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Exploring the Pathways for Applying Big Data in Dance Education

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Abstract

Based on the practical cases of big data in dance education, this study discusses the application of big data in dance education from the perspectives of physical assessment and psychological assessment. The research results show that teachers can not only use big data technology to support dance teaching, but also draw inspiration from big data thinking to inspire students. At the same time, big data technology can assess students' physical ability on the one hand, and pay attention to students' mental health on the other hand. A comprehensive understanding of these aspects will help the dance education industry to keep pace with the times and promote the improvement of dance teaching quality.

Keywords: Big Data; Dance Education; Application Paths

1. Introduction

1.1 Background

According to Klaus Schwab, the Fourth Industrial Revolution has already arrived, and this revolution is developing more violently than the previous ones (Klaus, 2016). With the continuous penetration of informatization and digitalization in social life, big data technology has gradually penetrated into various fields, including the field of education. In the past decade, the role of big data in education has mainly been to analyze large amounts of data generated by students and use it to improve teaching (José-Antonio et al, 2019). When big data enters the field of dance education, its application breaks the limitations of traditional dance education and provides a new path for dance development. Since ancient times, the transmission of dance has been mainly through oral and physical instruction. Even dance teaching in Chinese colleges universities is difficult to get rid of the teacher-centered form of offline teaching, through oral methods and classroom demonstrations. This traditional model of dance education, while able to cultivate professional dance talents for stage performance, only allows students to learn through imitation and memory, which greatly limits their creativity and imagination. As the Chinese dancer Xiaobang Wu emphasized, the creative role of "people" in dance education is strongly opposed to those who emphasized skills and "feudalized" the teacher-student relationship (Zhang, 2021). Furthermore, the transmission of Chinese folk dance and its underlying cultural heritage will also be restricted, especially ancient folk dance. It is impossible to effectively transmit precious folk dance culture solely by teaching the inheritors offline. Therefore, the application of big data in the dance teaching process not only conforms to the requirements of educational reform in the digital age but also represents a new way to inherit excellent traditional culture.

1.2 Purpose and Significance

The purpose of this study is to explore the application paths of existing big data technologies in the field of dance education based on the analysis of their practical applications. In the era of big data, the amount of information, knowledge, and data has become increasingly large, and coupled with the recent emphasis on quality education and aesthetics education, traditional dance teaching methods have gradually deviated from the needs of modern society (Zhao et al, 2023). Therefore, it is necessary to study the exploration and practice of big data technology from the perspective of dance education.

The significance of this research lies primarily in its ability to enable dance education and even dance art to rapidly adapt to the development of the times and actively respond to the changes brought about by technology. "With the rapid development of artificial intelligence, the contributions to generative artificial intelligence, particularly compared to the progress made in linguistics, the dance community is still lagging behind in constructing a dance knowledge system that can be used for AI learning and production." Dance research faces multiple challenges in data collection, rule formulation, and detailed capture of dance movements (Qiao, 2024). In addition, investigating the effective application of big data in dance education practice can, to a certain extent, promote the improvement of existing shortcomings in the application of big data in dance education, which is conducive to driving technological innovation and ultimately achieving a mutually beneficial outcome.

1.3 Big Data: A New Paradigm in Data Science

The concept of big data originates from the development of information technology, and its core lies in the rapid extraction of valuable information from various types of data. According to the *National Information Technology Development Report* (2023) (2024), the big data industry has shown rapid development trends in China and globally. In 2023, the scale of China's big data industry reached 1.74 trillion yuan, an increase of 10.45%. Around the world, governments have attached great importance to the development of big data industry and formulated strategic policies to better apply it to various fields of social development.



The characteristics of big data when it was proposed can be summarized as "3V". First, the volume of data is large (Volume), meaning that the amount of data is huge, and its generation speed and storage capacity are increasing rapidly, from the TB level to the PB level, and even to the EB and ZB levels (Yadav et al, 2019). Second, the data types are diverse

(Variety). Big data includes not only traditional structured data, but also unstructured data such as text, images, and videos (Wasem and Din, 2014). Third, the data processing speed is fast (Velocity). This requires the data processing system to be real-time, so as to support rapid decision-making and response. With the continuous leap and continuous improvement of technology, people have gradually dig out more and more characteristics of big data, and have added "4V", "5V" or even more characteristics on the basis of the previous ones, such as the authenticity (Veracity) and the connection (Valence).

2. Physical Assessment in Dance Education

2.1. Big Data Technology in Dance Education

With the support of AI technology, dance education can evaluate students' physical fitness and learning ability more comprehensively. In the "China Top Dancers Growth Plan" hosted by the China Dancers Association, AI big data analysis technology was used to measure and analyze students' physical conditions and functions from aspects such as body circumference, proportion, flexibility, and explosiveness. At the same time, create different scenarios, set up a variety of assessment questions such as improvisation, performance, to collect students' dance learning style, movement mastery and other indicators. After obtaining these data, by comparing the standardized dance movements in the database and combining the practical experience of teachers and analyzing the learning situations of different students at different stages, so as to provide scientific and powerful references for teachers to set and adjust teaching plans, teaching objectives and teaching methods.

In 2019, the youth dance competition program "Dance Storm" is launched by Hunan TV. There are interspersed dance knowledge tips on the screen, besides the traditional dance television program's elements such as contestant performances and expert reviews. Most importantly, in order to provide more professional perspectives, the show introduced a new segment called "Storm Moment". During recording, the program used 128 4K ultra-high-definition cameras to simultaneously capture 360-degree panoramic shots, and the dancers' highlight moments were frozen with the time-space condensation technology (Li,2021). Through the processing of the video signal collected by the server, it can realize the multi-angle observation of the subject at any point in time, and even achieve slow-motion and zoom effects. Thus the dancers' exciting moments of jumping, soaring, descending and landing can be capture. This segment breaks the limitations imposed by the linear expression of dance art in time, allowing the audience to experience the beauty of dance in an all-round and multi-faceted way. Combined with the popular science tips, it will lead the audience to understand the dance culture while enjoying the dance, and play a role in popularizing dance education in the mass.

2.2 The application of big data thinking in teaching activities

"The technology of big data is not to grasp huge data information, but to professionally process these meaningful data to obtain effective information (Lin,2018)." This way of thinking can also be referred to in dance education, and with the support of big data technology, the dance teaching model in the digital era can be improved. At present, the number of dance

courses in most schools is relatively large compared with the number of teachers, resulting in heavy workload for teachers and diverse needs among students.

Incorporating big data thinking, teachers can use the data platform to collect, count and analyze the situation of students. Additionally, they can also share resources, academic discussions and other communication activities through the platform, and adopt personalized teaching according to the situation of students. The introduction of teaching tools like "Rain Classroom" has provided powerful technical support for education across various disciplines. The software is equipped with features such as timed exercises, a "confused" button, push notifications for "mobile courseware", "bullet chat" discussions, and the ability to generate "word clouds". It immediately aggregates and analyzes the feedback data from students during learning activities, quickly helping teachers quantify students' learning outcomes. This enables teachers to effectively evaluate the teaching process and adjust their teaching strategies accordingly.

In addition, big data thinking emphasizes the characteristics of "divergence" and "relevance", so teachers should not limit their vision just to classroom content, but also pay attention to the expansion of more cutting-edge information and interdisciplinary fields. Nowadays, an increasing number of rehearsal halls are equipped with multimedia devices. Teachers can make full use of such hardware facilities to provide students with a wider range of video materials, thereby cultivating their imagination and creativity.

3. Psychological Assessment in Dance Education

3.1 Aesthetic Education and National Consciousness of Primary and Secondary School Students

China has been a unified multi-ethnic country since ancient times, with rich ethnic culture and dance culture, and has nurtured a large number of valuable intangible cultural heritage. Therefore, aesthetic education and national consciousness education are placed in an important position. However, aesthetic education cannot be completed by "teaching" alone, but it should be gradually cultivated within the context of the artistic influence.

Applying motion capture technology to the education of Chinese ethnic and folk dance cultures not only serves to protect and inherit the excellent traditional Chinese cultures, but also establishes a sense of ethnic community among primary and middle school students in the new era through education, ultimately achieving the purpose of infiltrating aesthetic education into every aspect of teaching. In October 2024, Professor Gulimina from Dance college in Minzu University of China, along with her graduate student team, traveled to Xinjiang, Sichuan, and other regions to promote the project of "Exploration of Digital Dance Education in the Age of Artificial Intelligence" initiated by Minzu University of China.

With the support of this modern technology, dance education has broken through the traditional models of demonstration and instruction, enhancing the fun and immersion of classroom learning. It fully takes into account the leapfrogging and active thinking characteristics of adolescent students, cultivates their imagination and creativity, and truly aligns with the educational requirements advocated by quality education. Furthermore, this model also leads students to experience folk customs, learn folk culture, and feel the charm of ethnic traditional dances in a relaxed and enjoyable atmosphere through its immersive environment.

3.2 Mental health of college students

With the rapid development of information technology and the support of national policies, the material life of college students has become increasingly abundant. But at the same time, they are also faced with various challenges in academics, employment, and other aspects. In such an environment, students are prone to psychological issues such as insomnia, anxiety, pessimism, and even depression, which hinder the formation of a healthy mental state.

The "intervention " of big data technology, along with the "advancement" of various technologies such as the Internet, the Internet of Things, cloud computing, and artificial intelligence, has optimized the problems faced in the mental health education of college students, including difficulties in data collection, inadequate data mining, and lagging data value development (Jia, 2022). On this basis, dance is utilized as a means to alleviate and intervene in negative emotions. The positive therapeutic effects of dance movement therapy on anxiety have been confirmed by numerous studies. Compared to speech therapy, dance movement therapy can intervene from both physical and mental aspects, and its methods are easy to operate without being confined to complex theoretical frameworks (Li and Li, 2024).

With the support of rational data conclusions, the perceptual dance healing is constructed to enable college students to experience the charm of dance in the form of therapeutic potential. More and more colleges and universities both domestically and internationally set up clubs, salons and other courses for students of all majors and grades. These activities lead students to adjust their state in the form of physical exercise, release negative emotions, and then feel relaxed, pleased, intellectually agile, etc. At the same time, they can also enhance students' social skills, physical coordination abilities, and other capabilities. Teachers refer to the data of students before and after class, summarize and evaluate the teaching effectiveness, and make corresponding adjustments to the teaching plan and method.

4.Conclusion and suggestion

4.1 Existing Problems

The application of big data technology in dance education has made certain progress, but there are also many challenges faced in the process of integrating technology and art.

Firstly, big data itself has issues of technological immaturity, such as vulnerabilities like model penetration and sudden crashes, as well as problems related to privacy and security, time-consuming processes, and high investment costs.

Secondly, in the integration process, the implementation of technical means such as the digital reproduction of dance movements, the realization of immersive feelings and the accuracy of teaching evaluation remains challenging. Additionally, there is a corresponding increase in the requirements for teachers' digital literacy. Finally, although big data technology can effectively integrate and classify existing dance education resources, it is still necessary to think about how to ensure teaching quality and student participation, while maintaining students' understanding and appreciation of the essence of dance art.

Therefore, while promoting new technologies, it is also indispensable to balance the traditional essence and artistic nature of dance education.

4.2 development prospect

Primary and secondary school teachers can use big data thinking in the teaching process to exercise students' divergent thinking, cultivate their creativity and imagination, and show students the dance forms of various ethnic groups with the support of multimedia equipment and existing application software. This can infiltrate aesthetic education among primary and secondary students and strengthen their education on the consciousness of the Chinese national community. University teachers can adopt mixed teaching mode, combining the advantages of online and offline teaching, to enrich teaching resources and provide more opportunities for students to learn independently, which is conducive to the cultivation of innovative talents. Additionally, big data technology can also be used to discover hidden psychological health problems among university students, and help students resolve psychological problems based on scientific evidence and teachers' experience guidance.

4.3 Conclusion

This study explores the use of AI technology in dance and the application of big data thinking in teaching activities. It analyzes the important role of big data in dance education for aesthetic education in primary and secondary schools and mental health education for university students.

From the perspective of current situation and prospect, the practice of big data in the field of dance education needs to be promoted from the aspects of technological update and finding a balance in integration, and it is also related to the scientific literacy of teachers. It can be seen that the application of big data technology has opened up a broader path for dance education, improved the quality and efficiency of dance education, and promoted the development of education modernization.

In the era of rapid advancement in digital technology, the government and relevant departments can organize a series of seminars and training activities on how big data can empower dance education, and provide certain policy support to promote the development and exchange of new technologies.

Dance teachers should take the initiative to learn how to use big data technology as a teaching tool to assist dance teaching. They can also draw on the characteristics of big data thinking to expand teaching concepts, optimize teaching content and methods, and provide personalized learning resources and methods. Ultimately, this will cultivate high-quality composite talents.

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