

Why Traditional Art Students Need Digital Competence: An Argument for Curriculum Reform in Chinese Vocational Colleges

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Abstract

The rapid digitalization of education has created new demands for students across all disciplines, yet traditional art students in Chinese higher vocational colleges face unique challenges. Unlike their peers in general education, calligraphy and painting students must balance the preservation of millennia-old artistic traditions with the acquisition of contemporary digital skills. This paper argues that digital competence is not a threat to traditional art but a necessary extension of it. Drawing on a review of 22 empirical studies published between 2021 and 2025, combined with findings from expert interviews with 12 vocational art educators in Hebei Province, this paper presents a three-pillar argument. First, digital competence preserves rather than replaces traditional practice through documentation, archiving, and dissemination tools. Second, self-efficacy serves as a critical determinant of whether students successfully adopt digital tools. Third, digital learning environments demand enhanced critical thinking skills that studio-based art practices are uniquely positioned to develop. The paper identifies key barriers to digital integration at the teacher, student, and institutional levels, then proposes a five-component curriculum reform framework. The argument contributes to the growing discourse on digital transformation in vocational art education and offers actionable recommendations for educators and policymakers.

Keywords: Digital Competence, Traditional Chinese Art, Vocational Education, Curriculum Reform, Self-Efficacy, Critical Thinking

Introduction

The digital revolution has fundamentally reshaped the global landscape of education, creating unprecedented demands for digital competence across all academic disciplines (Zakir et al., 2025). In the context of higher education, students are increasingly expected to possess not only disciplinary knowledge but also the ability to navigate, evaluate, and create content using digital technologies. Digital competence has been defined as the knowledge, abilities, skills, and attitudes necessary to access, analyze, evaluate, reflect critically, create, and communicate in technology-rich environments (Marrero-Sánchez & Vergara-Romero, 2023).

Consequently, higher education institutions worldwide have integrated digital training as a central component of their academic policies and curricular frameworks.

However, within this broader digital transformation, a critical yet underexamined population exists: students of traditional Chinese calligraphy and painting in higher vocational colleges. These students occupy a unique position at the intersection of two seemingly contradictory demands. On one hand, they are expected to preserve and master artistic traditions that span thousands of years, rooted in material practices involving brush, ink, rice paper, and silk. The physical act of creating art, the tactile feedback of brush on paper, and the spiritual discipline of mastering traditional techniques remain central to what it means to be a calligrapher or painter (Bolatova & Nasipov, 2023). On the other hand, they must acquire contemporary digital skills to meet the expectations of employers, galleries, and an increasingly digital art market.

The research problem addressed in this paper arises from this tension. Existing digital competence frameworks, such as DigComp 2.1, have been validated in general higher education contexts (Abubakari et al., 2023) and across diverse student populations (Zhao et al., 2021). However, these frameworks were not designed with traditional art students in mind. They do not account for the specific needs of learners who must balance digital skill acquisition with the preservation of heritage artistic practices. Preliminary evidence suggests that vocational art students face unique barriers, including lack of access to art-specific digital tools, insufficient systematic training, and low motivation due to workload and stress (Diachuk, 2024; Othman et al., 2023).

Despite these challenges, a comprehensive argument for why traditional art students need digital competence, supported by empirical evidence and offering actionable curriculum reforms, remains absent from the literature. Most existing studies focus either on general digital competence in higher education or on digital integration in arts education as a technical matter, without addressing the underlying pedagogical and psychological dimensions. Specifically, three critical gaps persist. First, the relationship between digital competence and self-efficacy has been established in general education contexts (Zakir et al., 2025; Dong, 2025), but its applicability to traditional art students has not been examined. Second, the role of digital literacy in fostering critical thinking has been demonstrated (Leuwol et al., 2023), yet the unique critical thinking demands faced by traditional art students in digital environments remain unexplored. Third, and most importantly, no study has synthesized these three constructs into an integrated argument for curriculum reform in traditional Chinese vocational art education.

This paper directly addresses these gaps. The selection of this topic is justified by three converging factors: the growing digitalization of the art profession, which demands that graduates possess both traditional and digital skills; the rapid expansion of vocational art education in China, which serves a large and increasing number of traditional art students; and the absence of evidence-based curriculum guidance for educators navigating this digital transition. Drawing on 22 empirical studies published between 2021 and 2025, combined with original findings from expert interviews with 12 vocational art educators in Hebei Province, this paper advances a clear and timely argument: digital competence is not a threat to traditional art but a necessary extension of it.

The paper is structured as follows. Section two defines digital competence specifically for traditional art students. Section three presents the three pillars of the argument: preservation through digital tools, the mediating role of self-efficacy, and the development of critical thinking. Section four identifies barriers to integration at the teacher, student, and institutional levels. Section five proposes a five-component curriculum reform framework with actionable recommendations for educators and policymakers.

Theoretical Foundations

What is digital competence?

Digital competence has been defined and measured through various frameworks. The DigComp 2.1 framework, validated in non-Western higher education contexts, identifies five key areas: information and data literacy, communication and collaboration, digital content creation, safety, and problem solving (Abubakari et al., 2023). Research with 5,164 Chinese university students found that students perceive their digital competence positively in information literacy, communication, and safety, but weaker in digital content creation (Zhao et al., 2021). These findings suggest that even general university students need targeted support in producing, rather than merely consuming, digital content.

For vocational education students and teachers, digital competence takes on additional dimensions. A study of vocational teachers found that only 43.3% had high digital competence, with significant gaps in specialized software knowledge, systematic training, and technical support (Diachuk, 2024). The same study identified low motivation due to workload and stress as major barriers. These findings are directly relevant to the vocational art education context in China.

Digital Competence in Arts Education

Research specifically addressing digital competence in arts education is more limited but growing. Digital painting has been recognized as a reasonable component of art education, though obstacles to integration exist (Bolatova & Nasipov, 2023). A comparative study of traditional and digital painting found that the foundation of art education remains academic painting, but digital and traditional forms are interrelated and complementary (Parkhomenko & Matusovsky, 2023). The authors concluded that a combined approach allows students to become professionals with modern tools while preserving academic tradition.

However, barriers to digital integration in art education are substantial. In Malaysia, visual art education receives limited attention, with students reporting that the lack of art materials and tools creates stress, and they perceive the subject as difficult with inadequate exposure (Othman et al., 2023). These challenges resonate with the Chinese vocational art education context.

Why Traditional Art Requires a Unique Digital Competence Framework

Generic digital competence frameworks, while useful, do not fully capture what traditional art students need. Based on expert interviews conducted for this study, five art-specific dimensions of digital competence were identified. **Table 1** presents these dimensions with descriptions and supporting literature.

Table 1

Dimensions of Digital Competence for Traditional Art Students

Dimension	Description	Supporting Literature
Digital Documentation of Analog Art	High resolution capture, color calibration, and archival storage of traditional artwork	Marrero-Sánchez & Vergara-Romero (2023); Zhao et al. (2021)
Online Portfolio Curation	Professional presentation of artwork using platforms such as ArtStation or Xiaohongshu	Zakir et al. (2025)
Digital Calligraphy and Painting Tools	Use of tablets with pressure sensitivity and brush simulation software	Parkhomenko & Matusovsky (2023); Bolatova & Nasipov (2023)
Virtual Exhibition Participation	Creation and navigation of 3D gallery spaces and online viewing rooms	Diachuk (2024)
Ethical Digital Sharing	Copyright awareness, watermarking, and avoidance of AI-generated plagiarism	Moustaghfir & Brigui (2024)

These five dimensions go beyond generic digital literacy by addressing the specific needs of artists and art students. Digital documentation, for example, is not merely about taking photographs but about faithfully capturing the nuance of ink wash gradation, brush rhythm, and paper texture. Online portfolio curation requires aesthetic judgment, not just technical skill. Digital calligraphy tools demand an understanding of traditional brush techniques to be used effectively.

The Three Pillars of the Argument

This section presents the core argument of the paper through three interconnected pillars. Each pillar draws on empirical evidence to support the claim that digital competence is not a threat to traditional art but a necessary extension of it.

Pillar 1: Digital Competence Preserves Rather than Replaces Traditional Practice

The first and most important pillar of the argument is that digital competence does not replace traditional artistic practice. Rather, it preserves, documents, disseminates, and enhances it. This claim is supported by several lines of evidence.

Digital tools for documentation and preservation. Traditional artworks are physically fragile. Ink on paper degrades over time. Colors fade. Works are lost to fire, flood, or simply the passage of time. High-quality digital documentation creates a permanent record that can be preserved, studied, and shared without risking damage to the original. Experts in this study emphasized that students who cannot properly photograph their ink wash paintings lose the

subtle gradation that defines the medium. Digital documentation is not an alternative to creating physical art. It is a tool for protecting and sharing it.

Digital tools as complements, not substitutes. Research comparing traditional and digital painting found that digital tools are best understood as complements to traditional practice, not substitutes for it (Parkhomenko & Matusovsky, 2023). Students in the study used digital tools for composition studies, color testing, and iterative experimentation before executing the final work with traditional materials. This approach preserves the tactile and physical communication that traditional works enable while gaining the efficiency and flexibility of digital methods.

Digital tools for teaching and learning. Digital competence also enables new forms of art education. Teachers can demonstrate techniques through video, provide feedback on digital submissions, and create online galleries of student work. Virtual exhibitions developed during the COVID-19 pandemic remain valuable for reaching audiences beyond the local community. **Table 2** provides examples of digital tools that support rather than replace traditional artistic practice.

Table 2

Digital Tools That Support Rather Than Replace Traditional Practice

Digital Tool	Traditional Practice Supported	How It Complements Rather Than Replaces
High-resolution scanner	Documentation of finished work	Creates a permanent archive without altering the original
Tablet with stylus	Composition studies and color testing	Allows rapid iteration before final execution on paper
Online portfolio platform	Exhibition and sales	Extends reach beyond physical gallery space
Video recording software	Technique demonstration	Enables repeated viewing without consuming teacher time
Color calibration tools	Print and reproduction accuracy	Ensures faithful reproduction of original colors

Pillar 2: Self-efficacy determines digital adoption success

The second pillar addresses a psychological factor that is often overlooked in discussions of digital competence: self-efficacy. Self-efficacy refers to an individual's belief in their ability to succeed in specific situations. Research has consistently shown that self-efficacy is a critical determinant of whether students actually use the digital tools available to them.

Self-efficacy as a mediator. A large-scale study found that digital literacy improves digital competence, informal digital learning engagement, and digital self-efficacy (Zakir et al., 2025). These three factors, in turn, increase the likelihood of academic success. The same study

demonstrated that self-efficacy serves as a partial mediator between digital literacy and academic performance. In other words, students who believe they can learn digital tools are more likely to do so successfully.

Digital self-efficacy in educational settings. Research grounded in Self Determination Theory found that digital self-efficacy acts as a mediator between digital media engagement and motivation (Dong, 2025). Students who actively use digital tools tend to have greater motivation for online learning, and this relationship is explained by their digital self-efficacy. Similarly, positive attitudes and digital literacy significantly contribute to self-efficacy, which then positively affects online engagement across social, collaborative, cognitive, behavioral, and emotional dimensions (Getenet et al., 2024).

Self-efficacy in arts education. In the specific context of visual arts education, research on pre-service primary teachers found a significant correlation between self-efficacy beliefs in visual arts instruction and attitudes toward the teaching profession (Erden Kocaarslan & Riedler Eryaman, 2024). Teachers with higher self-efficacy were more confident in their ability to teach visual arts. An upward trend in self-efficacy was observed as academic grade level advanced, suggesting that self-efficacy can be developed through training and experience.

The domain-specific efficacy gap. Experts in this study identified a notable gap in students' self-efficacy. Students were highly confident using social media platforms for sharing artwork, but had low confidence in technical tasks such as color calibration and archival storage. This domain-specific efficacy gap suggests that interventions should target the specific areas where self-efficacy is low, rather than assuming that digital confidence transfers across all tasks. **Figure 1** illustrates the mediating role of self-efficacy in digital adoption.

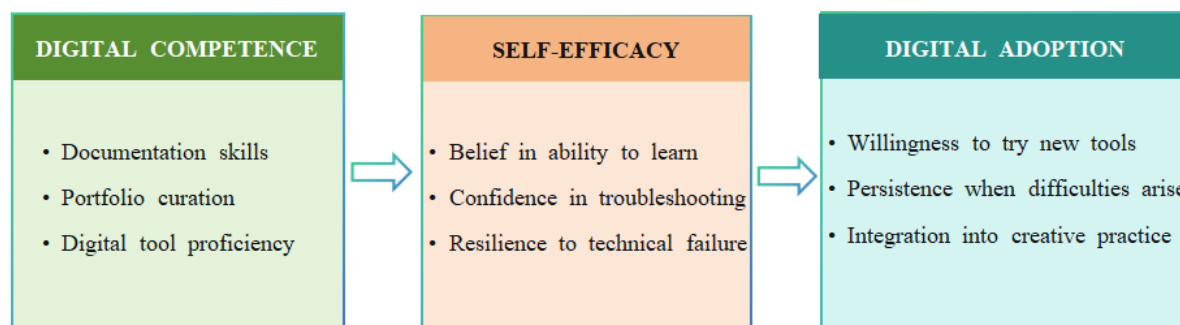


Figure 1. The Mediating Role of Self-Efficacy in Digital Adoption

The figure shows that digital competence alone is insufficient. Without self-efficacy, students may possess digital skills but fail to apply them. Self-efficacy transforms knowledge into action.

Pillar 3: Digital environments demand enhanced critical thinking

The third pillar addresses the cognitive demands of digital learning environments. As students engage with digital tools, online resources, and AI-generated content, they need enhanced critical thinking skills to evaluate, select, and use digital information appropriately.

The relationship between digital literacy and critical thinking. Research has established that digital literacy and self-efficacy together have a positive and significant effect on students' critical thinking (Leuwol et al., 2023). Students who are digitally literate and confident in their digital abilities are better able to think critically about digital content. They can distinguish reliable sources from unreliable ones, evaluate the authenticity of digital images, and make informed decisions about which digital tools to use for which purposes.

Studio-based art practices as critical thinking training. Studio-based art practices such as drawing, painting, and sculpture can foster critical thinking skills in young learners (Ankyiah & Bamfo, 2023). Open-ended art projects that promote student autonomy and require decision-making boost skills like analysis, interpretation, evaluation, and creative problem-solving. When combined with self-reflection and group critique, studio art enhances perspective-taking, reasoning ability, and abstract thought.

However, research has also found that critical thinking levels among art education students are generally low (Basak & Yucel, 2024). This finding is concerning but also hopeful: it suggests that critical thinking can and should be explicitly taught, not assumed to develop automatically through art practice. The same study concluded that critical thinking skills could be supported by designing curricula that encourage and develop critical thinking through specific educational strategies.

Unique critical thinking demands for traditional art students. Experts in this study identified four critical thinking sub-themes specific to traditional art students. **Table 3** presents these sub-themes with descriptions and supporting literature.

Table 3

Critical Thinking Challenges in Digital Environments for Traditional Art Students

Challenge	Description	Supporting Literature
Authenticity Evaluation	Judging whether a digital reproduction distorts the original artwork	Li & Qi (2025); Moustaghfir & Brigui (2024)
Tool Critique	Critically evaluating digital tools rather than accepting them uncritically	Ankyiah & Bamfo (2023); Basak & Yucel (2024)
Tradition Digital Synthesis	Integrating digital methods while preserving core traditional aesthetics	Parkhomenko & Matusovsky (2023); Bolatova & Nasipov (2023)
Information Source Criticism	Evaluating online tutorials, reference images, and AI generated content	Leuwol et al. (2023); Moustaghfir & Brigui (2024)

These four challenges are unique to traditional art students because they require domain specific knowledge. Evaluating the authenticity of a digital reproduction of a calligraphy work,

for example, requires understanding what brush rhythm is and how it manifests in ink on paper. A general critical thinking curriculum would not address this. Art educators must therefore integrate critical thinking instruction into studio practice, not treat it as a separate subject.

Barriers to Integration

Despite the compelling case for integrating digital competence into traditional art education, significant barriers exist. Understanding these barriers is necessary for designing effective interventions. **Table 4** organizes barriers into three levels: teacher level, student level, and institutional level.

Table 4

Barriers to Digital Integration in Traditional Art Education

Level	Barrier	Evidence
Teacher	Insufficient knowledge of specialized art software	Diachuk (2024)
Teacher	Lack of systematic training	Diachuk (2024)
Teacher	Low motivation due to workload and stress	Diachuk (2024)
Teacher	Resistance to changing traditional teaching methods	Expert interviews
Student	Low self-efficacy for technical tasks	Expert interviews
Student	Perception that digital tools are irrelevant to traditional art	Expert interviews
Student	Lack of access to quality digital tools at home	Othman et al. (2023)
Student	Stress due to inadequate materials and tools	Othman et al. (2023)
Institutional	Limited funding for digital equipment	Expert interviews
Institutional	Outdated curriculum that does not include digital competence	Zhao et al. (2021)
Institutional	Lack of technical support staff	Diachuk (2024)
Institutional	No reward system for digital innovation	Diachuk (2024)

These barriers are interconnected. Teachers who lack training cannot effectively teach digital skills. Students who lack access to tools cannot practice. Institutions that lack funding cannot provide either training or tools. Effective reform must address all three levels simultaneously.

Proposed Curriculum Reforms

Based on the three-pillar argument and the identified barriers, this section proposes a five-component curriculum reform framework. **Figure 2** provides a visual overview of the framework, followed by detailed recommendations for each component.

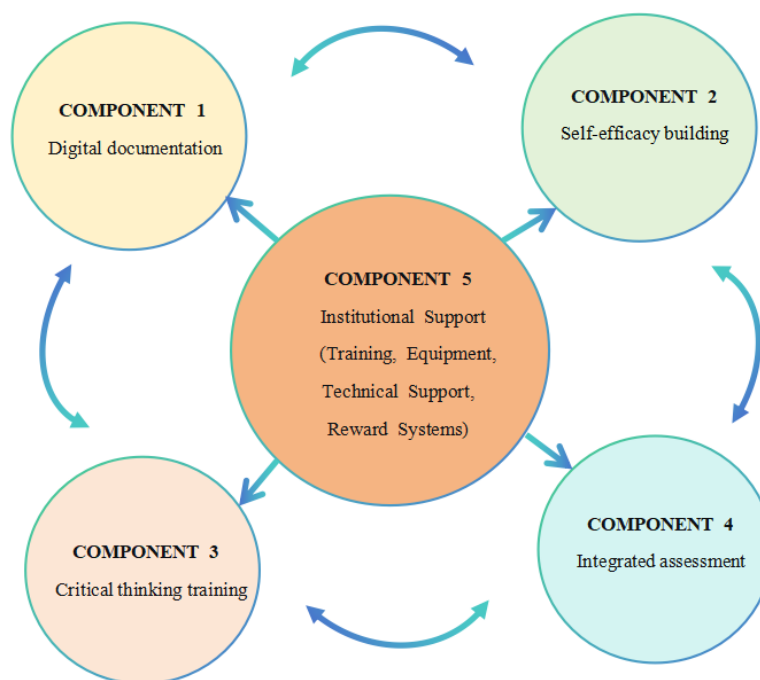


Figure 2. Five Component Curriculum Reform Framework

Component 1: Digital documentation and portfolio training

Every traditional art student should complete a mandatory module on digital documentation. This module should cover high-resolution photography of artwork, color calibration, file management, and archival standards. Students should learn to photograph the same painting under different lighting conditions and critique the accuracy of digital reproductions. Online portfolio platforms should be introduced, and students should maintain a professional portfolio throughout their studies.

Component 2: Self-efficacy building through scaffolded learning

Self-efficacy is developed through mastery experiences, vicarious experiences, social persuasion, and emotional states. Curriculum designers should apply these principles. Scaffolded digital tool introduction should start with simple, low-stakes tasks and gradually increase in complexity. Failure practice sessions, where students deliberately encounter and solve common technical problems, build coping self-efficacy. Peer mentoring programs pairing confident students with less confident students provide vicarious learning. Positive feedback from teachers and peers provides social persuasion.

Component 3: Critical thinking integrated into studio practice

Critical thinking should not be taught as a separate subject. Instead, it should be integrated into existing studio practice. Comparative analysis tasks, where students paint the same subject using traditional and digital methods and then defend which version is more authentic, develop evaluation skills. Group critiques should explicitly address digital

authenticity questions. Students should be required to evaluate the sources of online tutorials and reference images, not simply download whatever they find.

Component 4: Integrated assessment

Assessment should reward both traditional and digital competence. A portfolio might include 60% physical artwork, 30% digital documentation or presentation, and 10% critical reflection on digital traditional integration. This structure signals that digital competence is valued but does not replace traditional skills. Reflection essays should require students to justify their tool choices and evaluate the authenticity of their digital reproductions.

Component 5: Institutional support

None of the above components can succeed without institutional support. Colleges must invest in digital equipment, including tablets, scanners, and color-calibrated monitors. Technical support staff must be available to assist both teachers and students. Faculty development programs should provide training in art-specific digital tools. Workload must be adjusted to give teachers time to learn and implement new methods. Reward systems should recognize digital innovation in teaching. **Table 5** provides a summary of all five recommendations with target stakeholders and implementation priorities.

Table 5

Summary of Curriculum Reform Recommendations

Component	Recommendation	Target	Priority
1	Mandatory digital documentation module	Students	High
1	Professional online portfolio requirement	Students	High
2	Scaffolded digital tool introduction	Curriculum designers	High
2	Failure practice sessions	Teachers	Medium
2	Peer mentoring programs	Institutions	Medium
3	Comparative traditional digital tasks	Teachers	High
3	Critical evaluation of online sources	Teachers	Medium
4	Integrated portfolio assessment	Curriculum designers	High
4	Reflective essays on tool choices	Teachers	Medium

5	Investment in digital equipment	Institutions	High
5	Faculty development programs	Institutions	High
5	Technical support staffing	Institutions	Medium

Implications and Limitations

Implications for Educators

For art educators, the primary implication is that digital competence should be reframed as an extension of, not a threat to, traditional practice. Teachers need not become digital experts overnight. Small, incremental changes such as requiring digital documentation of all finished works or introducing one digital tool per semester can be effective. Professional development should focus on art-specific digital tools, not generic software training.

Implications for Policymakers

For policymakers at the institutional and provincial levels, the implications are primarily about resource allocation. Digital equipment, technical support, and faculty training require funding. Curriculum standards should include digital competence as a learning outcome for art programs. Reward systems should recognize teachers who innovate with digital tools.

Implications for Future Research

Several directions for future research emerge from this argument. Quantitative studies are needed to validate the relationships proposed in the three-pillar model. Longitudinal research should test whether the proposed curriculum reforms actually improve digital competence, self-efficacy, and critical thinking over time. Comparative studies between traditional art students and design or fine arts students would identify what is unique about digital competence in traditional contexts. Finally, the impact of generative AI tools on traditional art students' authenticity judgments requires investigation (Moustaghfir & Brigui, 2024).

Limitations

This argument has several limitations. First, the evidence base for digital competence in traditional art education remains limited. Much of the supporting literature comes from general higher education or vocational education contexts, not specifically from traditional Chinese calligraphy and painting programs. Second, the expert interviews that informed the art-specific dimensions and barriers were conducted with only 12 educators in Hebei Province. Findings may not generalize to other regions. Third, the proposed curriculum reforms have not been empirically tested. They represent informed recommendations, not evidence-based prescriptions.

Conclusion

This paper has argued that traditional art students in Chinese higher vocational colleges need digital competence, not as a replacement for traditional skills but as a necessary extension of them. The argument was built on three pillars. First, digital competence preserves rather than replaces traditional practice through documentation, archiving, and dissemination tools. Second, self-efficacy is a critical determinant of whether students successfully adopt digital tools, and interventions should target domain-specific efficacy gaps. Third, digital learning

environments demand enhanced critical thinking skills, and studio-based art practices are uniquely positioned to develop these skills when critical thinking is explicitly integrated into instruction.

Barriers to integration exist at the teacher, student, and institutional levels. Effective reform must address all three levels simultaneously. A five-component curriculum reform framework was proposed, including digital documentation training, self-efficacy building, critical thinking integration, integrated assessment, and institutional support. The argument contributes to the growing discourse on digital transformation in vocational art education. It offers actionable recommendations for educators who want to prepare their students for the demands of the digital age without sacrificing the traditions that define calligraphy and painting as art forms. The goal is not to replace the brush with the tablet but to give students the tools they need to thrive in a world where traditional and digital practices increasingly coexist.

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