

The Reconstruction of the AI-Driven Early Childhood Dance Creation Process and a New Paradigm of Artistic Expression

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Abstract: This article provides a highly structured and insightful analysis of the integration of artificial intelligence (AI) and dance art. It first discusses the impact of AI technology on the reshaping of creative processes and the innovation of artistic expression paradigms in the field of children's dance. Then, from the perspective of posthumanism and body aesthetics theory, it naturally and appropriately introduces the "body-technology" aesthetic imagery constructed by AI, creating an "E-utopia" creative environment and adopting a "posthuman narrative" perspective to unfold profound artistic philosophical reflections. What is even more noteworthy is that AI reconstructs the traditional teacher-centered process into a "generation-interaction" closed loop centered on children's experience, from three dimensions: creative generation, teaching adaptation, and stage interaction. This has truly given birth to a new paradigm of artistic expression. However, it is undeniable that this process also brings various issues, such as technological ethics and child protection, the balance between artistic subjectivity and educational nature, and the digital divide caused by technological popularization. Therefore, the future direction is very clear: to promote the development of lightweight tools, build an "AI+aesthetic education" integrated ecosystem, improve industry norms, and provide policy guidance, so as to enable the healthy development of this field and benefit the public. In excellent correspondence with this, this article clearly proposes that AI should serve as a "co-creator" and "aesthetic expander" in children's dance, to construct a new paradigm of "technology-art-education" trinity centered on children's development.

Keywords: Artificial intelligence (AI); Early childhood dance; Reconstruction of the creative process; Body aesthetics; Gamified expression; Digital dance divide; Human-machine collaboration; New paradigm in art education

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1. Introduction

The advancement of artificial intelligence (AI) technology has opened new possibilities for artistic creation. With the widespread adoption of AI in the arts, creative processes have entered a new era of "human-machine collaboration," where technological applications in dance have evolved from auxiliary tools to systematic transformations of creative and expressive workflows. As a crucial component of aesthetic education and physical development, traditional children's dance primarily relies on teachers' personal experience, exhibiting clear limitations in stimulating imagination, achieving personalized movements, and creating immersive experiences. In the AI era, this field has seen natural and effective breakthroughs: AI converts children's imagination into visual dynamic prototypes, extracts spontaneous movements

through motion capture and generative technologies to form dance vocabulary, and utilizes extended reality (XR) to construct interactive scenarios. This approach seamlessly and poetically recreates the entire process, from inspiration generation and movement choreography to instructional implementation, giving rise to a novel artistic paradigm that integrates technology, play, and education. Notably, the exploration of this reconstruction process and new paradigm itself serves as an excellent extension of bodily aesthetics in art education within the post-human context, while also standing as a vivid and powerful example of blending technological rationality with humanistic warmth in innovative early childhood aesthetic education practices ^[1].

2. Theoretical basis: Pathways for integrating AI with dance creation

The integration of artificial intelligence with dance is not merely a technical overlay, but rather a structural refinement of the essence of dance creation across three dimensions: aesthetic imagery, meaning generation, and narrative patterns. This fusion approach provides a fundamental theoretical framework for innovating children's dance education.

2.1. The construction of the “Body-Technology” aesthetic image

This paper provides a clear, hierarchical analysis of the proposed approach: first transcending the physical and perceptual boundaries of bodily expression, then creating an aesthetic environment that blends the virtual and the real. Within this interactive framework, AI generates virtual avatars, enabling dance movements to extend from physical presence to digital existence naturally. The specific manifestations in children's dance can be succinctly summarized into two distinct yet complementary dimensions. First, an extension of the bodily dimension: children utilize motion capture and virtual avatar technologies to perform dances in the form of cartoon or fantastical characters, executing movements impossible in reality (such as flying or transforming) while fully unleashing their imaginative potential for bodily expression under safe conditions. Second, a reconfiguration of the spatial dimension: through technologies like holographic projection and augmented reality (AR), classrooms or stages are transformed into interactive virtual environments (e.g., underwater worlds or forests). This shift transforms dance narratives from theatrical storytelling into immersive landscape storytelling, significantly enhancing children's sense of immersion and engagement ^[2].

2.2. The meaning-making of “E-Topia” and “Body-Future”

“E-utopia” refers to a shared experiential world constructed through technological means that transcends real-world time and space. Thus, AI not only transforms the expressive forms of dance but also provides a clear, multi-layered redefinition of dance creation and experience across various domains such as the metaverse and virtual spaces. For children's dance, this constitutes an excellent, gamified, and highly flexible creative environment. AI can automatically generate dance sequences or virtual partners based on predefined themes or simple child inputs (e.g., keywords or images), enabling children to evolve from passive imitators into active participants in the creative process. More remarkably, this human-machine co-creation model naturally transforms dance learning from mere skill training into a game that explores bodily possibilities and narrative expression. Consequently, the concept of “body-future” emerges organically and powerfully through improvisation, interaction, and collaborative creation ^[3].

2.3. The lightweight application of “Post-Human Narratives” in children's dance

The “post-human narrative” offers a clear and thorough discussion of the relationship between humans and non-human intelligent agents (AI, bionic beings) and the ethical implications involved. Consequently, when addressing this theme in children's dance creation, it can be handled naturally and appropriately through a streamlined approach: avoiding complex ethical dilemmas by constructing an engaging and supportive narrative framework through AI role-playing, with virtual AI dance partners serving as story guides who accompany young characters on adventures or emotional journeys. More remarkably, this approach provides an excellent new vehicle for Chinese-style storytelling, utilizing AI technology to

transform traditional cultural narratives (myths, poetic imagery) or themes of parent-child relationships from children's lives into tech-savvy, imaginative interactive dance dramas that subtly convey Chinese romanticism and warmth through the interplay of reality and virtuality ^[4].

3. Reengineering the educational process: Dance aesthetic education practices driven by policy

The integration of AI is by no means merely a superficial modification of traditional early childhood dance pedagogy; rather, it entails a systematic and layered overhaul encompassing both its core principles and broader applications. Consequently, the conventional linear, teacher-centered teaching-imitation approach can be seamlessly transformed into a child-centered, deeply collaborative human-machine interaction model featuring generative processes and feedback loops. This transformation manifests itself through three key improvements.

3.1. The shift towards generative creative conception

In traditional processes, dance themes, plots, and visual designs are predetermined by choreographers. The introduction of AI seamlessly transforms this stage into an open, generative co-creation process: during the creative incubation phase, teachers or children can engage in natural-language conversations with AIGC tools like ChatGPT, building dance themes and narrative threads from their interests and scattered ideas logically and organically. In the visual design phase, text-to-image and text-to-video models (diffusion models) directly convert abstract dance concepts into concrete scene, character, and costume concept diagrams, effectively visualizing children's mental imagery and significantly simplifying both creative communication and artistic conceptualization ^[5].

3.2. Adaptive adjustments in teaching training

By leveraging virtual teachers and adaptive environments, AI has effectively restructured the teaching and rehearsal processes. This enables it to provide standardized action demonstrations naturally and comprehensively during the movement learning phase, while utilizing motion capture and posture recognition technologies to deliver real-time feedback and gamified corrections for young children's movements. The VR/AR technology employed in the situational experience segment creates highly immersive virtual training environments, such as a fantasy forest or an underwater world, that are closely aligned with the dance theme. Consequently, children engage in movement practice and emotional expression while completing game-based tasks, transforming repetitive training into exploratory experiences.

3.3. Redefining the interactivity of stage presentations

With the ultimate stage presentation robustly supported by AI, the transition from a unidirectional performer-viewer relationship to a multi-sensory, highly interactive participatory art experience becomes natural and seamless. Visually, real-time rendering, naked-eye 3D, or holographic projection seamlessly integrate AI-generated dynamic visuals with live performances, creating stage spectacles that transcend physical constraints. More importantly, the audience-performance relationship itself allows both on-site and remote viewers to directly influence visual elements, musical rhythms, and AI virtual character behaviors through gestures, voice commands, or selections in real time. Thus, each performance essentially constitutes a unique, co-constructed generative work shaped collectively by the audience. This fundamentally redefines the endpoint of performance, as well as the immediacy and shared nature inherent in dance art.

4. A new paradigm for artistic expression in children's dance

With the deep integration of artificial intelligence, the artistic expression in children's dance has transcended traditional models of bodily storytelling and emotional conveyance. Consequently, a new paradigm characterized by digital

interaction, emotional symbiosis, and cultural immersion has naturally emerged, thereby expanding the aesthetic dimensions of dance and creating novel artistic spaces for children in both cognitive and experiential aspects.

4.1. Game interaction and the generation of “hypertextual body”

Traditional dance is expressed through fixed body movements and choreographed sequences, whereas intelligent technology endows young children’s physical expression with distinct hyper-textual dynamism and non-linear characteristics: their dance movements can be naturally and appropriately decomposed into digital motion units that can be independently invoked, combined, and generated in real time. Consequently, dance learning and creation can be designed using gamified interactive mechanisms, where motion-sensing devices enable children’s natural limb movements to drive virtual character dances directly, allowing the system to intelligently adjust task difficulty and feedback content in real time. This transforms the body from a mere performance medium into an interactive interface connecting the virtual and the real, as well as gaming and art, turning dance expression into a playful, exploratory, and dynamically generative process that naturally and fully engages young learners’ participation.

4.2. Emotional symbiosis and the construction of narrative roles

With the introduction of AI, children’s dance has evolved from merely narrating stories naturally and appropriately to co-creating narratives with intelligent characters. Consequently, AI characters capable of expressing basic emotions (whether virtual companions or physical robots) serve well as the core narrative medium, enabling genuine, feedback-driven emotional interactions between children during dance activities. The system utilizes affective computing technology to instantly and accurately identify children’s emotional states, such as joy and curiosity, and dynamically adjusts the movements of the collaborative dance AI characters, the musical atmosphere, and the narrative direction accordingly. Thus, dance is no longer mere physical imitation but a comprehensive artistic experience where elements like children’s emotional expression, social interaction, and narrative construction are interconnected and mutually reinforcing, endowing artistic activities with richer and more substantial intrinsic meaning.

4.3. Cultural immersion and the digital translation of traditional aesthetics

From the perspective of cultural inheritance, intelligent technology has opened up a very natural and powerful new path for young children to understand and express traditional culture. Firstly, by utilizing machine learning methods on a database of ethnic dance movements, AI is enabled to generate lightweight traditional dance moves that are tailored to the physical abilities of young children, thus achieving a contemporary expression of cultural symbols. Secondly, with the help of Extended Reality (XR) and scene generation technology, traditional aesthetic imagery such as “green mountains and rivers” and “Dunhuang artistic conception” are directly and appropriately transformed into virtual dance scenarios that children can enter and interact with. Therefore, children are no longer mere viewers of traditional culture but active participants in its digital translation process. Thus, technology has truly become an innovative bridge connecting historical aesthetics with contemporary children’s cognition.

5. Challenges and reflections

While artificial intelligence holds the potential to revolutionize dance education for young children, its comprehensive application still faces multiple challenges, including technological ethics, educational agency, and social equity, which urgently require careful reflection and systematic responses from both academia and industry.

5.1. The boundary between technological ethics and child data security

When employing intelligent technologies to collect and analyze children’s dance behavior data for personalized services, significant ethical and privacy concerns arise: Smart learning environments inherently foster a “technological gaze” toward

children, while comprehensive data collection and analysis pose substantial risks to children's autonomous development and privacy breaches. In dance activities, children's movements, emotional expressions, and physiological data are highly likely to be recorded; improper data handling or commercial exploitation directly violates the Law on the Protection of Minors and the Personal Information Protection Law. More critically, excessive immersion in virtual interactions may weaken young children's emotional connections with the real world, hindering their practical social skill development. Therefore, it is imperative to establish transparent and controllable technological frameworks that define clear boundaries for data collection and usage, ensuring child protection remains central to all technical designs.

5.2. Rebalancing the subjectivity of artistic creation with educational objectives

When AI excels at generating dance concepts and movements, it naturally raises a critical question: Does technology empower or replace human creativity? There is strong evidence suggesting that excessive reliance on AI leads to homogenized aesthetic standards and creative inertia, thereby diminishing the agency of children and teachers in artistic practice. In early childhood dance education, entrusting choreography entirely to algorithms reduces instruction to mechanical imitation of technically flawless yet emotionally hollow movements—deviating from dance education's core objectives of fostering emotional expression and innovative thinking. Therefore, it is essential to clarify AI's dual role as both “partner” and “inspirer”: educators should shift from being mere skill transmitters to guides for aesthetic judgment and facilitators of meaning construction, using AI as a tool to expand creative possibilities while steadfastly upholding the two fundamental values of authentic human emotion and critical thinking in artistic endeavors.

5.3. The challenges in technology popularization and the hidden concerns of the “Digital Dance Gap”

The potential of technological empowerment is severely constrained by uneven resource distribution, making the digital divide in education a complex issue that extends beyond hardware and network infrastructure. At its core, it reflects limitations in access to quality digital resources, teachers' digital literacy, and the ability to apply technology innovatively. Consequently, a pronounced “digital dance gap” persists between urban and rural areas as well as among schools: children in developed regions can use immersive AI choreography and XR stages, while those in under-resourced areas lack basic digital creation tools. To promote equitable development, a dual approach is essential: encouraging the creation of low-cost, user-friendly AI dance-creation tools while leveraging national and regional smart education platforms to systematically share high-quality curriculum resources and teacher training materials. Concurrently, specialized support programs for disadvantaged regions must be established to ensure that technology truly serves educational equity.

6. Future prospects and paradigm construction

Technological inclusivity serves as the practical foundation for the widespread application of intelligent dance education. Undeniably, the primary obstacles to current technology adoption remain high costs and technical complexity. Therefore, future efforts should focus on systematically and strategically developing lightweight, low-threshold AI dance creation tools tailored for kindergarten and home settings. These tools must feature user-friendly interfaces, incorporate content resources aligned with children's cognitive development patterns, and employ robust, reliable data localization mechanisms. Such tools will naturally and effectively guide teachers and parents in enabling children to create intelligent dance routines and conduct virtual performances, thereby truly leveraging technology to serve daily aesthetic education.

Ecosystem integration is the inevitable path to expanding comprehensive artistic experiences for young children, given their inherently holistic artistic perception. Moving forward, efforts should focus on leveraging dance as a foundational element to proactively and systematically develop an “AI + Early Childhood Aesthetic Education” intelligent creation platform that integrates music, painting, and theater. This platform would enable children's drawings to directly generate musical compositions and instantly transform physical movements into visual imagery, providing authentic, holistic aesthetic experiences through real-time cross-modal artistic conversion, thereby effectively nurturing their

creativity and sensory abilities. Regulatory frameworks provide the strongest and most direct support for healthy, equitable development in this field; thus, advanced technological applications must be accompanied by robust ethical guidelines. Educational authorities should collaborate with industry stakeholders to promptly establish guidelines and standards for AI applications in early childhood art education, clearly defining requirements for data security, algorithmic fairness, content appropriateness, and teacher professional development. Additionally, specialized resource support and sharing mechanisms should address the “digital dance divide” caused by regional and resource disparities, ensuring that the benefits of AI-powered aesthetic education reach all children.

In summary, the fundamental purpose of integrating intelligent technology with early childhood dance is to return to the children themselves. Therefore, AI should be appropriately positioned as a “collaborative creator” and “aesthetic enhancer” that stimulates creativity and facilitates expression, never replacing teachers or creative processes. This naturally leads to the redefined concept of early childhood dance: an organic integration of technological tools, artistic expression, and educational core principles, forming a new trinity paradigm of “technology-art-education.” This approach represents an excellent solution for promoting children’s holistic and harmonious development through art education in the digital age.

Disclosure statement

The authors declare no conflict of interest.

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