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TECHNOLOGIES FOR THE SCIENTIFIC AND THEORETICAL FORMATION OF PROFESSIONAL COMPETENCE IN FUTURE FINE ARTS TEACHERS

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Abstract

The article examined the scientific and theoretical formation of professional competence in future fine arts teachers, emphasizing the integration of technology in modern education. The competency-based approach is essential because traditional training alone no longer meets the demands of contemporary fine arts pedagogy. Future educators must develop a balance of artistic, pedagogical, research, and digital competencies to effectively engage students and adapt to evolving educational landscapes. The study explored digital tools such as AI-driven learning, virtual reality, online collaboration platforms, and digital design software, which enhance both theoretical knowledge and practical artistic skills. However, challenges such as limited accessibility, lack of educator training, and ethical concerns must be addressed to ensure effective technology adoption. The research highlights the need for innovative pedagogical strategies in higher education to bridge traditional fine arts education with digital advancements. By fostering artistic creativity, adaptability, and technological literacy, fine arts educators can enhance their professional competence and effectively prepare students for interactive and digitally integrated learning environments. Future research should focus on structured training programs and empirical validation to ensure sustainable integration of modern educational technologies in fine arts teacher training.

Keywords: Competence, Future teacher fine arts, Professional competence, Professionalism, Readiness for pedagogical activity.

1. Introduction

The competency-based approach has become a key focus in pedagogical education because teacher training must prepare educators for practical professional challenges [1]. This is especially true for fine arts teachers, who require a unique blend of artistic, pedagogical, psychological, and technological competencies to foster creativity and artistic literacy in students.

The modernization of education has introduced new demands on teacher training. These changes are significant, where educational reforms emphasize the need for technologically equipped and methodologically prepared fine arts educators. Many reports regarding the art education [2-6]. However, existing training programs often struggle to integrate digital tools, virtual learning platforms, and AI-driven technologies, creating a gap in the formation of professional competence. The use of technology has been well-reported elsewhere [7-9]. Because of this, it is essential to analyse and refine training approaches to align with contemporary educational requirements.

The purpose of this study is to analyse the scientific and theoretical formation of professional competence in future fine arts teachers, emphasizing the role of technology in modern education. As traditional fine arts pedagogy evolves, educators must integrate digital tools, innovative teaching strategies, and competence-based learning models to enhance their artistic, pedagogical, and research skills. The novelty of this study lies in its comprehensive examination of digital advancements, including AI-driven learning, virtual reality, and online collaboration platforms, and their impact on fine arts education. By addressing technological integration, training gaps, and pedagogical innovation, this research provides new insights into modernizing fine arts teacher training.

2.Method

This study employed a qualitative approach to analyse the scientific and theoretical formation of professional competence in future fine arts teachers, focusing on technology integration. A literature review, comparative analysis, and expert opinions were used to assess key competencies, including artistic, pedagogical, and digital skills. Case studies of higher education institutions implementing digital tools such as AI, VR, and online platforms were examined. Content analysis identified trends in teacher training. The study is limited by its reliance on secondary data and focus on higher education, requiring updates as educational technology evolves. Detailed information for gaining references is reported elsewhere [10-12].

3.Results and Discussion

The formation of professional competence in future fine arts teachers occurs at the intersection of general scientific, socio-cultural, and moral-aesthetic processes [13, 14]. The increasing role of the teacher’s personality is gaining urgency because professional competence directly influences the quality of education, creative expression, and pedagogical effectiveness. The development of this competence requires both theoretical and practical training, ensuring future educators can navigate the evolving demands of fine arts education.

Figure 1 shows that competence-based education has emerged as a solution to the contradictions between the need for high-quality education and the limitations of traditional training methods. The modern competence approach ensures that teacher training goes beyond knowledge accumulation, focusing on the ability to act in various problem-solving situations. Competence is now viewed as an integrated ability, where theoretical knowledge merges with practical execution, intellectual self-regulation, and moral responsibility. This shift highlights the importance of scientific and technological advancements in fine arts pedagogy, as traditional teaching alone no longer meets contemporary educational requirements.

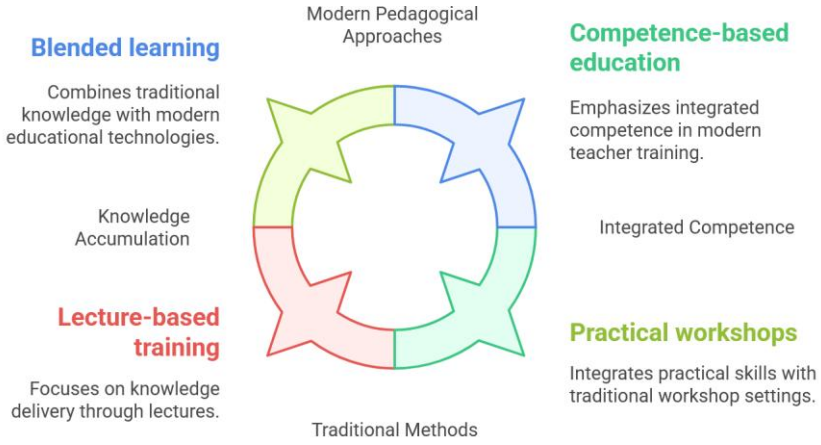

Fig. 1. Evolution of teacher training methods.

In higher education institutions, the training of future fine arts teachers must prioritize innovative approaches to foster independent creative activity, self-development, and professional growth. Scholars emphasize that professional competence is not just a sum of learned skills but an individual's ability to apply knowledge, experience, and values holistically in practice. One critical component requiring attention is research competence, which plays a significant role in fine arts education. As teacher roles shift from an informational model to an interactive and student-centred approach, educators must not only demonstrate research competence but also engage students in research-driven artistic activities [15, 16].

Figure 2 describes technological integration as an essential part of this transformation. Several technologies for the scientific and theoretical formation of professional competence in future fine arts teachers are available (Table 1). Digital learning platforms and online courses. e-learning platforms provide access to theoretical and scientific knowledge related to fine arts education. websites such as Coursera, Udemy, and khan academy offer structured courses on art history, pedagogy, and instructional strategies. learning management systems (LMS). VR and AR technologies provide immersive experiences that enhance artistic skills and pedagogical understanding. VR tools like Google Tilt Brush and Oculus Medium allow students to practice digital painting and sculpture in a three-dimensional space. AR applications like Artivive integrate traditional and digital media, helping future teachers develop interactive lesson plans that merge classical art with modern technology.

Table 1. Technology used in education.

Techno.	Title	Ref.
AI	A review of artificial intelligence in security and privacy: Research advances, applications, opportunities, and challenges.	[17]
AI	Embedded design and implementation of mobile robot for surveillance applications.	[18]
AR	Development of augmented reality application for exercise to promote health among elderly.	[19]
ML	Prediction and classification of low-birth-weight data using machine learning techniques.	[20]
VR	The use of virtual reality as a substitute for the pre-school students' field trip activity during the learning from home period.	[21]
AI	Combining chatbot and social media: Enhancing personal learning environment (PLE) in language learning.	[22]
IOT	Greening the Internet of Things: A comprehensive review of sustainable IoT solutions from an educational perspective.	[23]
AI	Chatbots as digital language tutors: revolutionizing education through AI	[24]
ML	Evaluating the performance of supervised machine learning algorithms in breast cancer datasets.	[25]
ML	A neural network aided real-time hospital recommendation system.	[26]
AI	Trends in the use of artificial intelligence (AI) technology in increasing physical activity.	[27]
ML	Handwritten digit recognition using machine learning algorithms.	[28]
LMS	Determinants of learning management system (LMS) adoption by university students for distance learning.	[29]

AI-powered tools assist in the analysis of artistic styles, techniques, and pedagogical methods. Professional art software enhances the practical skills of future fine arts teachers while also introducing them to modern digital methods of art creation. These programs are increasingly integrated into art education curricula to ensure that future educators are proficient in both traditional and digital artistic methods.

Collaboration platforms facilitate joint artistic projects and discussions on art theory. 3D printing technology helps future fine arts teachers understand contemporary sculptural techniques and mixed-media applications. Exposure to digital fabrication technologies prepares teachers to integrate modern artistic methods into their future classrooms. E-portfolios help students document their learning progress, artistic growth, and teaching competencies.

Interactive resources enhance the theoretical learning of fine arts education. Interactive textbooks and digital libraries like JSTOR and Google Arts & Culture offer extensive academic resources on fine arts education. Data-driven approaches help future fine arts teachers understand the impact of their teaching strategies and

improve educational outcomes. Learning analytics tools such as Tableau and Power BI allow educators to analyse student engagement, artistic progress, and pedagogical effectiveness. Insights gained from big data help refine instructional methods and enhance the scientific approach to fine arts education. By incorporating these technologies, the formation of professional competence in future fine arts teachers can be enhanced through a balance of scientific theory and practical application. These tools ensure that educators are well-prepared to teach fine arts in modern, technologically integrated learning environments.

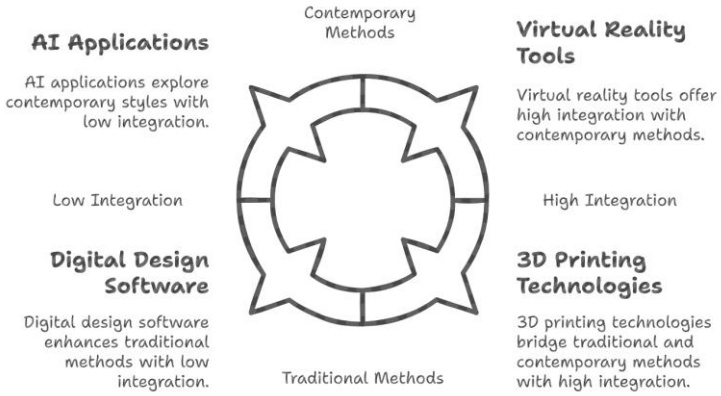

Fig. 2. Technological tools in Fine Arts education.

Figure 3 shows despite these advancements, several challenges hinder the full adoption of digital tools in fine arts education. Ethical concerns, particularly in AI-generated art, raise questions about originality and student reliance on automated tools. Addressing these challenges is critical because fine arts education must equip teachers with the ability to adapt to technological changes while maintaining the artistic and pedagogical traditions that define the profession. A balanced approach to professional competence formation-incorporating scientific theory, creative expression, and technological tools-ensures that future fine arts educators can thrive in modern learning environments [30-37].

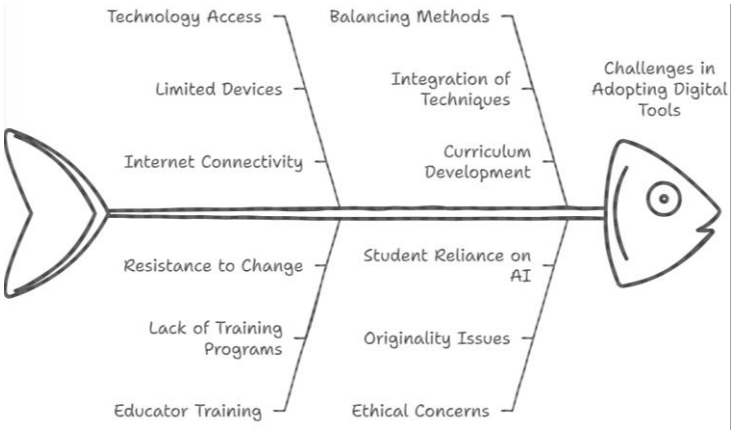

Fig. 3. Overcoming barriers to digital integration in fine arts education.

4. Conclusion

The formation of professional competence in future fine arts teachers requires a balance of scientific theory, artistic skills, and technology. Traditional methods alone are insufficient, making digital tools like AI, VR, and online platforms essential for enhancing teaching and creativity. However, challenges such as accessibility and training gaps must be addressed. Higher education institutions should integrate innovative pedagogical strategies to prepare teachers for modern learning environments. Future research should focus on empirical validation and structured training programs. By fostering artistic creativity, adaptability, and technological literacy, fine arts educators can effectively navigate evolving educational demands.

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