Digital Intelligence Technology Empowers the Transformation and Upgrading of the Art Education Ecology in Primary and Secondary Schools

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Abstract. Digital and artificial intelligence technologies are the new frontier shaping the professional development of art teachers in primary and secondary schools in the new era, serving as a crucial pillar for building a strong nation in aesthetic education. They anchor the transition of outstanding art teachers into educator-type teachers and play a demonstrative, leading, and timely role in the training of art teachers in primary and secondary schools. The 2025 National Training Program demonstration project hosted by the School of Fine Arts, Capital Normal University (China Beijing) focuses on enhancing the digital and intelligent capabilities of outstanding art teachers in primary and secondary schools, adopting a training path of "spiritual guidance-conceptual support-technological empowerment-assessment as benchmark-workshop implementation." A 10-day intensive training was conducted at Capital Normal University, effectively improving the digital and intelligent literacy of 50 outstanding art teachers from 31 provinces, autonomous regions, municipalities, and the Xinjiang Production and Construction Corps. This training has broad coverage and significant impact, holding incubation and pioneering significance in the vertical application training ecosystem of digital and intelligent technologies for outstanding art teachers in primary and secondary schools nationwide.

Keywords: Digital Intelligence Technology, Art Education in Primary and Secondary Schools, Teaching Ecosystem, Transformation and Upgrading

1 Introduction

"Diligent study, earnest practice, seeking truth, and innovation" is the hands-on attitude of educators [1], and the state encourages the integration of the spirit of educators into the entire process of teacher training [2]. Art, science, and technology are mutually reinforcing and complementary [3]. "We must focus on cultivating backbone teachers for the future, encouraging them to actively respond to new technologies, knowledge, and disciplines [4]. Photoelectric sensing technology achieves a mirror-like simulation of the physical world through chip storage, human-like intelligent computing, electronic media, and 3D presentation, bringing about a revolutionary paradigm of reshaping social culture with digital and intelligent technologies. The National Training

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Program is the highest-level national training for art teachers in China's primary and secondary schools, with trainees possessing representativeness and influence, capable of covering all provinces, autonomous regions, municipalities, and the Xinjiang Production and Construction Corps nationwide. Through the National Training Program, the spirit of educators and digital and intelligent technologies can be systematically and comprehensively introduced into primary and secondary school art classrooms, empowering the thoughts and actions of backbone art teachers to transform into educators, innovating educational models and methods. Existing research primarily focuses on the evolution, connotation, value, characteristics, and cultivation paths of the spirit of educators, concentrating on universities, rural areas, case studies of renowned educators, and young teachers. This study, from the perspective of diligent study and innovation, takes backbone art teachers in primary and secondary schools as the object, enriching the practical level of the spirit of educators and analyzing its micro-level texture, laying the foundation for building a strong nation in aesthetic education and cultivating future citizens of China who shoulder global responsibilities.

2 Data-oriented National Training Program for Primary and Secondary School Art Teachers

The 2025 National Training Program Demonstration Project for Primary and Secondary School Art Education, hosted by Capital Normal University and organized by its School of Fine Arts, will run from November 18 to 27,2025. Titled "Enhancing Core Competencies of Outstanding Art Teachers in the Digital-Education Era," the 10-day training program follows a structured approach: problem-solving, theoretical guidance, field visits, workshop practice[5], and follow-up evaluations, totaling 80 instructional hours. Participants include 50 art teachers from 31 provinces, autonomous regions, municipalities, and the Xinjiang Production and Construction Corps. The average age of trainees is 45, with a majority holding junior high school teaching experience, senior professional titles, or bachelor's degrees. The gender ratio is 12:13, featuring municipal and district-level education researchers, key teachers, and master educators, along with principals, vice-principals, and department heads. Forty-two students from the School of Fine Arts' art education program (undergraduate, master's, and doctoral levels) participated in conference operations. Over 30 undergraduates attended selected courses, while 30 teachers delivered lectures. Nine distinguished guests attended the opening and closing ceremonies. Digital resources developed for art education include: 50 AI-powered teaching cases, 12 AI-enhanced course materials, 10 posters, 40 Xiaohongshu (China's social media platform) posts, and 10 learning bulletins totaling 50,000 words. Training resources consist of: 28 teaching transcripts, 10 activity records, 34 course materials, over 200,000 words of teaching scripts, and 4 WeChat public account articles totaling nearly 10,000 words. The impact metrics include: WeChat Official Account posts garnering over 6,800 views, Xiaohongshu (a Chinese social media platform) receiving 780+ likes and saves, attracting 270+ followers, media coverage by Modern Education Daily, Beijing Daily, and Study Strong, establishing a

digital-intelligence-enabled teaching innovation team, and achieving a 98% student satisfaction rate.

3 The Digital Teaching Efforts and Thinking of the Training Participants

3.1 The Digital Preparation and Guidance of Training Organizers

The training organizers conducted pre-, mid-, and post-training assessments using Wenjuanxing (a Chinese survey platform), generating visualized analysis reports that enabled dynamic management and provided trainees with actionable feedback for improvement. The graduate assistant overseeing the event introduced trainees to online AI-assisted video lectures and analysis sessions, demonstrating data categorization methods and showcasing a digital platform for presenting learning outcomes.

3.2 The Digital and Intelligent Theory Guidance and Enlightenment of the Instructor

The theoretical instructor explained the working principles of digital intelligence technologies, technical ethical standards, characteristics and application methods of digital intelligence software, as well as practical scenarios. For instance, People's Education Press utilizes digital intelligence technologies to compile textbooks and create content with digital intelligence artistry. Haidian District in Beijing employs digital intelligence technologies to profile students' artistic literacy, while Shenzhen's primary and secondary schools implement digital monitoring of art education, teaching evaluations, lesson plan design, and artwork creation. The instructor also cited examples of using AI-generated artworks to help students identify differences between original and fake pieces, enhancing their appreciation skills, and highlighted the transformation of art education in the AI era. The practical instructor introduced innovative applications through real-world cases of digital intelligence technologies empowering art education. Examples include students at Liandong Middle School in Wenchang City, Hainan Province, who hand-drew designs of Hainan gray sculpture-patterned farmland and used WeChat to communicate with various parties [6], creating stop-motion animations and video works. Students from Beijing No.19 Middle School and the First Primary School of Capital Normal University Affiliated High School in Haidian District utilized digital intelligence technologies to create painting artworks. The Ziqi Experimental Middle School of Capital Normal University in the Hengqin Guangdong-Macao Deep Cooperation Zone employed digital intelligence technologies to achieve dynamic teaching of static works. Other examples include the Beijing China Millennium Monument Digital Immersive Art Exhibition, the China Artists Association's virtual exhibition halls, video media, and cultural and creative design.

4 Digital and Intelligent Technologies Are Driving a Comprehensive Upgrade of Art Education in Primary and Secondary Schools

4.1 Digital Intelligence Technology Enables the Improvement of Art Teachers' Ability in Primary and Secondary Schools

All stakeholders involved in art education—from training organizers and service providers to instructors and trainees—concur that digital intelligence technologies will profoundly transform primary and secondary art education. From a humanistic perspective, technology is merely an extension of the human body, created to meet human needs and inherently subordinate to humanity [7]. The human-like intelligence of digital technologies has demonstrated exceptional capabilities in certain domains, including memory retention, computational efficiency, and operational proficiency in high-risk environments, with significantly enhanced productivity. These technologies provide abundant reference templates for learning and work, enabling rapid visualization of materials, sketches, creative concepts, and models. Actively adopting and applying digital intelligence in art education and creative practice undoubtedly enhances teachers 'professional competence and instructional quality. The core human agency isn't eroded by technological progress, but rather by the pessimistic notion that technology alienates humanity due to insufficient human utilization.

4.2 Exploring the Feasibility Training of Improving the Work Performance of Primary and Secondary School Art Teachers by Using Digital Intelligence Technology

The development of human society is uneven. Respecting the actual conditions of art education in regional primary and secondary schools, and timely, appropriately, and suitably introducing digital technology to empower art education is essential for protecting the educational ecosystem. Participants in this training program have recognized the significance of digital-intelligent technologies and actively engaged in learning. However, limited by their academic foundations, they still struggle to skillfully apply these technologies in creative work or effectively integrate their methodologies and expressive techniques into guiding student creations. The training has only provided participants with a basic understanding of digital-intelligent technologies, without comprehensive learning or exploration of specific software applications, let alone achieving proficient use and innovative expression. If the training could address practitioners 'current work challenges by systematically teaching software skills, creating original works, designing high-quality lessons for actual teaching scenarios, and producing reflective, application-oriented practical articles, followed by achievement evaluation and publication closely linked to practitioners' current performance, such training would be more effectively implemented. However, this approach requires a relatively long learning cycle, and its true effectiveness still needs further evaluation.

4.3 Feasibility Exploration of Primary and Secondary School Students Learning Digital Intelligence Technology to Assist Art Creativity

Children's development varies, and aligning with developmental patterns is fundamental to designing art education curricula for primary and secondary schools. Gradually integrating digital technologies into art instruction aligns with educational science principles. The Chinese government has established basic guidelines for AI applications in K-12 education, providing a reference framework for digital technology implementation in art education [8]. However, this interdisciplinary framework requires further refinement to better serve art education. For instance, collaborative development of intelligent systems by enterprises, governments, and schools can reduce teacher workload while preventing excessive commercialization. Families, schools, and society should jointly foster a tech-savvy community that nurtures children's emotional growth and prevents technological misuse. Under adult supervision, young children should first use controllable digital tools, gradually transitioning to multimodal large-scale AI systems as they mature. Content-wise, integrating localized, wholesome language and audiovisual materials helps students naturally appreciate technology's practical value, sparking their curiosity and skills. The government encourages exploring diverse AI-powered art education solutions, with targeted support for remote areas to ensure equitable educational access.

5 Conclusion

Amid the digital transformation wave, the evolution of art education ecosystems in K-12 schools has become inevitable. The Ministry of Education of the People's Republic of China launched a national flagship training program for core art teachers, demonstrating both foresight and practicality. While participants have explored feasible applications of digital technologies in art education, achieving measurable outcomes and fostering a positive adoption culture, there remains a critical gap in actionable implementation resources and concrete solutions. Addressing these challenges, this study proposes a long-term training curriculum for art teachers using digital tools, alongside a performance-linked publication incentive for digital research achievements. By adopting a future-oriented approach, the program aims to systematically enhance art education through controlled technological integration, laying a solid foundation for students' development. It advocates for collaborative efforts among families, schools, and communities to create an ecosystem that optimally supports digital-powered art learning for K-12 learners.

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