

Research on the Application of Artificial Intelligence (AI) in (K-14 to K-18) Art Education

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Abstract. This paper investigates the educational integration of Artificial Intelligence (AI) in high school art education and examines AI's roles in teachers' and students' classrooms. A snowball sampling method was selected, covering 25 participants from developed areas in China, including six teachers and 19 students. Participants are categorized by familiarity with AI tools such as ChatGPT and DALL-E, which are conducted as an assessment and creative exercise. The results showed that, although 55% of teachers used AI to offer formative feedback, 24% feared that students might become overly dependent on AI scribes and lose some of their spontaneous creative instincts. Meanwhile, 52% of students said AI helped them more effectively generate and refine creative documents. The study concluded that, when AI comes to art education, it can be both a boon and a bane: it has the potential to enhance creativity but may threaten the integrity of the learning process

Keywords: AI in education, art education, teaching tools, generative AI, teacher-student dynamics

1. Introduction

The motivation of this study was to explore and understand the current state of the usage of AI in art education practices. The research examines both on the part of students and teachers. We discovered that AI is increasingly important in education in general. Still, interest in interrogating AI's role in creative disciplines such as art is growing fast.

However, the primary focus has remained: art teachers impart their knowledge to high school students through the creative process or making art under teacher supervision. Drawing on the interviews documented and analyzed, along with other informal field notes, we offer a brief assessment of the theoretical stakes involved in considering AI's development in the context of school art programs. This study will focus on the specifics of potential art education in high school. As the development of AI provides educators with efficient grading tools and the usage of AI-generated images from students in the classroom, the education industry needs to pay more attention to how students and teachers are being impacted.

In this paper, we identify the emergent trends, main pitfalls, and opportunities of using AI in high school art classes based on students' and teachers' responses in art classes where AI has been introduced. Our research proposes solutions to improve learning in art classes through AI and further enhance creativity in art classes based on these experiences. The main research contribution and goal is to help art teachers and designers of AI software and platforms better understand how to apply AI in art classes.

Participants were recruited through the snowball sampling technique via social media channels. Our first participants were people we knew, and their list grew. Finally, there were 25 participants in our pool. These participants consisted of six high-school art teachers (ranging in experience from three to nine years of teaching experience) and 19 students who had recently used AI tools such as ChatGPT and DALL-E in their education, particularly in learning about interface design – a growing field in which various AI approaches are being applied. Most participants were from developed regions in China and were relatively familiar with artificial intelligence.

The study presented a profound picture of AI's potential role in art education. It showed that 55% of teachers used AI for formative assessment of student work and helped students course-correct; However, 55% of teachers also agreed that AI feedback can undermine their confidence in students' levels in their artistic intuition. If teachers present AI as an automated tool, seen as an inevitable

reality, AI might likely lead students to over-rely on it. 55% of teachers were open and shoulder expectations of more AI integration in teaching but worried about cheating. Student responses were more positive than teachers. 42% of students reported that they found AI tools helpful in generating creative ideas. However, teachers tended to be cautious in that they worried about the potential of AI to make everything the same – automated and delivered by machine learning- and that it may lead to the ‘flattening’ of how creativity is manifested in learning. This difference of perspective presents the complexity of AI’s potential role in shaping the future of art education.

Finally, we discuss the key themes explored in our study:

In art education, we delved into several topics related to AI, such as how students and teachers viewed the use of AI as part of the creative process – as an asset, where creativity and freedom of expression were enhanced, or as a threat, where creativity and freedom of expression were undermined. Meanwhile, a focus on the possible ethical concerns in the application of AI in art education. This work further elaborates that the emerging AI-supported creativity and project generation are prime examples of how AI may shape the future of art education.

Focused on these four themes, our research questions are:

1. How are teachers and students today using AI tools in art lessons?
2. How can the application of AI improve the learning experience of high school students?
3. What is the feedback from teachers and students toward integrating AI in high school art education?

If we can critically address these questions, our research provides one piece in the puzzle of understanding how AI could reshape the art education experience by filling gaps and imparting new opportunities in the field. As art educators and policymakers help shape a cultural climate in which AI is integrated into creative learning, our findings can inform and refine strategies for making incorporation compatible with core values of art education and maximizing AI's benefits for our learners' creativity.

2. Related Works

There is a massive potential for AI in art education; in its current stage of development, an AI tool will help an art student develop new ideas for design, generate other compositions, or analyze the student's output.

Based on recent survey observations by Lo CK (2023), AI tools like ChatGPT, which helps with the search for types of information, among others, help to automate repetitive work and shorten the time needed for that process, which in turn gives more free time to research and create. The more AI helps with repetitive and rote work on items, the more an artist can focus on abstract and conceptual ideas when creating, gaining a deeper connection with the subject matter and having more time to experiment. Zhai et al. (2021) suggest that the misapplication of AI might change the teacher-student dynamic and potentially pose ethical dilemmas regarding indoctrination. Furthermore, while the advantages of AI in education – such as the potential for greater efficiency and creativity – do seem real, they are by no means unproblematic.

Tasks involving technical challenges will be lessened. Sannikov (2024) explains: 'A reduction in cognitive load allows students to work more effectively on creative tasks because they can use the time saved to engage in creative work.' More of the class will be able to be used for the subject at hand, not for producing the images, as ultimately could be the case with AI-based art classes. As Byrne (2022) claims, you could argue that typing a prompt and getting an expert-level reply in return 'represents a form of creative thinking.' So, in a sense, AI research has the potential to empower creativity within an arts-education setting: providing students with field information is a form of creativity facilitation since that information is not as accessible without more time and energy spent conducting research.

Soewandi, Danial, and Achmad (2024) carried out a systematic literature review into the 'generative potential of AI to produce new compositions in the arts and the aid that AI can give in the

arts without showing a bias towards the artist's role.' One way in which AI tools allow students to iterate quickly and efficiently is to 'provide as many iterations for the student as they want or need.' The researchers say this helps artists and designers experiment with new ideas and perspectives within the curriculum, making the creative process more accessible for teachers and students. Generative AI can be used as a pedagogically supportive tool in arts curricula. Sáez-Velasco et al. (2023) pursued a similar line of investigation when they asked educators and students to evaluate how they think AI technologies could (and should) support collaboration and creativity in the classroom setting. Students using text-to-image and image-to-text machines such as DALL-E2 regularly conceptualize abstract topics that can be digested and explored in material form. Given the iterative process of productions, experimentations, and variations in the currency of artistic bravery, students are sorely aided by such technologies.

Huang (2022) also describes how Generative Adversarial Networks (GANs) and Augmented Reality (AR) prompt students to make new creative connections with existing digital art tools: GANs ask the students to input creative keywords to generate new works, while AR allows students to immerse themselves within virtual 3D spaces to manipulate a digital artwork daily. Recent research on AI as a tool for creative learning also sheds light. Hutson (2023) details case studies of how generative art tools can foster creative and critical thinking in students, helping them examine artistic problems from new angles and devise new ways of solving design challenges or expressing an idea visually. AI tools can function as new routes to creativity, providing new ways for students to interact with art.

Nevertheless, on the one hand, the increasing use of AI in education in its various forms could dissipate 'human skills' at the core of art-making. Raising doubts and tensions regarding the way forward, Black and Chaput (2023) note that using tools like AI in teaching and learning could lead to a double bind where AI is used as a tool that enhances teaching and learning but at the same time draws the focus away from the inherently human skills of art-making, specifically 'what' and 'how' people make things. In an article for McGraw Hill, Holmes and Tuomi (2021) describe the general humanizing potential of AI in education: 'A predominant commercial benefit of AI is to make instruction personalized at scale, providing deeper engagement and improving student outcomes through learning tuned to the individual needs of children'... socially constructed approaches to art-making can be taught through applying personalized feedback based on data. In art education specifically, AI can help learners access their creativity at the human scale, as their data can be used to provide personalized feedback, and vast datasets can underlie these humanizing learning activities.

Several aspects of the application of AI in education are helpful to students. Although many problems can be solved from the ethical perspective of AI in education, Fan Ke (2023) discusses several issues, including data privacy and intellectual property, and some teachers may feel the threat of being abandoned by technology. Fear of replacement plays a dominant role in the process. Though AI can support creativity or teaching efficiency in art education, it is necessary to experiment carefully so as not to damage its values. The current AI education-art literature provides a complex picture whereby AI is a force for creativity, learner personalization, collaboration, and a slippery ethic and fit. Current research must be attentive to how AI can and should be used to support creativity and learning at younger ages in K-14 to K-18 art teaching and learning.

3. Methods

The research objective was to understand how high school art teachers and students perceive the impact of AI tools on art education. The research explored how integrating AI tools into the art classroom will contribute to art education and what challenges or concerns the teachers and students predict. Through the following, the research elaborates and identifies the data collection method and analysis.

Recruitment: Teachers and students, including high school art teachers and students across China, were recruited for the study via social media. The general recruitment method was 'snowball

sampling,' where the researchers contacted a few people they knew, whether teachers, students, community members, family, or friends. The group of participants grew from that starting point. The final group consisted of 25. 6 participants were high school art teachers, and 19 were students.

The demographic of the survey takers is mostly from developed regions in China, with a decent understanding of Artificial Intelligence.

Participants: The participants included high school art teachers who had taught art for at least three years and high school students who have recently used AI tools in their art education (ChatGPT, DALL-E, other generative AI) and can discuss the learning experience with their instructor. Most of these instructors and students are working on/studying interface design, which is the frontier in applying AI to produce new designs for websites and interfaces.

Data Collection: Surveys and semi-structured interviews with learners and experts were used to collect qualitative data from participants to determine their early perceptions of AI in art education and elicit their opinions on using AI as a creative and learning tool. We have included all the questionnaires in Appendices A and B.

- **Surveys for Students:** We asked when and how they used AI tools in writing class, what they felt it contributed or took away from their creativity, and if they thought AI tools helped or hindered them as writers. Questions such as (Appendix A):

1. Did you know about AI products when you were in high school? (Single choice)
2. Have you used AI products when you were in high school? (Single choice)
3. Did you use AI for artistic creation when you were in high school? (Single choice)
4. What is your primary artistic research direction? (Single choice)
5. Can AI help your artistic creation? (Single choice)
6. How does AI help your artistic creation? (Multiple choice)

- **Teacher Surveys:** Teacher surveys probed data related to how AI changes teacher pedagogical practice, their perception of how they and students collaborate with AI, and any issues they have with incorporating AI into their teaching curriculum, such as (Appendix B):

1. Have you ever come into contact with AI products? (Single choice)
2. What is your attitude towards AI? (Single choice)
3. What is the reason for your optimism? (Multiple choice)
4. What is the reason for your pessimism? (Multiple choice)
5. Have you ever thought about using AI to assist you in teaching? (Multiple choice)
6. If so, how can we help you? (Text entry)
7. What do you think about the future development of AI? (Text entry)

4. Results

In this section, we share the results of our data collection from instructors and students. We first summarize them and then proceed to analyze them according to the most significant insights we found regarding the use of AI as an assessment tool, trends in the way AI tools are being used in art classrooms today, the contrast of the teachers' and students' perceptions of AI in Art Education.

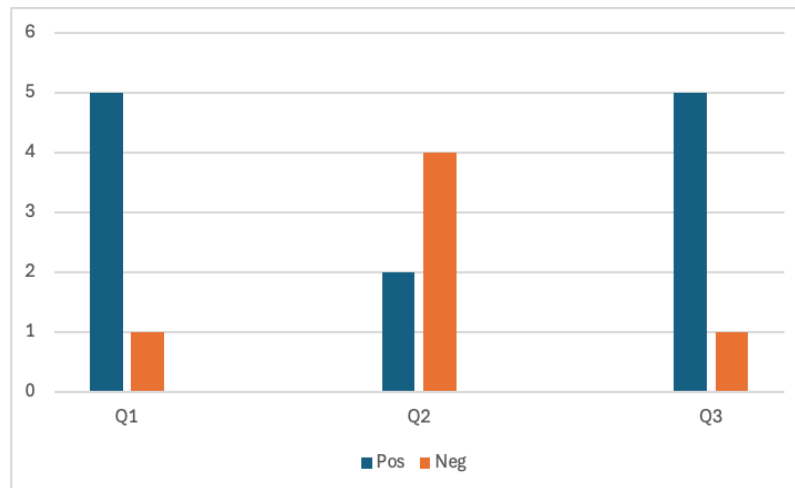


Figure 1. Summary of Attitudes Towards AI (Teacher)

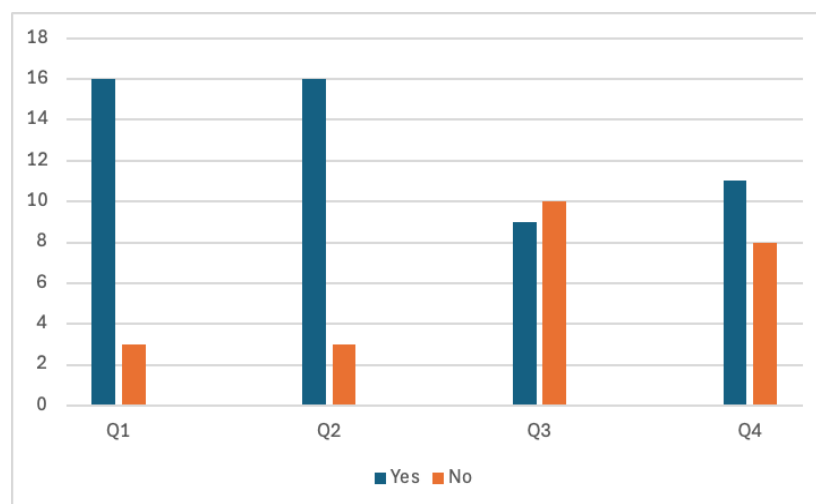


Figure 2. Summary of AI Involvement in Art (Student)

Our subsequent analysis of the two survey sets—based on the responses of six high school art teachers and six students—helped reveal insights about how AI is being incorporated into the structure of art education and the potential benefits and challenges that come with it. All collected data is included in Appendix C and D, with a summary of the results shown in Figures 1 and 2 above and an analysis of the results presented according to their significant insights.

Insight #1: AI as an Assessment Tool

An important insight was the potential of AI in summative and formative assessment. 55% of the teachers reported using AI tools to give students formative feedback on work in progress. One teacher used AI to analyze her students' compositions and give feedback on balance and visual harmony. This allowed her to focus on more personalized input due to the help provided by the AI assistant, which gave more general advice.

As one teacher said: "(AI) needs to be used reasonably and should not affect students' creativity."

Not all teachers shared these positive views. 55% of the teachers expressed concern about students developing an overreliance on AI feedback. "If they trust that computer analysis more than their instincts, they could lose confidence in their sense of what works well or what would be a good idea to pursue," said one teacher.

"For example, input your ideas and then generate core ideas," one teacher commented.

Insight #2: Trends of AI Tools in Art Education

Teachers acknowledged AI's role in art education, though opinions varied on its use in the classroom. Students expressed similar views. Many saw AI tools as helpful for refining their skills rather than replacing human artistic practice.

While 55% of teachers said they would like to understand better how to use AI effectively in teaching and are considering incorporating AI in their daily education, students focused on maintaining their individuality. Over 33% of teachers expressed concerns about the potential use of AI for cheating, which can ruin the trust between the two entities.

Insight #3: Perceptions of AI Tools in Art Education

The most notable result was how differently teachers and students responded to AI. Among the student respondents who had AI as part of their Art course, 52% claimed that AI art tools such as DALL-E or ChatGPT are beneficial at least once in generating creative outputs for their assignments. These students also reported that AI helped them create initial ideas quickly, which could then be refined: 56% said they used AI to generate and refine ideas manually.

One teacher said, "I hope to use the convenience brought by AI to improve social development rather than use it for illegal or unethical actions." Meanwhile, another teacher also claimed, "It needs to be used reasonably and should not affect students' creativity."

These competing perspectives suggest that, while students perceive technological assistance as facilitating creativity, teachers fear that AI could blur the creative learning process and lead to standardization in student output.

5. Discussion

In the previous sections, we have shared the results from our surveys, together with an analysis of the main insights we found regarding the use of AI as an assessment tool, trends in the way AI tools are being used in art classrooms today, the contrast of the teachers and students' perceptions of AI in Art Education, and the process of overcoming the fear of replacing art teachers with AI alternatives. In this section, we discuss how AI can serve as a support tool for high school art teachers to assess their students, the ethical concerns of AI-generated work regarding plagiarism, and AI's potential for enhancing creativity.

We have found that students and teachers alike expressed confidence that, with time, AI will have a place in art education, but they suggested different ways in which it might be applied. Students indicated their enthusiasm for AI tools that might provide more sophisticated automated feedback to them or design more personalized lessons. This is consistent with the findings of Huang (2022), who does not just consider current AI tools but instead explores ways in which more advanced AI technologies – such as GANs and AR – could be used to immerse students in playful, interactive art-learning experiences.

5.1. AI Assessment Support

Teachers and students reported that AI can effectively be used as a summative and formative assessment tool in art classes. Some teachers in this research had already started using AI to provide formative feedback on student writing, a feedback practice that was commonly used by the participants surveyed and was described by many of them as a time-saving way to generate formative feedback on students' work, particularly technical issues related to elements such as balance and proportion in visual arts.

We have seen in the related literature that researchers (Holmes & Tuomi, 2021) believe that AI can be used in education, with the great potential of AI to provide a personalized experience for learners and create a space for feedback to be provided and analyzed in real time. Nevertheless, we acknowledge that AI has proven for surface-level adjustments but could lack the capacity to deeply understand the 'why,' as the research by Hutson showed in 2023. Considering this, we think more research should be done in this direction because of the exciting benefits it would introduce to art classrooms.

5.2. Ethical Concerns

Scholars have analyzed the use of AI tools as a potential risk for intellectual property, with studies suggesting that students could be passing off work in their name that was generated by AI (Ke, 2023). Our study participants also reported concerns about the ethical implications of using AI-generated work. We found that students were primarily open about using AI, and many admitted to using AI tools for their visual arts when filling backgrounds or outlines but drawing the rest themselves. Teachers felt themselves questioning the line between work enhanced with AI and student-generated work, and with good reason: other researchers have found that AI leaves authors struggling with the boundaries of creativity and authenticity of art.

Holmes and Tuomi (2021) confirm that ‘as more students are given more AI tools in their classrooms, AI tools will need to be regulated by standards for ethical use. Developing clear guidelines and policies on AI use in art classes is an essential next step. As more schools adopt AI, they must establish guidelines defining the parameters of acceptable AI-aided work. Students should still, of course, be engaging in the hands-on creative process. Our study supports this idea, showing how students and teachers are interested in having rules in art education for how AI tools should and should not be used in art classrooms.

5.3. AI’s Role in Enhancing Creativity

In our study and Sáez-Velasco et al.’s review (2023), students reported using AI to quickly ‘generate ideas’ refined by manual editing, suggesting that AI can function as an ideation tool. There is an exciting opportunity to use AI to empower students to foster critical and creative thinking, providing ‘new opportunities for creativity’ by providing immediate visual feedback for students.

We understand that alongside this excitement are fears about over-reliance, with students and teachers expressing anxieties about how AI might make it unnecessary to fully engage in one or more of the lenses of the copybot model, thereby shortchanging students’ engagement with essential aspects of the creative process. However, constructing more Art-generating-oriented AI models will allow art students who do not have a solid foundation to express their ideas to their teacher more specifically and directly; the use of AI art does not need to be a restraint on enhancing creativity; instead, it is an excellent opportunity for people who do not know art much to be able to present their ideas a to the world. The process of sharing and improving is an essential part of art creation. AI can potentially assist people with a more accessible communication channel in art creation, which might allow a more innovative and enormous artist population in this generation.

6. Conclusion

In this study, we have focused on how teachers and students use today’s AI tools, how they might improve the learning experience of high school art lessons, and their suggestions about integrating them better. We conducted two separate surveys for students and teachers, with 25 participants from art institutes. The results we shared classified them into we found regarding the use of AI as an assessment tool, trends in the way AI tools are being used in art classrooms today, and the contrast of the teachers’ and students’ perceptions of AI in Art Education.

We have discussed the future trends of AI in art classrooms, including using AI as a support tool for high school art teachers to do summative and formative assessments. We also looked into the ethical concerns of AI-generated work regarding plagiarism and the need for clear guidelines for teachers and instructors regarding what is considered fair use. We also discussed the exciting potential of AI tools to enhance creativity in tasks such as ideation.

Future research is needed to investigate how AI can be designed into pedagogic artifacts in art education under conditions that both facilitate uses that stimulate creativity and the development of artistic thinking and ‘doing’, and foresee and address the accompanying ethical and practical challenges, with new research about the longer-term effects of AI on student creativity and artistic growth,

To sum up, though AI has the potential to impact art education, incorporating it in the classroom positively requires mindful considerations of ethical dilemmas and creating a proper equilibrium to maintain creativity in students along side technicality as AI enriches the learning of students only through them and is not a replacement by any extent of means.

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