoption of AI, stakeholder preparedness and fulfillment, problems in Philippine education are still dispersed, making it difficult for stakeholders to comprehend the current situation and future directions (Lapada et al., 2020; Oducado et al., 2021). Instead of using strategies from high-resource countries, the Philippines' distinct socioeconomic and infrastructure features require contextual understanding (Huang et al., 2020; Villarino, 2025).

Overall, even though there are existing international guidelines and domestic regulatory scaffolding, there is a research gap at the sub-national level concerning how ethical issues actually play out in everyday teaching and learning. In particular, little empirical work has examined how AI-mediated tools influence the development of critical thinking of junior high school students in Social Studies within the schools in the Philippines. This gap is important because the ethical challenges of AI – privacy risks, algorithmic opacity, biased outputs, shifts in teacher authority, and potential erosion of critical reasoning—are contextually mediated by local policy implementation, teacher capacity, infrastructure, and community expectations (Luckin et al., 2021; UNESCO, 2020).

This study, therefore, investigates the students' critical thinking skills and the utilization of artificial intelligence instructional strategies of teachers in social studies. Furthermore, the study seeks to uncover the ethical challenges faced by educators in adopting AI tools and proposed a policy brief that can support the evolving demands of Social Studies education. The proposed policy brief will help the Social Studies teachers to be guided on how to responsibly and ethically utilize various AI tools in the teaching and learning process.

STATEMENT OF THE PROBLEM

This study aimed to examine the students' critical thinking skills and the utilization of artificial intelligence (AI) instructional strategies of teachers in Social Studies.

Specifically, it sought to answer the following questions:

1. What is the level of the students' critical thinking skills in the use of Artificial Intelligence relative to:

- 1.1. evaluating information credibility;
- 1.2. drawing logical conclusions;
- 1.3. problem-solving and decision-making; and
- 1.4. ethical reasoning?

2. What is the extent of utilization of AI instructional strategies used by the teachers in developing the students' critical thinking skills in terms of:

- 2.1 ai-powered content analysis and evaluation;
- 2.2 automated assessment and feedback systems;
- 2.3 personalized learning pathways; and
- 2.4 interactive AI tutoring and discussion?

3. Is there a significant relationship between the assessments on the students' level of critical thinking skills and on the extent of utilization of the AI instructional strategies by the teachers?

- 4. What are the ethical challenges encountered by the teachers in using AI tools?
- 5. Based on the findings of the study, what policy brief may be proposed?

RESEARCH HYPOTHESIS

There is no significant relationship between the assessments on the students' level of critical thinking skills and on the extent of utilization of AI instructional strategies used by Social Studies teachers.

METHODOLOGY

RESEARCH DESIGN

This study used a descriptive research design of investigation. The design examined the students' critical thinking skills and the utilization of artificial intelligence instructional strategies of teachers in social studies. A validated research-made and Likert scale type of questionnaire and interview are used as a major instrument in collecting data to answer some questions regarding the focus of the study. To further validate and substantiate the quantitative findings, interviews were also conducted to obtain deeper insights into teachers' challenges regarding the utilization of Artificial Intelligence (AI) tools in teaching Social Studies among junior high school students. Once the necessary data was collected, the researcher developed a policy brief based on the results of the study. This policy aimed at enhancing the critical thinking skills of junior high school students as well as to guide the ethical and pedagogically sound use of various AI tools in the classroom discussion.

PARTICIPANTS

The respondents of the study were Social Studies teachers from the Public Junior High Schools in SDO Tanauan City and SDO Sto. Tomas City. In the aforementioned divisions, there were 92 Social Studies teachers who served as the respondents of the study, which was determined using the **Raosoft Calculator** with a 5% margin of error. The respondents by school are chosen using a stratified random sampling using proportionate allocation.

DATA GATHERING INSTRUMENTS

The data gathering instruments in this study are research-made survey questionnaire and interview. The research-made questionnaire was used to gather the data about the students' critical thinking skills and the utilization of artificial intelligence instructional strategies of teachers in social studies. Interviews were also conducted to support and validate the quantitative findings.

PROCEDURES

The researcher secured official permission from the Schools Division Superintendent of Tanauan City and Sto. Tomas City and the school principals. Before collecting any information, the researcher explained the study's purpose, risks, and benefits to the teacher-participants to ensure they understood their rights, including the freedom to withdraw at any time. The researcher strictly adhered to the Data Privacy Act of 2012 to keep all personal information private and secure. Data collection, including the distribution, retrieval, and scoring of questionnaires, was personally managed by the researchers to ensure accuracy and reliability.

DATA ANALYSIS

To analyze the data gathered from the respondents, this study employs a variety of statistical methods to ensure accurate interpretation. A structured questionnaire was used as the primary instrument to collect reliable information, which was then processed using the weighted mean to determine the average response for each item and provide a basis for verbal interpretation. Additionally, ranking was utilized to assess the relative importance for frequency of the participants' responses. Finally, Pearson's r coefficient of correlation was applied to determine the significant relationship between the level of critical thinking skills of students and the AI instructional strategies utilization by Social Studies teachers.

RESULTS AND DISCUSSION

Level of the Students' Critical Thinking Skills in the Use of Artificial Intelligence in terms of AI-Powered Content Analysis and Evaluation.

As shown in Table 1, the data revealed that there is an above average among students in terms of analyzing AI-generated data instead of relying solely on memorization, as assessed by the teachers, gaining the highest weighted mean of 3.15.

Crompton et. al. (2023) stated that students benefit from AI-powered platforms that support them through credibility verification activities such as identifying misinformation in news feeds or analyzing the authenticity of online data. It asserts that AI technologies can improve and strengthen the analytical and critical thinking of the students, especially when used properly in an academic setting. Additionally, AI-generated and supported learning environments can encourage deeper cognitive engagement by allowing students to evaluate various information critically rather than simply recall facts and concepts.

On the one hand, students can explain the reasons why some AI-generated information may be biased, inaccurate, or misleading, and gained the lowest mean of 2.95, which is verbally interpreted as above average. Students possess a satisfactory level of competence in analyzing and evaluating the credibility of information when using AI, with a grand composite mean of 3.04.

Table 1

Students' Level of Critical Thinking Skills in the Use of Artificial Intelligence as assessed by the Teachers in terms of Evaluating Information Credibility

Items	WM	VI	RANK
1. My students can verify the credibility and accuracy of online information sources using AI-assisted tools.	3.09	AA	3.5
2. My students can distinguish between reliable and unreliable data with the support of AI-based fact-checking applications.	2.96	AA	9
3. My students can differentiate factual information from opinions in AI-generated responses.	3.00	AA	8
4. My students can justify their chosen sources when completing Social Studies research tasks supported by AI.	3.11	AA	2
5. My students demonstrate improved ability to assess the authenticity of digital content through AI-assisted learning activities.	3.04	AA	6
6. My students can explain the reasons why some AI-generated information may be biased, inaccurate, or misleading.	2.95	AA	10
7. My students can use AI tools to cross-check and validate information from multiple sources.	3.09	AA	3.5
8. My students demonstrate critical judgment and digital discernment when using AI for research.	3.05	AA	5
9. My students can analyze AI-generated data instead of relying solely on memorization.	3.15	AA	1
10. My students demonstrate digital literacy in evaluating the quality and relevance of information.	3.01	AA	7
COMPOSITE MEAN	3.04	AA	

Legend: *G* (Good (3.50-4.00)) *AA* (Above Average (2.50-3.49)) *BA* (Below Average (1.50-2.49)) *P* (Poor (1.00-1.49))
WM (Weighted Mean) *VI* (Verbal Interpretation)

Level of the Students' Critical Thinking Skills in the Use of Artificial Intelligence in terms of Drawing Logical Conclusions.

It can be gleaned from Table 2 that students can summarize key ideas and insights from AI-supported learning activities to support logical reasoning and can identify gaps, missing information, or unsupported claims in their arguments when using AI as above average as assessed by teachers, as they both on the highest rank with a weighted mean of 3.12.

According to Ennis (2020), summarizing information and identifying missing evidence are core components of critical thinking and logical reasoning. These skills demonstrate students' capacity to analyze and interpret complex information rather than merely accepting conclusions generated by AI systems. Students are able to process information generated by AI

systems and use it to develop logical insights and arguments. Also, Liu, Latif, and Zhai (2025) found that students who use AI tutoring systems demonstrated improved logical structuring in their written analysis compared to other students who are still in traditional instruction.

Meanwhile, students identify logical fallacies or inconsistencies in AI-generated arguments obtained the lowest mean of 3.00 which is verbally interpreted as above average. Generally, there is an above-average ability that students demonstrated in terms of drawing logical conclusions when using AI tools, as reflected in the grand composite mean of 3.08.

Table 2

Students' Level of Critical Thinking Skills in the Use of Artificial Intelligence as assessed by the Teachers in terms of Drawing Logical Conclusions

Items	WM	VI	RANK
1. My students use AI-generated feedback to refine their reasoning and strengthen the logic of their arguments.	3.03	AA	9
2. My students analyze cause-and-effect relationships in social, historical, or political issues with the support of AI tools.	3.07	AA	7.5
3. My students draw well-supported conclusions in Social Studies discussions using AI-assisted information.	3.10	AA	3.5
4. My students identify logical fallacies or inconsistencies in AI-generated arguments.	3.00	AA	10
5. My students synthesize evidence from multiple sources before arriving at conclusions with the aid of AI tools.	3.09	AA	5
6. My students evaluate whether their conclusions logically follow from the available data when using AI.	3.07	AA	7.5
7. My students summarize key ideas and insights from AI-supported learning activities to support logical reasoning.	3.12	AA	1.5
8. My students organize and prioritize evidence before forming conclusions using AI-assisted strategies.	3.10	AA	3.5
9. My students distinguish between strong and weak evidence in AI-supported analytical tasks.	3.08	AA	6
10. My students identify gaps, missing information, or unsupported claims in their arguments when using AI.	3.12	AA	1.5
COMPOSITE MEAN	3.08	AA	

Legend: *G* (Good (3.50-4.00)) *AA* (Above Average (2.50-3.49)) *BA* (Below Average (1.50-2.49)) *P* (Poor (1.00-1.49)) *WM* (Weighted Mean) *VI* (Verbal Interpretation)

Level of the Students' Critical Thinking Skills in the Use of Artificial Intelligence in terms of Problem-Solving and Decision-Making.

As shown in Table 3, the teacher respondents found out that there is an above average among students in terms of applying AI-generated data to propose solutions to real-world social or political problems which garnered a weighted mean of 3.16 and were highest in the rank list.

According to the study of Zawacki-Richter et al., (2020), it shows that the use of AI tools can develop students' decision-making and problem-solving skills by providing data-driven insights that reflects to the complexities of real-world scenarios. This was supported by the study

of Holmes et al., (2022), which revealed that AI-supported learning environments can encourage students to be more indulged in understanding various societal issues, enabling them to analyze patterns, critically evaluate multiple evidences, and generate informed solutions. Thus, the development of critical civic awareness is deemed important in the teaching and learning process because as students become more conscious of contemporary social issues and their implications, it will foster active engagement in the classroom which is a key factor in social studies education.

Students integrate contextual and real-world reasoning into AI-supported decision-making processes got the least weighted mean of 2.99 with a verbal interpretation of above average as well. Generally, the results revealed that students demonstrate an above-average level of competence in problem-solving and decision making when using various AI tools as assessed by the teachers reflected in the grand composite mean of 3.08.

Table 3

Students' Level of Critical Thinking Skills in the Use of Artificial Intelligence as assessed by the Teachers in terms of Problem-Solving and Decision-Making

Items	WM	VI	RANK
1. My students enhance their collaborative problem-solving skills through AI-supported learning activities	3.12	AA	3.5
2. My students apply AI-generated data to propose solutions to real-world social or political problems.	3.16	AA	1
3. My students integrate social, cultural, and moral considerations alongside AI-generated analyses when making decisions.	3.10	AA	5
4. My students critically evaluate AI-generated suggestions before applying them to contextual situations.	3.03	AA	8
5. My students generate multiple possible solutions to social or policy issues using AI-assisted simulations.	3.07	AA	6
6. My students recognize the limitations of AI when addressing complex human and societal problems.	3.12	AA	3.5
7. My students effectively collaborate with peers when analyzing AI-supported problem-solving tasks.	3.15	AA	2
8. My students critically examine and compare different outputs produced by AI tools before selecting a solution.	3.02	AA	9
9. My students demonstrate independent judgment when AI-generated responses are incomplete or questionable.	3.04	AA	7
10. My students integrate contextual and real-world reasoning into AI-supported decision-making processes.	2.99	AA	10
COMPOSITE MEAN	3.08	AA	

Legend: *G* (Good (3.50-4.00)) *AA* (Above Average (2.50-3.49)) *BA* (Below Average (1.50-2.49)) *P* (Poor (1.00-1.49)) *WM* (Weighted Mean) *VI* (Verbal Interpretation)

Level of the Students' Critical Thinking Skills in the Use of Artificial Intelligence in terms of Ethical Reasoning.

Table 4 revealed that students use AI-supported simulations to analyze moral dilemmas in governance, law, or social policy as assessed by the teachers, which gained the highest mean of 3.21 interpreted as above average.

According to the study of Baker and Hawn (2022), they emphasized the value of reflective conversations in developing ethical thinking. When students use AI technologies to mimic moral dilemmas, such as resource allocation or digital rights, they practice making ethical decisions in a safe context. These simulations, when led by teachers, foster empathy and moral judgment grounded in civic responsibility. This supports the idea of Floridi (2020), which stated that AI technologies can be valuable tools in ethics education because they enable learners to analyze the social implications of emerging technologies.

Subsequently, based on the data reflected on the table, the teacher respondents assessed that students demonstrate awareness of data privacy and security concerns when using AI tools, can show sensitivity to issues of equity, representation, and bias in AI-generated content, and can distinguish between ethical and unethical applications of AI in social contexts, which are manifested as above average. Those three items garnered a weighted mean of 3.07 and were the lowest in the rank list. Generally, the result revealed that students demonstrate a generally high level of reasoning through the help of using various AI tools, as manifested in the composite mean of 3.12 interpreted as above average.

Table 4

Students' Level of Critical Thinking Skills in the Use of Artificial Intelligence as assessed by the Teachers in terms of Ethical Reasoning

Items	WM	VI	RANK
1. My students recognize ethical implications of AI use in society through classroom discussions and activities.	3.12	AA	4.5
2. My students use AI-supported simulations to analyze moral dilemmas in governance, law, or social policy.	3.21	AA	1
3. My students critically examine issues of fairness, bias, and justice in AI systems used in education and society.	3.17	AA	2
4. My students demonstrate awareness of data privacy and security concerns when using AI tools.	3.07	AA	10
5. My students show sensitivity to issues of equity, representation, and bias in AI-generated content.	3.07	AA	10
6. My students demonstrate responsible and ethical use of AI in academic tasks.	3.16	AA	3
7. My students draw well-reasoned ethical judgments when evaluating AI-generated information.	3.10	AA	7
8. My students distinguish between ethical and unethical applications of AI in social contexts.	3.07	AA	10
9. My students reflect critically on the role and impact of AI in academic and societal settings.	3.12	AA	4.5
10. My students clearly articulate ethical concerns arising from AI-generated information.	3.11	AA	6
COMPOSITE MEAN	3.12	AA	

Legend: *G* (Good (3.50-4.00)) *AA* (Above Average (2.50-3.49)) *BA* (Below Average (1.50-2.49)) *P* (Poor (1.00-1.49))
WM (Weighted Mean) *VI* (Verbal Interpretation)

Extent of Utilization of AI Used by the Teachers in terms of AI-Powered Content Analysis and Evaluation.

As shown in Table 5, it revealed that teachers design AI-supported activities that require students to evaluate multiple viewpoints on an issue which garnered the highest weighted mean of 3.20, interpreted as moderately utilized.

According to Labadze and Soysa (2023), they cited that AI-based content evaluation provides opportunities for metacognitive reflection. By comparing their interpretations against algorithmic analyses, students become aware of their own biases and assumptions. The dialogic interaction between human and machine analysis fosters an environment of cognitive challenge that strengthens higher-order thinking. Moreover, research by Luckin et. al., (2019) supports that AI can enhance inquiry-based learning by enabling students to explore complex, real-world issues through multiple lenses. According to Neil Selwyn, AI technologies can enhance classroom discourse by exposing students to multiple viewpoints and enabling deeper analysis of social and political issues. Such instructional strategies are particularly valuable in Social Studies because they promote critical engagement with complex societal topics.

Table 5

Extent of Utilization of AI Used by the Teachers in Developing the Students' Critical Thinking Skills in terms of AI-Powered Content Analysis and Evaluation

Items	WM	VI	RANK
1. I use AI tools to analyze historical, social, or political data to stimulate critical classroom discussions.	3.13	MU	2.5
2. I integrate AI systems that help students evaluate and cross-check the credibility of information sources.	3.07	MU	6
3. I guide students in using AI to detect bias, propaganda, or misleading information in digital materials.	2.88	MU	8
4. I use AI tools to provide structured feedback on students' reasoning and argument quality.	2.84	MU	10
5. I employ AI-generated summaries to help students compare and evaluate diverse perspectives.	2.86	MU	9
6. I allow students to use AI tools to distinguish between fact, opinion, and misinformation.	2.89	MU	7
7. I design AI-supported activities that require students to evaluate multiple viewpoints on an issue.	3.20	MU	1
8. I apply AI tools to assist students in analyzing primary and secondary sources critically.	3.13	MU	2.5
9. I guide students in using AI to verify whether claims are supported by reliable evidence.	3.09	MU	4
10. I incorporate AI tools that help students identify key themes, arguments, and underlying assumptions in Social Studies content.	3.08	MU	5
COMPOSITE MEAN	3.02	MU	

Legend: *HU* (Highly Utilized (3.50-4.00)) *MU* (Moderately Utilized (2.50-3.49)) *SU* (Slightly Utilized (1.50-2.49)) *LU* (Least Utilized (1.00-1.49)) *WM* (Weighted Mean) *VI* (Verbal Interpretation)

Meanwhile, the use of AI tools to provide structured feedback on students' reasoning and argument quality by the teachers got the lowest mean of 2.84, manifested as moderately utilized. The grand composite mean of 3.02 shows that the teachers moderately utilize AI-powered content analysis tools, such as in tasks and activities that promote discussion, information evaluation, and analysis of multiple perspectives, although the utilization of AI for feedback and bias detection remains less prevalent.

Extent of Utilization of AI Used by the Teachers in terms of Automated Assessment and Feedback Systems.

Table 6 showed that teachers moderately utilized the integration of adaptive AI quizzes that adjust based on students' responses, which gained the highest weighted mean of 3.07.

According to Holmes et al., (2022) adaptive AI systems can enhance formative assessment by personalizing learning experiences and providing immediate, tailored feedback based on student performance. This supported the idea of Luckin et al., (2022), which indicated that such systems are designed to adjust question difficulty and content in real time, which supports differentiated instruction and helps address varying learner needs. Moreover, adaptive assessments can promote critical thinking by encouraging students to engage with progressively challenging tasks that require deeper analysis and reasoning. The finding implies that teachers are beginning to leverage these benefits to monitor student progress and enhance learning outcomes.

Moreover, the use of AI-generated analytics to monitor students' progress in critical thinking skills got the lowest mean of 2.82, manifested as moderately utilized. Also, the grand composite mean of 2.95 reveals that the overall utilization of AI in assessment practices related to students' critical thinking is moderately utilized by the teacher respondents.

Table 6

Extent of Utilization of AI Used by the Teachers in Developing the Students' Critical Thinking Skills in terms of Automated Assessment and Feedback Systems

Items	WM	VI	RANK
1. I use AI platforms that provide immediate formative feedback on students' written outputs.	2.96	MU	4
2. I use AI-generated analytics to monitor students' progress in critical thinking skills.	2.82	MU	10
3. I employ AI tools to identify students' strengths and weaknesses in reasoning and argumentation.	2.92	MU	7.5
4. I use automated feedback systems to guide students in improving analytical skills.	2.84	MU	9
5. I apply AI-assisted grading tools to support objective evaluation of students' reasoning.	2.92	MU	7.5
6. I use AI tools to assess students' understanding of complex Social Studies concepts.	2.95	MU	5.5

7. I use AI tools to detect possible academic dishonesty or plagiarism.	3.04	MU	2
8. I utilize AI-generated rubrics or scoring guides to ensure consistency in grading.	3.02	MU	3
9. I integrate adaptive AI quizzes that adjust based on students' responses.	3.07	MU	1
10. I use AI tools to provide diagnostic feedback that informs my instructional decisions.	2.95	MU	5.5
COMPOSITE MEAN	2.95	MU	
Legend: <i>HU</i> (Highly Utilized (3.50-4.00)) <i>MU</i> (Moderately Utilized (2.50-3.49)) <i>SU</i> (Slightly Utilized (1.50-2.49)) <i>LU</i> (Least Utilized (1.00-1.49)) <i>WM</i> (Weighted Mean) <i>VI</i> (Verbal Interpretation)			

Extent of Utilization of AI Used by the Teachers in terms of Personalized Learning Pathways.

As shown in Table 7, incorporating AI tools to design differentiated lesson pathways for diverse learners is moderately utilized by the teacher respondents, which gained the highest weighted mean of 3.14.

In the study of du Plooy (2024), AI personalization enhanced student engagement by aligning learning materials with interests, prior knowledge, and preferred modes of interaction. In Social Studies, this may involve customizing historical case studies or political scenarios that resonate with local contexts, thus making abstract global issues more relatable. Also, this supports the concept of Tomlinson (2020), which stated that differentiated instruction enhances student learning by aligning teaching strategies with learners' readiness and interests. Furthermore, AI-driven personalization has been shown to support adaptive learning environments that foster deeper cognitive engagement (Holmes et al., 2019). AI-driven personalization systems can help educators design more adaptive learning environments that respond to students' individual learning patterns and cognitive development.

On the other hand, employing AI systems to personalize the pacing of students' critical thinking development got the lowest mean of 2.88, manifested as moderately utilized by the teacher respondents. The grand composite mean of 3.01 reflects the overall utilization of AI for personalized learning pathways in developing students' critical thinking skills is moderate.

Table 7

Extent of Utilization of AI Used by the Teachers in Developing the Students' Critical Thinking Skills in terms of Personalized Learning Pathways

Items	WM	VI	RANK
1. I use AI tools that adapt learning activities to students' individual critical thinking levels.	3.08	MU	2
2. I create AI-supported materials tailored to students' progress and learning needs.	2.95	MU	8
3. I employ AI systems to personalize the pacing of students' critical thinking development.	2.88	MU	10

4. I use AI-generated recommendations to strengthen students' analytical and evaluative skills.	3.05	MU	4
5. I utilize AI personalization tools to deepen students' engagement with Social Studies topics.	3.02	MU	6
6. I use AI analytics to identify which critical thinking skills require reinforcement.	3.04	MU	5
7. I incorporate AI tools to design differentiated lesson pathways for diverse learners.	3.14	MU	1
8. I apply AI-assisted grouping strategies based on students' learning needs.	3.00	MU	7
9. I use AI tools to adjust instructional strategies based on student performance data.	2.89	MU	9
10. I integrate AI-generated practice tasks aligned with individual students' skill gaps.	3.07	MU	3
COMPOSITE MEAN	3.01	MU	

Legend: *HU* (Highly Utilized (3.50-4.00)) *MU* (Moderately Utilized (2.50-3.49)) *SU* (Slightly Utilized (1.50-2.49)) *LU* (Least Utilized (1.00-1.49)) *WM* (Weighted Mean) *VI* (Verbal Interpretation)

Extent of Utilization of AI Used by the Teachers in terms of AI Tutoring and Discussion.

Table 8 revealed that designing AI-assisted collaborative activities that strengthen critical engagement gained the highest weighted mean of 3.10, manifested as moderately utilized.

According to Zhai et al., (2021) it affirmed that AI-supported collaborative learning environments can foster deeper engagement by enabling students to co-construct ideas, exchange perspectives, and participate in meaningful dialogue. Similarly, integrating AI into collaborative tasks aligns with constructivist principles, where learning becomes more active and student-centered, ultimately improving higher-order thinking skills (Su & Yang, 2023). However, the moderate level of utilization implies that while teachers are adopting these strategies, there is still room for more consistent and structured implementation. Strengthening the use of AI in collaborative learning can further enhance student interaction, engagement, and critical thinking development.

On the one hand, the use of AI-driven discussion tools to facilitate structured debates and reflective dialogue is moderately utilized by the teachers, which gained the lowest mean of 2.86. Overall, the utilization of AI in interactive tutoring and discussion for developing students' critical thinking skills is moderate, which garnered a grand mean of 2.95.

Table 8

Extent of Utilization of AI Used by the Teachers in Developing the Students' Critical Thinking Skills in terms of Interactive AI Tutoring and Discussion

Items	WM	VI	RANK
1. I use AI-driven discussion tools to facilitate structured debates and reflective dialogue.	2.86	MU	10
2. I integrate AI-based collaborative platforms to promote peer questioning and critical discussion.	2.96	MU	4

3. I use AI chatbots or tutoring systems to support inquiry-based learning.	2.91	MU	7
4. I design AI-supported interactive activities that require students to defend their viewpoints with evidence.	2.87	MU	9
5. I use AI-generated debate topics to challenge students' reasoning skills.	2.95	MU	5
6. I incorporate AI tools that simulate Socratic questioning techniques.	2.93	MU	6
7. I integrate AI platforms that enable real-time dialogue or debate simulations.	2.90	MU	8
8. I use AI-generated prompts to deepen students' analytical discussions.	3.00	MU	3
9. I design AI-assisted collaborative activities that strengthen critical engagement.	3.10	MU	1
10. I use AI tutoring systems to help students clarify complex Social Studies concepts.	3.02	MU	2
COMPOSITE MEAN	2.95	MU	

Legend: *HU* (Highly Utilized (3.50-4.00)) *MU* (Moderately Utilized (2.50-3.49)) *SU* (Slightly Utilized (1.50-2.49)) *LU* (Least Utilized (1.00-1.49)) *WM* (Weighted Mean) *VI* (Verbal Interpretation)

Relationship between the Assessments on the Students' Level of Critical Thinking and the Extent of Utilization of the AI Instructional Strategies by the Teachers.

The Table 9 presented the relationship between evaluating information credibility and the extent of utilization of the AI instructional strategies by the Social Studies teachers. The results revealed strong positive correlations across all areas, in AI-Powered Content Analysis and Evaluation with r-value of .642, Automated Assessment and Feedback Systems with r-value of .606, Personalized Learning Pathways with r-value of .601, and Interactive AI Tutoring and Discussion with r-value of .595 indicating that all relationships are statistically significant. Thus, the null hypothesis stating that there is no significant relationship between the students' level of critical thinking and the utilization of AI instructional strategies by teachers is rejected. This indicates that AI tools help teachers in analyzing and verifying information since it significantly strengthens the ability of the students to evaluate the reliability, credibility, and validity of multiple sources.

Also, the findings revealed that those teachers who relatively utilize AI tools in the teaching and learning process particularly in AI-Powered Content Analysis and Evaluation tend to facilitate higher levels of students' ability to check the veracity of information. The implementation of AI tools in the classroom will allow students to examine digital information critically, verify multiple sources, and cross-check evidence more effectively and efficiently.

Overall, the findings highlight that the teachers' role in utilizing instructional strategies with the use of AI tools is a critical factor in enhancing students' critical thinking skills. The strong significant correlations from the study indicates that AI-driven practices and pedagogy of the teachers provide meaningful contribution to the enhancement of students' information credibility evaluation skills.

Table 9

Relationship between Evaluating Information Credibility and the Extent of Utilization of the AI Instructional Strategies by the Social Studies Teachers

	<i>r-value</i>	<i>Degree of Relationship</i>	<i>p-value</i>	<i>Decision on H0</i>	<i>Interpretation</i>
AI-Powered Content Analysis and Evaluation	.642	Very Strong	<.001	Reject	Significant
Automated Assessment and Feedback Systems	.606	Very Strong	<.001	Reject	Significant
Personalized Learning Pathways	.601	Very Strong	<.001	Reject	Significant
Interactive AI Tutoring and Discussion	.595	Very Strong	<.001	Reject	Significant

Table 10 showed the relationship between drawing logical conclusions and the extent of utilization of the AI instructional strategies by the Social Studies teachers. The results revealed strong positive correlations across all areas, with AI-Powered Content Analysis and Evaluation showing an *r-value* of .673, Automated Assessment and Feedback Systems with *r-value* of .600, Personalized Learning Pathways with *r-value* of .641, and Interactive AI Tutoring and Discussion with *r-value* of .656. Thus, the null hypothesis stating that there is no significant relationship between the students' level of critical thinking and the utilization of AI instructional strategies by teachers is rejected. This indicates that AI tools help teachers in drawing logical conclusions since it significantly develops the ability of the students to form reasoned conclusions based on the information that they have gathered and collected.

Moreover, the result shows that the use of various AI tools by teachers in their classroom significantly enhance the reasoning and logical thinking skills of the students. Through the use of AI-driven systems and platforms, it will be easy for the teachers to provide structured feedback, analytical prompts, and guided questioning that will allow students to refine their arguments and will be able to form strong logical conclusions.

Overall, intelligent AI-driven learning systems can assist students in terms of improving their reasoning processes through the help of teachers by guiding them through structured analytical tasks that promote deeper cognitive engagement. Also, it enables the students to synthesize information from multiple sources, enabling them to construct well-supported conclusions.

Table 10

Relationship between Drawing Logical Conclusions and the Extent of Utilization of the AI Instructional Strategies by the Social Studies Teachers

	<i>r-value</i>	<i>Degree of Relationship</i>	<i>p-value</i>	<i>Decision on H0</i>	<i>Interpretation</i>
AI-Powered Content Analysis and Evaluation	.673	Very Strong	<.001	Reject	Significant
Automated Assessment and Feedback Systems	.600	Very Strong	<.001	Reject	Significant
Personalized Learning Pathways	.641	Very Strong	<.001	Reject	Significant
Interactive AI Tutoring and Discussion	.656	Very Strong	<.001	Reject	Significant

The presentation of data in Table 11 is about the correlation between problem-solving and decision-making and the extent of utilization of the AI instructional strategies by the Social Studies teachers. The results revealed strong positive correlations across all areas, with AI-Powered Content Analysis and Evaluation showing an r-value of .634, Automated Assessment and Feedback Systems with r-value of .572, Personalized Learning Pathways with r-value of .621, and Interactive AI Tutoring and Discussion with r-value of .675, all statistically significant. Thus, the null hypothesis stating that there is no significant relationship between the students' level of critical thinking and the utilization of AI instructional strategies by teachers is rejected. This indicates that AI tools play a crucial role in enhancing students' ability to solve problems and make informed decision if properly implemented by the teachers in their classroom.

Furthermore, the variables revealed that AI tools contribute meaningfully by providing relevant information and tailored experiences that help the students to challenge their critical thinking skills which is vital in Social Studies classroom. Although there is a slightly lower r-value in terms of automated assessment and feedback systems, still it demonstrates a strong relationship which indicates that feedback mechanism aid in refining decision-making skills.

Overall, the findings highlight that the extent of utilization of the AI instructional strategies by the Social Studies teachers in terms of problem-solving and decision-making skills is a key factor in cultivating students' critical thinking skills. By integrating this kind of strategy in the teaching and learning process, students are encouraged to engage deeply in meaningful problem-solving and decision-making activities to analyze different scenarios, test alternative solutions, and evaluate outcomes. This approach not only strengthens students' analytical abilities but also helps them understand the relevance of AI tools as modern tool of education today.

Table 11

Relationship between Problem-Solving and Decision-Making and the Extent of Utilization of the AI Instructional Strategies by the Social Studies Teachers

	<i>r-value</i>	<i>Degree of Relationship</i>	<i>p-value</i>	<i>Decision on H0</i>	<i>Interpretation</i>
AI-Powered Content Analysis and Evaluation	.634	Very Strong	<.001	Reject	Significant
Automated Assessment and Feedback Systems	.572	Very Strong	<.001	Reject	Significant
Personalized Learning Pathways	.621	Very Strong	<.001	Reject	Significant
Interactive AI Tutoring and Discussion	.675	Very Strong	<.001	Reject	Significant

As shown in Table 12, the presentation of data revealed the correlation between ethical reasoning and the extent of utilization of the AI instructional strategies by the Social Studies teachers. The results revealed strong positive correlations across all areas, with AI-Powered Content Analysis and Evaluation showing an *r-value* of .753, Automated Assessment and Feedback Systems with *r-value* of .659, Personalized Learning Pathways with *r-value* of .690, and Interactive AI Tutoring and Discussion with *r-value* of .682, all statistically significant. Thus, the null hypothesis stating that there is no significant relationship between the students' level of critical thinking and the utilization of AI instructional strategies by teachers is rejected. This indicates that AI tools play a crucial role in classroom instruction in fostering students' awareness of ethical issues related to technology use, fairness, bias, and social responsibility.

In addition, it can be gleaned from the result that among the four variables, ethical reasoning shows the strongest overall relationships, highlighting that exposing students in the utilization of AI tools in the classroom greatly help them to enhance their moral reasoning skills. Aside from this, AI driven platforms can support ethical reflection by providing scenarios, simulations, and feedback that challenge students' values and judgments which are crucial in having an interactive and engaging classroom discussion.

General findings underscore that the utilization of AI tools by teachers in developing the critical thinking skills of the students particularly their ethical reasoning skill is a key factor that allows students to analyze real-world challenges, issues and dilemmas and its implications to our society driven by various technological innovations. Integrating AI literacy and ethical

awareness in education is essential to prepare learners for responsible participation in an increasingly technology-driven society.

Table 12

Relationship between Ethical Reasoning and the Extent of Utilization of the AI Instructional Strategies by the Social Studies Teachers

	<i>r-value</i>	<i>Degree of Relationship</i>	<i>p-value</i>	<i>Decision on H0</i>	<i>Interpretation</i>
AI-Powered Content Analysis and Evaluation	.753	Very Strong	<.001	Reject	Significant
Automated Assessment and Feedback Systems	.659	Very Strong	<.001	Reject	Significant
Personalized Learning Pathways	.690	Very Strong	<.001	Reject	Significant
Interactive AI Tutoring and Discussion	.682	Very Strong	<.001	Reject	Significant

Ethical Challenges Encountered by the Social Studies Teachers in Using AI Tools.

The use of Artificial Intelligence (AI) tools is crucial nowadays, as it serves as a modern trend in providing different strategies to assess and evaluate students' learning, which may provide a variety of options to assess students beyond the traditional. It is the teachers' power to choose the best to implement and utilize for the betterment of Social Studies instruction.

Table 13 presents the ethical challenges encountered by the Social Studies teachers in the utilization of Artificial Intelligence (AI) tools in their instructional strategies.

As shown in the table, the teachers agreed that they feel responsible for protecting students' personal and sensitive information when using AI-based tools. This got the highest weighted mean of 3.47. This means that teachers are well aware of data privacy, which is the most pressing ethical concern that they are facing, reflecting a strong sense of professional accountability in protecting the information of the students. Also, it implies that teachers are knowledgeable of the risks associated with using various AI tools that collect and process personal data. As an educator, it is deemed important to protect the background information of the students so that they will not be used into unnecessary things in the media. Through doing this, teachers need to ensure that student information is handled responsibly.

According to the study of Holmes et al., (2021), teachers are often hesitant to adopt AI tools due to concerns over student data misuse or surveillance. These anxieties are exacerbated by the absence of clear institutional guidelines and policies on ethical AI use in education. This supports the idea of Popenici and Kerr (2020), the automation of of learning environments created new vulnerabilities for data breaches and misuse, especially when third-part platforms manage student information. The issue of data privacy and ethical concerns emerges as a significant barrier.

Subsequently, teachers agreed that they find it difficult to monitor whether students rely excessively on AI in completing essays or projects, which raises concerns about academic integrity. This item got the lowest weighted mean of 3.05. Although still agreed upon, teachers may find it challenging to track AI usage due to the evolving nature of AI tools and the lack of clear monitoring mechanisms. Also, it indicates that while teachers recognize the issue, it may not be the most pressing challenge compared to other ethical concerns. Nonetheless, academic integrity remains a significant issue in AI-supported learning environments, as automated text-generation tools can potentially be misused by students.

As cited by Long and Magerko (2020), they found out that when learners perceive AI as an authoritative tutor rather than a supportive tool, they may become passive users of information rather than active constructors of knowledge. This poses a particular threat to Social Studies teachers, where inquiry, debate, and interpretive reasoning are foundational. This supports the idea of Floridi (2022), which states that this challenge faced by teachers was to ensure that AI remains an augmentative technology that enhances human cognition rather than replacing it. Similarly, UNESCO (2021) also cited that teachers should maintain epistemic oversight by continuously questioning the outputs of AI and encouraging the students to do the same.

Overall, the findings indicate that teachers generally agreed that ethical challenges exist in the use of AI tools in education, with a grand composite mean of 3.19. This is manifested particularly in relation to data privacy protection, students' overreliance on AI, reduced teacher–student interaction, and academic integrity concerns. These challenges highlight the importance of establishing clear ethical guidelines, professional development programs, and institutional policies that support responsible and effective use of artificial intelligence in the classroom. The overall findings reflect a heightened awareness among teachers regarding the ethical implications of AI use.

Table 13

Ethical Challenges Encountered by the Social Studies Teachers in Using AI Tools

Items	WM	VI	RANK
1. I have difficulty detecting plagiarism or AI-generated content in students' written outputs.	3.08	A	9
2. I am not confident in fully integrating AI in my teaching due to the lack of clear ethical and data privacy guidelines in my school.	3.09	A	8
3. I feel responsible for protecting students' personal and sensitive information when using AI-based tools.	3.47	A	1

4. I find it difficult to monitor whether students rely excessively on AI in completing essays or projects, which raises concerns about academic integrity.	3.05	A	10
5. I worry that heavy reliance on AI may reduce my professional creativity and instructional autonomy.	3.21	A	4.5
6. I feel hesitant to use AI tools because of concerns about ethical issues and responsible use in the classroom.	3.12	A	7
7. I am concerned that the use of AI may reduce meaningful teacher–student interaction and engagement.	3.23	A	3
8. I find it challenging to ensure that AI platforms comply with data protection policies and institutional regulations.	3.21	A	4.5
9. I struggle to verify the credibility, accuracy, and bias of AI-generated outputs before using them in classroom activities.	3.13	A	6
10. I am concerned that excessive use of AI may limit students' creativity and independent thinking.	3.37	A	2
COMPOSITE MEAN	3.19	A	

Legend: *SA* (Strongly Agree (3.50-4.00)) *A* (Agree (2.50-3.49)) *D* (Disagree (1.50-2.49)) *SD* (Strongly Disagree (1.00-1.49))
WM (Weighted Mean) *VI* (Verbal Interpretation)

Proposed Policy Brief

The proposed policy brief emphasized the responsible, balanced, and pedagogically sound use of AI tools in the classroom. This policy directly addresses the study's findings, particularly the moderate utilization of AI, the strong relationship between AI use and critical thinking, and the ethical challenges faced by teachers such as data privacy concerns, academic dishonesty, and overreliance on AI.

Additionally, this policy is hoped to benefit both teachers and students, ensuring effective use of AI tools in order to have a meaningful learning. By implementing these guidelines, schools and teachers can ensure that AI serves as a supportive educational tool that enhances students' critical thinking skills, ethical awareness, and independent learning, while minimizing potential risks associated with its misuse. These guidelines aim to support teachers in integrating AI tools responsibly while ensuring that students' critical thinking, academic integrity, and ethical awareness are preserved.

Link to access the Policy Brief:

https://docs.google.com/document/d/1wG2pk65psxRTxj4hKCauLXc2e74JxSde/edit?usp=drive_link&ouid=104948941134332372875&rtopof=true&sd=true

CONCLUSIONS

In view of the findings revealed in the study, the following conclusions were drawn:

1. The teachers assessed their students' level of critical thinking skills as above average.
2. The utilization of Artificial Intelligence instructional strategies were assessed by the teachers themselves as moderately utilized.

3. There was a significant and very strong positive relationship between the assessments on the students' level of critical thinking skills and on the extent of AI instructional strategy utilization by teachers.
4. Social Studies teachers in SDO Tanauan City and Sto. Tomas City experienced several challenges in the utilization of Artificial Intelligence tools, particularly in relation to data privacy protection, academic integrity, and the potential dependency of students on AI technologies.
5. The proposed policy brief can help the Social Studies teachers to be guided on how to properly integrate and utilize different AI tools in the teaching and learning process. Also, through the help of this, it will ensure that AI driven technological tools are used responsibly, ethically, and effectively in Social Studies education.

RECOMMENDATIONS

In light of the conclusions drawn, the following recommendations were offered by the researcher:

1. The proposed policy brief may be submitted for review and approval before its utilization.
2. Teachers may further integrate AI instructional strategies in their teaching practices to enhance students' critical thinking skills, particularly in activities that involve logical reasoning, problem-solving and critical evaluation of information.
3. The school administrators may develop a strong and clear institutional policies and guidelines with regard to the effective, responsible and ethical use of AI tools in academic setting.
4. Further training and seminars on the use of Artificial Intelligence (AI) tools may be conducted to strengthen and upgrade teachers' skills and capabilities in utilizing it.
5. Parallel studies may be conducted in other Divisions using different variables to determine the usefulness and utilization of the Artificial Intelligence (AI) instructional tools.

REFERENCES

A. Books

- American Psychological Association. (2020). *Publication manual of the American Psychological Association* (7th ed.). American Psychological Association.
- Chadwick, R. (Ed.). (2024). *Encyclopedia of Applied Ethics* (2nd ed.). Academic Press.
- Floridi, L. (2022). *The ethics of artificial intelligence: Principles and applications*. Springer.
- Gallant, T. B. (2020). *Academic integrity in the 21st century: A teaching and learning imperative*. Jossey-Bass.
- Holmes, W., Bialik, M., & Fadel, C. (2021). *Artificial Intelligence in Education: Promises and Implications for Teaching and Learning*. Boston: Center for Curriculum Redesign.
- Holmes, W., Bialik, M., & Fadel, C. (2022). *Artificial intelligence in education: Promises and implications for teaching and learning* (2nd ed.). Center for Curriculum Redesign.
- Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B. (2020). *Intelligence Unleashed: An Argument for AI in Education*. Pearson Education.
- OECD. (2021). *AI in education: Challenges and opportunities for sustainable development*. OECD Publishing. <https://doi.org/10.1787/2b0e9c8e-en>
- Selwyn, N. (2020). *Should robots replace teachers? AI and the future of education*. Polity Press.

B. Unpublished/Published Materials

- Crompton, H., Burke, D. Artificial intelligence in higher education: the state of the field. *Int J Educ Technol High Educ* 20, 22 (2023). <https://doi.org/10.1186/s41239-023-00392-8>
- Ilias, Khalid & Sharif, Ibrahim & Abdulla, Saman. (2024). The Ethical and Social Implications of using Artificial Intelligence in Social Studies Instruction. 10.13140/RG.2.2.18497.16488.
- Organization for Economic Co-operation and Development. (2023). *Artificial intelligence in education: Policy guidance*. OECD Publishing
- Perez, S., Massey-Allard, J., Butler, D., Ives, J., Bonn, D., Yee, N., & Roll, I. (2020). Identifying productive inquiry in virtual labs using sequence mining. In E. André, R. Baker, X. Hu, M. M. T. Rodrigo, & B. du Boulay (Eds.), *Artificial intelligence in education*, (vol. 10,331, pp. 287–298). https://doi.org/10.1007/978-3-319-61425-0_24.
- Russel, S., & Norvig, P. (2020). *Artificial intelligence - a modern approach*. New Jersey: Pearson Education.
- Salmon, G. (2000). *E-moderating - the key to teaching and learning online*, (1st ed.,). London: Routledge.
- UNESCO. (2023). *Guidelines for the use of artificial intelligence in education*. UNESCO Publishing.
- U.S. Department of Education. (2023). *Artificial Intelligence and the Future of Teaching and Learning: Insights and Recommendations*. Retrieved from <https://www.ed.gov/sites/ed/files/documents/ai-report/ai-report.pdf>

C. Journals, Magazines, Periodicals

- Alon, D., & Domingo, Z. R. (2021). Digital divide in Philippine education: Infrastructure and training gaps. *Philippine Journal of Education and Development*, 9(2), 34–49.
- Bayne, S. (2020). Posthumanism and research in education. *Educational Philosophy and Theory*, 52(2), 101–110. <https://doi.org/10.1080/00131857.2019.1642804>

- Chen, X., Zou, D., Cheng, G., & Xie, H. (2023). Detecting and promoting critical thinking through AI-supported prompting in education. *Computers & Education*, 200, 104784. <https://doi.org/10.1016/j.compedu.2023.104784>
- Chiu, T. K. F., Chai, C. S., Williams, P. J., & Lin, T. J. (2023). Teacher professional development on AI integration in education: A systematic review. *Educational Technology & Society*, 26(2), 1–15.
- Dai, C. P., Zhu, H., & Chen, W. (2024). Generative AI in education: Opportunities and challenges for instructional design. *Educational Technology Research and Development*.
- Holmes, W., & Porayska-Pomsta, K. (2022). Responsible AI in education: Ethical and practical considerations. *British Journal of Educational Technology*, 53(6), 1490–1508. <https://doi.org/10.1111/bjet.13200>
- Hortelano, Julius Ceasar & Salamia, Shella. (2025). Perceptions of Artificial Intelligence among Philippine Undergraduate Students: Examining Instrument Construct and Demographic Influences on Knowledge and Beliefs. *Journal of Teaching and Learning*. 19. 52-71. 10.22329/jtl.v19i4.9790.
- Kasneci, E., Sessler, K., Küchemann, S., Bannert, M., Dementieva, D., Fischer, F., & Kasneci, G. (2023). ChatGPT for good? On opportunities and challenges of large language models for education. *Learning and Individual Differences*, 103, 102274. <https://doi.org/10.1016/j.lindif.2023.102274>
- König, J., Jäger-Biela, D. J., & Glutsch, N. (2023). Adapting to digital teaching: The role of teacher competence in using AI tools. *Teaching and Teacher Education*, 122, 103942. <https://doi.org/10.1016/j.tate.2022.103942>
- Molnar, A., & Traxler, J. (2022). Aligning AI tools with educational goals: Policy challenges in a digital age. *Journal of Digital Learning and Education Policy*, 2(1), 14–28.
- Nguyen, M., Le, T., & Do, H. (2020). Barriers to educational technology use in Southeast Asia: Perspectives from teachers. *International Journal of Educational Technology in Higher Education*, 17(1), 1–17. <https://doi.org/10.1186/s41239-020-00192-3>
- Peters, M. A., Jandrić, P., & Hayes, S. (2023). Digital ethics and artificial intelligence in education. *Educational Philosophy and Theory*, 55(2), 137–153. <https://doi.org/10.1080/00131857.2022.2121839>
- Popenici, S. A. D., & Kerr, S. (2020). Exploring the impact of artificial intelligence on teaching and learning in higher education. *Research and Practice in Technology Enhanced Learning*, 12(1), 1–13. <https://doi.org/10.1186/s41039-017-0062-8>
- Selwyn, N., & Jandrić, P. (2023). Education and artificial intelligence: Critical perspectives. *Learning, Media and Technology*, 48(1), 1–18. <https://doi.org/10.1080/17439884.2022.2118892>
- Su, J., & Yang, W. (2023). Artificial intelligence in education: A systematic review of collaborative learning and critical thinking. *Computers and Education: Artificial Intelligence*, 4, 100124. <https://doi.org/10.1016/j.caeai.2023.100124>
- Wang, T., & Lim, C. P. (2022). AI literacy and ethics in education. *Educational Technology Research and Development*, 70(4), 1499–1522. <https://doi.org/10.1007/s11423-022-10166-3>
- Williamson, B., & Eynon, R. (2020). Historical threads and future directions of AI in education. *Learning, Media and Technology*, 45(2), 85–99. <https://doi.org/10.1080/17439884.2020.1706628>
- Wollny, S., Schneider, J., Di Mitri, D., Weidlich, J., Rittberger, M., & Drachsler, H. (2021). Are we there yet?—A systematic literature review on chatbots in education. *Frontiers in Artificial Intelligence*, 4, 654924. <https://doi.org/10.3389/frai.2021.654924>
- Yang, X., Li, X., & Chen, Y. (2023). Supporting students' argumentation with AI-

- generated prompts: Effects on critical thinking and reasoning. *Computers & Education: Artificial Intelligence*, 4, 100120. <https://doi.org/10.1016/j.caeai.2023.100120>
- Yilmaz, C., & Cobanoglu, A. (2024). Artificial intelligence literacy teaching in Social Studies education. *International Journal of Psychology and Educational Studies*, 11(1), 124–137. <https://www.ijopr.com/download/artificial-intelligence-literacy-teaching-in-social-studies-education-13224.pdf>
- Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2020). Systematic review of research on artificial intelligence applications in higher education – where are the educators? *International Journal of Educational Technology in Higher Education*, 16(1), 1–27. <https://doi.org/10.1186/s41239-019-0171-0>
- Zhai, X., Chu, X., Chai, C. S., Jong, M. S. Y., Istenic, A., Spector, M., Liu, J. B., Yuan, J., & Li, Y. (2021). A review of artificial intelligence (AI) in education from 2010 to 2020. *Complexity*, 2021, 8812542. <https://doi.org/10.1155/2021/8812542>
- K.

D. Legal Documents

- Department of Education. (2019). Policy Guidelines on the K to 12 Basic Education Program. https://www.deped.gov.ph/wp-content/uploads/2019/08/DO_s2019_021.pdf
- UNESCO. (2021). Recommendation on the ethics of artificial intelligence. UNESCO.

E. Electronic References

- Floridi, L., & Chiriatti, M. (2020). GPT-3: Its Nature, Scope, Limits, and Consequences. *Minds and Machines*, 30, 681–694. <https://doi.org/10.1007/s11023-020-09548-1>
- Kimmons, R., & Rosenberg, J. M. (2022). Factors influencing teacher technology integration: A meta-analysis. *Educational Technology Research and Development*, 70, 437–468. <https://doi.org/10.1007/s11423-021-10003-2>
- Organization for Economic Co-operation and Development. (2023). Artificial intelligence in education: Policy guidance. <https://www.oecd.org>
- Popenici, S., & Kerr, S. (2019). Exploring the impact of artificial intelligence on teaching and learning in higher education. *Research and Practice in Technology Enhanced Learning*. <https://doi.org/10.1186/s41039-017-0062-8>
- Tondeur, J., Roblin, N. P., van Braak, J., Fisser, P., & Voogt, J. (2020). Preparing pre-service teachers to integrate technology in education: A synthesis of qualitative evidence. *Computers & Education*, 158, 103978. <https://doi.org/10.1016/j.compedu.2020.103978>
- UNESCO. (2023). Guidelines for the use of artificial intelligence in education. <https://www.unesco.org>
- Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2020). Systematic Review of Research on Artificial Intelligence Applications in Higher Education – Where Are the Educators? *International Journal of Educational Technology in Higher Education*, 16(1), 1–27. <https://doi.org/10.1186/s41239-019-0171-0>