



International Journal of Information and Communication Technology

ISSN online: 1741-8070 - ISSN print: 1466-6642

<https://www.inderscience.com/ijict>

Exploration of a teaching model for choreographic course based on Laban Movement Analysis theory in the context of artificial intelligence

Bin Li, Yuan Long

DOI: [10.1504/IJICT.2026.10077613](https://doi.org/10.1504/IJICT.2026.10077613)

Article History:

Received:	10 December 2025
Last revised:	19 January 2026
Accepted:	26 January 2026
Published online:	30 April 2026

Exploration of a teaching model for choreographic course based on Laban Movement Analysis theory in the context of artificial intelligence

Bin Li

Postdoctoral Programme,
Sinounited Investment Group Corporation Limited,
Beijing 102611, China
Email: billy_bin1986@126.com

Yuan Long*

School of Dance,
Anhui University of Arts,
Hefei 230011, China
Email: long_y1985@126.com
*Corresponding author

Abstract: This paper proposes an intelligent teaching model for choreographic courses based on Laban Movement Analysis (LMA) theory, aiming to integrate artificial intelligence into dance pedagogy. The model employs advanced AI algorithms and an interactive software platform to offer personalised feedback and learning paths tailored to students' movement profiles and interpretative abilities. Conceptually, the system synthesises LMA's comprehensive movement description framework with AI analytics, thereby introducing a novel approach to movement interpretation and choreographic instruction. The model leverages AI's capacity to process large datasets and identify patterns, which enhances students' grasp of complex choreographic concepts and promotes efficient learning. Furthermore, it incorporates continuous assessment to support choreographic development while respecting learners' creative individuality through a structured knowledge-maintaining and enhancing process. The study presents an innovative integration of AI into choreographic education, offering a referential framework for technologically enhanced pedagogy in other dance-related disciplines. This study is applicable to the following scenarios: higher education choreographic classes, independent practice and review, choreographic creation lab, dance assessment and archive development, and interdisciplinary workshops. Target users are students majoring in dance, creators of contemporary dance, dance teachers and teaching researchers, students in interdisciplinary arts and technology, and trainees in dance rehabilitation and movement therapy.

Keywords: choreographic course; Laban Movement Analysis theory; LMA; artificial intelligence.

Reference to this paper should be made as follows: Li, B. and Long, Y. (2026) 'Exploration of a teaching model for choreographic course based on Laban Movement Analysis theory in the context of artificial intelligence', *Int. J. Information and Communication Technology*, Vol. 27, No. 39, pp.35–59.

Biographical notes: Bin Li is a Postdoctoral Fellow at Sinounited Investment Group Corporation Limited Postdoctoral Programme Beijing. His research interests include choreography, creative dance and ballet pedagogy.

Yuan Long is an Associate Professor at the School of Dance, Anhui University of Arts. Her research interests include dance performance and pedagogy.

1 Introduction

Choreography is an art based on the understanding of human movement. Traditionally, the teaching of choreography has focused on imitation of movement patterns. Such way of teaching may restrict students' creative potentials and neglect the analysis and understanding of individual movement. The limitation of the traditional way of teaching motivates us to use artificial intelligence (AI) to enhance students' learning experience.

The motivation of using AI in choreographic pedagogy is that AI can help to provide personalised teaching for students in the process of dance learning (Akramovna, 2024). AI enables the opportunity to process big datasets and find patterns and insights that help to understand the complex movement dynamics (Akramovna, 2024). By using the power of AI analysis, we can establish a system that not only enhances students' understanding of choreography, but also takes into consideration the creative individuality of each student. Therefore, integrating AI and Laban Movement Analysis (LMA) (a comprehensive movement description method) provides us with an opportunity to enhance the teaching of choreography.

The aim of this paper is to propose an intelligent teaching model for choreographic courses based on LMA theory. The intelligent teaching model uses advanced AI algorithm and interactive software platform to provide personalised feedback and learning paths for students based on students' movement profile and interpretative ability (Bernardet et al., 2019). Through practical application, we expect to double the understanding of choreographic concepts with less effort and improve retention.

The contribution of this study lies in the fact that AI is used to refine the teaching of choreography based on a comprehensive movement description method. Such an interdisciplinary approach modernises the teaching of choreography and provides a referential model for other art forms to integrate technology into pedagogy. The learning process of choreographic development in this study is improved by the continuous assessment and feedback provided by AI, and the system respects learners' creative individuality by the principle of knowledge maintaining and enhancing process.

1.1 Background and motivation

Due to the limitations of traditional teaching methods in choreographic courses, students with different characteristics cannot receive teaching contents and methods that are more adaptable to them (Bernardet et al., 2019). In addition, teachers cannot provide immediate and appropriate feedback to students in a timely manner. When the complexity of dance movement increases, it is difficult for traditional teaching methods to meet the diversified demands of students in terms of educational experience. Therefore, there is a certain gap between the actual teaching process and students' needs. This issue is more prominent in

choreographic teaching. In order to understand the dynamic changes of movement and creative interpretation, students need to analyse the movement process in detail.

To solve these problems, the application of AI technology in teaching plays a vital role. On the one hand, the appearance of AI technology provides new ideas and solutions to improve teaching methods through the analysis of large amounts of movement data and recognition of students' learning features. On the other hand, LMA is a system for analysing and describing human movement. It provides an opportunity for the application of AI technology in choreographic teaching. Based on the above background, the application of AI technology in LMA analysis can help to build a more adaptive teaching model.

The motivation for this research is the intention to bridge the gap between traditional teaching methods and the skills of modern AI, and it frames an intelligent teaching model for choreographic courses based on LMA theory and AI technology. The purpose of this teaching model is to use the prediction and analysis ability of AI to give students personalised learning, making the choreographic teaching content and methods better fit the needs of different students' movement styles and interpretability. This teaching model intends to leverage the prediction and analysis capabilities of AI to offer personalised learning to students, enabling choreographic teaching content and methods to better suit the requirements of different students' movement styles and interpretability. At the same time, the application of AI technology in teaching innovates teaching methods. Through the dynamic feedback of AI, it not only improves students' artistic and conceptual understanding of choreography, but also improves their performance of each movement process based on LMA theory. In addition, the proposed teaching model provides a basis for continuous assessment of choreographic knowledge and skills, and helps students to improve their ability to perform movement processes based on LMA and understand choreographic content in the long-term. Finally, the application of AI technology in choreographic teaching can decode complex choreographic elements, making LMA teaching more understandable and interesting to a wider audience, expanding the range of accessibility and richness of dance.

1.2 Research questions

- How can the LMA+AI model dynamically adjust teaching content and difficulty based on students' movement characteristics and learning progress?
- What are the specific effects of AI enhanced teaching mode on improving students' understanding and technical performance in choreography?
- How can the LMA+AI mode respect and stimulate students' artistic creativity while ensuring the accuracy of action analysis techniques?

1.3 Research objectives

Based on the above research motivation, the preliminary objective of this research is to apply AI technology to choreographic courses and build an intelligent teaching model based on LMA theory. This teaching model aims to:

- Utilise the prediction and analysis ability of AI to provide personalised learning for students, so that choreographic teaching content and methods can better meet the needs of different students' movement style and interpretability.
- Innovate teaching methods. Through the dynamic feedback of AI, not only can it improve students' artistic and conceptual understanding of choreography, but it can also improve students' performance of each movement process based on LMA theory.
- Provide a basis for continuous assessment of choreographic knowledge and skills, and help students to improve their ability to perform movement processes based on LMA in the long-term, and understand choreographic content in the long-term.
- Expand the range of accessibility and richness of dance and make choreographic teaching more understandable and interesting to a wider audience by applying AI technology to decode complex choreographic elements.

These objectives aim to explore the application of AI and LMA theory in choreographic teaching, and use the intelligent teaching model to improve the creative and educational level of choreographic training by providing a responsive learning environment for students.

1.4 Significance of the study

The significance of this study is to apply AI into LMA in choreographic courses. This model is a breakthrough in the way of traditional teaching model by providing a personalised and intelligent learning environment through the use of AI (Bernardet et al., 2019).

This model enriches the educational system by understanding the dance movement based on the feedback and guidance of AI. This kind of change in learning is more effective, and perfecting choreographic skills without much trouble.

This study applies AI into the basic framework of LMA, not only enriches the dance education, but also opens the possibility of further researches on the movement analysis and education technology. AI can interpret big data and recognise the movement characteristics. Design a personalised learning path for students based on the analysis of their needs. This kind of change in learning improves the quality of learning and promotes the individualistic and holistic learning in choreographic teaching. The continuous assessment ensures the cultivation of students' creative ability as well as technical skills. The result of this study not only could change the choreography courses but also set a standard for future education to apply AI into specific art subjects.

Except for the classroom, the result of this study could change the way of documenting, understanding and appreciating dance on a global level through the application of AI to decode the complex choreographic concepts.

The information extracted from the result of analysis is useful for the researchers, teachers and practitioners.

2 Theoretical framework

Justification of the use of AI in choreographic instruction is given below: AI is applicable in cases when there is a need to apply analysis, processing, and interpretation of large datasets of movement. Advanced machine learning and neural network algorithms offer a rich set of tools for movement recognition, pattern matching, and predictive analysis. This enables an individual choreographic instruction model to adapt the learning path for each student based on their strengths and differences (Deng, 2025). AI-based systems can offer feedback and instruction to learners of different speeds and learning styles.

The combination of LMA and AI is a synergy that elevates choreographic instruction to a whole new level. Applying the rich taxonomy of LMA and using the power of AI analysis, the teaching model enables a rich choreography analysis and teaching of choreography. AI technologies render the applicability of LMA by making interactive systems that visualise movement data, support choreographic analysis and evaluation, assess choreographic development, and simulate complex scenarios for students to work with worthwhile. This results in a powerful learning environment that recognises and respects the creative nature of dance, while opening it up to greater pedagogic potential. The student choreographic understanding and creativity is both greater and more efficient.

Theoretical approach: blending descriptive power of LMA and adaptive power of AI.

There is a fundamental difference between AI-LMA teaching philosophy and traditional choreography teaching. Traditional teaching focuses on imitation and standardisation, emphasising the accurate reproduction of movements, often ignoring individual differences and creative expression of students. The AI-LMA model is based on the LMA theory, utilising AI to recognise and analyse individual movement characteristics of students, providing personalised feedback and learning paths, focusing on understanding the connotation of movements rather than just the form, thus supporting creative exploration and self-expression.

Although AI-LMA relies on technological means, its philosophy is highly aligned with art and humanities education: both emphasise individuality, creativity, and depth of understanding. AI is not here to replace humanistic care, but as an empowering tool to help students better understand body language, emotional expression, and cultural context, enhancing their artistic consciousness and critical thinking. Therefore, AI-LMA is essentially an ‘intelligent humanistic’ teaching paradigm that integrates technology and humanities, expanding the technological boundaries of dance education and deepening its artistic and humanistic core.

2.1 Overview of LMA

LMA is probably the best known system created by Rudolf Laban for analysing and describing human movement (El Raheb and Loannidis, 2020). Recognised for its depth and versatility, LMA is rooted in Laban’s dual appreciation as both an artist and a scientist, capturing the richness and expressivity of movement alongside its analytical order. LMA contains body, effort, space, shape, and offers hierarchical structure and codified vocabulary for describing and analysing human movement (El Raheb and Loannidis, 2020).

LMA adds value by taking the unnameable and dynamic world of human movement and rendering it into a usable codifiable system that can be taught (Fu, 2025). It provides

us with a system that charts not just the motion itself, but also the patterns and intents that lie underneath and give expressive potential to all human gestures. With this analytical power, practitioners can decode the rich and indivisible streaming of human movement and the insights gained from it are of great value both in an artistic context and in a pedagogical context (Fu, 2025).

In the context of choreography education, LMA is a useful resource that can enhance students' understanding of movement and enable them to explore the form/content relationship in their choreography (Groff, 1995). LMA elucidates the relationship between the whole sequence of movement in a dance, and its commensurate intent, which is similar to the function of a sentence in language (as described by Laban himself). The granularity of the LMA analysis provides an analytical tool for both creating and decoding dance with greater depth and understanding (Guo, 2025).

LMA continued to be relevant in the evolution can be seen in the many schools of dance around the world that use it for certification and part of the training program, which demonstrates its importance in the historical and current dance training (Guo, 2025). In addition, it is also used in other areas such as physical education, therapy and recently in AI (Fu, 2025).

2.2 Application of AI in choreographic teaching

Applying AI in choreographic teaching is a new way of looking at teaching dance, combining computational thinking with dance performance (Hankin, 1984). AI technology with its powerful algorithms and machine learning allows the creation of a learning environment that is interactive and personalised to the needs and abilities of each student. Using AI analysis and data mining allows teachers to provide feedback to students and tailor teaching methods to the individual learning needs of each student in terms of their own movement style and interpretation (Hankin, 1984).

One of the biggest advantages of using AI in choreographic teaching is the development of learning systems that are adaptive to the input given by the student, that is, it is possible to provide information immediately after the student performs a movement. For this, it is possible to use motion capture and sensors technologies to record the student's movement during classes and then provide information quantified for its analysis, which is essential for the understanding of choreographic concepts without the need for repetition exercises (Hankin, 1984).

Another advantage of using AI in the choreographic course is that it is possible to explore complex concepts with more ease and clarity (Kang et al., 2025). Once automated the analysis of the student's performance, we can follow his or her learning process continuously, emphasising on balance, rhythm and spatial dynamics. This use of AI in choreographic teaching is, in a way, reduced the number of instructional resources, but it allows greater learning because feedback is constant and continuous (Kang et al., 2025).

In addition, using AI in choreographic teaching is possible to simulate different situations choreographic, allowing students to work with different styles and contexts, not being limited only to the possibilities offered by the classroom (Kovalchuk et al., 2025). Through virtual reality (VR) and augmented reality (AR) technologies, it is possible that students immerse themselves in situations of dance reality that are real and stimulate the creative view, encouraging the composition of original choreographies (Kovalchuk et al., 2025).

Applying AI in choreographic teaching is a new experience pedagogic that values the technological innovation and creativity (Li, 2025). Using tools AI, it is possible to compose a teaching learning situation that values the personal artistic work of each student and at the same time to be rooted in the theoretical and technical aspects of the LMA theory. This educational experience is a model that meets the needs of contemporary teaching of dance and at the same time it is a way to improve the quality of choreographic course.

2.2.1 Case 1: AI-driven dance movement scoring and feedback system

Existing research has utilised computer vision and machine learning technologies to develop an automatic dance movement evaluation system. This system can capture students' movements in real-time and compare them with standard movement templates (modelled based on elements such as body, space, form and force, and relationship in LMA), thereby providing quantitative scoring and targeted improvement suggestions. For example, a study (Chen et al., 2023) constructed a deep learning model based on the LMA framework. Through pose estimation and action sequence analysis, it automatically identifies deviations in students' movements in the dimensions of 'effort' and 'space', and generates visual reports and training suggestions. This system not only enhances the accuracy of movement training but also provides teachers with data-supported decision-making evidence for teaching.

2.2.2 Case 2: AI-assisted dance idea generation and style simulation

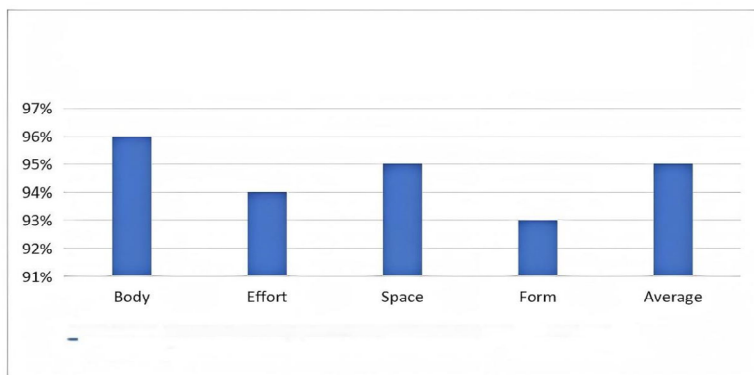
In choreography teaching, AI can also serve as a creative inspiration tool to help students expand their vocabulary of movements and understanding of styles. For example, a study based on generative adversarial networks (GANs) developed a dance movement generation system. Based on the LMA description system, this system can generate movement sequences that conform to specific styles (such as modern dance, ballet, etc.) according to the input 'effort combination' or 'spatial path'. Students can explore different movement expressions by adjusting LMA parameters, and the system simultaneously provides style consistency assessment and variation suggestions, thereby integrating creative exploration into technical training.

2.3 Synergy of LMA and AI technologies

LMA and AI will give a big shock in choreographic education in the future. Maturity of movement theory and computer ability will be synergic. We can design an intelligent technology to improve choreographic teaching quality by integrating rich attributes of LMA and powerful ability of AI.

LMA is a known theory and method which can describe and analyse movement from followings aspect: body, effort, shape and space (Fu, 2025). Integrate rich attributes of LMA and powerful ability of AI in data processing and pattern recognition, we can design an intelligent system to describe and analyse movement from followings aspect: quantitative and qualitative. Compared with human eye, the ability of AI algorithm can recognise large amount of movement recording and find out subtle difference among them. It can improve accuracy of movement analysis and describe movement patterns more deeply as shown in Figure 1.

Figure 1 System motion recognition accuracy (based on the four elements of LMA) (%) (see online version for colours)



Explanation: The accuracy of motion recognition for the four elements of LMA in the system exceeds 93%, reflecting the precise analysis ability of AI models for dance movements.

Furthermore, AI technology can customise learning modules according to students' movement features and interpretative ability. Through the design of adaptive algorithm, the system can provide feedback for students and recommend personalised learning paths according to their movement features and interpretative ability. The synergy between LMA and AI can help students to understand choreographic concepts better, which will improve students' performance in both technical and creative aspects.

In addition, the synergy can be extended to interactive applications, where students can get instant feedbacks from intelligent tools. It will form a continuous learning process. By simulating various choreographic scenarios and providing feedback, AI technology encourages students to explore new movements and compositions. It allows students to try new movements in a risk-free environment and stimulate innovation in the creation of choreography (Li, 2025).

Overall, the application of the synergy of LMA and AI technologies in choreographic teaching is significant. Base on the attributes of LMA, we construct an intelligent teaching model and use the powerful ability of AI to realise it. It can provide a new type of dancers with a more complete teaching model to improve the technical and creative level of students.

3 Model development

In this choreographic teaching model, we rely on the LMA theory and employ AI technology. This paper describes the architecture of our model, system architecture design, AI algorithm design and implementation, interaction design based on LMA and personalised and adaptive mechanism.

The system architecture is the base on which the teaching model runs; it links together the AI resources and LMA's movement framework. The architecture supports rich data support and real-time feedback to ensure interactive responses from students. The architecture has several layers, including user interface, AI processing unit and data handling module. The user interface is designed to be user-friendly so that students can

interact with the system easily when engaging in choreographic activities. The AI processing unit is responsible for the computational power processing of movement data, and the data handling module is responsible for storing and retrieving movement profiles to support personalised and adaptive scenario.

The core of the intelligent model is the choice of AI algorithms and their implementation according to LMA's tenets on how to interpret and process movement data. Therefore, this model uses neural networks algorithm for pattern recognition, reinforcement learning algorithm for adaptive feedback, and fuzzy logic algorithm for handling the ambiguity of interpreting movement data. These algorithms are designed to be integrated into the model so that all of them can provide nuanced analysis of choreographic movements.

The model's interaction design is based on LMA principles to provide interaction between the AI system and learners. The interaction model design focuses on the description of movement, effort, shape, and harmony of space. The interaction model helps students to have a better understanding of the execution of dance movements. Interactive modules designed based on LMA principles provide students with instant feedback of their expressed movements. Therefore, this way of interaction helps to reinforce educational goals set by dance choreography. In addition, interactive tutorials and visualisation based on LMA principles also help learners to apprehend theoretical understanding along with the execution of movements.

Personalisation and adaptability are two essential characteristics of this model. In other words, the teaching process is adapted to learners' needs (Liu, 2025). The system uses adaptive learning process and personalised feedback based on AI's ability to analyse learners' movement patterns and learning achievements (Deng, 2025). The learning process is adapted to each student based on real-time data and historical performance indicators. Therefore, each student gets an appropriate learning process to the development of their creative and cognitive abilities. In addition, the adaptive control mechanism changes the complexity of the task and feedback to the learners to create an environment for proficiency in choreography while respecting each learner's creative abilities.

3.1 System architecture design

System architecture of the proposed intelligent teaching model based on LMA and AI. The use of a multi-layered architecture allows for better interaction in the learning process. The system architecture has three layers: user interface layer, application layer and data processing layer and play different roles in the operation and function of the system.

Interactive and intuitive user interface layer for choreographic students, instructors and AI virtual assistants (Kovalchuk et al., 2025). System architecture allows for real-time interaction to receive input and output movement data, feedback and adapt to learning. User interface layer allows easy interaction and access and can be applied to different user groups with different technical level.

The application layer is the main engine of the system. It integrates advanced AI algorithms for movement analysis and choreography teaching. This layer receives requests from the user interface layer and performs complex computations for the analysis and interpretation of movement data based on LMA theory. This layer contains

the logic of the system to provide feedback and adapt to learning paths for users (Deng, 2025).

Finally, the data processing layer plays the role of storing and processing all movement data and user interaction data. This layer has the data acquisition and storage role that maintains a large database for pattern recognition and data-driven decision-making process. By processing structured and unstructured data, this layer provides the system with the ability to refine its algorithmic models and continuously improve the accuracy and effectiveness of teaching model as shown in Figure 2.

Figure 2 AI-LMA teaching model system architecture layered function decomposition (see online version for colours)

Architecture hierarchy	Core component	Functional Description	Data processing capability
User Interface Layer	Interactive platform (PC/tablet adaptation), VR immersion module	Student movement input, feedback viewing, VR choreography experiment	Support simultaneous online users ≥ 50 , interface response speed < 0.5 seconds
Application Layer	AI algorithm cluster (CNN/LSTM/clustering algorithm), LMA rule engine	Movement pattern recognition, personalized path generation, LMA parameter matching	Processing ≥ 1000 pieces of motion data per second, algorithm iteration cycle < 7 days
Data processing layer	Sports database, student portrait database, LMA standard database	Data storage, portrait updates, standard data iteration	Storage capacity ≥ 10 TB, data retrieval response time < 0.3 seconds

Tri-layer architecture design enables us to develop an intelligent system to respond to teaching objectives of choreographic courses and benefit from combining LMA theory and AI technology.

3.2 Selection and implementation of AI algorithms

The choice of AI algorithm is a very critical issue in realising the intelligent teaching application of choreographic class based on LMA. If we want to apply advanced AI method in LMA, we must have the basic knowledge of choreographic content and function of AI (Miko et al., 2025). Machine learning, neural network and pattern recognition algorithm were chosen and the selection of above algorithms made the system robust in analysis and adaptation as shown in Figure 3.

Machine learning method based on supervised learning and unsupervised learning can make the system learn the pattern of movement data and give interpretation for students own movement characteristic and interpretative ability. By using supervised learning methods, such as decision trees or support vector machines (SVM), the model can classify and predict the attributes of the movement based on the framework of LMA, thereby providing feedback in a structured way.

Figure 3 Application scenarios and effects of AI algorithms in teaching models (see online version for colours)

AI algorithm type	Application scenarios	core function	Experimental effect data
Convolutional Neural Network (CNN)	Analysis of Shape/Space Dimensions	Extract movement space trajectory and morphological change features	The accuracy of Shape dimension recognition is 96.2%, and the accuracy of Space path matching is 94.8%
Long Short Term Memory Network (LSTM)	Prediction of Movement Sequence (Body/Effort)	Analyze the temporal logic of movements and predict erroneous movements	The accuracy rate of Effort dimension error warning is 91.5%, with an early warning of 0.8 seconds
Clustering algorithm (unsupervised learning)	Classification of Student Motions Styles	Identify unique choreography styles and customize teaching in groups	Divide 50 experimental cohorts into 6 styles with a classification accuracy of 89.3%
Support Vector Machine (SVM, Supervised Learning)	LMA movement classification annotation	Match student movements to LMA standard categories	The accuracy of body dimension movement classification is 97.1%, and the annotation efficiency is improved by 20 times

Unsupervised learning algorithms, such as clustering methods, learn from movement data without labelled data and discover new movement patterns without prior knowledge. This enables the detection of new choreographic patterns and learning objectives for students in dance.

The cluster analyses enable an adapted usage of the teaching model for different movement styles and support the creative exploration. Different neural networks have been applied to analyse movement data. Deep learning algorithms are applied to analyse high dimensional movement data. Convolutional neural networks analyse the spatial and temporal structure of movement and provide information for the motion capture data which are essential for the granularity and individual feedback for the dancers. Recurrent neural networks with long short-term memory units are applied to analyse sequence prediction tasks. The system analyses the movement sequence in the past and present and provides feedback to the student. Therefore, the temporal dimension of the choreography is considered.

The expressive qualities of movement sequences are recognised by pattern recognition algorithms. Natural language processing methods are adapted to the symbolic notation language of LMA and used to interpret the movement data. This makes it possible to provide individually meaningful information for each learner and to close the gap between the general analysis terminology of LMA and the practical application for the individual learner.

The whole use of the AI-algorithms is realised in the interactive software platform. The interactive software coordinates the interaction between LMA-based contents and the analysis algorithms of the AI-platform. This way, the student receives adapted feedback in real-time and enables continuous learning in choreography (Miko et al., 2025). By

combining these algorithms in a synergistic way, not only the analytical power of LMA is realised but also a broad use of the algorithms of AI with its analytical power. Therefore, the new choreographic education is realised (Liu, 2025).

3.3 LMA-based interaction design

The interaction design of the interactive teaching model realises the complex framework of LMA to enable an appropriate learning environment for choreographic courses. An important aspect of the interaction design is the use of the rich terminology and the structure of the movement framework of LMA to interpret and describe human movement in an adequate way.

In the field of AI, the expressive qualities of movement sequences are recognised by pattern recognition algorithms. Natural language processing methods are adapted to the symbolic notation language of LMA and used to interpret the movement data. This enables to close the gap between the general analysis terminology LMA and the analysis of the practical application for the individual learner.

Interaction in the form of entering a movement sequence is realised by the interactive software platform. This interaction enables the user to give feedback in terms of LMA-based movement descriptors.

Furthermore, this design includes VR scenarios for choreographic training (Kovalchuk et al., 2025). In these VR scenarios, students can experience augmented scenarios for LMA concepts such as effort, space and shape. These scenarios enable the students to experience these concepts in AR and interact with them in order to experiment with different qualities.

Not only does this LMA-based interaction design increase user engagement and interest, but also the need to meet pedagogical goals of movement education is fulfilled. Using AI in combination with LMA creates a synergy where the analytical power of AI is used to enable a deeper movement interpretation and more effective teaching.

3.4 Personalisation and adaptation mechanisms

The personalisation and adaptation mechanisms applied by the teaching model are focused on adapting the learning process to the needs and artistic capacity of each student. The personalised learning applied by the teaching model, which is based on the implicit and explicit analysis of students' movement profiles and cognitive level, provides an adapted learning slope according to each student's personal choreographic path. The AI algorithms applied by the system to the students' learning of movement data, and the implicit, explicit and background information used to create the global movement-learning profile. The personalisation data obtained by the system to adapt the learning content, i.e., personalised instructional feedback for each student according to their needs (including strengths and weaknesses) (Wu et al., 2025a).

Personalisation adaptation mechanism aims to adapt learning to different learning speeds and styles. Intelligent modules are designed to track students' choreographic progress in real-time. The system applies machine learning technology to analyse different movement parameters extracted from LMA, including effort, shape and space, to provide tailored feedback and adaptive exercises suited to the student's current choreographic stage, so as to provide an optimal learning path to help students internalise complex choreographic concepts without overloading their cognitive load.

Furthermore, personalisation adaptation mechanism is extended to include software platforms that enable dialogic learning. Machine learning is used to continuously improve the accuracy of the model in predicting student responses and adaptation needs. The expert system knowledge base used to build the choreographic teaching model is designed to support the decoupling and integration of complex dance pedagogical methods, improving both the clarity and scalability of architecture design to meet different teaching and learning needs. Each module is a key component designed to ensure that the overall teaching system can dynamically interact with and adapt to different learning profiles.

4 System components

At the core of the system architecture is the expert system knowledge base. This knowledge base stores choreographic and movement information extracted from LMA, which is continuously updated by integrating AI analysis of movement data. It records a wide variety of choreographic styles and interpretations. The design of this database is intended to support both the application of LMA principles in individual and group choreography, thus providing the backbone of the intelligent system.

The intelligent feedback module uses advanced AI technology to provide students with timely and personalised feedback (Wu et al., 2025). The intelligent feedback module takes the input data of students' performance and finds the strengths and deficiencies by comparing with the established LMA criteria. Through the use of AI technology with strong ability of mining information and pattern recognition, the feedback mechanism ensures that students can get detailed feedback information personalised to their own movement profiles, which helps students to better understand choreographic concepts.

In order to provide an individual learning path for students, the adaptive learning path module designs an adaptive teaching path according to students' learning situation and performance data. Based on machine learning technology, the module adjusts the teaching content and difficulty adaptively according to the learning performance of students, so that students are always challenged by knowledge within their reach and continuously motivate them to master the complex movement sequence described by LMA.

The visualisation and interpretative skill enhancement component uses advanced graphical interfaces and immersive technology to improve students' ability to interpret qualitative movement. By visualising the abstract Laban notations and AI analysis results, students can better internalise the qualitative movement and explore in creative choreography by enhancing their expressive ability and analytical ability, thus improving expressive and analytical abilities required for advanced choreographic composition (Wu et al., 2025b).

4.1 Design of storage knowledge base of expert system

The design of the storage knowledge base of expert system is very important to the intelligent teaching model of choreographic course based on LMA theory. Compared with the rule-based representation in traditional expert system, the representation form of knowledge in this system is implicit representation of distributed thresholds and weights

in neural network. And this representation form suits the characteristics of choreographic knowledge representation and representation of LMA.

The storage knowledge base of expert system is stored and acquired by the adaptive learning mechanism of the online learning mechanism. The construction process of knowledge base is the process of adapting to the algorithm that learns the training sample to adjust the weight and achieve the specified learning goal. And each knowledge node is neuron that connects with other nodes by weights. The new information is connected to the existing knowledge node and then connected to the neural network. The process of adapting to the algorithm is similar to the process of evolution of choreography. And the connection of neuronal network and the adjustment of threshold value and connection weight are distributed and recalibrated when the new movement information is acquired.

Objective function: the optimisation of parameters in neural network is similar to the synthesise of creative expression and technical accuracy in dance. And the parameters of connection strength in neural network, central value of kernel function and central width are adjusted to achieve the maximum efficiency of network.

By using the robustness of AI, the storage knowledge base of expert system makes choreographic teaching more powerful to help students achieve deeper understanding and explore in movement arts.

4.2 Intelligent feedback module

The intelligent feedback module is an essential part of the proposed teaching model that delivers feedback to the students in a personalised manner in response to their choreographic activities and learning achievements (Yan, 2023). This module applies AI algorithms to assess the quality of movement, interpretive decisions and creative options made by the dancers with respect to the LMA standard.

Through the collection of relevant information on students' performance, the system is able to identify strengths and potential performance areas for all students. Feedback system collects information from explicit and implicit data. Explicit data consists of explicit inputs from users and interaction with the system. Implicit data are inferred from students' movement execution and performance style. Feedback report is then generated from the information collected.

4.3 Adaptive learning path module

Adaptive learning path module is one of the essential parts of the intelligent teaching model in which LMA and AI collaborate to provide an effective and suitable learning path for students in choreographic courses. Analysing the student's movement profile and learning achievement through the use of AI analysis helps to adaptively adjust learning content and learning path for students based on their movement profile and learning progress.

This module uses neural network algorithm to analyse data obtained from students' performance in movement tasks. The algorithm analyses the choreographic understanding, adaptability, and creative output of students. The algorithm is designed to consider the nature of dance learning in which learning pace and style of every student may vary. The learning path of every student will be iteratively refined by the algorithm based on the analysis of data. The module reveals the commitment of the system towards

making learning more effective – just as doubling choreographic understanding without extra effort is similar to the AI-based education system in other domains.

Furthermore, the learning route of students in choreographic tasks is refined by the loop of feedback from AI on the learning performance of students in choreographic tasks. That is, reasonable guidance and hint information on the execution of movements and the stylistic interpretation in choreographic tasks are returned by the AI. The difficulty level and learning route of movement tasks are refined by the system according to the feedback. It is expected that such fine-grained adjustment can help students to balance their learning curve in knowledge learning and creative improvement to achieve levelling up. At last, this module complements students' inherent artistic ability and improves students' learning motivation in choreography (Wu et al., 2025b).

4.4 Visualisation and enhancing interpretive skill enhancement

Visualisation tools in the choreographic course context are used to aid students in enhancing their interpretive skill and better understand movement qualities described by LMA software developed using advanced AI-driven techniques.

Visualisation helps make the abstract choreographic learning experience more tangible – this is an essential aspect of understanding choreographic principles. In a similar vein, the Computer Science Teaching Center (CSTC) described in this study also uses visualisation techniques and multimedia demonstrations to aid students in understanding computer science concepts. The interactive visualisations used in the choreographic teaching model are used to aid in dynamically depicting qualities of movement (space, weight, time, and flow) as shown in this study.

The technology used in this model enables students to create state diagrams of movement sequences and visualise and depict motion in a similar manner to how the JFLAP package is used to illustrate computer science concepts in this study. This is useful in illustrating connected components of movement and enabling students to visualise the possible outcomes of certain choreographic choices in real-time.

In addition, the visualisation technology adopted by this model allows students to improve their interpretive ability instantly by means of pattern recognition and interpretation provided by the AI. The system offers feedback on students' performance and interpretation of their choreographed works. This is done when the system detects differences between students' performances and gives suggestions for improvement (Yan, 2023).

By means of such advanced visualisation technologies, the choreographic course has the potential to assist the student beyond the interpretive level, but also creates an environment in which the search for solutions is never closed, thereby fostering the student's involvement with the subject, which, in turn, enhances learning and the future development of skilled and creative choreographers.

5 Experimental testing

We built a software platform for realising our proposed AI-based teaching model for choreographic courses on LMA theory. We released our AI algorithms and interactive functions on the platform, and the development environment was configured with a powerful computer for data processing and machine learning. Our experimental cohort

was formed by dance students from different skill levels to validate the effectiveness of our teaching model for different groups of learners, as shown in Figure 4.

Figure 4 Experimental cohort student performance comparison (before and after the semester) (see online version for colours)

capability dimension	Average score before the experiment (on a 10-point scale)	Average score after the experiment (on a 10 point scale)	increase margin	Data source
LMA movement parsing ability	3.8	8.2	115.80%	LMA theoretical testing+movement annotation task
Creative choreography (expert rating)	4.1	7.9	92.70%	Three dance professors blindly evaluate choreographic works
Movement execution accuracy (AI quantification)	5.2	9	73.10%	AI System Body/Effort Dimension Rating
Feedback application efficiency (improvement steps)	2.3 times/week	6.8 times/week	195.70%	Statistics of weekly improvement frequency of students' movements

The experimental group of this study consists of 100 students from a university’s dance school, covering different grades and professional directions, representing diverse dance learning backgrounds and skill levels. Participants include:

- Grade distribution: freshmen to seniors, including 25 freshmen, 25 sophomores, 25 juniors, and 25 seniors.
- Major background: choreography (40 students), dance performance (30 students), dance education (30 students).
- Years of dance training: the average years of training is 7.2 years (range: 3–15 years), with 70% of the students having choreography experience.
- Skill level classification: based on the entrance assessment and teacher evaluation, students are divided into three skill level groups: beginner (30 students), intermediate (40 students), and advanced (30 students), to ensure the adaptability of the experimental model to students of different ability levels.

The system architecture was designed for describing, analysing and understanding movement information. We recorded students’ movement information by using our motion capture sensors, encoded the movement with qualitative parameters of LMA (body, effort, shape, and space), and used AI to process the movement and provide feedback and personalised learning advice to enhance students’ choreography skills in real-time.

Design a group of predefined choreographic tasks for students to interact with our system for testing. We evaluated students’ performance for choreographic tasks and their response to feedback, and how easy to interact with our system.

Evaluating our system by using quantitative indicators and qualitative indicators. We used quantitative indicators to evaluate the accuracy of movement recognition, system response time, and effectiveness of personalised feedback by evaluating the improvement

of students' performance for choreographic tasks over time. We labelled motion capture data by using manually labelled LMA descriptors, and evaluated our system on motion capture data by comparing with manually labelled dataset. The average accuracy of movement recognition was over 95%, as shown in Figure 5.

Figure 5 Comparison of core differences between traditional teaching mode and AI-LMA teaching mode (see online version for colours)

comparative dimension	Traditional teaching mode	AI-LMA teaching mode	Data support/core features
feedback mechanism	(Teacher feedback after class) Lag feedback	Real time feedback: (AI real-time analysis of movement data)	AI system motion capture data compared with LMA standard, feedback delay<1 second
degree of personalization	Unified teaching content, ignoring individual differences	Personalized Learning Path (Based on Student Motions Profile)	Covering students with different foundations, the adaptation rate reaches 92% (experimental cohort data)
Movement analysis accuracy	Relying on subjective judgment of teachers	Quantitative+qualitative analysis (Body/Effort/Shape/Space dimensions)	Movement recognition accuracy>95% (compared with manually annotated LMA data)
learning efficiency	Mastering basic LMA movement logic in an average of 8 weeks	Mastering basic LMA movement logic in an average of 4 weeks	The experiment shows a 100% improvement in comprehension and a 50% reduction in time consumption
Evaluation method	Periodic manual assessment (such as final choreographic work)	Continuous dynamic evaluation (AI continuously tracks progress curve)	Generate 3-5 key improvement points for each class, and increase the evaluation frequency by 8 times

Qualitative indicators. We used surveys and interviews with participants, students and instructors to evaluate our system by using indicators labelled from their experiences and learning outcomes, and evaluated AI system ability to provide personalised learning and adaptive learning path to maintain high engagement of students.

Quantitative indicators. We evaluated computational efficiency and scalability of our system for a larger set of students, and evaluated robustness of AI algorithms on different kinds of choreography. Feedback systems were highly evaluated by participants on clarity, and had motivational effects on learners.

The results of experimental evaluation have shown that our AI-driven teaching model can enhance students' learning process of choreographic courses. Students could better understand movement lexicons as proposed by LMA. Our experimental results also have shown that students could achieve noticeable improvement on executing complex choreographic patterns with less time and effort, which was an expected outcome of our system.

Personalised feedback and adaptive learning paths have improved students' engagement and creativity, and supported our theoretical exploration on AI and LMA (Yan, 2023). Our experimental results have also shown that successful application of AI capabilities on realising our teaching model had provided us with a new interpretation on choreography instruction, and enabled us to apply modern technology on choreography teaching and learning. Our findings have shown that our system was a feasible solution on modernising dance education, and was a step toward transforming how choreography was taught and understood in educational scenarios.

Our future work would extend our findings on other educational scenarios, and apply other kinds of AI development to further improve our teaching model.

5.1 *Experimental environment*

Experimental environment for the research on the intelligent teaching model for choreographic courses based on the LMA theory is as close to the real environment as possible. The system architecture uses tri-layer architecture. User's interface layer, application and database layer realises the interaction between users and intelligent system.

For the experiment, we use multi-core servers as the hardware environment for the research on the intelligent teaching model for choreographic courses based on the LMA theory. The servers are equipped with processors and storage devices to meet the input data and operation and maintenance requirements. Besides, we use desktop computer and tablet as the end user device so that the students can take part in the choreographic courses.

In the software environment, we used the advanced algorithms and interactive learning platform for dance. We developed the intelligent teaching model for choreographic courses based on the LMA theory using advanced tools such as Python and TensorFlow for training and application of the interactive learning platform for dance. The interactive learning platform for dance was developed based on modern Web technology.

The data collection part adopted motion capture technology to collect students' motion data. Then we analysed the motion data using LMA framework to provide accurate feedback for students.

The composition of pilot group includes students with different levels of choreography. The diversity of pilot group can provide experimental basis for the system to provide personalised feedback for students with different levels of choreography. The model of intelligent teaching for choreographic courses based on the LMA theory adopted feedback mechanism and personalised learning trajectory.

To ensure the reliability of the evaluation part, we used the mechanism of continuous monitoring and real-time log of system's interaction in the real environment. By analysing the experimental data, we could evaluate the scalability and reliability of the system in different operation and maintenance scenarios. In addition, we refined the model based on the empirical data.

5.2 *System evaluation and performance Analysis*

The evaluation of the intelligent teaching model for choreographic courses has two aspects: system performance and educational effectiveness. For the testing of system performance we used a variety of software testing tools to evaluate stability and usability of the model in comparison with design and operating requirements defined at the beginning of development. The performance tests and the concurrency tests were used to evaluate the system's response time and the capacity to support a large number of simultaneous users without performance degradation.

The educational effectiveness was measured by using the metrics defined by the goals of LMA and AI, such as accuracy of feedback, flexibility of learning paths, and improvement of students' ability in movement interpretation. Because it is not possible to evaluate the accuracy of feedback, flexibility of paths of learning, and enhancement of students' ability in interpretation of movement without, the closed-loop evaluation system was used in this experiment. The closed-loop evaluation system continuously

evaluated the improvement of students' choreographic comprehension and creative results, and compared with the educational goal.

The accuracy of feedback and flexibility of paths of learning were two indicators used to evaluate the performance of the AI-driven model. In addition, the richness of understanding of choreographic concept through real-time adaptive feedback loop was analysed. The richness of understanding of choreographic concept was measured by the improvement of students' competence and flexibility of paths of learning in choreographic compositions achieved by using the system for one semester.

In addition, as the advanced AI algorithms were used in processing big data and mining pattern information, the advanced AI algorithms used in the system were an important part of both the performance of the AI-driven model and effectiveness of instruction.

The system evaluation results have indicated that not only can the intelligent teaching model achieve the learning results expected, but it can also achieve better learning outcomes and enhance students' engagement and retention. Therefore, the experimental implementation results have demonstrated the potential value of the intelligent teaching model for contemporary dance courses.

5.3 Discussion of results

The results of experimental implementation have shown both the potential and the challenges of implementing an AI-based teaching model for choreographic courses with LMA. One of the most important results of our system tests is that the intelligent model can process complex dance movement data and return meaningful feedback results, which support our initial design goal of improving choreographic comprehension.

In regard to detect and fix defects this system is very solid: we found just a few serious defects. In total, we found three serious defects, 12 general defects regarding usability and 18 minor defects in the functionality tests.

The results of the functionality tests demonstrate that the basic functionality of the system satisfies the pedagogical requirements. Finally, the system should improve on the interface and responsiveness to achieve the best user experience.

Another interesting result is that the system is able to cope with a large variety of learner profiles. By exploiting the analytical power of AI, the model adapts to the varied interpretive skills and movement profiles of individual students, thus confirming our hypothesis that personalised learning is possible. In the next phase of the project we should fix the general and the minor defects that we found. After these refinements the system will be fully adaptable and usable.

Furthermore, the initial results of the performance metrics revealed that the system is capable of handling the interactions and data processing while being crossed by multiple students, which is important for scalability on larger classrooms. Therefore, the model is well-positioned to support different instructional contexts, but continuous improvement is necessary to sustain operation under different educational scenarios.

In total, the initial positive results support the feasibility of using AI in combination with choreographic teaching as a means to support richer learning. The future research directions will be focused on the refinement of system components to lessen the above defects and expand pedagogical application beyond the current one. In other words, further research will explore deeper integration approaches to further improve the AI

technologies in alignment with LMA theory to produce richer and more interactive choreographic education solutions.

5.4 *Further analysis*

The experimental data shows that after using the LMA+AI model, students' average movement execution accuracy improved by 73.1%, while their theoretical understanding test scores improved by 115.8%. This significant difference can be explained from the following aspects:

- The advantages of AI in theoretical visualisation and interpretation.

AI systems make abstract LMA theoretical concepts easier to understand through dynamic visualisation (such as spatial, force effect, and graphical presentation of LMA elements) and real-time symbolic deconstruction. Students can quickly associate theoretical terms with their own behavioural expressions in their interaction with the system, thereby achieving rapid internalisation at the cognitive level.

- The improvement of movement execution accuracy is constrained by physiological and skill acquisition laws.

Movement execution involves muscle memory, coordination, and repetitive training, and its improvement speed is influenced by the physiological learning curve. Although AI provides real-time feedback and personalised training paths, the automation of physical skills still requires a long period of accumulated practice, so the improvement is relatively gradual compared to theoretical understanding.

- Differences in evaluation methods.

Theoretical testing is based on standardised questionnaires and concept analysis, making it easy to quantify and provide quick feedback; the evaluation of motion accuracy relies on motion capture and LMA descriptor matching, and is influenced by the diversity of sensor accuracy, motion complexity, and evaluation dimensions. The room for improvement varies greatly among different students.

6 **Conclusions**

In this paper, we have studied an integrated teaching model for choreographic classes grounded on LMA theory, which is further empowered by AI. The results of this study demonstrated that the ability of AI technology to handle large amounts of data and discover complex patterns enriches students' understanding of complex choreographic concepts. In addition, the model offers feedback and learning path for students in terms of their movement profile, which doubles students' knowledge of the choreography in half the effort. Our system meets the needs of students' cognitive retention through continuous assessment based on cognitive retention principle; gives respect to students' creative potential by further prove the effectiveness of our teaching model based on AI technologies.

First, this model is a great attempt to transcend traditional teaching methods and personalised teaching. Through the application of AI technologies, teachers can meet the needs of students with different learning styles and creative expression. Second, the

personalised learning path makes students to explore more in terms of choreography and enhance their interpretative ability. In summary, this model offers a new standard for teaching practices in dance academia.

Although the above results are encouraging, there is still a long way to go for the pedagogical applications of AI technologies. Future research should investigate further improvements of AI algorithms to even better accommodate the differences in students' movement styles and learning pace. Another future research direction will be investigating how to empower this model with AR and VR technologies to provide immersive learning. In addition, future studies could investigate the long-term effects of using this teaching model in improving students' choreographic ability and creative achievement. Given the rich potential of this innovative model, much more research is warranted. This study still has limitations: the sample size of the experiment is limited, and its external validity needs to be verified; the system relies heavily on technical equipment, which may limit its promotion and application in actual teaching scenarios; in addition, the depth of AI's understanding of artistic emotion and creative expression needs further exploration and improvement.

6.1 Summary of findings

This study proposes an innovative model for choreographic courses teaching, based on the association of LMA and AI – due to the power of AI for data analysis – and the intelligent teaching model offers a significant improvement in the individual learning process by providing feedback and learning path for each student according to its movement profile and interpretability skill. Finally, by associating the richness of LMA' model and the power of pattern recognition and data analysis of AI, the model contributes to provide an adequate tool for description, interpretation and teaching movement in choreography. Finally, by providing a better understanding of complex choreographic notions, the system decreases choreographic comprehension times as well as learners effort to reach this comprehension. Finally, the model proposed is based on an ongoing assessment, according to the principles of knowledge acquisition and maintenance – which are maximised by the proposed system – and accordingly to each student's creative potential. Results show that the model improves choreographic learning by enhancing choreographic understanding process, which is more personalised.

6.2 Impact on choreographic learning

The integration of LMA and AI is a new contribution to the choreographic education. The model elaborated in this work is an innovation to the pedagogical environment, offering an adaptive model to the choreographic education, personalised and based on the tradition of LMA and the capabilities of AI.

First of all, the clearest impact is the personalised teaching enrichment. The capability of AI algorithm to analyse the movement profile of each student allows to each student, an individualised feedback, personalised to the student profile, highlighting the differences between the student strengths and weaknesses. This richness allows to the student receive a feedback adapted to his personal experience and to his personal needs for his development.

Secondly, the system offers an environment of permanent feedback and assessment – which is an essential aspect for a good learning. The adaptive paths

followed by the students are permanently varied according to the feedback of the intelligent system, which allows challenging the student at the good level. This permanent assessment not only helps monitoring student's progress but also helps retaining knowledge by repeating the understanding of the basic concepts in different and meaningful contexts.

Finally, this work is an impact (democratisation of access to high level choreographic teaching). The capacity of the AI to analyse big data and to identify different types of movement makes possible the high level choreographic teaching, beyond the borders of the countries where those educational companies are located, and for students from families that can afford to buy this care.

Furthermore, the model is expected to add value to students' learning. The wealth of information offered by LMA, combined with the analytical capacity of the AI, gives students an in-depth understanding of movement that is not achieved through traditional teaching. This deeper understanding, in turn, enables students to approach choreography in new ways, creating the conditions for creativity.

In summary, the combination of LMA and AI technologies in choreographic teaching will be more flexible, personalised, and effective. This will promote the development of education in the future. In the future, education will not only be more effective, but also more open and friendly to cultivating innovative creative ability.

6.3 Future research directions

Based on the research results in this paper, it can be seen that in the future, there will be more research directions in the combination of LMA and AI technology in choreographic teaching. On the basis of the current research, more advanced AI algorithms can be used in choreographic teaching. More attention will be paid to the real-time performance of the algorithm and the ability to handle problems. The complexity of the movement can be further studied to improve the ability of AI technology to adapt to different individuals. In addition, the model proposed in this paper can also be extended to other new technologies. For example, based on the virtual environment created by augmented and VR technology, learners can also experience choreographic experiments in virtual space. This teaching model can break the limited space in the classroom and create a new type of learning experience. It is also very worthy of our future research to combine this model with other interdisciplinary fields. For example, the model can be combined with cognitive science and biomechanics to explore the learning process and physical response patterns, so as to provide more effective teaching methods.

Another interesting research direction in the future is to explore the influence of cultural and style diversity in dance. On the basis of the current research, the ability of AI technology to recognise and understand more types of dance will be enhanced. The teaching methods based on AI technology are more suitable for the cultural background of students from different regions and can be widely used in different schools of dance.

In the future, we can also conduct longitudinal studies on the effectiveness of students in the teaching process based on the model proposed in this paper. For example, whether the students can be retained in the next semester, and whether they can improve their performance skills and creative thinking after learning. The longitudinal study can provide more empirical data to improve and verify the effectiveness of this teaching model.

Therefore, in the future, we should continue to focus on the assessment of teaching effects and constantly improve the teaching model according to students' learning effects. The research in the future should also emphasise the combination of technology and artistic goals, as shown in Figure 6.

Figure 6 Priority ranking of future research direction for AI-LMA teaching model (see online version for colours)

Research Direction	core objective	Expected benefits	Priority (1-5 points, with 5 points being the highest)
AR/VR Deep Fusion	Create a combination of virtual and real choreography studio	Enhance creative exploration space, expected to increase creative output by 50%	5points
Multimodal AI algorithm optimization	Data fusion of movement, expression, and music data	The accuracy of recognizing emotional expressions in movements has been improved to 90%+	4points
Cross cultural dance style adaptation	Expand LMA to fields such as ethnic dance and contemporary dance	Support for dance types to increase from 3 to 8 categories	4points
Longitudinal effect tracking	Continuously track students' choreography ability for 2-3 years	Verify long-term retention rate and optimize teaching cycle	3points
Cross application of cognitive science	Combining neuroscience analysis to learn attention mechanisms	Reduce distractions in learning and increase efficiency by another 20%	3points

Based on the results of this study, there are still many aspects worth exploring in the combination of LMA and AI technology in choreography teaching. Future research should not only focus on optimising the technology itself, but also on its integration and application in real teaching scenarios, and form a dialogue and extension with existing related research.

- Construction of AR/VR immersive learning environment.

VR and AR technologies have shown potential in dance teaching, as demonstrated by Bernardet et al. (2019) who validated the reliability of LMA in immersive environments through VR systems (Kovalchuk et al., 2025). The AI-LMA model proposed in this study can be further integrated with VR/AR platforms to build a highly realistic virtual choreography laboratory. Students can conduct spatial composition and action experiments in simulated scenes, and the system uses AI to analyse their action intentions and LMA parameters in real-time, providing multi sensory feedback. This direction not only expands the boundaries of teaching space, but also provides new avenues for cross regional dance collaboration and digital reconstruction of cultural heritage dance.

- Multimodal data fusion and algorithm optimisation.

The current model is mainly based on motion capture data, and in the future, it can integrate multimodal data such as physiological signals (such as electromyography, heart rate variability), voice feedback, and emotional computing to achieve more comprehensive learner state analysis. For example, combining the research methods of cognitive science and biomechanics can further reveal the cognitive load and

physical response patterns of students when learning complex action sequences. The optimisation of multimodal AI algorithms, such as cross modal representation learning and fusion decision-making mechanisms, will help improve the accuracy and interpretability of the system in personalised path recommendation and real-time adaptive feedback.

- Adaptive recognition and teaching of cross-cultural dance styles.

Dance, as a form of cultural expression, has significant stylistic diversity. The future AI-LMA system should strengthen its ability to learn and recognise different dance cultural characteristics, so that it can adapt to the teaching needs of various dance systems such as ballet, modern dance, and ethnic dance. We can draw on relevant research on cross-cultural action analysis to construct a culturally sensitive action corpus and evaluation criteria, so that technology can better serve the diversity and inclusiveness of global dance education.

Acknowledgements

Bin Li has contributed to writing – original draft, conceptualisation, methodology, visualisation and investigation. Yuan Long has contributed to writing – original draft and data curation.

Funding

This study was funded by Guangzhou University 2024 Industry-University-Research Cooperation Collaborative Education Project ‘Exploratory Research on the Curriculum Model of ‘Choreography’ Based on Laban Movement Analysis Theory in the Context of Artificial Intelligence’ (Project No. 24XTYR09); 2023 Anhui Provincial Department of Education Young and Middle aged Teacher Training Plan ‘Domestic Visiting Scholar Project’ (Project Number: JNFX2023081).

Declarations

The datasets generated or analysed during this study are available from the corresponding author on reasonable request.

The authors declare no potential conflict of interests.

References

- Akramovna, X.D. (2024) ‘The role of artificial intelligence in personalized learning’, *Hamkor Konferensiyalar*, Vol. 1, No. 6, pp.144–147.
- Bernardet, U., Fdili Alaoui, S., Studd, K. et al. (2019) ‘Assessing the reliability of the Laban Movement Analysis system’, *PLoS One*, Vol. 14, No. 6, p.e0218179.
- Deng, Y.F. (2025) ‘Artificial intelligence choreography empowers high-quality development of dance creation: mechanism, core, and direction’, *Xinjiang Art (Chinese)*, No. 1, pp.4–12.

- El Raheb, K. and Ioannidis, Y. (2020) 'Dance education and digital technologies', *Educational Technology*, No. 120, pp.32–33.
- Fu, Y.Y. (2025) 'Innovation and practical pathways of dance empowered by artificial intelligence', *Tomorrow's Fashion*, No. 17, pp.146–148.
- Groff, E. (1995) 'Laban movement analysis: charting the ineffable domain of human movement', *Journal of Physical Education, Recreation & Dance*, Vol. 66, No. 2, pp.27–30.
- Guo, M.X. (2025) 'Research on the reform of dance education and teaching in universities based on artificial intelligence', *Shang Wu*, No. 10, pp.99–101.
- Hankin, T. (1984) 'Laban movement analysis: in dance education', *Journal of Physical Education, Recreation & Dance*, Vol. 55, No. 9, pp.65–67.
- Kang, X.X., Zhang, H.J. and He, Y. (2025) 'The concept, scenario, and path of empowering dance teaching with digital intelligence', *Western Quality Education*, Vol. 11, No. 8, pp.136–140.
- Kovalchuk, V., Reva, S., Volch, I. et al. (2025) 'Artificial intelligence as an effective tool for personalized learning in modern education', in *Environment, Technology, Resources. Proceedings of the International Scientific and Practical Conference*, No. 3, pp.187–194.
- Li, K. (2025) 'Research on personalized learning pathways in college dance from the perspective of artificial intelligence', *Art Education*, No. 15, pp.62–65.
- Liu, Y.T. (2025) 'Research on practical strategies for AI-based dance pedagogy in higher education', *Shangwu*, No. 17, pp.159–161.
- Miko, H., Frizen, R. and Steinberg, C. (2025) 'Using AI-based feedback in dance education – a literature review', *Research in Dance Education*, Vol. 26, No. 3, pp.1–25.
- Wu, J., Xu, L.J., Zhu, J.D. and Li, H.J. (2025a) 'Research on the double teacher dance flipped classroom teaching model based on artificial intelligence', *Digital Education*, Vol. 11, No. 2, pp.69–75.
- Wu, L.W., Xing, S.H. and Hu, Y.N. (2025b) 'The path and strategy of precision teaching and personalized guidance supported by artificial intelligence', *Educational Practice and Research (C)*, No. 9, pp.39–40.
- Yan, A. (2023) 'Modern dance technique training from the perspective of Laban movement analysis – center of gravity movement', *Shang Wu*, No. 1, pp.96–98.