

Constructing a Multidimensional, Integrated, and Collaborative Education System for Cultivating New-Quality Talent in Painting Majors in the Era of AI Teachers

Zhaoxia Yu*, Yongqi Pang

Yuzhang Normal College, Nanchang, Jiangxi, 330103, China

*Corresponding author: Zhaoxia Yu, 1169696359@qq.com

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Abstract: The rapid iteration of generative artificial intelligence has reshaped the creative modes, aesthetic forms, and industrial ecosystem of the traditional painting industry. The conventional talent cultivation model in painting programs, which emphasizes technical training while paying insufficient attention to innovation and interdisciplinary integration, can no longer meet the developmental needs of the art industry in the AI era. New-quality talent emphasizes creativity and innovation, human–AI collaborative competence, interdisciplinary integration literacy, and industry adaptability, and has become a core orientation for talent cultivation in painting programs at higher education institutions. Against the backdrop of AI-enabled art education, this paper takes multidimensional integration and collaborative education as its central approach, focuses on frontline teaching reform practices, and draws on real cases of curriculum reform, project-based training, and industry–education collaboration in university painting programs. From multiple dimensions, including curriculum integration, teacher–student collaboration, industry–education linkage, and the integration of scientific and technological innovation, this study explores pathways for constructing a new-quality talent cultivation system for painting majors. It aims to address such pain points in traditional painting education as homogenized teaching, rigid skill training, and insufficient innovation, thereby providing practical and implementable references for the digital transformation and high-quality talent cultivation of painting programs in higher education.

Keywords: AI Era; Painting Major; Multidimensional Integration; Collaborative Education; New-Quality Talent Cultivation

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1. Introduction

With the widespread application of AIGC-based generative painting, intelligent image optimization, and digital art creation technologies, the painting industry has officially entered a new stage of human–AI collaborative creation; existing studies on AI art, generative models, and computational creativity have shown that artificial intelligence is reshaping artistic production, aesthetic judgment, and authorship in visual creation (Cetinic & She, 2022; Creswell et al., 2018; Elgammal et al., 2017; Epstein et al., 2023; Hertzmann, 2018; Manovich, 2018; McCormack et al., 2014). The core advantages of traditional painting talent, which once relied primarily on hand-drawing techniques and imitation-based creation, are gradually weakening. The industry now urgently needs interdisciplinary new-quality artistic talent who possess a solid foundation in traditional art, digital technical competence, innovative and creative thinking, and industry adaptability. As the main institutions responsible

for cultivating artistic talent, higher education institutions have long faced such problems in traditional painting education as a single-dimensional curriculum system, rigid teaching models, disconnection between universities and enterprises, and separation between scientific and technological innovation and teaching practice. In the field of higher education, research on AI-supported teaching has also emphasized that the transformation brought about by artificial intelligence requires changes in curriculum design, teacher roles, learning environments, and educational evaluation rather than the simple addition of digital tools (Holmes et al., 2019; Luckin et al., 2016; Zawacki-Richter et al., 2019). Teaching has often been confined to basic technical training in sketching, color, and figure drawing, while insufficient attention has been paid to the integration of digital technologies, the cultivation of original creativity, and project-based practical training. As a result, graduates tend to demonstrate rigid creative thinking, low job adaptability, and weak innovation capacity, making it difficult for them to respond effectively to the new competitive landscape of the art industry in the AI era. Based on this context, this paper adopts the concept of multidimensional integration and collaborative education and draws on real teaching reform practices to reconstruct the talent cultivation system for painting majors. It seeks to break down educational barriers among art, technology, industry, and scientific and technological innovation, establish a new-quality painting talent cultivation model suited to the AI era, and promote the transformation and upgrading of painting education.

2. Existing Pain Points in Talent Cultivation for Painting Majors in the AI Era

2.1 A Single-Dimensional Curriculum System and Insufficient Integration of Art and Technology

At present, most painting programs in higher education institutions still adopt a traditional fine arts curriculum model. Conventional subjects such as sketching, oil painting, Chinese painting, and art history account for a large proportion of the curriculum, while emerging courses such as AI-based art creation, digital painting, human–AI collaborative design, and art big data analysis are either neglected or offered only as supplementary components. Courses are often isolated from one another, and aesthetic education remains disconnected from information technology. This problem is consistent with broader findings in AI education research, which indicate that educators and curriculum systems often lag behind the rapid expansion of AI applications in higher education (Holmes et al., 2019; Luckin et al., 2016; Zawacki-Richter et al., 2019). As a result, students may be able to produce hand-drawn works but lack the ability to use intelligent devices for digital image production or to employ AI tools to generate new creative ideas. Their knowledge structure is therefore relatively narrow and cannot meet the current demand for talent in fields such as digital art, cultural and creative product design, and new media painting.

2.2 Rigid Teaching Models and Weak Cultivation of Innovation

Traditional fine arts classrooms are generally organized according to a fixed procedure of “teacher demonstration—student imitation—assignment critique.” Such teaching mainly emphasizes the improvement of technical proficiency while neglecting the cultivation of students’ imagination, creativity, and individuality. From the perspective of creativity research, creative learning depends not only on the acquisition of techniques but also on the formation of motivation, problem awareness, divergent thinking, and the capacity to generate original ideas (Amabile, 1996; Boden, 1998). With the advent of the AI era, some teachers still refuse to use intelligent technologies in their teaching and continue to adhere to conventional concepts. Consequently, students lack an understanding of the principles of AI-assisted painting creation and do not know how to use AI software to improve visual effects, develop new ideas, or update their works. Their thinking is therefore constrained, their works tend to be highly similar, and they lack core competitiveness, especially when AI-based artistic creation increasingly requires both technical understanding and aesthetic judgment (Cetinic & She, 2022; Colton & Wiggins, 2012).

2.3 A Single-Actor Talent Cultivation Model and the Absence of Collaborative Mechanisms

Traditional talent cultivation in painting programs has mainly relied on unilateral training by universities. Classroom teaching, practical training, and outcome assessment are all implemented primarily by university teachers, with insufficient participation from enterprises and industry organizations. The knowledge taught in universities often lags behind changes in industry development, and practical training projects are detached from real industrial contexts. Existing research on industry–education collaboration suggests that talent cultivation should be connected with industrial scenarios, practical projects, and teacher professional development mechanisms in order to enhance students’ employability and applied competence (Darling-Hammond et al., 2017; Wang & Ma, 2023). Students lack opportunities to engage in commercial

projects, have limited understanding of industry standards, and are short of practical creative experience. This leads to a gap in talent cultivation, in which students may achieve excellent academic performance at school but find it difficult to adapt after entering society. As a result, they are unable to become new-quality talent that meets the needs of industrial development.

2.4 A One-Sided Evaluation System and Neglect of Comprehensive Competence

At present, assessment in painting education mainly focuses on pictorial techniques, fundamental modeling skills, and color composition. It emphasizes the evaluation of finished visual effects while neglecting students' creative design thinking, human–AI collaborative ability, capacity for upgrading and iterating works, teamwork competence, and market relevance. In the context of AI-supported education, assessment design needs to move beyond a single outcome-oriented model and pay attention to process, authenticity, collaboration, and comprehensive competence (Dong et al., 2025; Kadel et al., 2024). This single technical evaluation approach leads students to place excessive emphasis on the neatness and similarity of their images, suppresses creativity and cross-disciplinary experimentation, and fails to align with the cultivation goals of new-quality talent, which emphasize innovation, comprehensiveness, and practical application.

3. Core Educational Logic of Multidimensional Integration and Collaborative Education

The multidimensional integration and collaborative education model breaks through the limitations of the traditional single teaching model. Aiming to cultivate new-quality talent in painting majors, it establishes a four-in-one educational mechanism characterized by the integration of art and technology, teacher–student collaboration, industry–education integration, and the integration of scientific and technological innovation. This logic echoes research on digital-intelligence-enabled talent cultivation and AI-supported higher education, which stresses the need to coordinate curriculum, teachers, learning environments, and applied learning tasks (Chen, 2025; Holmes et al., 2019; Luckin et al., 2016; Zawacki-Richter et al., 2019). Unlike previous teaching approaches that emphasized skills while neglecting comprehensive literacy, this model, against the backdrop of the AI era, not only inherits the cultural genes of traditional art but also incorporates digital capabilities. It builds an interconnected talent cultivation pathway extending from classroom learning to project-based practice, industrial practice, and scientific research and innovation. In doing so, it promotes comprehensive transformation in educational actors, curriculum resources, teaching environments, and assessment methods, and is committed to cultivating diversified new-quality painting talent with a solid artistic foundation, strong digital and intelligent literacy, robust innovation capacity, and a broad industry-oriented perspective (Chen, 2025).

4. Teaching Practice Cases of Multidimensional Integration and Collaborative Education

This practice involved a one-semester teaching reform experiment conducted in a junior-year teaching class of the painting major at a university. The multidimensional integration and collaborative education model was implemented in the course module of AI-based human–machine collaborative painting creation. The curriculum, practical training, and assessment schemes were reconstructed. The entire process was organized around practice-based projects, with reduced emphasis on theoretical instruction, so as to comprehensively cultivate students' new-quality competencies.

4.1 Practice of Art–Technology Curriculum Integration: Reconstructing Hierarchical Teaching Content

This teaching reform broke through the boundaries of the traditional fine arts curriculum and constructed a new step-by-step curriculum system integrating “traditional foundations, digital technologies, and creative innovation.” In the lower grades, traditional foundational courses such as sketching, color, and composition continued to be offered to cultivate students' modeling ability and aesthetic literacy, thereby consolidating the foundation of the painting major. In the upper grades, courses such as Fundamentals of AI Art Creation, Human–Machine Collaborative Painting Design, Digital Image Optimization, and Cultural and Creative IP Painting Creation were added. The application of artificial intelligence tools, intelligent composition, AI-assisted color matching, and creative material iteration were integrated throughout classroom teaching. Such curriculum reconstruction is supported by studies on AI art creation and generative models, which demonstrate that AI tools can participate in image generation, style exploration, and creative ideation when they are integrated with human aesthetic judgment

(Cetinic & She, 2022; Creswell et al., 2018; Elgammal et al., 2017; Hertzmann, 2018).

Classroom teaching moved away from one-way instruction and adopted a dual-track teaching method combining “traditional hand-drawing foundations with AI-enabled creative enhancement.” In the landscape painting techniques course, students first completed traditional hand-drawn composition, subject shaping, and basic color arrangement to form an initial draft. They then used AI to improve and refine the atmosphere, details, color correction, and style transformation, thereby integrating original hand-drawn ideas with AI technology. Classroom instruction focused on guiding students to avoid the excessive use of fixed AI templates. Under the guidance of their own subjective aesthetic concepts, students engaged in creative activities in which AI served as a tool for refining works, expanding creative perspectives, and enriching expressive methods. This effectively addressed such problems as insufficient imagination, lack of visual layering, and outdated styles, truly realizing the integration of art and technology (Epstein et al., 2023; Manovich, 2018).

4.2 Practice of Teacher–Student Collaborative Creation: Activating Classroom Innovation

The reform established an interactive and collaborative teaching relationship between teachers and students, transforming the previous model in which teachers demonstrated unilaterally and students merely imitated. The classroom carried out theme-based creative activities. Teachers no longer provided unified standard templates but instead worked with students in creative conception, discussion of design ideas, and improvement of works. In the activity titled “Chinese-Style Cultural and Creative Painting Creation,” teachers and students jointly discussed the aesthetic characteristics of Chinese-style paintings, directions for modern transformation, and principles for the appropriate use of AI creation. Teachers provided targeted guidance based on students’ creative ideas, while students used AI tools to propose multiple design possibilities, which in turn inspired teachers. This created a positive collaborative educational atmosphere marked by mutual promotion, consistent with the view that creativity is strengthened by supportive contexts and effective teacher professional development (Amabile, 1996; Darling-Hammond et al., 2017).

At the same time, creative groups were organized in class to carry out cooperative creation. Students collaborated on original conception, hand-drawn sketches, AI-based beautification, detail refinement, and text matching, drawing on one another’s strengths in the process. Students with stronger foundational skills were responsible for modeling and hand-drawing; students with more active creative thinking were responsible for AI-assisted idea iteration and style transformation; and students with stronger technical abilities were responsible for post-production and output adjustment. This approach comprehensively cultivated students’ cooperative spirit and innovation capacity, while addressing the problems of isolated individual work and narrow thinking. The use of AI as a collaborative learning resource also aligns with research emphasizing AI’s potential to support personalized and interactive learning processes (Luckin et al., 2016).

4.3 Practice of Industry–Education Collaboration: Connecting with Real Industry Scenarios

Based on the university–enterprise cooperation platform, real commercial painting projects from enterprises were introduced, enabling teaching to connect directly with frontline production. This course introduced three types of real commercial projects: cultural and creative illustration, new media cover painting, and Chinese-style decorative painting. Under the joint guidance of enterprise designers and university teachers, students conducted practical training and creative production in accordance with industry standards. The implementation process fully simulated the workflow of real commercial production. Students were required to go through a series of steps, including needs analysis, creative conception, sketch drawing, human–machine collaborative painting, work revision, and final output. Throughout this process, they had to meet the requirements of commercial painting in terms of size specifications, forms of expression, aesthetic orientation, and delivery deadlines. This project-based arrangement reflects the logic of university–enterprise collaborative education and helps connect learning tasks with occupational requirements (Wang & Ma, 2023).

Enterprise mentors mainly introduced the current application rules, copyright boundaries, and market aesthetic trends of the AI commercial painting industry. They helped correct students’ tendency to emphasize techniques while neglecting commercial value, or to focus on visual effects while ignoring client needs. University teachers were responsible for training students in artistic taste, composition techniques, and detailed depiction. This dual-mentor guidance model enabled students to accurately understand how to complete commercial creation through human–machine collaboration, clarify copyright reg-

ulations and relevant laws in AI painting, and overcome the limitations of purely theoretical learning during their university studies, thereby greatly improving their employment competitiveness. Given that AI-generated artworks involve complex issues of authorship, originality, and copyright infringement, the introduction of copyright and legal awareness into practical training is especially necessary (Gillotte, 2020; Guadamuz, 2017). Many students' practical training works were used in the development of cultural and creative products, realizing the integration of educational outcomes with industrial development (Dong et al., 2025).

4.4 Practice of Scientific and Technological Innovation Integration: Cultivating Advanced Innovation Capacity

Relying on the university-level art and innovation platform, this reform integrated innovation competitions and work development into daily teaching, using scientific and technological innovation competitions to promote students' competence development. Activities such as digital art design competitions and AI cultural and creative creation competitions were carried out, encouraging students to use traditional painting techniques and AI technologies to develop innovative works. Unlike ordinary after-class exercises, innovation-oriented creation required students to develop an independent awareness of IP creation and avoid template-based AI production, thereby forming their own distinctive artistic characteristics. Teachers provided guidance on work revision, style refinement, and thematic enhancement, helping students overcome technical obstacles encountered in innovation practice and cultivating their comprehensive qualities, including original creativity, product development ability, and aesthetic appreciation. This approach is consistent with research on computational creativity and generative art, which stresses that AI should be used to expand creative possibilities rather than replace human originality (Boden, 1998; Colton & Wiggins, 2012; Elgammal et al., 2017; McCormack et al., 2014).

4.5 Practice of Multidimensional Collaborative Evaluation: Improving the Educational Closed Loop

The reform changed the traditional single technical evaluation mechanism and established a multi-actor comprehensive assessment system consisting of "evaluation by university teachers, evaluation by enterprise mentors, peer evaluation among students, and evaluation of innovation outcomes." The assessment criteria were no longer limited to pictorial techniques but placed greater emphasis on students' original creativity, level of human-machine collaboration, commercial relevance, teamwork, and novelty of works. Process-based evaluation was also introduced to monitor students' conceptual design, plan adjustment, and work refinement throughout the entire process, thereby avoiding a simplistic results-oriented assessment model. Through diversified assessment methods, students were encouraged to value innovation, pursue excellence, and stay close to practical needs, thus comprehensively meeting the requirements of talent cultivation in the new era (Dong et al., 2025; Kadel et al., 2024).

5. Construction Pathways for a New-Quality Talent Cultivation System for Painting Majors in the AI Era

5.1 Promoting Multidimensional Art-Technology Integration and Building a Hierarchical Curriculum System

In response to the requirements for new-quality talent, a multi-level curriculum system should be established according to the logic of "consolidating foundations, empowering through technology, enhancing quality through innovation, and realizing industrial application." In the lower grades, training in traditional painting fundamentals should be strengthened to consolidate students' basic abilities in modeling, color, and aesthetics, thereby preserving the roots of artistic education. In the middle and upper grades, a series of integrated courses, such as AI digital art, human-machine collaborative creation, and digital cultural and creative design, should be offered to help students understand various intelligent tools and technological principles. In addition, elective courses on art ethics, AI copyright law, and market aesthetic trends should be added to enhance students' professional competence and critical awareness. In this way, traditional art can be integrated with digital technology, and aesthetic competence can be unified with technical ability (Gillotte, 2020; Guadamuz, 2017; Holmes et al., 2019; Luckin et al., 2016; Wang & Ma, 2023; Zawacki-Richter et al., 2019).

5.2 Strengthening Multi-Actor Collaboration and Improving the Industry-Education Talent Cultivation Mechanism

A university–enterprise collaborative education model should be established to transform the single campus-based cultivation approach. Real enterprise projects, frontier industry technologies, and market aesthetic concepts should be regularly introduced into classrooms, and dual-mentor teaching, project-based training, and position-oriented practice should be carried out. AI art creation laboratories and digital cultural and creative training centers should also be established to provide students with a favorable environment for human–machine collaborative creation. Through participation in real industrial contexts, students can gain practical work experience and achieve seamless connection among learning, internship, and employment. The effectiveness of this model depends on sustained university–enterprise collaboration and the continuous professional development of teachers who can connect artistic education with industrial practice (Darling-Hammond et al., 2017; Wang & Ma, 2023).

5.3 Innovating Teaching Models and Cultivating Core Original Creativity

Traditional teaching methods characterized by copying, imitation, and uniformity should be comprehensively abandoned, and new teaching methods featuring “project-driven learning, collaborative creation and iteration, and empowerment through scientific and technological innovation” should be adopted. Theme-based creation, commercial projects, and innovation competitions can be used as carriers to stimulate students’ independent imagination, autonomous composition, and self-directed upgrading of works. On this basis, artificial intelligence can be used to expand the scope of creation while preserving the soul of hand-made artistic expression. This reflects the educational implication of creativity and AI art research: AI can provide new generative possibilities, but students still need human creativity, judgment, and aesthetic agency to form original artistic expression (Amabile, 1996; Boden, 1998; Colton & Wiggins, 2012; Hertzmann, 2018).

Teachers should focus on inspiring students’ imagination, improving their aesthetic literacy, and broadening their creative thinking, while reducing mechanical training that relies on rote memorization of skills and techniques. Greater emphasis should be placed on cultivating students’ creative ability, aesthetic thinking, and personalized expression, so that students can become artistically distinctive talents who cannot be replaced by AI.

5.4 Improving Multidimensional Evaluation and Constructing a Long-Term Educational Closed Loop

A diversified evaluation mechanism should be constructed that gives equal attention to process and outcome, balances art and technology, and integrates innovation with practicality. Assessment indicators should include creative originality, the rationality of human–machine collaboration, market adaptability of works, teamwork ability, and scientific research or innovation outcomes. The proportion of scores based solely on technical skills should be reduced. Through diversified evaluation, students can develop a proper understanding of the relationship between traditional techniques and technological means, between artistic appreciation and commercial application, and between imitation-based practice and personal creation. This can promote coordinated development in all dimensions, continuously improve the quality of talent cultivation, and form a comprehensive educational chain (Dong et al., 2025; Kadel et al., 2024).

Conclusion

The application of artificial intelligence technologies has brought new opportunities to the education and teaching of painting majors, while also creating numerous challenges and tests. The traditional single-skill-oriented talent cultivation model can no longer meet contemporary society’s demands for the art industry. In response to talent cultivation issues in the AI era, the multidimensional integration and collaborative education model carries out comprehensive reforms in art–technology integration, teacher–student co-creation, industry–education linkage, and empowerment through scientific and technological innovation. It reconstructs the curriculum system, teaching methods, practice bases, and evaluation standards of painting majors, effectively addressing such problems in traditional classrooms as homogenization, insufficient innovation, and weak adaptability. These reforms respond to the broader transformation of generative AI, AI-supported education, and higher education talent cultivation (Epstein et al., 2023; Holmes et al., 2019; Luckin et al., 2016; Zawacki-Richter et al., 2019).

This model not only preserves the traditional cultural connotations of painting education but also incorporates the advantages of digital information technology. It can effectively cultivate new-quality painting talent with artistic literacy, digital competence, creativity, and an industry-oriented perspective. In the future, painting programs in higher education institutions should continuously accelerate educational reform, actively promote the implementation of multidimensional collaborative

education, keep abreast of technological updates and changes in market development trends, and constantly improve the quality of talent cultivation, so as to provide outstanding interdisciplinary new-type talent for the development of the digital art field.

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Conflict of Interests

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