

Potential Risks of Artificial Intelligence in Dance Education and Human-Centered Mitigation Strategies

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Abstract. Artificial intelligence is increasingly used to support choreography, movement analysis, feedback, and assessment in dance education. This paper examines the educational and ethical risks of these applications through a literature-informed conceptual discussion. It identifies five connected concerns: threats to academic and artistic integrity, reduced critical thinking and independent movement exploration, excessive reliance on automated guidance, data privacy and algorithmic bias, and weakened emotional and social development. The discussion links these concerns to the embodied, creative, and interpersonal character of dance learning. It proposes process-oriented assessment, inquiry-based engagement with AI, professional development that sustains teacher agency, responsible data governance, and continued attention to human interaction and embodied practice. The paper argues that AI integration should be guided by pedagogical purposes and artistic development, with teachers retaining responsibility for interpretation and assessment. These proposals offer a framework for evaluating AI-supported dance teaching; their effectiveness requires examination in specific educational settings.

Keywords: artificial intelligence, dance education, artistic integrity, embodied learning, teacher agency, educational ethics.

1. Introduction

The rapid development of artificial intelligence (AI) has significantly influenced contemporary educational practices, leading to its increasing integration into various teaching and learning contexts. Dance education, as a specialised field of arts education, has likewise begun to incorporate AI-driven technologies into instructional processes. Emerging applications include automated choreography generation, motion capture and posture analysis, technical performance assessment, and administrative management systems. These technologies offer new possibilities for improving instructional efficiency, supporting personalised learning, and enhancing data-informed teaching practices[1].

However, dance education differs from many academic disciplines in that it is fundamentally grounded in embodied learning, physical demonstration, emotional communication, and interpersonal interaction. The development of dance skills and artistic expression relies not only on the acquisition of technical knowledge but also on continuous teacher guidance, collaborative practice, and experiential engagement. As a result, the increasing adoption of AI technologies in dance education raises a series of pedagogical, artistic, and developmental concerns that warrant critical examination.

Existing discussions of AI in education have largely focused on its potential benefits for teaching effectiveness and learning outcomes. Comparatively, limited attention has been given to the specific challenges posed by AI within practice-based arts disciplines such as dance. This study therefore investigates the potential risks associated with the application of AI in dance education and examines how these risks may affect students' technical development, creative capacity, social interaction, and overall educational experience.

By analysing five key areas of concern and illustrating them through discipline-specific educational contexts, this paper aims to contribute to a more balanced understanding of AI integration in dance pedagogy. The study further discusses possible strategies for mitigating these risks and explores how AI technologies may be utilised in ways that support, rather than undermine, the educational and artistic objectives of dance learning.

2. Major Dangers of AI in Dance Education

2.1. Threats to Academic and Artistic Integrity

The popularization of generative AI in dance education poses risks to academic standards and artistic originality. AI tools can produce choreography drafts, movement materials, reflective papers and performance critiques to inspire learning, yet improper use blurs the line between technical aid and students' independent creation.

Academically, if learners hand in AI-produced work without revision, critical reflection or clear citation, assessments fail to truly reflect their knowledge and creativity, making fair evaluation difficult for teachers.

Artistically, heavy reliance on AI undermines creative development. Choreography training focuses not only on finished works but also on students' self-exploration of movements, composition trials and unique expressive styles—key steps to build creative thinking, aesthetic judgement and personal choreographic identity. Replacing most exploratory practice with AI results reduces students' reflective and physical creation experience.

Long-term overuse of AI weakens learners' independent creativity and individual artistic characteristics. Though AI outputs look technically polished, they lack the personal experience and introspection core to artistic creation. Therefore, dance institutions need to balance the application of generative AI with the protection of academic norms and art cultivation processes.

2.2. Reduced Critical Thinking and Independent Movement Exploration

AI training systems powered by motion capture and automated analysis deliver instant, customised technical feedback to boost learning efficiency, yet they threaten students' critical thinking and independent movement exploration.

Dance study is far more than replicating standard techniques. Students need to dissect movement logic, compare multiple expression schemes and make artistic choices matching their physical traits and expressive aims—these reflective practices foster critical thinking, body awareness and independent artistic judgement. Over-reliance on algorithmic feedback makes students passively accept standardised corrections instead of actively exploring and reflecting on movements.

Dancers differ greatly in physique, physical stamina, training background and artistic style. AI only judges movements against fixed technical templates and ignores personalised adjustments tailored to individual bodies and expressive needs. This drives students to chase algorithmic standards rather than explore unique, personalised movement styles.

Long-term reliance on automatic feedback weakens students' ability to solve movement problems and experiment creatively. They grow used to seeking judgement from AI instead of analysing movement options and forming personal interpretations. This damages interpretive competence, creative initiative and reflective learning, which are core to professional dance training. In short, AI is a useful technical aid, while teaching must prioritise critical questioning, physical exploration and independent artistic decision-making to balance its downsides.

2.3. Over-Reliance on AI and the Potential Decline of Teaching Quality

AI offers dance teachers automated evaluation, performance analysis and lesson-planning tools to cut administrative work and supply objective technical data for teaching decisions. Still, risks emerge once teachers take AI outputs as the main teaching reference, which lessens their active observation, evaluation and independent teaching judgment.

Professional expertise lies at the heart of quality dance teaching. Apart from grading technical precision, teachers need to perceive students' physical states, track their progress, pinpoint personal learning barriers and adjust teaching methods for different learners. Such work demands long-term on-site observation and contextual comprehension that quantitative movement data cannot fully cover. Restricted by fixed parameters and training datasets, AI fails to capture the complexity of each student's unique learning context.

Overusing automated tools hinders teachers from polishing their professional capabilities. If teaching arrangements mainly follow algorithmic suggestions, teachers will lose chances to practice careful classroom observation, teaching reflection and flexible differentiated instruction—core parts of professional teaching. This problem stands out in dance education, as students' growth relies heavily on motivation, self-confidence, emotional involvement and human communication besides technical improvement.

Moreover, dance education quality cannot be measured merely by technical metrics. Students' artistic progress comes from teacher-student communication, tailored guidance, emotional encouragement and joint creative exploration. AI can only provide auxiliary data yet cannot interpret the social, emotional and artistic layers of learning. Heavy dependence on AI creates a rigid, technique-centred learning atmosphere, narrowing the space for personalised tutoring and all-round artistic growth. To sum up, AI is only auxiliary equipment and must never replace dance teachers' professional judgment and core teaching duties.

2.4. Data Privacy and Algorithmic Bias: Ethical Challenges in Dance Education

Wide adoption of AI dance training tools brings two core ethical risks: data privacy leakage and algorithmic bias[2]. These systems gather massive personal data such as motion footage, body measurements, training logs and physical health records to realise motion analysis, performance scoring and tailored guidance. This raises critical issues over informed consent, data ownership, storage safety and regulated data usage at school.

The risks hit harder in dance, as the human body acts both as learning carrier and evaluation subject. Dance courses constantly collect sensitive physical data rarely seen in other disciplines. Lack of clear data access and management rules leads to unauthorised data circulation, unapproved secondary exploitation and inadequate privacy safeguards. Teenage and young student groups are extra vulnerable, since they hardly recognise long-term digital privacy hazards.

Algorithmic bias constitutes another ethical barrier. AI evaluation results depend heavily on the diversity of training datasets. If datasets are dominated by specific body shapes, movement styles or single aesthetic standards, automatic scoring will favour performances matching these mainstream features. Students with distinctive physical conditions or unique artistic styles will receive biased, inaccurate feedback.

Such bias undermines fairness and inclusivity in dance teaching. Modern dance advocates body diversity, plural aesthetics and equal learning rights for all learners. Algorithms with narrow evaluation standards will solidify outdated aesthetic prejudice and suppress diversified dance creations. To deploy AI ethically in dance education, schools need complete data protection rules, plus sustained optimisation to make algorithm frameworks transparent, impartial and sufficiently inclusive [3].

2.5. Weakened Emotional and Social Development

The extensive application of AI in dance education harms students' emotional and social growth. Intelligent tools deliver technical feedback and personalised learning resources, yet they cannot substitute the interpersonal communication core to dance training. Rooted in physical interaction and group cooperation, dance learning heavily depends on bonds between teachers and peers [4].

Students build emotion and social competence via shared learning activities including teacher demonstrations, partner practice, group rehearsals and stage preparation. These activities build confidence, empathy and communication awareness, shaping learners' artistic identity and professional literacy alongside technical skills. Once tech-driven learning cuts down deep human communication and teamwork practice, students lose vital growth opportunities.

The problem stands out in group dance and stage performances. Excellent dance demands more than precise individual moves; dancers must interact with partners, convey emotions and adjust flexibly to live performance atmospheres. AI optimises movement stability but fails to foster trust, emotional resonance and unified group artistic expression built through complex human interaction.

Long-term overuse of AI-based teaching deprives students of indispensable social and emotional training, weakening their teamwork ability, stage confidence and emotional expression skills critical to artistic and career development. Hence, despite AI's auxiliary value, teaching arrangements must prioritise face-to-face communication, group collaborative practice and emotional perception training to strike a balanced mode.

3. Strategies to Mitigate the Dangers of AI in Teaching

3.1. Establishing Institutional Governance and Process-Oriented Assessment to Safeguard Artistic and Academic Integrity

Addressing threats to artistic and academic integrity requires more than restricting AI use; it necessitates the development of comprehensive institutional governance frameworks that promote responsible and transparent engagement with emerging technologies[5]. Consistent with international discussions on human-centred AI in education, educational institutions should establish clear policies that define the appropriate scope of AI use within dance learning, choreography projects, and academic assessment. Rather than adopting a purely prohibitive approach, policies should distinguish between acceptable forms of AI-assisted learning, such as idea generation, research support, and technical feedback, and inappropriate practices that substitute for students' independent creative and intellectual contributions.

In addition to policy development, assessment practices should be redesigned to reflect the principles of authentic and process-oriented learning. Contemporary educational research suggests that academic integrity is strengthened when assessment focuses not only on final products but also on the learning processes through which knowledge and creative outcomes are developed. Within dance education, this approach is particularly relevant because choreographic competence emerges through experimentation, reflection, revision, and embodied exploration rather than solely through the presentation of a finished performance.

Accordingly, institutions may adopt assessment strategies that document students' creative development over time. Examples include reflective journals, choreographic process portfolios, rehearsal documentation, peer-feedback records, and supervised studio-based creation tasks. Such methods allow educators to evaluate students' decision-making processes, artistic reasoning, and creative growth, thereby reducing the likelihood that AI-generated outputs can be presented as evidence of independent achievement. Furthermore, greater emphasis on formative assessment can encourage continuous engagement with the creative process while supporting students in developing responsible approaches to AI-assisted learning.

From this perspective, safeguarding artistic and academic integrity should not be understood solely as a matter of detecting misconduct. Instead, it involves cultivating ethical awareness, creative responsibility, and reflective learning practices that enable students to use AI technologies critically and appropriately. By combining transparent institutional policies with process-oriented assessment frameworks, dance education programmes can better preserve the authenticity of artistic learning while continuing to benefit from technological innovation[6].

3.2. Integrating AI into Dance Pedagogy to Foster Critical Thinking and Dance Literacy

To mitigate the risk of reduced critical thinking and independent movement exploration, AI should be integrated into dance education as a tool for inquiry and reflection rather than as an unquestioned source of authority. Drawing upon constructivist and inquiry-based learning approaches, educators can encourage students to critically engage with AI-generated suggestions by analysing, evaluating, and adapting them in relation to their own embodied experiences and artistic intentions. Such an approach positions learners as active participants in the learning process rather than passive recipients of algorithmic recommendations.[7].

Within dance training, AI-generated movement sequences, technical feedback, or choreographic proposals can serve as starting points for discussion and exploration. Students may be encouraged to

compare algorithmic recommendations with their own movement discoveries, identify limitations within AI-generated outputs, and justify decisions to modify or reject particular suggestions. Through these activities, learners are required to articulate their reasoning, reflect on alternative possibilities, and make independent artistic judgements. The educational value therefore lies not in accepting AI-generated solutions, but in critically examining them through embodied practice and creative experimentation.

This pedagogical approach is consistent with the development of AI literacy, which emphasises the ability to understand, evaluate, and responsibly use AI technologies rather than relying on them uncritically. In the context of dance education, AI literacy extends beyond technical knowledge to include awareness of the limitations of algorithmic systems, recognition of the role of human creativity, and the capacity to make informed artistic decisions. By integrating reflective discussion, peer critique, and process-based inquiry into AI-supported learning activities, educators can strengthen students' critical thinking, creative autonomy, and choreographic problem-solving abilities.

The successful implementation of such approaches requires sustained professional support for educators. Designing inquiry-oriented learning environments often demands additional pedagogical planning and curriculum development. Therefore, institutions should provide opportunities for collaborative lesson design, professional learning communities, and the sharing of AI-integrated teaching resources. These forms of institutional support can help teachers develop effective strategies for incorporating AI into dance education while maintaining learner agency, creativity, and critical engagement[8].

3.3. Preserving Teachers' Professional Agency Through Human-Centred AI Integration

To address the risks associated with excessive reliance on automated systems, AI should be positioned as a supportive educational resource rather than a substitute for professional teaching expertise[9]. International discussions on human-centred AI in education emphasise that technological innovation should enhance, rather than replace, the professional judgement and pedagogical responsibilities of educators. Within dance education, this principle is particularly important because teaching involves not only technical instruction but also artistic mentorship, emotional support, injury prevention, and the facilitation of creative development.

Accordingly, institutions should establish clear frameworks that define the respective roles of teachers and AI systems within the educational process. AI technologies may contribute to tasks such as movement analysis, performance monitoring, and the provision of technical feedback. However, decisions concerning curriculum design, assessment interpretation, student wellbeing, artistic evaluation, and pedagogical adaptation should remain under the authority of qualified educators. Such an approach reflects a human-in-the-loop model of education, in which AI-generated information supports decision-making while teachers retain responsibility for contextual interpretation and educational judgement.

Maintaining teachers' professional agency is particularly significant in dance pedagogy because effective instruction requires continuous responsiveness to students' individual needs. Educators must interpret physical readiness, emotional engagement, motivation, and creative potential—dimensions of learning that cannot be fully captured through quantitative performance data alone. By combining technological insights with professional experience and pedagogical expertise, teachers can provide more comprehensive and individualised learning support than either human judgement or automated systems could achieve independently.

The successful implementation of human-centred AI approaches also depends on sustained professional development. As AI technologies become increasingly integrated into educational environments, dance educators require opportunities to develop digital competence and critical understanding of AI-supported teaching practices. Institutions should therefore provide ongoing professional learning programmes, collaborative communities of practice, and technical support mechanisms that enable teachers to engage confidently with emerging technologies. Through these

measures, AI can function as a tool that strengthens teaching effectiveness while preserving the central role of educators in supporting students' artistic, emotional, and professional development.

3.4. Promoting Ethical AI Governance Through Data Protection and Algorithmic Fairness

Addressing ethical concerns associated with AI in dance education requires the establishment of comprehensive governance frameworks that prioritise both data protection and algorithmic fairness. Consistent with international discussions on responsible AI in education, institutions should ensure that the collection, storage, and use of student data are guided by principles of transparency, accountability, and informed consent. Because AI-supported dance learning often involves the processing of highly sensitive physical and performance-related information, robust safeguards are necessary to protect students' privacy and maintain public trust in educational technologies.

Educational institutions should therefore implement clear policies governing data management, including secure storage procedures, restricted access protocols, and regular monitoring of data use practices. In addition to technical protections, students and educators should be informed about how personal data are collected, processed, and utilised within AI-supported learning environments. Strengthening awareness of digital rights and data responsibility can contribute to a more ethical and transparent educational ecosystem.

Beyond data protection, efforts are also needed to address potential sources of algorithmic bias. Contemporary research has highlighted that AI systems may reproduce existing inequalities when training datasets fail to adequately represent diverse populations and experiences. In dance education, this concern is particularly significant because performance evaluation is closely connected to physical characteristics, movement styles, cultural traditions, and aesthetic values. If algorithmic systems are developed using narrow representations of technical excellence or bodily norms, assessment outcomes may not accurately reflect the diversity of contemporary dance practice.

To promote fairness and inclusivity, institutions, researchers, and technology developers should collaborate in the continuous evaluation and refinement of AI systems. Regular algorithmic audits, diverse training datasets, and transparent evaluation criteria can help identify and mitigate unintended biases within automated assessment processes. Such measures support the development of AI tools that recognise a wider range of physical characteristics, artistic approaches, and cultural expressions.

Ultimately, the ethical implementation of AI in dance education extends beyond technical compliance. It requires an ongoing commitment to protecting student rights, ensuring equitable assessment practices, and promoting inclusive learning environments. By integrating principles of data governance, algorithmic fairness, and educational equity into AI policy development, institutions can better align technological innovation with the broader values and objectives of contemporary dance education.

3.5. Balancing AI-Supported Learning with Human Interaction and Embodied Practice

To support students' emotional and social development, AI technologies should be integrated into dance education in ways that complement rather than diminish opportunities for human interaction and embodied learning. Contemporary educational research emphasises that meaningful learning is shaped not only by access to information and technical feedback but also by participation in collaborative, socially situated, and emotionally engaging experiences. This principle is particularly relevant in dance education, where learning occurs through shared physical practice, interpersonal communication, and collective artistic exploration.

A balanced approach to AI integration should therefore combine the benefits of technological support with the pedagogical value of face-to-face engagement. AI systems may contribute to technical skill development by providing movement analysis, practice feedback, and personalised learning resources. However, activities that foster emotional expression, artistic interpretation, collaborative problem-solving, and interpersonal communication should continue to be centred within human learning environments. Teacher demonstrations, group rehearsals, peer feedback,

improvisational exercises, and live performance experiences remain important contexts through which students develop confidence, empathy, and professional performance skills.

This approach is consistent with social constructivist perspectives on learning, which emphasise that knowledge and understanding are developed through interaction with others. In dance education, collaborative learning experiences enable students to negotiate meaning, respond to diverse perspectives, and develop collective artistic awareness. These social processes contribute significantly to both artistic growth and personal development and cannot be fully replicated through individual interactions with technological systems.

Accordingly, institutions should adopt pedagogical models that promote a balanced relationship between AI-supported learning and human-centred educational practice. Rather than evaluating success according to the quantity of technology used, educational programmes should focus on how AI can enhance learning while preserving opportunities for embodied experience, social engagement, and creative collaboration. Through such an approach, dance education can benefit from technological innovation while continuing to support the emotional, social, and artistic dimensions of student development that remain central to the discipline.

4. Conclusion

The increasing integration of artificial intelligence into dance education presents both significant opportunities and important challenges. While AI technologies can enhance instructional efficiency, provide technical feedback, and support personalised learning, their implementation also raises concerns regarding artistic and academic integrity, critical thinking and creative autonomy, teaching quality, data ethics, and students' emotional and social development. These issues are particularly significant within dance education because learning is grounded not only in technical skill acquisition but also in embodied experience, artistic expression, interpersonal interaction, and creative exploration.

This study has argued that the effective integration of AI in dance education requires a balanced and human-centred approach. Rather than viewing AI as either a complete solution or a threat to educational practice, institutions should focus on developing governance frameworks and pedagogical strategies that support responsible and purposeful technology use. Such approaches include process-oriented assessment practices that safeguard artistic integrity, inquiry-based learning environments that cultivate critical thinking and AI literacy, human-centred teaching models that preserve teachers' professional agency, ethical governance mechanisms that promote data protection and algorithmic fairness, and collaborative learning environments that support students' emotional and social development.

More broadly, the relationship between AI and dance education reflects a wider challenge facing contemporary education: how technological innovation can be integrated without diminishing the human dimensions of learning. As a discipline centred on embodied practice, artistic interpretation, and collaborative experience, dance education provides an important context for exploring this balance. Future developments should therefore prioritise the complementary relationship between human expertise and technological support, ensuring that AI serves as a tool for enhancing rather than replacing the educational processes that foster creativity, artistic growth, and holistic student development.

Ultimately, the long-term value of AI in dance education will depend not only on technological advancement but also on the educational principles that guide its implementation. By adopting human-centred, ethical, and pedagogically informed approaches, dance educators and institutions can better harness the benefits of AI while preserving the artistic, social, and developmental qualities that remain fundamental to dance learning.

References

- [1] Wang, Z. (2024). Artificial intelligence in dance education: Using immersive technologies for teaching dance skills. *Technology in Society*, 77, 102579.
- [2] Kearney, D. (2024). Dancing with AI: Unveiling the Potentials and Pitfalls of ChatGPT for a New Wave of Dance Critics and Criticism. *Critical Stages*, (29).
- [3] Wang, Y., & Zheng, G. (2020). Application of artificial intelligence in college dance teaching and its performance analysis. *International Journal of Emerging Technologies in Learning (iJET)*, 15(16), 178–190.
- [4] Kang, J., Kang, C., Yoon, J., Ji, H., Li, T., Moon, H.,... & Han, J. (2023). Dancing on the inside: A qualitative study on online dance learning with teacher-AI cooperation. *Education and Information Technologies*, 28(9), 12111–12141.
- [5] Gao, Y. (2025, April). Path of Artificial Intelligence Technology in College Dance Education. In 2024 3rd International Conference on Educational Science and Social Culture (ESSC 2024) (pp. 324–337). Atlantis Press.
- [6] Huang, R., Zhang, L., & Li, Y. (2025). Transforming dance education in China: enhancing sustainable development and cultural preservation. *Research in Dance Education*, 1–29.
- [7] Liu Jie Xu, Jing Wu, Jing Dong Zhu & Ling Chen.(2025). Effects of AI-assisted dance skills teaching, evaluation and visual feedback on dance students' learning performance, motivation and self-efficacy. *International Journal of Human - Computer Studies*,195,103410.<https://doi.org/10.1016/J.IJHCS.2024.103410>.
- [8] Xiaojuan Cao.(2024). Case Study of China's Compulsory Education System: AI Apps and Extracurricular Dance Learning. *International Journal of Human-Computer Interaction*,40(13),3419–3426.<https://doi.org/10.1080/10447318.2023.2188539>.
- [9] A. D. Pereira dos Santos, L. Loke, K. Yacef, R. Martinez-Maldonado. (2022). Enriching teachers' assessments of rhythmic Forró dance skills by modelling motion sensor data. *International Journal of Human-Computer Studies*, 161, 102776. <https://doi.org/10.1016/j.ijhcs.2022.102776>