Redefining Teaching and Learning Mini Review: The Role of AI and Digitalization in Visual Art Pedagogy

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ABSTRACT

This mini review aims to examine the current role and potential of artificial intelligence (AI) and digitalization in visual art pedagogy, particularly in shaping competencies in digital visual culture, the use of educational frameworks, digital art techniques, and AI applications. A comprehensive literature review was conducted using databases such as Scopus, Web of Science, and Google Scholar, focusing on peer-reviewed articles published after 2015. Relevant keywords such as "artificial intelligence," "digitalization," "art pedagogy," and "learning" were used to filter suitable studies. The findings indicate that AI holds significant potential to enrich personalized learning, enhance creative expression, and support inclusive education through technologies like generative AI, AR/VR, and digital design tools. However, several critical challenges were also identified, including technological access gaps, ethical concerns, teacher readiness, and ongoing debates on artistic authenticity and integrity in the AI context. The lack of empirical data especially longitudinal and classroom-based studies reveals a knowledge gap in evaluating the true effectiveness of AI integration in visual arts. Therefore, this review recommends that future research focus on developing hybrid pedagogical models that balance human creativity with technology, expanding professional training for educators, and formulating ethical guidelines to ensure AI adoption in visual art education is effective, equitable, and culturally relevant.

Keywords: Artificial Intelligence, Digitalization, Art Pedagogy, Visual Education.

INTRODUCTION

The integration of artificial intelligence (AI) and digital technologies in education is transforming how knowledge is delivered, accessed, and experienced. Nowhere is this transformation more apparent than in the field of visual art education, where digitalization is reshaping traditional pedagogical practices and introducing new modes of creative expression and engagement (Bedir Erişti & Freedman, 2024; Mon et al., 2023; Pahel et al., 2024; Yambal & Waykar, 2025). As AI tools become increasingly accessible, their potential to assist, augment, or even challenge conventional teaching and learning in the arts has become a subject of growing academic and practical interest (Ahmed et al., 2024; Le & Taherdoost, 2025; Pahel et al., 2024; Panjabi et al., 2024).

This mini review explores the evolving role of AI and digitalization in visual art pedagogy, focusing on how these technologies influence teaching strategies, learner engagement, and creative processes. Despite the growing presence of digital tools in classrooms and studios, there remains a lack of consolidated knowledge on how AI specifically intersects with art education particularly regarding its pedagogical implications, ethical considerations, and cultural impact (Alonso-Martínez et al., 2024; Park, 2023; Pernencar et al., 2025)

The review aims to address this knowledge gap by examining current trends, highlighting key developments, and identifying unresolved questions and emerging debates. Among these are contrasting perspectives on whether AI enhances or diminishes human creativity, the tension between traditional and digital art instruction, and concerns about accessibility and equity in technology-enhanced learning (Aru, 2025; Jia et al., 2024; Nyholm, 2024; Vecherin & Yagolkovskiy, 2024)

This review will cover four main thematic areas: (1) the integration of AI in visual art curricula, (2) digital tools as pedagogical aids, (3) the impact of AI on artistic creativity and expression, and (4) the challenges and ethical

dilemmas faced by educators. In doing so, it presents insights to help educators, researchers, and policymakers better understand and navigate the digital transformation of visual art education (Bhatti & Zakariya, 2024; Hu & Li, 2025; Rani et al., 2023; You, 2025)

METHODS

A comprehensive literature search was conducted using Scopus, Web of Science and Google Scholar. Keywords such as

"artificial intelligence" OR "ai" OR "machine learning" OR "deep learning") AND ("digitalization" OR "digital transformation" OR "digitization" OR "technology") AND ("visual art" OR "art education" OR "art pedagogy" OR "art teaching") AND ("pedagogy" OR "instruction" OR "learning" OR "curriculum") AND ("creativity" OR "innovation" OR "expression" OR "design")artificial intelligence, digitalization, art pedagogy and learning were utilized to collect relevant articles. Various types of articles, including original research, systematic reviews, meta-analyses, were considered for this mini review.

Below, we provide the inclusion and exclusion criteria for studies in this review article.

Inclusion Criteria

Based on the defined inclusion criteria, the mini review synthesizes studies that explore the integration of AI and digitalization in visual art pedagogy.

- Studies discussing various aspects of visual art education examined how pedagogical strategies have evolved with digital technologies, including virtual classrooms, digital drawing platforms, and online collaboration tools (Anatoliivna et al., 2020;Bhatti & Zakariya, 2024; Hu & Li, 2025; Chen et al., 2022). These studies highlight the growing emphasis on creativity, flexibility, and learner autonomy in the digital era.
- Studies focusing on the application of AI tools (e.g., ChatGPT, DALL·E, DeepArt) in art education revealed innovative uses of generative AI for enhancing visualization, art critique, and personalized learning experiences. Such tools were found useful in developing conceptual thinking and providing instant feedback.
- Studies analyzing the strengths, limitations, and potential applications of AI reported that AI can foster creative thinking, broaden access to art education, and support differentiated instruction. However, limitations include ethical concerns, over-reliance on technology, and reduced human interaction in creative processes.
- Studies published in English provided a range of perspectives, but collectively acknowledged the need for deeper pedagogical frameworks to guide effective AI integration.

Despite promising developments, gaps remain in understanding the long-term impacts of AI on artistic identity, student-teacher dynamics, and curriculum design. There is also inconsistency in how effectiveness is measured across studies. Future research should prioritize longitudinal studies, focus on diverse educational contexts, and explore hybrid pedagogical models that balance human creativity with AI augmentation.

Exclusion Criteria

To ensure the mini review remained focused, methodologically sound, and academically rigorous, several exclusion criteria were applied during the selection of sources for Redefining Teaching and Learning: The Role of AI and Digitalization in Visual Art Pedagogy:

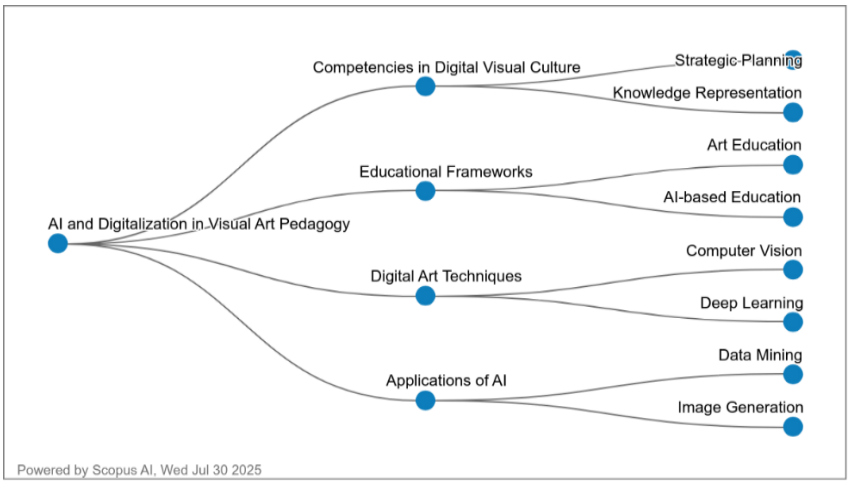
- Studies published in languages other than English were excluded to avoid translation inconsistencies and to ensure the review only included materials accessible to an international academic audience.
- Studies that discussed visual art education or pedagogy without explicit reference to artificial intelligence, machine learning, or digital tools were excluded. This criterion ensured that only literature directly relevant to the review's core themes was considered.

- Grey literature, including conference proceedings, theses, preprints, blog articles, and unpublished reports, was excluded. This was done to maintain a high standard of evidence, limiting the review to peer-reviewed and academically validated publications.
- Outdated studies that predate recent developments in AI and educational technology (typically before 2015) were also excluded, unless cited for historical context, to ensure the review reflects current advancements and debates.
- Duplicate studies or papers with overlapping data were excluded to prevent redundancy and bias in synthesis.

These exclusion measures helped refine the scope of the review, enhance its reliability, and align the analysis with contemporary research priorities in digital art education

DISCUSSION AND RESULT

Fig.1. AI and digitalization in visual art pedagogy concept map generated by Scopus AI



Current Status of AI and digitalization in visual art pedagogy based on theme competencies in digital visual culture

Artificial Intelligence (AI) and digitalization are transforming visual art pedagogy by fostering competencies in digital visual culture skills in interpreting, creating, and engaging with digital imagery. Current educational contexts emphasize AI-driven tools that personalize learning, stimulate creativity, and support inclusive art education. Key technologies include generative AI, AR/VR, and digital portfolios. Benefits include enhanced engagement and accessibility, while challenges involve ethical use, equity, and teacher preparedness. Debates persist over AI's role in artistic authenticity. Research gaps remain in empirical evaluations and long-term impacts. Future directions call for cross-disciplinary collaboration, teacher training, and ethical frameworks to advance equitable, culturally responsive digital art education.

Current Status of AI and digitalization in visual art pedagogy based on theme education frameworks

AI and digitalization are redefining visual art pedagogy through education frameworks such as Constructivism, Technological Pedagogical Content Knowledge (TPACK), and 21st Century Skills. These frameworks support learner-centered, technology-integrated instruction, fostering creativity and critical thinking. Key technologies—AI generators, VR/AR, and digital design tools—enhance visual learning experiences. Benefits include personalized learning and multimodal engagement; however, challenges involve digital literacy gaps, access disparities, and ethical concerns. Debates arise around AI's impact on authorship and creativity. Research lacks longitudinal data and classroom-based evidence. Future directions involve refining pedagogical models, expanding teacher training, and ensuring equitable digital access to fully harness AI's potential in art education.

Current Status of AI and digitalization in visual art pedagogy based on theme digital art technique

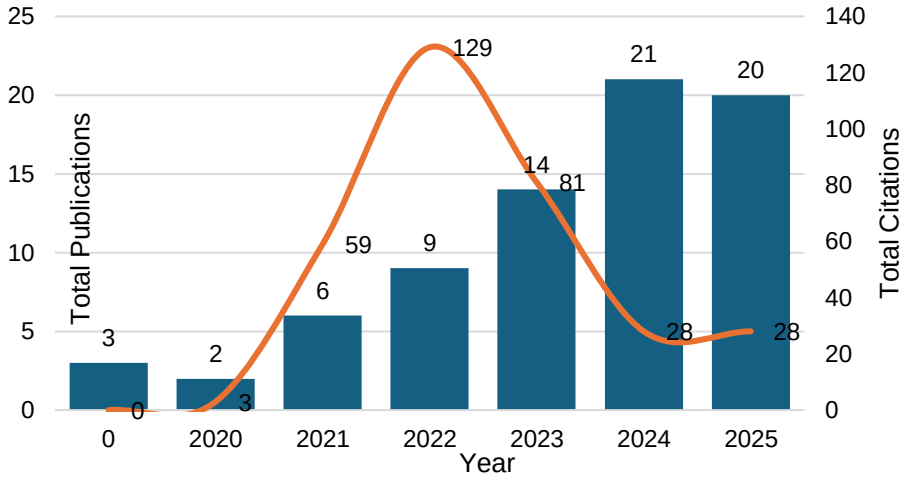
AI and digitalization are reshaping visual art pedagogy through the integration of digital art techniques such as digital painting, 3D modeling, and AI-generated imagery. These methods foster creativity, collaboration, and

critical visual literacy in classrooms. Emerging technologies—like AI art generators, AR/VR tools, and stylus-based tablets—enhance engagement and accessibility. While benefits include personalized learning and expanded artistic expression, challenges involve digital equity, ethical concerns, and teacher readiness. Debates center on originality and the human role in AI-assisted creation. Current gaps include limited empirical classroom research. Future directions suggest designing inclusive curricula, strengthening teacher training, and developing ethical guidelines for responsible digital art integration.

Current Status of AI and digitalization in visual art pedagogy based on theme application of AI

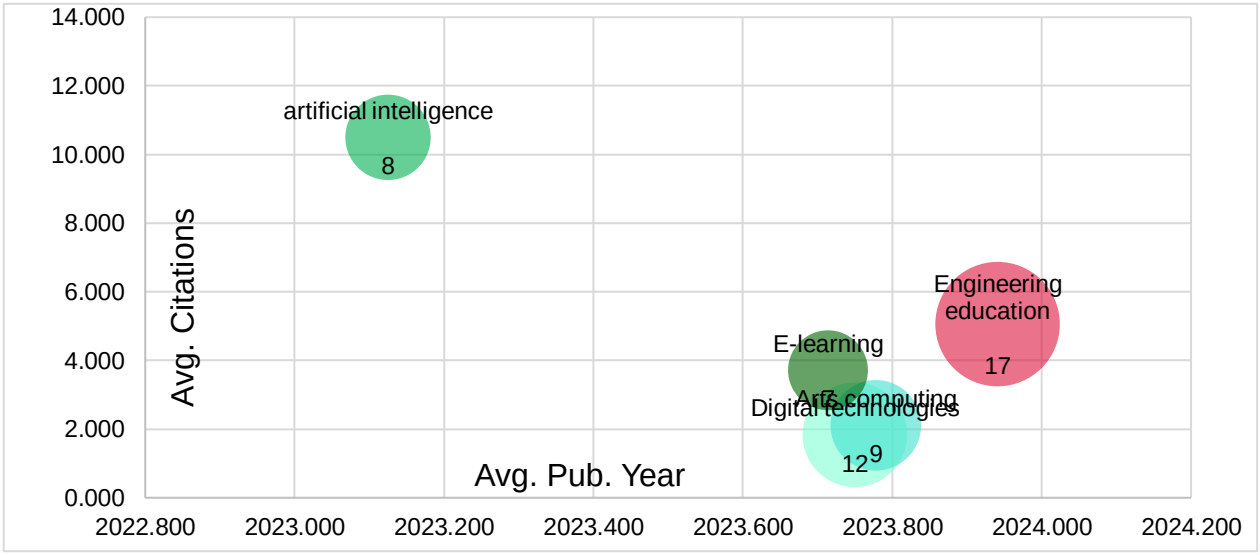
AI applications in visual art pedagogy such as image generation, style transfer, and intelligent tutoring are reshaping how art is taught and learned. These innovations promote creative exploration and individualized feedback in educational contexts. Key technologies include generative AI, AR/VR, and adaptive learning platforms. Benefits include increased engagement and inclusive learning; challenges involve ethical dilemmas, authenticity debates, and teacher preparedness. Controversies focus on AI's influence on originality and artistic integrity. Research gaps remain in pedagogical integration and learner outcomes. Future directions suggest developing ethical frameworks, advancing teacher training, and exploring AI's role in enhancing critical visual literacy across interdisciplinary and culturally diverse settings.

Fig. 2. Total publication in year 2020 to 2024



The chart shows a steady increase in publications from 2020 (2) to a peak in 2024 (21), with citations peaking earlier in 2022 (129). Despite high publication counts in 2024 and 2025, citation numbers dropped significantly to 28. This suggests recent publications have had less academic impact compared to earlier works.

Fig. 3. Average publication by keywords



The bubble chart shows "Artificial Intelligence" as the most cited topic (avg. ~10 citations), despite having an earlier average publication year (~2023.2). "Engineering Education" has the highest number of publications (17) but moderate citations (~5.5). Emerging topics like "Digital Technologies", "E-learning", and "Arts Computing" show lower citation averages, indicating newer, less-cited research areas.

CONCLUSION

In conclusion, this mini review highlights how AI and digitalization are transforming visual art pedagogy, particularly in shaping competencies in digital visual culture, educational frameworks, digital art techniques, and AI applications. The review demonstrates AI's potential to enrich creative expression and personalized learning, yet challenges such as digital access gaps, ethical issues, and debates over artistic authenticity persist. A lack of longitudinal data and classroom-based research was also identified.

Moving forward, the development of **hybrid pedagogical models** that combine human-centered approaches with AI-driven personalization should be a key priority. Furthermore, **interdisciplinary collaboration**—bringing together art educators, technologists, ethicists, and policymakers—will be essential to building ethical and culturally responsive frameworks for AI use in art education. Equally important are **teacher training modules, professional development strategies, and policy guidelines**, which will support sustainable integration across diverse educational contexts. Finally, future studies should establish **standardized metrics** for evaluating creativity, authenticity, and learner outcomes, ensuring that AI-assisted visual art education remains effective, equitable, and student-centered.

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