



Reconstructing Gen Z digital historical literacy through AI-based pedagogy in higher education

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ABSTRACT

History learning plays an important role in fostering historical awareness, national identity, and critical thinking. However, in reality, history learning still relies heavily on memorisation, resulting in underdeveloped digital history literacy among students, particularly in the areas of source verification, bias awareness, and visual reconstruction of events in the face of widespread misinformation. This study aimed to reconstruct digital history literacy among Generation Z by developing and implementing an artificial intelligence (AI)-based learning model for students in the Department of History Education at PGRI Argopuro University in Jember. This study employed an exploratory, sequential, mixed-methods approach to measure digital history literacy before and after model implementation. Results showed that implementing AI-based learning, including adaptive digital assistance, AI-based source analysis, visual history reconstruction, and digital inquiry learning, significantly improved students' digital history literacy from moderate to high levels. Qualitatively, students demonstrated development in critical thinking, creativity in creating visual history reconstructions, and ownership in designing digital history research. The theoretical contribution of this study is the development of a conceptual framework for AI-based digital historical literacy that integrates source verification, bias analysis, and visual historical reconstruction. In practice, these findings suggest the pedagogical and ethical integration of AI into history teaching in higher education to strengthen students' digital literacy in the modern information age.

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INTRODUCTION

Recent advances in digital technology have profoundly transformed how Generation Z students access, create, and understand historical information. The emergence of digital archives, digital narratives, virtual museums, and artificial intelligence (AI) driven visual reconstructions has enabled more interactive, multimodal, and data-driven history learning experiences (Nygren & Vikström, 2013; Wineburg, 2018b). This transformation has expanded access to historical materials and fostered student engagement in participatory digital history learning (Seixas &

Morton, 2013b). However, this increased accessibility also comes with increased risks of historical misinformation, visual manipulation, and the use of unverified digital materials (Nyhan, 2023). Research suggests that students still struggle to distinguish valid historical evidence from visual representations generated by digital technologies and AI, and that their critical evaluation skills for digital historical materials are underdeveloped (Kozyreva et al., 2020).

Several studies have shown that Generation Z students tend to rely on popular visual content and social media information without thoroughly verifying the source (Breakstone et al., 2021). In the Indonesian context, this phenomenon is reflected in students' limited ability to evaluate digital documents and to reconstruct historical events using reliable evidence (McGrew et al., 2018). Students' low digital literacy suggests weak critical thinking skills when evaluating online historical information (Nygren & Vikström, 2013). Furthermore, the social media environment may reinforce biased historical interpretations and limit access to diverse historical perspectives (Holmes et al., 2022). These circumstances highlight the crucial importance of strengthening digital history literacy in history education as part of 21st-century competencies that emphasize critical thinking, information evaluation, and historical awareness (Seixas & Morton, 2013a).

Digital historical literacy encompasses not only the technical skills necessary to utilise technology, but also the ability to evaluate sources, analyse evidence, interpret historical data, and conduct historical research in digital environments (Nygren & Vikström, 2013; VanSledright, 2014). Against this backdrop, the digitalization of education has transformed history education from mere knowledge transmission to digitally informed inquiry (Korniienko, 2025). Therefore, history learning must go beyond content delivery and foster evidence-based critical thinking by effectively integrating digital technologies. Because historical thinking requires source identification, corroboration, and contextualization (Leu et al., 2015; Rouet, 2006), appropriate pedagogical approaches are needed to develop students not simply as consumers of digital historical information, but as reflective and responsible learners capable of interpreting, reconstructing, and communicating historical knowledge in an increasingly complex digital environment.

In this context, artificial intelligence technology offers strategic opportunities to support the development of digital historical literacy. AI can be used to assess the reliability of sources, identify information bias, recognise patterns in historical documents, and support visual reconstructions based on historical data (Luckin et al., 2016). Research has shown that AI-assisted learning can increase student engagement in historical data analysis and provide adaptive learning support and personalised learning materials (Holmes et al., 2022; Kasneci, 2023). Furthermore, AI enables automated feedback, enhancing students' reflection and critical thinking in historical understanding (Baker & Inventado, 2014). However, previous research has tended to separate the application of AI in history learning from the development of historical thinking and digital resource literacy (Knox, 2020; Selwyn, 2019).

Based on this analysis, a clear research gap emerged in the development of a history learning model with a single, integrated pedagogical framework that systematically integrates digital source analysis, AI assisted historical visual reconstruction, and the development of digital historical reasoning. The novelty of this study lies in the formulation and implementation of an AI-based history learning model that utilises technology not only as a tool but also as an analytical framework for building comprehensive digital history literacy. Therefore, this study aims to empirically examine how the implementation of an AI based history learning model contributes to improving students' digital history literacy and, at the same time, enrich theoretical discussions on the integration of AI in history education.

METHOD

This study aimed to examine how effective an artificial intelligence (AI) based history learning model is in improving students' digital history literacy. This study employed a mixed-methods sequential exploratory design, first collecting and analysing quantitative data and then using qualitative data to contextualise the findings. This study employed mixed methods research using a sequential explanatory design. Quantitative data were collected and analyzed first, followed by qualitative data collection to explain and expand on the quantitative results (Creswell & Plano Clark, 2018). Quantitative data were collected through pretests and posttests to measure improvements in digital history literacy. Qualitative data were collected through interviews and observations to gain a deeper understanding of the AI-based learning process. Mixed methods were chosen because they provide a more comprehensive understanding of the effectiveness of learning interventions (Johnson & Onwuegbuzie, 2004).

This study was conducted in the even semester of the 2024/2025 academic year at the History Education Research Program of the Faculty of Teacher Training, PGRI Argopuro University Jember. The study period was eight weeks (March to May 2025) and consisted of a preparation phase (two weeks), intervention implementation (four weeks), and data collection and analysis (two weeks). The study subjects were all 156 fourth-year students in the History Education Research Program. Purposive sampling by (Sugiyono, 2022), a method of determining the sample based on specific considerations and the research objectives, was used. The selection criteria for participants were as follows: active fourth-year students enrolled in a history methodology course and willing to participate in the entire research process. Based on these criteria, 128 students were selected as the study sample. This study was approved by the faculty level institutional review board. All participants were provided with an informed consent form that explained the study's purpose, procedures, benefits, potential risks, and assurances regarding data confidentiality. Participation in the study was voluntary, and students were able to withdraw at any time without repercussions. This procedure complied with the Ethical Principles for Educational Research (Israel & Hay, 2006). The AI-based learning models used in this study are as follows; ChatGPT (OpenAI): Supports the analysis of digital historical documents and narrative reconstruction. Canva AI Image Generator: Supports visual reconstruction based on historical data. Google Gemini AI: Supports cross-validation of digital information. AI was used in a controlled manner based on a critical educational approach, with the aim of improving digital literacy and avoiding technology dependency (Holmes et al., 2022; Luckin et al., 2016). The stages of this research were carried out in accordance with the research plan in sequence, starting from the preparation stage to the combination of numerical and verbal data according to table 1 below;

Table 1. Research Procedure

Stage	Description of Activities
Preparation	Development of learning materials and validation of AI-based learning model development instruments.
Quantitative	Preliminary test, implementation of AI-based pedagogical learning model, and final test.
Qualitative	Interviews, observations in the implementation of AI-based pedagogical learning models, and document analysis
Integration	Integration of findings in research from quantitative and qualitative data

To ensure that the intervention was implemented as designed, fidelity of implementation was measured using a learning implementation observation sheet (Dane & Schneider, 1998). Implementation rates were calculated to determine the level of consistency in the implementation of the AI based learning model.

The quantitative instrument consisted of a digital history reading ability test developed in accordance with digital history literacy standards and validated by experts and through empirical testing. The validity test results showed a correlation coefficient (r_{xy}) ranging from

0.612 to 0.821, while the instrument's reliability was 0.887 based on Cronbach's Alpha. The qualitative instrument included a semi structured interview guide, observation sheets for learning activities, and guidelines for analyzing digital history learning documents in accordance with the research instruments shown in table 2 below;

Table 2. Research Instruments

Instrument Type	Form	Description
Digital historical literacy test	Written test	Valid and reliable
Interview guidelines	Semi-structured	Exploring students' experiences
Observation sheets	Checklist	Observing the learning process
Document analysis	Analysis guide	Students' learning products

Information is obtained using methods appropriate to the type of data required, including tests, interviews, observations, and document collection according to the instruments shown in table 3 below;

Table 3. Data Collection Techniques

Technique	Purpose
Test	Measuring digital historical literacy
Interview	Exploring perceptions and experiences
Observation	Observing the implementation of AI-based pedagogy
Documentation	Analyzing students' work products

For quantitative data analysis, paired t-tests were used to determine differences between pre- and post-test scores, and N-gain analysis was used to measure improvement (Hake, 1999). Qualitative data were analysed using the Miles, Huberman, and Saldaña interactive model, which involves organising, presenting, and drawing conclusions about data (Miles et al., 2014; Saldaña, 2021). Data synthesis was conducted during the interpretation phase to reach a comprehensive conclusion on the effectiveness of the AI-based learning model in improving digital history literacy.

RESULT AND DISCUSSION

RESULTS

Findings

This section presents the main findings directly derived from the quantitative and qualitative data analysis. Based on a sequential explanatory design, the results are presented objectively at this stage without any additional theoretical interpretation. The presentation is systematically structured around the research objectives to clearly demonstrate the intervention's effectiveness.

Improving Students' Digital History

The primary objective of this study was to assess the effectiveness of using an artificial intelligence (AI) based teaching model on students' digital history reading skills. Quantitative testing was conducted by comparing pretest and posttest scores on 128 students, as shown in Table 4 below;

Table 4. Descriptive Statistics of Students' Digital Historical Literacy Scores.

Test	N	Mean	SD
Pre-test	128	60.21	8.47
Post-test	128	82.36	6.91

Table 4. shows a 22.15-point increase in students' average digital history literacy scores after implementing the AI-based teaching method. To evaluate the significance of this increase, a paired-samples t-test was conducted in Tabel 5. as follows:

Table 5. Results of the Paired Sample *t*-Test

Comparison	t-value	p-value	Cohen's d	95% CI of Mean Difference
Pre-test – Post-test	0,55833333	< 0.001	01.13	[18.74, 25.56]

Table 5. showed a statistically significant improvement in student achievement. The effect size (Cohen's $d = 1.13$) indicated a large substantive effect, suggesting that the AI-based instructional model had a significant impact on digital history literacy. The 95% confidence interval supports the robustness of the mean difference.

Learning Effectiveness Based on N-Gain

Learning effectiveness is measured by analyzing N-Gain scores to determine the extent of student progress, as shown in Table 6 below:

Table 6. Distribution of N-Gain Categories in Digital Historical Literacy

N-Gain Category	Range	Percentage
High	> 0.70	42.2%
Medium	0.30–0.70	48.4%
Low	< 0.30	9.4%
Average	0.67	Medium–High

Table 6 shows an average N-Gain of 0.67, indicating that history learning using AI is moderately to highly effective.

Comparison of Pre-test and Post-test Scores

The difference in average scores in students' digital history literacy skills before and after the intervention is shown in Figure 1.

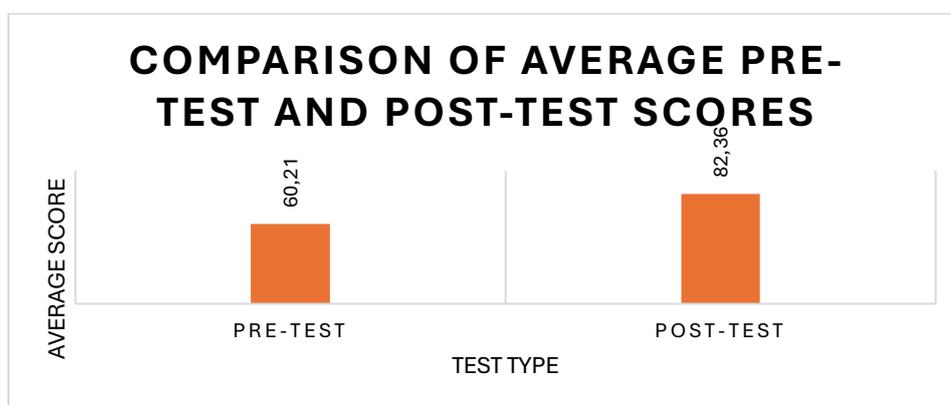


Figure 1. Comparison of Average Pre-test and Post-test Scores

Figure 1 shows a steady upward trend in students' digital history reading scores after implementing AI-based teaching methods. The pretest results showed an average score of 60, while the posttest showed an average score of 80.

Improvement Based on Digital Historical Literacy Indicators

Further analysis was conducted to test the improvement in each digital history literacy indicator shown in table 7 below;

Table 7. Mean Scores for Each Digital Historical Literacy Indikator

Digital Historical Literacy Indicator	Pre-test	Post-test	N-Gain	Category
Digital source verification	58.4	84.1	0.70	High
Identification of bias and misinformation	56.9	81.7	0.66	Medium
Analysis of digital historical sources	61.2	83.4	0.65	Medium
AI-based historical visual reconstruction	59.8	82.2	0.67	Medium-High

All indicators show an increase from the pretest and posttest data with a medium to high category, and the highest increase is shown in digital source verification, namely with an N-Gain value of 0.70.

Qualitative Findings on the Implementation of AI-Based Pedagogy

Qualitative analysis obtained from the results of interviews, classroom observations, and documentation analysis in the research shows four main discussions as shown in the following table 8;

Table 8. Summary of Qualitative Findings

AI-Based Pedagogical Components	Key Findings
Adaptive digital assistance	Supports conceptual understanding and exploration of historical sources
AI-based source analysis	Improve attitudes in critical thinking towards the credibility of digital sources.
Historical visual reconstruction	Encourage student creativity in determining the accuracy of an event in history.
Digital inquiry learning	Strengthening student independence in conducting digital history research

DISCUSSION

The Role of AI-Based Pedagogy in Digital Historical Literacy

Significant improvements were seen in students' understanding of digital history, demonstrating that AI-based education effectively addresses key challenges in teaching history in the digital age, particularly information overload, algorithmic bias, and the rapid spread of inaccurate historical information. The significant increase in mean scores from pretest (60.21) to posttest (82.36), supported by a significant t-test with p-value < 0.001, indicates that an AI-based learning environment can effectively improve historical understanding.

This finding aligns with the concept of online reasoning, which emphasises the ability to evaluate the reliability, context, and purpose of digital information (Holstein et al., 2018). Recent research suggests that AI-based teaching methods can help students move beyond superficial consumption and acceptance of information to more critical and reflective historical thinking (McGrew et al., 2018). In this study, AI acted as a knowledge-gathering tool by providing personalised guidance, comparative source analysis, and contextual explanations,

supporting students' thinking processes without replacing the role of the teacher (Zawacki-Richter et al., 2019).

This research aligns with the concept of online reasoning, which emphasizes the ability to evaluate the reliability, context, and purpose of digital information (Boonshoft, 2022). Recent research by Chen et al. (2021) shows that AI-based teaching methods can help students move beyond superficial information consumption to more critical and reflective historical thinking.

Strengthening the Ability to Check Sources and Recognize Bias

Across all indicators, digital source checking demonstrated the highest level of improvement (N = 0.70 increase), indicating that AI assisted learning is highly effective in fostering history learners' critical evaluation skills. This finding is particularly important in today's digital world, where historical narratives are often influenced by ideological bias, misinformation, and the spread of algorithmically generated content without data verification.

Recent empirical research has shown that structured digital interventions utilizing AI can significantly improve students' ability to detect misinformation and recognize bias in online historical content (Nyhan, 2023). In this study, students demonstrated increased awareness of authors, sources, and contextual frameworks, shifting from passive reception of historical information to critical consideration (Guess et al., 2019). (Selwyn, 2019) states that digital history education needs to be thoroughly examined to ensure vigilance regarding developments in the digital world. The AI-assisted document verification process encourages students to compare multiple documents, evaluate inconsistencies, and question their understanding skills that are core to digital historical literacy (Crompton & Burke, 2023). This is consistent with (Wineburg, 2018a) assertion that skepticism and positivity are fundamental practices for historical thinking in the digital age.

AI-Based Visual Reconstruction as a Tool for Historical Thinking

The development of an AI based visual historical rewriting (N-gain = 0.67) demonstrates the importance of utilizing digital visualization in deepening students' historical understanding. AI based tools, such as interactive timelines, regional maps, and image reconstructions, enable students to better understand the sequence, causes, and relationships of historical events.

Recent research has shown that AI based visualization analysis significantly deepens students' conceptual understanding and narrative coherence in history (Dede, 2009). In this study, the visual reconstructions not only served as supplementary images but also supported students' analytical thinking, enabling them to connect events to broader temporal and spatial contexts (Hegarty, 2019).

These findings reinforce the argument put forward by Seixas & Morton (2013a), who emphasised that thinking about history involves thinking from the past. In an AI-assisted environment, this meaning becomes broader, more interactive, and data-driven, enabling students to construct historical narratives by combining evidence, interpretations, and conclusions appropriate to the context (Luckin et al., 2016). In this way, AI based visualization supports critical thinking and creativity in history learning.

Digital Inquiry Learning and Learner Autonomy

Qualitative research findings indicate that AI-assisted digital inquiry learning significantly increased student autonomy and participation in the learning process. Students were more motivated and willing to ask questions, select appropriate digital resources, and present their analyses with minimal support from the instructor.

This is consistent with constructivist learning theory, particularly Vygotsky's mediated learning theory, which states that tools function as thinking partners that can expand students' capabilities (Vygotsky, 1978). Recent research also highlights that AI-assisted inquiry learning can enhance metacognitive awareness, self-regulated learning, and reflective thinking (Zhai et al., 2023).

In this study, AI functioned as an intellectual companion rather than simply a provider of information. By providing feedback, guiding the inquiry process, and assisting with synthesis,

AI enabled students to become more directly involved in the historical research process. This study supports the view that effective implementation of AI in education requires prioritizing student autonomy and freedom (Aleven et al., 2022).

Implications for AI-Based History Education

Overall, this study's results indicate that AI-based learning models are effective in helping Gen Z students understand history digitally. These models not only improve technical skills in finding, evaluating, and processing historical information available in the digital world, but also foster higher order competencies such as critical thinking, awareness of bias, and independent inquiry (Graesser et al., 2018; Zhai et al., 2023). By providing customizable guidance, comparative source analysis, and contextual explanations, AI acts as cognitive and metacognitive support, encouraging reflective engagement while maintaining the teacher's central role in learning (D'Mello & Graesser, 2012; VanLehn, 2011).

These results suggest that AI based learning is a strategic and forward-thinking approach to history education at the tertiary level. When implemented ethically and openly and supported by digital literacy, AI can enhance historical understanding, critical thinking, and digital responsibility (Selwyn, 2019; Williamson & Eynon, 2020). Furthermore, the results suggest that students benefit most when AI is supported by academic support systems and clear guidance on evaluating digital sources. Such support will enhance students' analytical skills and their ability to navigate complex digital information environments (Kahne & Bowyer, 2017; Wineburg, 2018a). Thus, AI not only delivers measurable learning outcomes but also helps history students become more thoughtful, independent, and digitally skilled, better prepared to face the challenges of an AI driven society.

CONCLUSION

This study confirmed that the introduction of an artificial intelligence (AI) based learning model is effective in supporting students' digital history literacy through a learning process that emphasises the examination of digital materials, the analysis of historical information, the identification of biases, and data-driven visual reconstruction. Integrating AI into history learning not only improves students' academic achievement, but also strengthens their historical thinking and digital literacy, which are essential abilities for learning history in the digital age. The main contribution of this study is the development of a pedagogical framework for AI-based history learning that integrates adaptive digital assistance, AI-based material analysis, historical visual reconstruction, and digital inquiry learning into a single structured learning model. This approach demonstrates that the use of AI in history education can expand humanities learning practices toward more analytical, contextual, and technology-based learning.

However, this study has limitations, including its implementation at a single higher education institution, a quasi-experimental design, and a relatively short learning intervention period. These limitations create opportunities for future research to examine the effectiveness of AI-based learning models through more robust experimental designs, longitudinal studies, and implementation in more diverse educational environments. Future research should also explore ethical and epistemological aspects of the use of AI in history learning. Specifically, these include the possibility of algorithmic bias, the validity of AI based historical interpretations, and the development of students' critical digital literacy when engaging with AI-based historical content.

From a global perspective, integrating AI into history learning is part of a digital education transformation that requires strengthening both historical and information literacy. Therefore, the AI-based learning model developed in this study can be an adaptive educational approach that supports history education that meets the needs of technological developments, the digital information ecosystem, and 21st-century competencies.

REFERENCES

- Aleven, V., McLaughlin, E. A., Glenn, R. A., & Koedinger, K. R. (2022). Instruction based on adaptive learning technologies. *Educational Psychologist*, 57(1), 1–17. <https://doi.org/10.1080/00461520.2021.2008748>
- Baker, R. S. J. d., & Inventado, P. S. (2014). Educational Data Mining and Learning Analytics. In *Learning Analytics: From Research to Practice*. Springer. https://doi.org/10.1007/978-1-4614-3305-7_4
- Boonshoft, M. (2022). Digital History, Social Media, and the Problem of Public Interpretation. *Journal of American History*, 109(2), 345–362. <https://doi.org/10.1093/jahist/jaac210>
- Breakstone, J., Smith, M., Wineburg, S., Rapaport, A., Carle, J., Garland, M., & Saavedra, A. (2021). Students' Civic Online Reasoning: A National Portrait. *Educational Researcher*, 50(8), 505–515. <https://doi.org/10.3102/0013189X211009780>
- Chen, L., Chen, P., & Lin, Z. (2021). Artificial intelligence in education: A review. *IEEE Access*, 9, 71573–71584. <https://doi.org/10.1109/ACCESS.2021.3063475>
- Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and Conducting Mixed Methods Research* (3rd ed.). SAGE Publications.
- Crompton, H., & Burke, D. (2023). Artificial intelligence in higher education: The state of the field. *International Journal of Educational Technology in Higher Education*, 20(1), 22. <https://doi.org/10.1186/s41239-023-00392-8>
- Dane, A. V., & Schneider, B. H. (1998). Program integrity in primary and early secondary prevention: Are implementation effects out of control? *Clinical Psychology Review*, 18(1), 23–45. [https://doi.org/10.1016/S0272-7358\(97\)00043-3](https://doi.org/10.1016/S0272-7358(97)00043-3)
- Dede, C. (2009). Immersive Interfaces for Engagement and Learning. *Science*, 323(5910), 66–69. <https://doi.org/10.1126/science.1167311>
- D'Mello, S., & Graesser, A. (2012). Dynamics of affective states during complex learning. *Learning and Instruction*, 22(2), 145–157. <https://doi.org/10.1016/j.learninstruc.2011.10.001>
- Graesser, A. C., Conley, M. W., & Olney, A. (2018). Intelligent tutoring systems. *International Journal of Artificial Intelligence in Education*, 28(4), 1–26. <https://doi.org/10.1007/s40593-018-0152-9>
- Guess, A. M., Nagler, J., & Tucker, J. A. (2019). Less than you think: Prevalence and predictors of fake news dissemination on Facebook. *Science Advances*, 5(1), eaau4586. <https://doi.org/10.1126/sciadv.aau4586>
- Hake, R. R. (1999). *Analyzing change/gain scores*.
- Hegarty, M. (2019). Learning from visualizations: Insights from cognitive science. *Topics in Cognitive Science*, 11(4), 709–722. <https://doi.org/10.1111/tops.12443>
- Holmes, W., Bialik, M., & Fadel, C. (2022). *Artificial Intelligence in Education: Promises and Implications for Teaching and Learning*. Center for Curriculum Redesign.
- Holstein, K., McLaren, B. M., & Aleven, V. (2018). Student learning benefits of a mixed-reality teacher awareness tool in AI-enhanced classrooms. *International Journal of Artificial Intelligence in Education*, 28(4), 1–25. <https://doi.org/10.1007/s40593-018-0171-6>

- Israel, M., & Hay, I. (2006). *Research ethics for social scientists*. Sage Publications.
- Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed Methods Research: A Research Paradigm Whose Time Has Come. *Educational Researcher*, 33(7), 14–26. <https://doi.org/10.3102/0013189X033007014>
- Kahne, J., & Bowyer, B. (2017). Educating for democracy in a digital age: Confronting the challenges of motivated reasoning and misinformation. *American Educational Research Journal*, 54(1), 3–34. <https://doi.org/10.3102/0002831216679817>
- Kasneci, E. (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>
- Knox, J. (2020). Artificial Intelligence and Education in China. *Learning, Media and Technology*, 45(3), 298–311. <https://doi.org/10.1080/17439884.2020.1754236>
- Korniienko, S. S. (2025). Digital history pedagogy in higher education: a PRISMA-compliant systematic review of empirical evidence (2011-2025). *CEUR Workshop Proceedings*, 4043, 200–235.
- Kozyreva, A., Lewandowsky, S., & Hertwig, R. (2020). Citizens Versus the Internet: Confronting Digital Challenges with Cognitive Tools. *Psychological Science in the Public Interest*, 21(3), 103–156. <https://doi.org/10.1177/1529100620946707>
- Leu, D. J., Forzani, E., Rhoads, C., Maykel, C., Kennedy, C., & Timbrell, N. (2015). The new literacies of online research and comprehension: Rethinking the reading achievement Gap. *Reading Research Quarterly*, 50(1), 37–59. <https://doi.org/10.1002/rrq.85>
- Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B. (2016). *Intelligence Unleashed: An Argument for AI in Education*. Pearson Education.
- McGrew, S., Breakstone, J., Ortega, T., Smith, M., & Wineburg, S. (2018). Can Students Evaluate Online Sources? Learning from Assessments of Civic Online Reasoning. *Theory & Research in Social Education*, 46(2), 165–193. <https://doi.org/10.1080/00933104.2017.1416320>
- Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). *Qualitative data analysis: A methods sourcebook* (3rd ed.). Sage Publications.
- Nygren, T., & Vikström, L. (2013). Treading Old Paths in New Ways: Upper Secondary Students Using a Digital Tool of the Professional Historian. *Education Sciences*, 3(1), 50–73. <https://doi.org/10.3390/educsci3010050>
- Nyhan, B. (2023). Leveraging AI for digital literacy: Experimental evidence on detecting misinformation and bias in digital history. *Journal of Media Psychology*, 35(2), 88–104. <https://doi.org/10.1027/1864-1105/a000342>
- Rouet, J.-F. (2006). *The Skills of Document Use: From Text Comprehension to Web-Based Learning*. Lawrence Erlbaum Associates.
- Saldaña, J. (2021). *The coding manual for qualitative researchers* (4th ed.). Sage.
- Seixas, P., & Morton, T. (2013a). *The Big Six Historical Thinking Concepts*. Nelson Education.
- Seixas, P., & Morton, T. (2013b). *The big six historical thinking concepts*. Nelson Education.
- Selwyn, N. (2019). *Should Robots Replace Teachers? AI and the Future of Education*. Polity Press.
- Sugiyono. (2022). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D* (3rd ed.). Alfabeta.

- VanLehn, K. (2011). The relative effectiveness of human tutoring, intelligent tutoring systems, and other tutoring systems. *Educational Psychologist*, 46(4), 197–221. <https://doi.org/10.1080/00461520.2011.611369>
- VanSledright, B. A. (2014). *Assessing Historical Thinking and Understanding: Innovative Designs for New Standards*. Routledge.
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.
- Williamson, B., & Eynon, R. (2020). Historical threads, missing links, and future directions in AI in education. *Learning, Media and Technology*, 45(3), 223–235. <https://doi.org/10.1080/17439884.2020.1798995>
- Wineburg, S. (2018a). *Why Learn History (When It's Already on Your Phone)*. University of Chicago Press.
- Wineburg, S. (2018b). *Why learn history (when it's already on your phone)*. University of Chicago Press.
- Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education. *International Journal of Educational Technology in Higher Education*, 16(1), 39. <https://doi.org/10.1186/s41239-019-0171-0>
- Zhai, X., Chu, X., Chai, C. S., Jong, M. S. Y., Istenic, A., Spector, J. M., Liu, J., & Yuan, J. (2023). A review of artificial intelligence in education from 2010 to 2020. *Computers & Education: Artificial Intelligence*, 4, 100124. <https://doi.org/10.1016/j.caeai.2023.100124>