INTEGRATION OF ARTIFICIAL INTELLIGENCE INTO THE TRAINING PROCESS OF CHOREOGRAPHY SPECIALISTS

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Abstract. Artificial intelligence, as a product of human creativity, is widely used in modern society and is deeply penetrating the field of art. In particular, in the domain of dance, AI has become a new tool for choreographers. These changes have necessitated modernizing choreography teaching methods and implementing innovative approaches aligned with current demands. This study explores the integration of artificial intelligence (AI) technologies into the training process of choreography specialists. The main *objective* of the research is to develop innovative AI-based teaching methods to train professionals in choreography. The study analyzes scholarly works by both foreign and domestic researchers on the application of AI in the arts. Existing AI platforms used in choreographic practice are identified. A model of the "Dance Composition" course curriculum incorporating AI is developed, and the proposed methodology is tested through experimental implementation. The *results* obtained during the research demonstrate the positive impact of AI technologies on the choreography education system, their contribution to enhancing students' creative abilities, and their potential to complement traditional teaching methods. Additionally, the study highlights the importance of considering pedagogical ethics and creative autonomy when integrating AI into the educational process. By analyzing international experience and effectively utilizing modern digital solutions, Kazakhstan's system of choreography training can enhance its competitiveness. This opens the door for future choreographers to become well-rounded professionals capable of adapting to the digital cultural environment. Overall, the research findings show that the effective integration of artificial intelligence into choreography contributes to modernizing Kazakhstan's education system, developing students' creative competencies, and preserving national art in a contemporary, relevant format.

Introduction

Artificial intelligence is a product of human creativity, and its role in society and range of applications in various fields are expanding. With the introduction of artificial intelligence into the arts, new approaches are emerging in both the creation and perception of creativity, bringing revolutionary changes to art. In dance, artificial intelligence is used as a tool for choreographers. Accordingly, the use of artificial intelligence and the optimization of the educational process for training choreographers in line with modern requirements are among today's pressing issues. Within the project, the potential of artificial intelligence for training choreographers is considered, and ways to improve traditional teaching methods are explored.

The use of innovative teaching technologies alongside the traditional system in choreography helps develop competitive specialists, adapt to modern demands, and solve professional issues effectively.

The scope of innovative technologies and artificial intelligence in the humanities and arts is expanding. New processes have emerged in staging choreographic performances. Initially, artificial intelligence was introduced as a notation system for choreographers and dancers (to facilitate the recording of dance movements). Today, AI has developed to the level of creating choreographic compositions based on provided data. Projects that link technology and choreography include Merce Cunningham's *Lifeforms*, Wayne McGregor's collaboration with Google Arts and Culture Lab, and the LuminAI project from the Georgia Institute of Technology. These projects use AI in various ways, making it a new tool for choreographers, which, in turn, raises ethical issues in its implementation (Plone 1). In this regard, choreographers now face the challenge of learning to work with artificial intelligence.

AI has entered the modern choreography education system, integrating immersive technologies and enhancing pedagogical approaches. "Researchers have explored ways to create a learning environment that combines the virtual and physical worlds using VR and AR tools through AI. These technologies allow for AI-based virtual mentoring systems and cognitive models that simulate human thought processes, helping develop dance skills" (Wang 1).

The connection between AI and interactive learning increases student engagement and improves learning quality. Additionally, AI-based mobile applications for learning dance movements offer opportunities to develop performance

skills. However, AI platforms only produce results when they preserve the unique characteristics of choreography pedagogy and are used in conjunction with traditional teaching methods. This process provides a comprehensive learning environment that shows students the connection between real and virtual exercises. Therefore, the role of AI in the choreography education system has become important in developing pedagogical technologies and continuously improving performance skills (Xiaoyu 3).

Furthermore, scientific research expresses concern that AI could not only serve as a tool for the choreographer but also become choreography itself, capable of directing and limiting human dancers. This is associated with the idea that AI might take complete control over choreography, reducing the human choreographer to a mere observer, thus raising fears that the dancer's body could be mechanically controlled by AI.

To adapt to the age of artificial intelligence, choreographers and dancers need to develop digital literacy, clearly delineate the roles of humans and AI in the creative process, and establish a discourse around AI choreography. This approach allows dancers to use AI productively within the new technological ecosystem, remaining the central subject of art as active participants rather than passive observers (Yim 3).

The use of artificial intelligence in training specialists in choreography enhances the organization of students' independent work. In the field of choreography, pedagogical technologies are a natural, hands-on process in which each movement's quality is evaluated by the instructor. In this context, AI technologies analyze students' performance abilities, identify mistakes, and offer recommendations for correct movement execution. Technologies such as OpenPose and Move.AI can be used as supplements to traditional methods.

Technologies of computer vision and motion analysis used in choreographic

education, such as OpenPose and Move. AI, serve as tools for automated recognition and interpretation of human motor activity. OpenPose is a software library based on machine learning algorithms that determines the positions of the human body, limbs, and joints in two- and three-dimensional space from video recordings. This technology is widely applied in sports analytics, rehabilitation medicine, biomechanics, and educational practices to analyze coordination, symmetry, and movement accuracy. In choreographic training, it enables the recording of kinematic performance parameters, the identification of deviations from reference movement trajectories, and the provision of visual feedback to students.

Move.AI is a markerless motion capture system that generates three-dimensional movement models from video data without specialized sensors. This technology is in demand in digital animation, performing arts, and virtual reality, and within an educational context, it can be employed to analyze the spatial organization of dance, tempo-rhythmic structure, and torso dynamics. Its application contributes to the development of students' self-regulation and reflective skills by allowing them to compare their own performance with a predefined reference model.

At the same time, these tools do not replace traditional pedagogical practice based on the instructor's professional expertise; rather, they serve as an auxiliary analytical resource that expands opportunities for students' independent work. In this context, artificial intelligence serves as a technical assistant that ensures objective movement recording, while the interpretation of artistic quality, expressiveness, and stylistic appropriateness remains the responsibility of the teacher as the bearer of professional and cultural knowledge.

Higher education programs in choreography include courses such as "Dance Composition," which prepare

choreographers, ballet masters, ballroom dance teachers, and contemporary dance instructors. As part of this course, students must stage their own dance performances and present them to their peers or junior students. Through AI, an innovative perspective on the creative process in the dance studio can be cultivated. For instance, platforms such as EDGE, developed by Stanford University, help set up dance compositions.

In higher education institutions specializing in choreography, practice-oriented disciplines are implemented, including the course *Dance Composition,* which is aimed at training choreographer-rehearsers, ballet masters, and instructors of ballroom and contemporary dance. Within this course, students develop original choreographic works and present them in an academic setting, a process that requires not only artistic thinking but also well-developed analytical and reflective skills. The integration of artificial intelligence tools into the educational process fosters an innovative perspective on choreographic practice and expands the dance studio's methodological repertoire (Figure 1).

Figure 1. The EDGE choreography platform.

Given the significant role of music in choreographic composition, the AI project AIVA (Artificial Intelligence Virtual Artist) serves as an example of creating and integrating musical compositions. AIVA analyzes the structure of classical works, identifies stylistic features, and can produce compositions with emotional depth and technical skill (Figure 2).
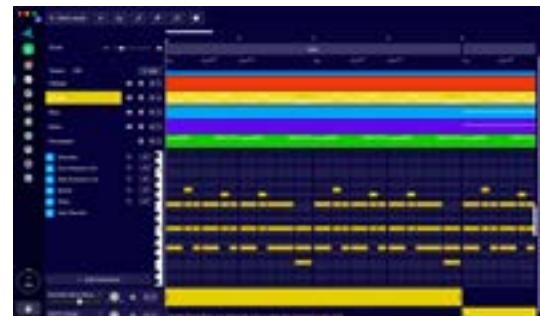
Figure 2. AIVA Platform

Additionally, automating dance movements enhances students' creative abilities. Research on the use of artificial intelligence in training choreography specialists allows for an evaluation of its positive and negative impacts on the learning process. AI opens up new possibilities in the arts, fostering collaboration between science and art. In dance, AI actively influences both the creative process and learning experience, playing a significant role in experimental projects (Wang and Zheng 1).

In teaching choreography, accurately capturing the three-dimensional motion of the human body is essential to preserving traditional dance and improving teaching methods. Qianling Zhou, Yan Tong, Hongwei Si, and Kai Zhou propose a model for human movement recognition based on convolutional neural networks and gated recurrent units. This model processes video data to extract spatial and temporal characteristics of dance movements and visually represents them, thereby enhancing the accuracy and effectiveness of choreography education (Zhou et al. 1).

In addition, the automation of dance movement analysis contributes to the development of learners' creative potential by expanding the tools available for interpreting and understanding plastic and kinetic material. Research on the application of Artificial Intelligence in the training of choreography specialists enables the identification of both the positive and limiting aspects of its influence on the educational process. In this context,

intelligent technologies function as a connecting link between science and art, opening up new experimental forms of artistic exploration and learning. In dance practice, Artificial Intelligence influences both the process of choreographic creation and pedagogical methods, particularly in research-based and experimental projects (Wang, Zheng).

Within the system of professional choreography training, the accurate reproduction of three-dimensional human body movements is particularly important, as it is essential for preserving traditional dance forms and improving teaching methodologies. In this regard, Qianling Zhou, Yan Tong, Hongwei Xi, and Kai Zhou propose a human motion recognition model based on a combination of Convolutional Neural Networks (CNNs) and Gated Recurrent Units (GRUs).

Convolutional Neural Networks (CNNs) are a class of deep learning algorithms designed for the automatic extraction of spatial features from visual data. In the proposed model, CNNs are used to analyze dance video frames and to identify key characteristics of body posture, such as joint positions, limb orientations, and spatial relationships between movement elements. This enables the formation of a structured representation of each moment of dance performance.

Recurrent Neural Networks with gating mechanisms, specifically Gated Recurrent Units (GRUs), are designed to process sequential data and analyze temporal dynamics. The gating mechanism allows the network to retain important information from previous movement states while filtering out less relevant variations, which is particularly crucial for dance, a continuous, time-dependent process. In the discussed model, GRUs are responsible for identifying rhythm, tempo-rhythmic transitions, and the logical progression of movements over time.

The combination of CNN and GRU enables step-by-step data processing: at the first stage, spatial features are extracted from the video stream; at the second stage, the temporal sequence of movements is analyzed in order to classify them, compare them with reference patterns, and subsequently visualize the results. The primary goal of this processing is to improve the accuracy of dance movement recognition and reproduction, as well as to establish an objective basis for pedagogical correction and learner self-analysis.

Thus, the proposed model not only ensures high accuracy in capturing three-dimensional movements but also expands the didactic potential of choreographic education by serving as a supportive tool for instructors and enhancing the overall effectiveness of the educational process (Zhou et al.).

In 2013, Caitlin Trainor and Apoorv Agarwal introduced a new approach to teaching through choreography called "Artificial IntelliDance." This method uses dance movements to visualize machine learning processes, including data points, predictive algorithms, and algorithm training (Agarwal and Trainor 52).

In 2015, Alexander Berman and Valencia James proposed an interdisciplinary project combining dance and artificial intelligence (AI). The project involves using AI to analyze and generate dance movements, enabling dancers to explore new poses and sequences in real time (Berman and James 2431).

That same year, Indian researchers, aiming to use AI for learning traditional dance, automated the Indian classical dance Bharatanatyam (BN) with the "Art to Smart" system. This system aids choreographers in exploring and creating new dance movements, automatically generating steps and categorizing them using a genetic algorithm (GA). The system addresses the challenge of managing numerous potential movements that would be difficult for human choreographers to memorize and analyze manually. The system's effectiveness is evaluated by experts (Jadhav et al.).

In 2016, Chinese researchers developed an autonomous choreography creation system for humanoid robots using AI methods. The study proposed a new method, Semi-Interactive Evolutionary Optimization (SIEC), enabling robots to independently create dance movements using machine learning and human feedback. The study assessed robots' ability to perform China's Tibetan Tap dance, gathering expert feedback to improve the choreography (Peng et al. 650).

Life Forms is another system that can be cited as a tool for teaching choreography, aiding in the digitization and modeling of dance movements. These tools modernize the choreographic process by using algorithmic calculations and computer animation. Custom or user-developed software helps automate algorithmic decisions and enhance the creative process (Figure 3).
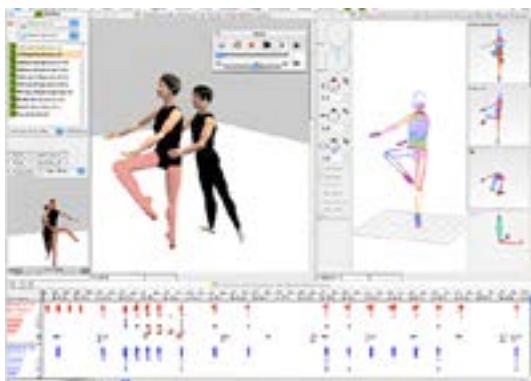

Figure 3. Life Forms Platform

In addition to models of using AI in choreography, researchers proposed new methods for identifying artificial consciousness through choreography and robotics in 2022. This study explores robots' capacity not only to repeat movements but also to create genuine social and emotional connections, allowing them to perform alongside humans (Lelièvre et al. 95).

In 2023, Darda K. M. and Cross E. S. examined how computer-generated dance moves are received by audiences in automatically generated dance performances. They discovered that people, including dance experts, often have preconceived opinions about computer-made choreography, comparing it to human-created choreography when evaluating it aesthetically (Darda and Cross 16).

The "Advanced Dance Choreography System Using Bidirectional LSTMs" introduces a choreography system based on Bidirectional Long Short-Term Memory (LSTM) for creating K-POP dance. Yoo H. and Sung Y. aim to generate new creative dance moves automatically, reducing the need for expensive equipment and professional dancers. The system collects K-POP dance moves from videos, analyzes them, and creates new choreographic works, potentially contributing to the genre's development by automating new and creative dance moves. Through this system, choreographers can quickly and cost-effectively create new choreographies and share them worldwide (Yoo and Sung 175).

Methods

The use of artificial intelligence in the field of art is analyzed through the research of both foreign and domestic scholars, with a focus on identifying its applications in dance. Experimental studies examine the impact of artificial intelligence on students' learning and academic performance. Through correlational analysis, the results of students' learning dance with artificial intelligence are compared with those of students using traditional methods.

Discussion

These studies reveal AI's potential applications in choreography, broadening the developmental possibilities for this field. Currently, Hunan Women's University and South China Normal University in China are using AI to automate dance instruction.

By utilizing deep learning to recognize and preserve dance movements, AI helps accurately convey them and preserve traditional arts. Additionally, AI enhances accessibility in choreography by providing personalized feedback, preventing injuries, and supporting learning, making dance more accessible to the public, including individuals with special needs.

Analyzing the use of AI in choreography, we see that AI platforms are used to create dance compositions, coordinate dance representations, and synchronize movements (Table 1).

Although the use of artificial intelligence elements in the arts, including choreography, has a history of more than a decade abroad (beginning around 2013), in Kazakhstan, this field remains relatively new and insufficiently researched to date. For example, Kazakhstani researchers Sanzhar Murat and Gulnara Mursalimova, using empirical and comparative methods, have studied the application of AI in sound design, analyzing the features of neural networks and generative models. They find that AI influences the creative process in sound design, saving time and improving

Table 1 – AI Platforms Used in the Field of Choreography

№	Platform Name	Description	Purpose of Use
1	DeepDance	This program uses deep neural networks to generate dance movements based on musical data. It analyzes musical rhythm and style to create dance movements that align with them.	It provides choreographers with ideas for creating new dance compositions based on musical tracks. The program synchronizes dance movements with music, helping generate movements that match the rhythm and mood.
2	PoseNet (Google)	PoseNet uses a webcam or video recordings to recognize and track human body movements in real time	It enables choreographers to analyze and visualize dance movements. The tool is used to analyze and improve dance movements, also providing feedback for evaluating performance technique.
3	Choreographing with AI	This is an experimental platform by Google Arts & Culture that creates new choreographies using AI. The system analyzes existing movements and generates new combinations from them.	It helps choreographers and dancers explore new approaches to creating dance. The platform enables the creation of dance movements that adapt to the rhythm and style of the music.
4	AIST++	It uses machine learning technologies to create choreographies. AIST++ synchronizes dance movements with music, analyzes them, and suggests movements that align with a specific musical rhythm.	It is used to automatically create dance compositions. It helps choreographers quickly construct movements adapted to musical rhythms and explore new combinations.
5	DanceBot	DanceBot analyzes music tracks and generates corresponding dance movements in real time. Additionally, it can adapt movements to different musical genres.	It is used to create unique dance movements that match the music genre. It allows choreographers to explore new methods for synchronizing music and dance movements.
6	Scribe	Scribe uses AI to visualize dance movements and synchronize them with music. It creates graphic and textual diagrams of dance steps.	It helps choreographers plan complex dance performances and popularize dance movements. Additionally, it is used in teaching and research, allowing for a better understanding of choreography execution through graphic visualization of dance movements.

product quality, yet it poses challenges such as potential loss of copyright and creative control, and the generation of poor-quality sounds. They also discuss future prospects for AI in sound design, examining its impact on the creative industries and related ethical issues (Sanzhar, Mursalimova 256).

Additionally, Meruert Zhanqujinova explores how AI affects the educational process for art students. She emphasizes that using AI technologies offers new perspectives for developing students' creative abilities, noting that traditional teaching methods in the arts are becoming outdated. She also provides recommendations for creating personalized learning programs through AI tools and automating students' creative processes. The use of AI in visual arts, music, literature, design, and other art fields is discussed, including innovations like interactive and virtual exhibitions, automated design, and advancements in new media (Zhanguzhinova 289).

In the field of choreography, the application of artificial intelligence within Kazakhstan's educational system requires comprehensive, interdisciplinary research. The use of AI platforms in teaching Kazakh dance opens up opportunities for the digital recording and analysis of characteristic hand and foot positions, the specific features of female and male movement plasticity, various styles of walking, elements associated with horseback riding, and other movements that reflect the national choreographic tradition. The digital preservation of these components facilitates the transmission of the cultural and historical characteristics of Kazakh dance to future generations and contributes to the formation of a sustainable foundation for its study and popularization.

The integration of artificial intelligence into choreographic education also enhances students' performance skills through objective analysis of movement techniques and the correction of motor errors. The use of digital tools enables the study of Kazakh dance regardless of geographical location, thereby expanding its presence in the international educational and cultural space. Due to the high precision in identifying errors and providing analytical feedback, the learning process can be accelerated and qualitatively improved.

An examination of the experience of leading global universities and an analysis of innovative technology implementation practices indicate that integrating artificial intelligence elements increases the competitiveness of the national system of choreographic education. The methodology of teaching choreography proposed in this study does not aim to develop a finished software product; rather, it is based on the design of a conceptual prototype of an AI-oriented educational platform, developed through analysis and pedagogical use of existing digital solutions applied in choreography.

During the course of the research, platforms such as computer vision and motion analysis systems (OpenPose, Move.AI), digital dance modeling tools (EDGE, Life Forms), and auxiliary algorithmic solutions were analyzed and partially tested. Their functional capabilities enabled the identification of key characteristics of a prospective AI platform for choreographic education, including automated analysis of dance movements, near-real-time visual and analytical feedback, and support for personalized learning trajectories for students. *A link to the prototype of the proposed platform is provided.* (https://drive.google.com/file/d/1AeRfSrX1qREoCRAcu1tBUnzchZiF-TY1/view?usp=sharing)

In the field of choreography, the application of AI elements in education in Kazakhstan requires comprehensive research. Using AI platforms to teach Kazakh dance can facilitate the digitization of distinctive hand and foot positions, movements for female and male dances, various walking styles, horse-riding styles,

and other elements specific to Kazakh national dance. Digitally preserving the traditional movements and style of Kazakh dance will help convey its cultural and historical elements to future generations. Additionally, the use of AI in the choreography education system can enhance students' performance skills and support the correct execution of dance movements. AI allows Kazakh dance to be studied from anywhere in the world, promoting it on an international level. By accurately identifying and correcting students' mistakes, AI can accelerate and improve the learning process.

By studying the experiences of leading global universities, the introduction of innovative technologies will enhance the competitiveness of Kazakhstan's choreography education system.

The choreography teaching methodology developed through this research, using AI, will significantly differ from traditional teaching methods. Currently, video lessons and instructors' personal experiences play a key role in teaching dance movements, but these methods cannot provide real-time feedback or automatically correct students' movements. The AI platform developed from this research will automatically analyze dance movements, provide real-time feedback, and enable personalized learning. This platform will enhance students' creativity, streamline the creation of dance compositions, and automate the learning process.

Development of a Curriculum and Course Outline for "Dance Composition" Using AI Research Results (Table 2): As part of the study on the potential of artificial intelligence (AI) in the field of choreographic education, a curriculum, a teaching and methodological complex, and a syllabus for the course "Dance Composition" were developed. The result is an AI-integrated curriculum and teaching methods for the "Dance Composition" course, chosen for its suitability in leveraging AI capabilities.

As a field requiring creative solutions and structural approaches, dance composition accommodates multiple styles and genres, encouraging the invention of new movements. AI technologies are effective for synthesizing new styles and movements, yielding unprecedented combinations. This course allows students to explore and test new ideas quickly, enhancing the efficiency of experimental processes by enabling rapid movement processing and correction using AI.

Testing of the Methodology for Training Choreography Specialists Using Artificial Intelligence.

As part of the experiment, the course "Dance Composition" was conducted with 4th-year students. The aim of the experiment was to determine the effectiveness of using artificial intelligence in the "Dance Composition" course. The experimental study was conducted with fourth-year students enrolled in the educational program 6B02102 — Choreography at the Kazakh National Women's Teacher Training University. The experiment was carried out by the authors of the article as part of their professional pedagogical activities and was based on their accumulated experience in teaching specialized disciplines.

The study group (planned for 30 students) was divided into two groups: one taught using traditional methods, and the other using artificial intelligence tools. Students applied these approaches in staging their own choreographic performances, realizing their ideas, processing musical material, and constructing dance compositions. Students' acquired knowledge was assessed at the end of the course through an exam held in a competition format. The evaluation was carried out by independent experts. To ensure objective results, the evaluators were not informed of which teaching method (AI-based or traditional) had been used with each student. The experiment's stages are presented in Table 2.

Table 2 – Thematic Curriculum for "Dance Composition" Course

Week	Theme	Artificial intelligence platform	Application purpose
1	Introduction to the course: fundamentals of dance composition. Libretto.	Platform not used	- fundamentals of dance composition: Time, Space, Dynamics.
2	Elements of dance composition.	Platform not used	-a brief overview of dance styles and genres.
3	Elements of dance composition.	Google AI Blog, IBM Watson	- artificial intelligence and its application in art: history and prospects.
4	Introduction to artificial intelligence. The use of AI in the selection or development of musical material (komponovka, sochinenie).	Google's DeepDance, AI Choreographer	- composition of dance movements: movements, poses, rhythm.
5	AI as a means of choreography	AI Choreographer, Dance Writer	- grouping and unifying movements.
6	Choreographic description (Risunok Tanza)	OpenAI GPT-3, AI Choreographer	- use of compositional patterns in choreography.
7	Synthesis of styles	IBM Watson Emotion Analysis	Understand the basics of AI technologies
8	Cognitive algorithms and dance	Unity, Blender	Planning and processing dance movements using AI
9	Technologies for depicting dance composition	AI Choreographer, DeepDance	Creating a composition for a dance performance using AI
10	Planning complex movements using AI	AI Choreographer, DeepDance	Synthesizing different dance styles and creating new movements
11	Practical application: creating dance performances	AI Video Analysis Tools (Vidooly, Piwik)	The relationship between movement and emotion
12	Analysis of the work of leading choreographers	AI Choreographer, Vidooly	Visualization of choreography using VR / AR technologies
13	Analysis and correction of student projects	Trello AI, Slack AI	Planning and analysis of complex movements
14	Working with a team	AI Choreographer, DeepDance	Compilation and preparation of dance compositions for performance using AI
15	Final project preparation	AI Choreographer, Vidooly	Analysis of choreographers ' works using AI

Notes:

1. Informed consent was obtained from the students to participate in the study. The consent form included information about the study's purpose, data collection methods, how the data would be used, and any potential risks.

2. By agreeing to participate in the study, students who were assigned to the traditional teaching group committed not to use artificial intelligence platforms in creating their dance compositions.

3. Students wrote down their ideas and librettos for the dance composition and

submitted them to the instructor within two weeks as part of their independent work (IW). These IW results were retained until the end of the semester to evaluate how effectively students had implemented their ideas. (Table 3)

At the end of the experiment, the results of both groups' work were evaluated, and the advantages and disadvantages of using AI in creating dance compositions were identified. This experiment provided an opportunity to study the effectiveness of AI in dance and to understand its advantages over traditional methods.

At the end of the experiment, the results of the control group, which employed traditional methods of dance composition, and the experimental group, which used artificial intelligence tools to create choreographic compositions, were analyzed. The comparative analysis identified specific advantages and limitations of using artificial intelligence in the educational choreographic process.

Among the advantages of applying artificial intelligence are the increased precision of the spatiotemporal organization of movement, manifested in more accurate adherence to trajectories, rhythm, and positional symmetry; the acceleration of the compositional design stage, as automated tools enabled faster selection and sequencing of movement variations; the development of students' analytical and reflective skills, evidenced by their ability to identify technical performance errors based on visual and digital feedback; and the expansion of the creative range through experimentation with atypical movement forms and spatial solutions that are rarely employed in traditional choreography.

At the same time, one of the significant limitations of using artificial intelligence lies in the risk of insufficient formation of an individual choreographic signature and authorial artistic solutions. Although algorithmic systems are capable of effectively analyzing the spatiotemporal parameters of movement, their structural

accuracy, and technical coordination, they are unable to fully model an individual authorial style grounded in creative intuition, artistic sensibility, and cultural-aesthetic experience. As a result, learners' focus may shift from developing independent artistic thinking and a personal choreographic perspective to reliance on algorithmic recommendations. In the long term, this may lead to a weakening of creative autonomy and the standardization of choreographic thinking.

Thus, the experimental findings demonstrate that artificial intelligence functions as an effective auxiliary tool in the analysis and compositional design of movement, surpassing traditional methods at these stages. However, it cannot replace the choreographer's pedagogical expertise, artistic judgment, and individual creative thinking. Consequently, the integration of artificial intelligence into choreographic education yields positive outcomes only when combined with the instructor's creative guidance and purposeful artistic reflection.

Basic Provisions

The present study is based on a set of fundamental provisions that summarize the conceptual framework, methodological logic, and empirically supported outcomes of integrating artificial intelligence into the professional training of choreography specialists.

1) AI in choreography education is positioned as an auxiliary pedagogical instrument rather than a substitute for artistic authorship and teacher expertise.

The research confirms that AI tools (computer vision, motion analysis, generative composition and music platforms) can strengthen the educational process by providing analytical feedback and accelerating technical corrections; however, artistic interpretation, stylistic appropriateness, and value-based aesthetic judgment remain within the responsibility

Table 3. Stages of the experiment

Experiment stages	Group 1 (artificial intelligence)	Group 2 (Traditional Method)	Teacher activities
The preparatory stage (1-2 weeks)	To give Group 1 more information about AI tools (Google's DeepDance, AI Choreographer, etc.).	Group 2 uses traditional choreographic techniques.	Dividing students into two groups, the teacher introduces students to two different educational and methodological complexes and syllabuses created in the discipline of dance composition.
Tool familiarization and planning period (3-4 weeks)	Start planning your own dance compositions using AI tools.	He plans his own dance performances using traditional methods.	Providing methodological assistance to both groups on the part of the teacher.
Stage of compilation of performances (5-8 weeks)	Composes and makes adjustments to dance movements using AI.	Based on the basic knowledge gained before the 4th year, they create dance compositions.	The teacher will monitor the progress between the groups and, if necessary, guide them.
Stage of improvement and rehearsals of performances (9-15 weeks)	Each student teaches his performance, students in the group. Conducts work with performers (students). Each student rehearses his performance several times, continuing to work on synchronizing movements and improving the composition. Work is carried out aimed at identifying the shortcomings that are visible in the performances and eliminating them.		
Stage of performance and evaluation of performances (16-17 weeks)	Each student performs their final dance performances on stage. Organized as a competition. Teachers of the department are invited, evaluation criteria and evaluation sheets are given for writing notes. Evaluators of dance compositions do not know which of the students used artificial intelligence and which created dance performances using traditional methods. This allows, in the course of the study, a comparative analysis of dance performances staged by artificial intelligence and the traditional method. Evaluation criteria: creativity and creativity, structure of the production, technical skill, behavior on stage, synchronicity.		
Analysis of the results and-conclusion stage (18-19 week)	The results of the evaluation of the performances of the two groups are compared. The degree of achievement of the main goals of the experiment is determined. By analyzing the differences between groups, conclusions are drawn about the effectiveness of the use of AI. A final discussion will be organized, where students from both groups will share their experience.		

of the instructor and the student as creative agents.

2) The effectiveness of AI integration depends on the preservation of choreography pedagogy's specificity: embodied practice, studio-based learning, and formative feedback.

AI produces meaningful educational results only when embedded into practice-oriented disciplines and used alongside traditional teaching methods. The study's experimental implementation in the "Dance Composition" course demonstrates that AI contributes to students' independent work through objective movement recording and visualized correction pathways, supporting reflective learning.

3) AI-supported training strengthens students' spatiotemporal organization of movement and compositional design skills.

The comparative analysis of student works indicates that the AI-assisted group showed stronger control over trajectories, rhythm, symmetry, and spatial patterns, as well as faster sequencing and restructuring of movement material. This provision is grounded in the documented advantages of AI-based motion capture and analysis and in the course-level use of platforms facilitating compositional planning.

4) AI enhances analytical and reflective competencies, but entails a risk of standardization and weakened authorial individuality.

The experiment revealed a dual effect: on the one hand, AI-based visual feedback increased students' capacity to identify technical errors and adjust movement logic; on the other hand, reliance on algorithmic suggestions may reduce the formation of an individual choreographic signature and shift attention from independent artistic thinking to "recommended" solutions. Therefore, the integration of AI must be didactically regulated to protect creative autonomy.

5) Ethical regulation and academic integrity constitute mandatory conditions of AI implementation in choreography training.

The study establishes that pedagogical ethics, intellectual property considerations, and transparent delineation of AI's role are essential. The experiment's design (informed consent, prohibition of AI use in the traditional group, blinded evaluation by independent experts) reflects the necessity of ethical safeguards to ensure reliability of conclusions and to prevent unregulated substitution of student authorship.

6) The proposed AI-integrated "Dance Composition" curriculum functions as a transferable methodological model for Kazakhstan's choreography education system.

The developed thematic curriculum and tested teaching approach demonstrate that Kazakhstan's professional training in choreography can be modernized through selective integration of international AI practices without losing national artistic identity. AI tools can support the digitization and preservation of Kazakh dance elements (hand/foot positions, gender-specific plasticity, walking styles, equestrian motifs), while the teacher-led pedagogical process maintains cultural and stylistic authenticity.

The basic provisions of this study confirm that AI yields the greatest educational benefit when used as a structured, ethically regulated, and pedagogically guided resource that expands students' technical precision, reflective skills, and compositional experimentation – while safeguarding creative individuality and the cultural specificity of choreography.

Conclusion

The integration of artificial intelligence into the field of choreography is not merely a technological innovation but also a strategic step toward transforming educational methods. The conducted literature review and experimental research demonstrated that AI technologies can

enhance students' creative potential. By drawing on international experience and effectively implementing digital solutions, Kazakhstan's choreography education system can improve its competitiveness. This paves the way for future choreographers to become versatile professionals aligned with the digital cultural environment.

At the same time, it was found that introducing AI into the education system may raise concerns: limitations on creative freedom, weakening of the teacher's role and emotional connection, and increased student dependence on AI. Therefore, when implementing such technologies, issues related to pedagogical ethics, intellectual property rights, and creative autonomy must be thoroughly addressed.

Overall, the research findings indicate that the effective integration of artificial intelligence into choreography can support the modernization of Kazakhstan's educational system, enhance students' creative capacity, and preserve national art in a contemporary format.

Authors contribution:
A. E. Kussanova — worked with domestic and international sources, prepared a literature review, completed the research section of the article, conducted an experiment, and developed the course program "Dance Composition" implemented using artificial intelligence.

S. A. Bakirova — development of the article concept, preparation of the research section of the article, identification of ways to apply artificial intelligence in the field of choreographic art, collection, generalization, and analysis of materials.

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References

Agarwal, Apoorv, and Citlin Trainor. "Artificial IntelliDance: Teaching Machine Learning through a Choreography." *Proceedings of the Fourth Workshop on Teaching NLP and CL*, 2013, pp. 51–55.

Berman, Alexander, and Valencia James. "Kinetic Imaginations: Exploring the Possibilities of Combining AI and Dance. " *IJCAI*, 2015, pp. 2431–2437.

Darda, Kohinoor M., and Emily S. Cross. "The computer, A choreographer? Aesthetic responses to randomly-generated dance choreography by a computer." *Heliyon, vol. 9,* no. 1, 2023, pp. 1–18. DOI https://doi.org/10.1016/j.heliyon.2022.e12750

Jadhav, Sangeeta, Manish Joshi, and Jyoti Pawar. "Art to SMart: an automated BharataNatyam dance choreography. " *Applied Artificial Intelligence, vol. 29,* no. 2, 2015, pp. 148–163. DOI: https://doi.org/10.1080/08839514.2015.993557

Lelièvre, Micheline, Robin Zebrowski, and Eric Gressier Soudan. "Robots and Choreography: A Contribution to Artificial Sentience Characterization." *International Conference on Advanced Information Systems Engineering. Cham: Springer International Publishing,* 2022, pp. 93–102.

Murat, Sanzhar, and Gulnara Mursalimova. «The use of artificial intelligence in sound design: automation of processes and improvement of sound quality». *Central Asian Journal of Art Studies,* vol. 9, no. 2, 2024, pp. 256–274. DOI: 10.47940/cajas.v9i2.881 (In Kazakh)

Peng, Hua, et al. "Autonomous robotic choreography creation via semi-interactive evolutionary computation. " *International Journal of Social Robotics,* vol. 8, no. 5, 2016, pp. 649–661. DOI 10.1007/s12369-016-0355-x

Plone, Abby. The influence of artificial intelligence in dance choreography. – 2019. https://digital.kenyon.edu/cgi/viewcontent.cgi?article=1004&context=dh_iphs_prog Accessed 20 March 2025.

Zhou, Qianling, et al. "Optimization of Choreography Teaching with Deep Learning and Neural Networks. " *Computational Intelligence and Neuroscience*, vol. 1, 2022, P. 7242637. DOI: https://doi.org/10.1155/2023/9845692

Wang, Zheng. "Artificial intelligence in dance education: Using immersive technologies for teaching dance skills." *Technology in Society,* vol. 77, 2024, p. 102579. DOI: https://doi.org/10.1016/j.techsoc.2024.102579

Wang, Yingping, and Guang Zheng. "Application of artificial intelligence in college dance teaching and its performance analysis." *International Journal of Emerging Technologies in Learning,* vol. 15, no. 16, 2020, pp. 178–190. DOI: https://doi.org/10.3991/ijet.v15i16.15939%0d

Xiaoyu, Zhang. "The Application of Artificial Intelligence Technology in Dance Teaching." *First International Conference on Real Time Intelligent Systems. Cham: Springer Nature Switzerland,* 2023, pp. 23–30. DOI: 10.1007/978-3-031-55848-1_4

Yim, Sujin. "Suggestions for the Independent Body in the era of Artificial Intelligence Choreography." *Trans, vol. 12*, 2022, pp. 1–19. https://doi.org/10.23086/trans.2022.12.01

Yoo, Hanha, and Yunsick Sung. "Advanced dance choreography system using bidirectional LSTMs. " *Systems, vol. 11,* no. 4, 2023, pp. 175.

Zhanguzhinova, Meruyert. "Artificial intelligence in education: a review of the creative process of learning students on Art educational programs". *Central Asian Journal of Art Studies,* vol. 9, no. 2, 2024, pp. 289–307. DOI: 10.47940/cajas.v9i2.858

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ХОРЕОГРАФИЯ САЛАСЫНДАҒЫ МАМАНДАРДЫ ДАЯРЛАУ ҮДЕРІСІНЕ ЖАСАНДЫ ИНТЕЛЛЕКТІНІ ЕНГІЗУ

Аңдатпа. Адамзат шығармашылығының нәтижесі ретінде жасанды интеллект қазіргі қоғамда кеңінен қолданылып, өнер саласына да терең енуде. Оның ішінде, би өнері саласында ЖИ хореографтар үшін жаңа құрал ретінде қолданысқа ие болып отыр. Осындай өзгерістер аясында хореографияны оқыту әдістерін жаңғыртып, заманауи талаптарға бейімделген инновациялық тәсілдерді енгізу қажеттілігі туындайды. Зерттеу барысында хореография саласындағы мамандарды даярлау үдерісіне жасанды интеллект (ЖИ) технологияларын енгізу мәселесі қарастырылады. Зерттеудің негізгі *мақсаты* — хореография саласында мамандарды даярлау үшін ЖИ көмегімен инновациялық оқыту әдістерін әзірлеу. Зерттеу барысында өнер саласында ЖИ-ні пайдалану мәселесін зерттеген шетелдік және отандық ғалымдардың еңбектері сараланады. Хореография өнері саласында қолданыстағы ЖИ платформалары анықталады. "Би композициясы" пәнін ЖИ қолдану арқылы оқыту бойынша оқу бағдарламасының моделі әзірленеді, ұсынылған әдістеме тәжірибе арқылы апробацияланады. Зерттеу барысында алынған *нәтижелер* ЖИ технологияларының хореография білім беру жүйесіне оң ықпалын, студенттердің шығармашылық қабілетін арттыруға қосатын үлесін және дәстүрлі оқыту әдістерін толықтыра алатындығын көрсетеді. Сонымен қатар, білім беру процесіне ЖИ-ді енгізу кезінде педагогикалық этика мен шығармашылық дербестік мәселелерін ескеру қажеттілігі анықталды. Халықаралық тәжірибені зерделеу және заманауи цифрлық шешімдерді тиімді пайдалану арқылы Қазақстандағы хореография мамандарын даярлау жүйесі өзінің бәсекеге қабілеттілігін күшейте алады. Бұл болашақ хореографтарға сандық мәдени ортаға бейімделген жан-жақты кәсіби тұлға ретінде қалыптасуға жол ашады. Жалпы алғанда, бұл зерттеудің нәтижелері жасанды интеллектті хореография саласына тиімді енгізу Қазақстанның білім беру жүйесін жаңғырту, студенттердің креативті қабілеттерін дамытуға және ұлттық өнерді қазіргі заман талабына сай форматта сақтап қалуға ықпал ететінін көрсетті.

Түйін сөздер: өнер, жасанды интеллект, хореография, білім беру процесі, мамандар даярлау.

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ИНТЕГРАЦИЯ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА В ПРОЦЕСС ПОДГОТОВКИ СПЕЦИАЛИСТОВ В ОБЛАСТИ ХОРЕОГРАФИИ

Аннотация. Искусственный интеллект как результат человеческого творчества находит широкое применение в современном обществе и активно внедряется в сферу искусства. В частности, в области танца ИИ становится новым инструментом для хореографов. В условиях таких изменений возникает необходимость обновления методов преподавания хореографии и внедрения инновационных подходов, адаптированных к современным требованиям. В рамках данного исследования рассматривается вопрос интеграции технологий искусственного интеллекта (ИИ) в процесс подготовки специалистов в области хореографии. Основная *цель исследования —* разработать инновационные методы обучения с применением ИИ для подготовки специалистов в хореографической сфере. В ходе работы анализируются научные труды отечественных и зарубежных исследователей, изучающих применение ИИ в искусстве. Определяются действующие ИИ-платформы, используемые в хореографическом искусстве. Разрабатывается модель учебной программы курса «Композиция танца» с применением ИИ, а предложенная методика проходит апробацию в экспериментальных условиях. Полученные в процессе исследования результаты демонстрируют положительное влияние ИИ-технологий на систему хореографического образования, их вклад в развитие творческих способностей студентов, а также потенциал для дополнения традиционных методов обучения. Одновременно с этим установлена необходимость учитывать вопросы педагогической этики и творческой автономии при внедрении ИИ в образовательный процесс. Изучение международного опыта и эффективное применение современных цифровых решений позволяют системе подготовки хореографических кадров в Казахстане повысить свою конкурентоспособность. Это создаёт условия для формирования будущих хореографов как универсальных профессионалов, способных адаптироваться к цифровой культурной среде. В целом, *результаты* исследования показывают, что эффективная интеграция искусственного интеллекта в сферу хореографии способствует модернизации системы образования Казахстана, развитию креативных способностей студентов и сохранению национального искусства в актуальном современном формате.

Ключевые слова: искусство, искусственный интеллект, хореография, образовательный процесс, подготовка специалистов.

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