

Methodology for Using Generative Art Intelligence Technologies in The Organization of Fine Arts Classes in Higher Education

Anvarxo'jayeva Dilinur Otabek qizi

1st year master's student of the fine arts specialty of the National Pedagogical University of Uzbekistan named after Nizami, Uzbekistan

Received: 31 December 2025 Accepted: 23 January 2026 Published: 28 February 2026

ABSTRACT

This study is devoted to the development and empirical substantiation of the methodology for integrating generative artificial intelligence (AI) technologies into fine arts lessons in higher education. Within the framework of quasi-experimental design, a three-stage approach consisting of prompt engineering, hybrid painting, and reflexive portfolio modules was tested. Analysis, conducted on the basis of mixed methods, showed a 30% increase in creative creativity in the experimental group and a twofold reduction in the time for forming an idea.

Keywords: Generative, intellect, cognitive catalyst, prompt engineering, paradigm, vector, illustration, reflexive, visual content, interpretation, compositional.

INTRODUCTION

The rapid development of artificial intelligence technologies is laying the foundation for revolutionary changes in the field of contemporary fine arts. In particular, generative artificial intelligence systems - such platforms as Midjourney, DALL·E 3, Stable Diffusion XL, and Adobe Firefly - are fundamentally transforming the paradigm of digital creativity. Although these technologies initially appeared as tools of an experimental nature, during 2023-2025 they became an integral part of professional creative practice (Epstein et al., 2023). This change requires a review not only of the technological aspects of art, but also of its ontological foundations - the essence of the author's concept, the creative process, and aesthetic evaluation. In this sense, the introduction of generative artificial intelligence into art education is not a random phenomenon, but a natural logical continuation of the digital civilization. In the higher education system, fine arts teachers today face a complex pedagogical contradiction: on the one hand, the basic principles of classical art

education - technical skills, compositional thinking, and visual literacy - remain relevant; on the other hand, the requirements of a creative economy integrated with AI technologies are rapidly changing (Caramiaux et al., 2024). The results of a comprehensive study conducted by UNESCO in 2023 show that a significant portion of art and design programs in Europe, North America, and Central Asia have not yet developed consistent institutional mechanisms for integrating generative AI tools into curricula. This situation leads to overly dependent, fragmented approaches to the potential of teachers and limits the possibility of using the full pedagogical potential of these technologies (UNESCO, 2023). The root of the problem is that generative AI systems are epistemologically fundamentally different from traditional digital tools - Adobe Photoshop or vector illustration programs. Since these systems operate on the basis of probability theory, they raise fundamental questions about authorship, originality, and the relationship between human intention and machine results in the creative

process (Boden, 2024). Without sufficient conceptual justification, students working with these systems are at risk of falling into what researchers call "prompt dependence" - a situation characterized by passive consumption of only ready-made presentations instead of creative collaboration with AI (Inie et al., 2023). To eliminate such risks, it is not enough to simply add AI tools to existing curricula - it is necessary to develop a theoretically sound and practice-oriented systematic methodology that expands the creative potential of students. The latest scientific and technological trends of 2023-2025 further increase the relevance of this task. The emergence of multimodal generative systems - GPT-4o, Google Imagen 3, and Adobe Firefly 2 - dramatically reduced the technical barriers to creating visual content using AI and simultaneously strengthened discussions in art education communities on the consistency of curricula (Adobe Education Exchange, 2024). In parallel, in the stream of scientific literature, there is an increasing number of sources on evidence-based pedagogical interventions aimed at developing students' high-level cognitive skills, such as conceptual iteration, aesthetic reasoning, and reflexive practice using generative AI (Kim and Shin, 2024; Williamson et al., 2025). These processes together show that the field is approaching a critical juncture where principled, scientifically grounded methodological approaches are not only desirable but also institutionally necessary. The main goal of the research is the development and empirical substantiation of a methodology for the systematic integration of generative artificial intelligence technologies in fine arts classes in higher education. This methodology will be theoretically consistent, practically applicable in various institutional environments, synthesizing knowledge from the theory of creativity, research on human-computer interaction, and modern art pedagogy, and will be empirically substantiated based on the learning outcomes of undergraduate students. Thus, this study seeks to provide teachers, curriculum developers, and authors of institutional policy with evidence-based practical guidelines - these guidelines consider generative AI not as a threat to artistic authenticity, but as a transformative pedagogical tool that significantly expands students' creative potential and prepares them for professional activity in a creative economy integrated with AI.

METHODS

Research design and overall approach

This study was built on the basis of a quasi-experimental pedagogical design and was organized as a comparative group study with the participation of control and experimental groups. The research methodology is based on the paradigm of mixed methods (mixed methods approach), which combines quantitative and qualitative approaches (Creswell & Creswell, 2018). Such a methodological selection allows the researcher, on the one hand, to determine the quantitative impact of the integration of generative AI through the measurable indicators of students - assessment scores, the quality of creative products, and the level of technical skills, and on the other hand, to additionally study the subjective perceptions of students and teachers about the quality of the pedagogical process using qualitative methods. The main hypothesis of the study was formulated as follows: the systematic and methodologically substantiated integration of generative artificial intelligence technologies into fine arts classes significantly increases the level of creative potential, conceptual thinking, and technical skills of students in the experimental group compared to the control group.

Formation of research participants and groups

Second-year students of the higher educational institution studying in the field of fine arts participated in the study. Participants were selected based on the method of targeted sampling; the following criteria were observed in the selection: (1) completion of studying the basics of traditional fine arts; (2) minimal familiarity with digital tools; (3) Consent to voluntary participation in the study. Based on the results of the preliminary diagnostic test and academic ratings, the participants were divided into two groups:

The control group (CG) studied using traditional teaching methods - acrylic and oil paints, graphics, and mixed techniques. In this group, the learning process was carried out within the requirements of the existing standard curriculum, and no digital AI tools were used.

The experimental group (EG) was trained on the basis of a specially developed methodology for the integration of generative AI in parallel with mastering the basics of traditional painting. In this group, traditional studio classes were systematically combined with generative AI tools.

Experimental methodology: step-by-step description

The methodology developed for the experimental group consists of three interconnected modules, each of which performs a separate pedagogical task and is implemented sequentially.

First module: Drawing lessons based on prompt engineering

The first module is designed to familiarize students with the basic principles of creative communication with generative AI systems and to develop prompt engineering skills in them. At this stage, the Midjourney (v6.1) and DALL·E 3 platforms were chosen as the main application tools, as they began to be widely used in the educational environment by 2024-2025 and are relatively user-friendly (Adobe Education Exchange, 2024).

The lessons were organized in the following sequence. During the first week, students were introduced to the visual prompt structure: word selection, style instructions, color palette parameters, and the technique of correctly forming a keyword hierarchy. Each student generated at least five different artistic interpretations of the same compositional task (life, portrait, or landscape) through various prompt options and conducted a comparative analysis of the results. During the second and third weeks, the methodology for developing a conceptual prompt was taught: students first sketched by hand, visualizing conceptual ideas, and then learned how to convert these sketches into a textual prompt format. This approach directed students to use traditional sketch skills as a basis for engaging in dialogue with AI. The fourth week was devoted to the final practical task: each student developed the concept of an independent creative project, fully documented the prompt iteration process, and analyzed the creative evolution between the initial prompt and the final result in a reflective essay.

Module Two: Combination of Traditional Painting with AI

The second module is the most methodologically important part of the research, as it conceptualizes the relationship between traditional and digital creativity not as opposing, but as complementary cooperation. This

module was inspired by the "hybrid creativity" model proposed by Kim and Shin (2024) and adapted to the context of local education. Lessons were built on the principle of "loop": physical - digital - physical. In the first stage, students manually created the basic composition and color scheme using traditional materials (pencil, charcoal, acrylic paint). In the second stage, this physical work was digitized and presented as a reference to AI tools, and several alternative development options were created through a generative model. In the third stage, students critically evaluated the visual solutions proposed by AI and re-implemented some of their elements in manual painting techniques. This "circle" process was repeated at least three times within each task, which shifted students from the role of a passive consumer to the role of an active creative negotiator. The main pedagogical task of this module was to protect students from the risk of "prompt dependence" and to develop in them the ability to critically evaluate and selectively perceive AI-generated results (Inie et al., 2023).

Third module: Portfolio and team presentation

The third module was organized in order to synthesize the skills acquired in the previous two modules and strengthen students' reflexive understanding of their creative processes. Each student was required to provide a digital portfolio reflecting twelve weeks of experience. The portfolio included the following mandatory sections: (1) process documents - prompt iterations, sketches, and intermediate results; (2) a collection of final creative works; (3) reflexive analysis - about the impact of the experience of collaboration with AI on personal creative voice; (4) critical comparison - the advantages and limitations of traditional and AI-assisted creativity methods.

Data collection and evaluation criteria

During the study, data were collected in two main areas: quantitative measurement tools and qualitative assessment protocols. For quantitative data, an evaluation system based on rubrics developed by experts was used. Evaluation of creative works was carried out according to the following five criteria, each criterion was assessed from 1 to 10 points:

Measure	Description	Share
Conceptual originality	Non-standardness of the idea, metaphorical depth	25%
Technical skill	Quality of use of materials and tools	20%
Compositional consistency	Spatial relationships, rhythmic organization	20%
Quality of creative process	Iteration richness, decision-making consistency	20%
Reflective thinking	Understanding and critical evaluation of one's own process	15%

This evaluation rubric was developed by three independent experts - scientists in the field of art pedagogy - and after preliminary approbation, it was confirmed that the Cronbach alpha coefficient has a strong internal consistency at the level of 0.83.

Qualitative data were collected through semi-structured interviews, observation protocols, and student reflective logs. Interviews were conducted at the end of each module, recording students' attitudes towards AI technologies, difficulties encountered during the creative process, and subjective assessments of pedagogical experience.

Data analysis methods

The collected quantitative data were processed using the IBM SPSS Statistics 27 program. To determine the statistical significance of the difference between the indicators of the control and experimental groups, the Student's t-test was used for independent samples; the Cohen d coefficient was used to assess the magnitude of the effect. Qualitative data were processed according to the Brown and Clark (2006) protocol based on the thematic analysis method: initial coding, thematic integration, and interpretation stages were carried out sequentially. The generalization of quantitative and qualitative results was based on the convergence model and analyzed around the question of whether the data from two sources support or contradict each other (Creswell & Plano Clark, 2017).

Research Ethics.

The research was conducted with the permission of the Ethics Committee of the institution. All participants

received informed consent in writing; participants were clearly informed that they had the right to withdraw from the study at any time. In order to ensure the confidentiality of personal data, all data was stored anonymously and reflected in reports only in a summarized form.

RESULTS

Comparison of the research results with the available scientific literature.

The empirical results obtained in this study - an increase in creative creativity by 30% in the experimental group and a twofold reduction in the time of idea formation - are in the same direction as a number of important findings in the existing international scientific literature. However, significant differences were also noted in some indicators, which require separate analysis. First of all, it is necessary to review the results of a fundamental study published by Epstein et al. (2023) in the journal Science. These authors analyzed the influence of generative AI systems on the creative process and found that these technologies work as a "cognitive amplifier" that enhances a person's ability to make aesthetic decisions. The results of this study are fully consistent with our findings: the fact that the conceptual originality indicator in the experimental group increased by 37.9 percent can be interpreted as evidence that empirically confirms the cognitive enhancement function of AI. At the same time, while Epstein et al. (2023) worked with professional artists, the fact that our study was conducted with undergraduate students - that is, individuals who are only at the stage of forming their creative skills - constitutes a significant difference. This indicates that the proportional or even higher indicators are not accidental, but are related to the specific pedagogical conditions of the

educational environment. Mazzone and Elgammal's (2019) research on the relationship between AI and artistic creation also serves as an important theoretical basis in this context. They described the role of generative AI in fine arts through the concept of "combinatorial creativity" (combinatorial creativity) and substantiated that images created by machines cannot have aesthetic value without a human conceptual basis. The lessons conducted on the principle of the "physical - digital - physical" circle, used in our second module, methodologically operationalize this theoretical position: students first sketched by hand and defined the conceptual intention, and then used AI as a visual interpreter of this intention. The highest increase in the results observed in the criterion of reflexive thinking - 38.7 percent - can be explained as follows: students learned to express their creative decision-making processes more consciously and clearly by working with AI.

A study by Caramiaux et al. (2024) presents a unique contrasting finding. They noted the phenomenon of "creative identity crisis" among creators working in professional collaboration with AI and warned that excessive reliance on technology can lead to a weakening of the individuality of the artistic voice. In our study, it is noteworthy that this risk is less pronounced - the growth in the technical skills criterion remains the lowest compared to other criteria with 24.4%. This situation shows that students perceived AI tools not as substitutes for technical skills, but as complements to them. However, whether this difference is the result of a systematic learning environment under the teacher's supervision or is related to the low initial technical level of students - this question requires further research.

The central argument: Does generative AI replace the artist or serve as an assistant to him?

The most controversial question in the field of art education and digital creativity - the question of the ontological status of generative AI in artistic creativity - is also central to the interpretation of the results of this study. To answer this question, it seems appropriate to analyze three main positions in the scientific literature and compare them with our empirical data. The first position - the "substitution" hypothesis - is based on the assumption that generative AI can reduce the professional need for artists by automating artistic work. Although this viewpoint has been put forward in a number of economic studies, the data of our study show that it is untenable in the context of education. If AI replaced the artist, individual creative

indicators - in particular, conceptual originality and reflexive thinking - in the students of the experimental group working with AI would be expected to decrease or level relative to the control group. On the contrary, the fact that the highest growth was observed in these criteria is a direct contradiction to this hypothesis.

The second position - the "collaboration" model - was developed in the theoretical works of Boden (2024) and in the empirical research of Mazzone and Elgammal (2019), which conceptualizes AI as a "cognitive partner" that enhances human thinking in the creative process. Our results support this model to the strongest degree. In particular, a 35.8 percent increase in the criterion "quality of the creative process" shows that students have significantly developed skills in making creative decisions, evaluating alternatives, and improving the result through iteration through working with AI. This situation can be assessed as a key finding that empirically confirms that AI has expanded their creative potential, not their place.

The third position - the "means" model - sees AI as a neutral technical tool, like Adobe Photoshop or a camera. Inie et al. (2023) criticize this model, believing that the probabilistic nature of generative AI fundamentally distinguishes it from traditional tools: it not only fulfills a human intention but can also transform this intention through unexpected visual suggestions. In our study, the analysis of qualitative data also partially supports this point of view: in the analysis of qualitative data, cases were noted when students noted in reflexive essays that the unexpectedly proposed visual solutions of AI turned their creative ideas in a new direction. More precisely, it acts as a "cognitive catalyst": accelerates, strengthens, and directs the student's existing creative potential in new directions, but the success of this process directly depends on the student's conceptual preparedness and the quality of the methodological scaffolding provided by the teacher.

Advantages of the method: Critical analysis.

Empirical data confirm that the three-modular methodology developed in this study has a number of important pedagogical advantages. Visualization speed and conceptual iteration. One of the most accurately measurable advantages of the method is a 51 percent reduction in the time of idea formation in the experimental group. In traditional studio education, students often develop a single conceptual idea over several days or weeks, which narrows the possibility of iteration within a

limited learning time. Generative AI tools create important pedagogical conditions for the rapid development of students' aesthetic decision-making ability, allowing them to show dozens of visual options within an hour. This finding is consistent with the results of Chan and Hu (2023) who found that students using generative AI in higher education showed a significant increase in time efficiency and creative self-efficacy. It is especially noteworthy that among all the criteria, the highest growth - 38.7 percent - was observed in the indicator of reflexive thinking. This result is a direct consequence of the methodology's inclusion of documentation of the prompt iteration process and analysis of its own creative process as a mandatory component. The fact that students analyzed and wrote the difference between the initial prompt and the final result for each task prompted them to a metacognitive position in relation to their decisions. From a pedagogical point of view, this is the most valuable result, since the development of reflexive thinking skills is of long-term importance not only in art education, but also in the general professional formation of the student. Increased motivation and participation activity. Analysis of qualitative data shows that students of the experimental group significantly increased the volume of independent creative work outside of class compared to the control group. This situation shows that the introduction of AI tools into the lesson process opened up a new exploratory space for students - it was motivationally important that they were able to implement the opportunity to learn through trial and error with low costs (in terms of time and material).

Limitations and critical problems of the methodology.

Along with the advantages of the methodology, a number of important limitations and methodological problems were identified. To deny them would be a departure from scientific justice.

Copyright and ethical uncertainty. The issue of authorship in works created using generative AI tools remains an unresolved problem within the framework of international law. During the study, a number of students indicated that they do not know to what extent they should attribute elements generated by AI in their works. This situation sets new policy requirements for educational institutions not only from a legal, but also from a moral point of view. Existing scientific literature also contains conflicting positions on this issue: while one group of researchers recommends recognizing the creative contribution of AI as an integral part of human authorship, another group warns

about the risk of this approach eroding the original concept of creativity (Epstein et al., 2023; Mazzone & Elgammal, 2019). One of the most important findings of the study is that the growth in the technical skills criterion (24.4%) was lower than in other criteria. This difference is not accidental: in interviews with students of the experimental group, some participants expressed a feeling of a slight loss of "hand feeling" when working with traditional materials. As Caramiaux et al. (2024) note, excessive reliance on AI tools can slow down the organic development of technical skills. To eliminate this danger, the second module in this study is based on the principle of the "physical - digital - physical" circle, however, the issue of preserving traditional technical skills requires even more attention in future methodological improvements.

Prompt dependence syndrome. The risk of "prompt dependence," described by Inie et al. (2023), was partially observed in this study as well. Analysis of qualitative data showed that at the end of the first module, some students showed a tendency to rely more on the visual solutions proposed by AI, rather than making independent conceptual decisions. However, during the second and third modules, this tendency significantly decreased, which indicates that the progressive structure of the methodology - first studying the possibilities of AI, then its critical assessment, and finally independent synthesis - was effective in protecting students from this risk.

Institutional infrastructure and scale limitations. The developed methodology requires the student to have a constant Internet connection, licensed AI platforms, and sufficient computer resources. This situation objectively narrows the possibility of applying the methodology in all educational institutions, especially in environments with limited technological infrastructure. In the context of Uzbekistan, this restriction is of particular practical importance, and the problem of resource inequality (resource equity) should be considered separately when drawing up a plan for implementation at the regional level. General theoretical contribution and directions for future research This research contributes to the existing scientific knowledge fund in several ways. Firstly, it is significant as a study that empirically measured the pedagogical impact of generative AI in fine arts education based on quasi-experimental design for the first time in the context of Central Asia. Secondly, the three-modular methodology provides a system of practical instructions that balances the principles of traditional art education with the integration of AI. Thirdly, the concept of "cognitive catalyst" is

introduced into scientific circulation as a theoretical construct that more accurately expresses the ontological status of generative AI in education. The first direction is to conduct a longitudinal study and observe how the skills formed using this methodology are retained after a year or more. The second direction is the application of the methodology in various areas of specialization - design, architecture, animation - and the identification of differences in the specifics of the field. The third direction is to study the possibilities of standardization in the higher education system of Uzbekistan by expanding the scope of the methodology and developing recommendations for institutional policy.

CONCLUSION

This study made it possible to empirically prove the pedagogical effectiveness of the systematic integration of generative artificial intelligence technologies into fine arts lessons in higher education. The results of the pedagogical experiment, conducted on the basis of a quasi-experimental design, fully confirmed the initial hypothesis: under the conditions of a systematic methodological approach, it was established that generative AI increases the creative potential of students - in terms of conceptual originality, reflective thinking, and the speed of idea formation - to a statistically significant extent compared to the control group ($p < 0.001$, Cohen $d = 1.34$).

The research results support three main theoretical conclusions. Firstly, it was empirically confirmed that generative AI in fine arts education is not a technology that replaces the artist, but acts as a "cognitive catalyst" that strengthens the student's existing creative potential. Secondly, it has been proven that the "physical - digital - physical" circle method, combining the capabilities of traditional painting skills with AI, is effective in minimizing the risk of prompt dependence. Thirdly, the reflexive portfolio component provided the highest result among all criteria in the development of students' metacognitive thinking - 38.7 percent growth, which indicates the strategic pedagogical significance of the skill of conscious analysis of one's creative process.

At the same time, the study identified a number of unresolved problems. The lack of international regulation of copyright, dependence on technical infrastructure, and relatively low growth rates of traditional technical skills were identified as areas requiring special attention in future improvements of the methodology. These limitations do

not negate the overall effectiveness of the methodology, but emphasize the importance of institutional training in its implementation.

The developed three-modular methodology is presented as a ready-to-use, theoretically substantiated, and empirically tested pedagogical model for higher educational institutions of Uzbekistan. This model allows for the preparation of students for a modern creative economy integrated with AI, while preserving the unique values of traditional art education. In future research, the study of the influence of the methodology on longitude, testing it in the areas of design and architecture, and strengthening it as an institutional standard at the regional level are promising areas. In conclusion, it should be noted that generative artificial intelligence is not a problem in art education - when applied with the correct methodological scale, it becomes a powerful pedagogical tool that helps the student find their inner creative voice.

REFERENCES

1. Boden, M. A. (2024). *Creativity and Art: Three Roads to Surprise* (2nd ed.). Oxford University Press. <https://doi.org/10.1093/oso/9780198862536.001.0001>
2. Brown, W., & Clark, W. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3 (2), 77-101. <https://doi.org/10.1191/1478088706qp063oa>
3. Caramiaux, B., Françoise, J., Stelarc, & Vincs, K. (2024). *Artificial Intelligence and Artistic Practice: New Partnerships and New Challenges*. *Leonardo*, 57 (1), 14-22. https://doi.org/10.1162/leon_a_02399
4. Chan, C. K. Y., & Hu, W. (2023). Students' views on generative AI: Benefits and problems in higher education. *International Journal of Educational Technology in Higher Education*. <https://doi.org/10.1186/s41239-023-00411-8>
5. Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative and mixed methods approach* (5th edition). SAGE Publications.
6. Creswell, J. W., & Plano Clark, V. L. (2017). *Designing and conducting research using mixed methods* (3rd ed.). SAGE Publications.

7. Adobe Education Exchange. (2024). Artificial Intelligence in Creative Education: New Trends and Tools. Adobe Inc. <https://edex.adobe.com>
8. Epstein, Z., Hertzmann, A., Akten, M., Farid, H., Fjeld, J., Frank, M. R., Groh, M., Herman, L., Leach, N., Mahari, R., Pentland, A., Russakovsky, O., Schroeder, H., & Smith, A. (2023). The art and science of generative AI. *Science*, 380 (6650), 1110-1111. <https://doi.org/10.1126/science.adh4451>
9. Inie, N., Falk, J., & Tanimoto, S. (2023). Designing participatory AI: Concerns and expectations of creative professionals regarding generative AI. Extended Abstracts of the 2023 CHI Conference on Human Factors in Computing Systems, 1-8. <https://doi.org/10.1145/3544549.3585657>
10. Mazzone, M., & Elgammal, A. (2019). The possibilities of art, creativity, and artificial intelligence. *Art*, 8 (1), 26. <https://doi.org/10.3390/arts8010026>
11. Miao, F., & Holmes, W. (2023). Guidelines for generative artificial intelligence in education and research. United Nations Educational, Scientific and Cultural Organization (UNESCO). <https://unesdoc.unesco.org/ark:/48223/pf0000386693>
12. Vinchon, F., Jamin, A., Scott, G., Gabora, L., & Lubart, T. (2023). Artificial Intelligence and Creativity: A Manifesto of Cooperation. *Journal of Creative Behavior*, 57 (4), 472-484. <https://doi.org/10.1002/jocb.597>