

Artificial Intelligence Technology Enables Higher Dance Education: Opportunities, Challenges and Path Exploration

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Abstract: Artificial intelligence technology is deeply integrated into the field of education, and higher dance education, empowered by technologies such as motion capture and intelligent choreography, faces opportunities for efficiency improvement and creative expansion. However, it also encounters challenges such as the erosion of physical experience and ethical risks. This article explores practical approaches for AI-empowered higher dance education from the perspectives of the integration of technology and art, the transformation of educational subjects, ethical prevention and control, and value reconstruction. It proposes leading technology with a humanistic approach, aiming to enhance efficiency and vitality while preserving the essence of art and cultural mission, providing a reference for cultivating versatile talents.

Keywords: Artificial Intelligence Technology; Higher Dance Education; Man-Machine Collaboration; Education Empowerment

In the era of digital intelligence, the iterative advancements in artificial intelligence technology are profoundly reshaping the educational landscape. Higher dance education faces challenges such as inefficient movement training and a narrow cultural heritage in traditional teaching methods, while also benefiting from technologies like motion capture and virtual training. As technology and art education become more intertwined, balancing efficiency gains with the preservation of artistic essence has become a critical issue of our time. This article examines the opportunities and challenges that AI technology presents for higher dance education, aiming to explore its development path and provide insights for the innovative development of this discipline in the digital intelligence era.

1. Opportunities for the Development of High-Level Dance Education Empowered by Artificial Intelligence

1.1 Intelligent Upgrading and Personalized Expansion of Teaching Mode

Artificial intelligence (AI) technology offers opportunities for the intelligent upgrade and personalized expansion of advanced dance education models. Motion capture technology, through visualization and biomechanical data, accurately diagnoses movement deviations and dynamically generates personalized correction plans, overcoming the limitations of past 'common guidance, lagging individualization,' and shifting skill training from experience-driven to data-driven. Virtual reality (VR) technology creates immersive teaching environments, simulating theater settings and interactions with virtual partners, providing students with highly realistic performance practice, thus addressing the lack of stage experience in traditional teaching. In terms of personalized expansion, integrating multidimensional dance databases and intelligent search systems allows for the intelligent matching of teaching videos and biomechanical analysis resources based on students' training goals, dance preferences, and ability levels, supporting teachers in preparing lessons and helping students independently plan their training paths[1].

1.2 Technological Driven Innovation in Creation and Research

Artificial intelligence (AI) technology offers innovative opportunities for the creation and research in higher dance education. Generative AI, leveraging a database of motion style characteristics, can automatically generate diverse movement combinations, helping choreographers integrate creative elements from different dance styles, such as blending the regional movements of ethnic dances with

the abstract expressions of modern dance. Digital twin technology can simulate stage setups and scenic presentations, reducing trial-and-error costs and shifting the creative process from experience-based to data-driven and creativity-led [2]. In academic research, big data analysis can uncover the movement characteristics and cultural connections of historical dance works, using algorithmic modeling to analyze the logic of body movement and emotional expression. For instance, the quantitative study of the 'form, spirit, strength, and rhythm' in classical dance provides a foundation for dance theory. Additionally, interdisciplinary platforms that integrate biomechanics and sports science are developing models for toe-standing balance and algorithms for predicting movements in fatigue states, enhancing scientific training and injury prevention research.

2. The Real Challenges Under the Background of Technology Empowerment

2.1 The Internal Conflict Between Technical Characteristics and the Essence of Dance Education

The standardized data processing capabilities of artificial intelligence technology conflict deeply with the artistic and experiential nature of dance education, primarily manifested in the erosion of bodily and emotional expression by technical rationality and the suppression of artistic intuition. While motion capture technology can quantify physical parameters such as joint angles, it struggles to capture the non-structured artistic qualities of classical dance, such as 'body rhythm' and 'aura,' and the body narratives of modern dance improvisation. This can lead students to a situation where they meet technical standards but lack artistic depth. Additionally, while VR-generated digital scenes can replicate stage spaces, they fail to recreate the subtle tactile sensations of the body on the ground and the immediate emotional responses from audience interactions in real theaters. This results in students experiencing the physical texture and dynamic tension of the 'dance field' being replaced by data symbols. Furthermore, standardized training programs based on algorithmic recommendations overly focus on efficiency, reducing the space for personalized artistic insights in interactive teaching, potentially

turning dance learning into data-driven action replication, which deviates from the essence of dance education, which emphasizes bodily experience and creative expression.

2.2 Role Adaptation and Ability Gap of Educational Subjects

In the context of technology empowerment, teachers and students in higher dance education face dual challenges: unclear role definitions and insufficient capability reserves. For teachers, the traditional teaching model of 'physical demonstration + experiential guidance' is no longer suitable for the new requirement of 'technology-art synergy.' Some teachers lack the ability to integrate AI tool operations, training data interpretation, and artistic guidance [4]. This deficiency in 'dual-teacher capabilities' (artistic literacy and technical application) can lead to a superficial layering of technology tools and dance teaching, rather than deep integration. Students face the risk of 'technological dependence' inhibiting creative thinking. Over-reliance on AI-generated choreography plans and training correction suggestions may undermine their ability to independently conceptualize and express themselves physically. Additionally, students accustomed to data-driven feedback are prone to fall into 'standardized thinking,' overlooking the core role of bodily intuition and spontaneous insights in dance learning, leading to the paradox of 'enhanced technical skills at the expense of artistic creativity.'

2.3 Ethical Risks and Hidden Dangers of Educational Equity

The deep integration of artificial intelligence (AI) technology into higher dance education brings ethical risks and educational equity concerns. In terms of data ethics, the body posture and biomechanical data collected by motion capture systems can lead to privacy breaches or commercial misuse if there are no adequate protection mechanisms [5]. Algorithmic biases can infiltrate teaching through intelligent evaluation tools, such as action norm models trained on a single historical dataset. If these models are based on specific body types or dance styles, they may lead to biased evaluations of students with different physical conditions, thereby suppressing diverse aesthetic expressions. Moreover, technological empowerment

exacerbates the 'digital divide': universities in developed regions, leveraging their financial advantages, can prioritize the allocation of motion capture labs and VR training systems, while institutions in central and western China lag significantly in the availability of AI-assisted teaching tools and access to high-quality digital courses. The reliance on smart devices for teaching also poses a hidden barrier for students from economically disadvantaged families. Some students, lacking personal devices or extracurricular technical resources, are at a disadvantage in human-machine collaborative learning, thereby amplifying educational inequality.

3. Exploration of Development Path Under the Perspective of Human-Machine Collaboration

3.1 The Appropriateness of Integrating Technology and The Essence of Art

In advanced dance education, to achieve a deep integration of artificial intelligence technology with the essence of art, it is essential to focus on the physicality, emotionality, and creativity of dance, establishing a suitable paradigm for the coexistence of technology and art. In terms of technology application, the physicality, emotionality, and creativity of dance should be the foundation, integrating the mechanical data analysis from motion capture technology with the emotional logic and cultural connotations of dance. Through the two-way interaction of 'technology decoding—art reconstruction,' training should shift from merely optimizing technical parameters to cultivating cultural expression skills. The use of VR technology should aim to recreate the interactive experience of real dance venues, simulating audience feedback and physical space sensations to compensate for the 'sense of presence' in virtual scenes, ensuring that technological assistance serves the fundamental need of conveying dance emotions[6]. Additionally, in the choreography field, the application of generative AI should adhere to the principle of 'art leading, technology assisting,' using algorithm-generated action groups as a creative material library. Creators should process these actions through their artistic intuition, ensuring that technology always supports personalized artistic expression. At the same time, it is

crucial to guard against the risk of 'technology supremacy,' guiding students to understand the aesthetic logic and cultural connotations behind movements when using wearable devices, intelligent evaluation systems, and other technical tools, avoiding the trap of 'data worship.'

3.2 Enhance the Transformation and Ability of Educational Subjects

To enhance the role adaptation and professional qualities of educators in higher dance education, a two-way empowerment development mechanism between teachers and students should be established. At the teacher level, a dual-track training system combining 'artistic literacy + technical application' should be set up. This involves conducting technical practical training, such as motion capture operations and training data analysis, through school-enterprise cooperation, and deepening the understanding of dance fundamentals through art workshops. For instance, incorporating virtual simulation teaching module design and data chemistry situation analysis into teacher evaluations can facilitate their transition from 'physical demonstrators' to 'technical-art collaborative guides.' Teachers need to master human-machine collaborative teaching strategies, interpreting technical parameters while guiding students to understand the aesthetic implications of movements, thus integrating data feedback with artistic guidance. For the student group, it is essential to cultivate a balanced ability to integrate 'technological tool rationality with artistic sensibility.' On one hand, AI-assisted platforms should be used to improve movement standardization and training efficiency; on the other hand, workshops like improvisation and intangible cultural heritage dance should be organized to strengthen artistic intuition and cultural awareness, avoiding over-reliance on technology. A learning cycle of 'intelligent assessment-self-reflection-creative practice' should be constructed. For example, students should develop plans based on AI flexibility assessment reports, guided by teachers, and then transform technical data into emotional expressions through choreography. Additionally, interdisciplinary projects should be encouraged, such as collaborating with computer science students to develop AI applications for dance, which will deepen the

understanding of technical principles and foster an awareness of 'using technology for art,' achieving the coordinated development of technical tools and artistic thinking.

3.3 Promote Ethical Risk Prevention and Control and Educational Equity

To promote ethical risk prevention and educational equity in higher dance education, a systematic approach should be developed through institutional design, technical governance, and balanced resource allocation. To address data privacy and algorithmic bias, a comprehensive ethical framework should be established: during the data collection phase, biometric data from motion capture should be encrypted and stored with hierarchical authorization, adhering to the 'minimum necessary' principle to limit usage; in algorithm development, technology providers should disclose their logic frameworks and integrate fairness verification modules to eliminate evaluation discrimination caused by data bias, and third-party certification for algorithm transparency should be introduced to ensure the objectivity of intelligent evaluation tools. To address the uneven distribution of technical resources, government special fiscal investments and equipment donations should be made to increase the coverage of intelligent hardware such as motion capture systems and virtual training platforms in central and western universities, while simultaneously advancing 5G and cloud computing infrastructure to narrow the regional technology gap; a national resource sharing platform should be established to integrate high-quality courses, intangible cultural heritage databases, and intelligent creation tools, using dynamic weight recommendation algorithms to evenly distribute diverse content across different regions, avoiding the homogenization of cultural experiences caused by algorithms, and ensuring students' equal development opportunities through balanced resource allocation and diverse content supply.

4. Conclusion

In the exploration of integrating artificial intelligence into higher dance education,

opportunities and challenges coexist, with the key being to harness technological tools through a humanistic core. From the integration of technology and art to enhancing individual capabilities, from ethical oversight to value reconstruction, human-machine collaboration must always uphold the physical, emotional, and cultural essence of dance. In the future, only by continuously balancing technological efficiency with artistic essence and establishing a development paradigm that unifies instrumental and value rationality can AI truly become a powerful tool for expanding educational boundaries and stimulating creative vitality. This will help cultivate dance talents with both digital literacy and humanistic sentiment, driving higher dance education to achieve a creative leap in the digital age.

References

- [1] Yao Jiaxu. Exploration of the Development Path of Artificial Intelligence Empowering Higher Dance Education in the Digital Age [J]. Shangwu, 2024, (24):156-158.
- [2] Li Lina, Ma Ao, and Wang Hanhan. Does Dance Require AI? —— Generative AI Empowers the Innovative Development of Dance [J]. Golden Key (Chinese and Mongolian), 2024, (04):70-74+80.
- [3] Ke Qing. Challenges and Countermeasures of Generative AI in Promoting High-Quality Development of Higher Education [J]. University Education, 2024, (17):16-20.
- [4] Liu Zhixue, Zhang Gongxun, and Zhang Shun. The Role of Teachers in the Age of Artificial Intelligence: Challenges, Responses, and Reforms [J]. Journal of Mudanjiang Normal University (Social Sciences Edition), 2025, (03):16-23.
- [5] Zhang Yingteng and Xu Jingjing. Exploring the Path of Empowering Higher Education with AI Large Models [J]. Science, Education, and Culture Review, 2025, (12):1-5.
- [6] Hu Wei. From Tradition to Innovation: Exploring the Future of Metaverse in Dance Education [J]. Dance, 2022, (06):95-97.