Big Data in Preschool Dance Multimedia Teaching Dance Posture Correction

Li Li Wang1,*
1Quanzhou preschool education college, Fujian Quanzhou, China, 362000

*Corresponding author e-mail: 545349135@qq.com

Abstract. With the explosive growth of data and the enhancement of data openness, big data is quietly changing our daily work and life. This article mainly studies the application of big data in preschool dance multimedia teaching dance posture correction. Using a small sample control method, the body characteristics of the research subject were measured before the experiment and used as the index before the measurement; after 8 weeks of learning, the measurement was performed again and used as the index after the measurement. Then, the principle of feature plane similarity matching is used to analyze the motion posture. The experiment found that after 8 weeks of multimedia correction training, mild pelvic backwards accounted for 75% and moderate 22.2%. The results show that big data plays a technical support role in the correction of dance posture in preschool dance multimedia teaching.

Keywords: Big Data, Preschool Dance, Multimedia Teaching, Dance Posture Correction

1. Introduction

The arrival of big data era is constantly changing our daily production and life. Nowadays big data has been applied in various fields. Under the Internet environment, traditional media is constantly changing to emerging media, and the form of multimedia teaching affects students of all ages. The inheritance and development of dance as an art form needs to take human body as the carrier of development, and combine with relevant movements, music, space and dance beauty. People pay more and more attention to the cultivation of children's art cells. Many children choose preschool dance to avoid their bad manners.

With the development of big data technology, the original single data statistics has become data mining, analysis and application, and more and more industries begin to realize the importance of big data[1]. The future society is a society based on the comprehensive development of individual qualities
such as ideological quality, scientific and cultural quality, labor quality, virtue quality, etc. Good posture should be cultivated from early childhood, and the best period is generally 3 to 6 years old\cite{4}. In order to cultivate the future builders of our motherland, we should start from childhood, cultivate them, form good habits, guide their correct attitude, and help them shape their image\cite{5}. Preschool dance education is an important part of art education for children, intuitive, lively, deeply loved by children\cite{6}. It provides a wide range of areas for children's free expression and plays an important role in high-quality education\cite{7,8}. Therefore, the combination of big data technology and multimedia teaching, as well as the general application of correcting dance posture before school, play an important role in children's future appearance and their own health\cite{9,10}.

The education form and training mode cannot be separated from the influence of social environment. In the current era of big data, multimedia education is the inevitable choice of current school education. Education problems are mainly reflected in the following two aspects. One is the lack of emotional communication in the process of education. Teachers and students communicate at the same time of training, especially in dance, the proportion of physical and emotional influence is more significant. Preschool dance education is aimed at children. It is necessary to make full use of the special functions of dance education to form children's healthy personality and excellent psychological quality, so as to create conditions for children's comprehensive development.

2. Multimedia Teaching Posture Correction of Preschool Dance in the Era of Big Data

2.1. Era of Big Data

Big data is the final result obtained through the accumulation of various data. If these data representing information are collected into the database, various industries can choose the data they want to understand for analysis, so as to obtain the preferred information to promote development.

According to the characteristics of big data, it can be summarized by four V, which are volume, variety, value and velocity. Volume refers to huge amount of data; variety refers to various types of data; value refers to low value density; and velocity refers to fast processing speed.

2.2. Preschool Dance

Children's dance teaching is not mainly to practice soft opening, but to children's dance performance and emotional expression. The basic skill training is also an important part in the teaching of children's dance. It requires students' body posture to be correct, not to end the shoulder, collapse the waist, keep the body upright, train the students' physical quality including image and related quality, which can not only improve the students' dance culture and artistic cultivation, but also ensure the healthy development of students.

2.3. Multimedia Teaching

In the process of multimedia education, it follows the law of educational art beauty and creatively uses a set of unique characteristics of educational activities. It is a modern educational means combined with science. It reflects the educational significance and aesthetic value through various multimedia educational means. Multimedia teaching makes use of emotional factors to arouse students' happy emotion and realize the educational and entertainment functions of multimedia teaching art.
2.4. Posture Correction

The data acquired by motion capture equipment or video is discrete. The motion posture parameters of the arm are obtained by video, and the calculation formula is as follows:

\[
E(y_i, x_i) = S \times \left( (1 - \beta) \frac{B_i}{B_i + Y_i} + \beta \frac{R_i}{R_i + Y_i} \right)
\]  \hspace{1cm} (1)

Where \( R_i \) is the silhouette area of the human body in the calculated image, \( B_i \) is the projected area of the model, and \( Y_i \) is the coincident area of the two.

Firstly, the function relationship \( f(t) = a_0 t + a_1 \) between \( x_i, y_i, z_i \) and time is calculated. In the coefficient space, we expect \( \phi = \text{span} \{ \varphi_0 t, \varphi_1 t, \ldots, \varphi_n t \} \) to find the most suitable function \( f(t) \), and the formula is as follows:

\[
s(t) = a_0 \varphi_0 t + a_1 \varphi_1 t + \cdots + a_n \varphi_n t
\]  \hspace{1cm} (2)

3. Application Experiment of Big Data in Preschool Dance Multimedia Teaching Dance Posture Correction

3.1. Experimental Subjects and Basic Information

The experiment randomly selected 200 pupils for posture measurement, and finally selected 36 students with pelvic forward leaning as the experimental object. The specific information is shown in Table 1.

|       | Quantity | Age range | Height range | Weight range |
|------|----------|-----------|--------------|--------------|
| Boys | 27       | 3-6 years old | 123~131 cm  | 24.3~28.1 kg |
| Girls| 9        | 3-6 years old  | 122~129 cm  | 23.7~27.8 kg |

3.2. Experimental Application Factors

Using muscle movement and stretching, the core area of the body plays an important role in stabilizing the spine and pelvis, strengthening muscle control and balance.

3.3. Measuring Method

A single group control method with a few samples was used as a pre measurement index to measure the position characteristics before the teaching experiment. For 8 weeks, three classes a week, multimedia teaching was conducted, and the measurement was conducted again. The principle of similarity matching of feature plane is used to analyze the motion posture. The main steps are as
follows: (1) obtaining real-time skeleton data; (2) pose analysis; (3) characteristic pose difference analysis.

3.4. Attitude Assessment

The position of pelvis was measured and the attitude correction of students was evaluated according to different degrees of characteristic posture.

4. Discussion

4.1. Analysis of Posture Correction

The results are shown in Table 2. According to the data in the table, before posture correction, there were 10 students with mild pelvic retroversion, accounting for 27.8% of the experimental population; 18 students with moderate pelvic retroversion accounted for 50% of the experimental population; and 8 students with moderate pelvic retroversion accounted for 22.2%. After 8 weeks of multimedia correction training, 75% of the patients had mild retroversion and 22.2% had moderate pelvic inclination. From a physiological point of view, their bone mineral density is very high, and the chemical composition of children's bone is different from that of adults. Because the ratio of organic and inorganic content of children's bone is 1:1, the elasticity of bone is very large, but the hardness is small, it is not easy to fracture and easy to deform. The popularization of multimedia teaching can arouse children's interest in learning. At the same time, children of this age group are curious and good at imitating. Therefore, the use of multimedia teaching and big data technology can correct children's bad posture in time, so as to achieve the health and perfection of the body.

|               | Mild Proportion | Moderate Proportion | Overweight | Proportion |
|---------------|-----------------|---------------------|------------|------------|
| Pre-test index| 10 27.8%        | 18 50.0%            | 8 22.2%    |            |
| Posttest index| 27 75.0%        | 8 22.2%             | 1 2.8%     |            |

4.2. Impact of Big Data on Preschool Dance Education

The relationship between the Internet and big data is complementary. On the one hand, the Internet provides a platform for the development of big data. Relying on the popularity of Internet technology and various Internet applications, the "volume" of big data is becoming larger and larger, and the types of big data obtained are becoming more and more abundant, thus making the development of big data a qualitative leap. On the other hand, big data technology provides more support for the development of the Internet. The education in early childhood is the most important education stage in the whole education process of life. It is also an important stage of physiological and psychological development and maturity in one's life. The quality education in this stage determines the development of human body, intelligence, personality, attitude, behavior and morality. In this period, children's dance training
activities can not only develop children's physical movement skills, promote the balanced development of left and right brain, improve children's ability of physical and mental coordination activities, meet children's needs for physical activities, cultivate children's character and morality, but also develop children's observation, attention, memory and thinking and creativity. More and more parents use big data technology to make efforts for children's all-round development. Preschool dance education can have a profound impact on children's body.

4.3. Analysis of the Influence of Multimedia Teaching on Preschool Dance Posture Correction

Students' interest in multimedia teaching is shown in Figure 1. Generally speaking, students' interest in multimedia teaching is relatively high. There are many factors in this aspect. Either students are interested in the computer itself and think the computer is very interesting, or they are more adaptable to the multimedia teaching environment. They think this form is very novel, or both. Dance is one of many art forms. It takes a long time to learn and practice dance movements. Different body shapes can reflect different emotions. In dance learning, it is not only imitation learning, but also cultivating students' ability of thinking and thinking, and being able to innovate dance movements boldly. The teaching group of preschool dance is children. Compared with adults, children's imitation ability is higher, which will lead to the deformation of children's posture. The use of multimedia teaching can make children correct their posture in a relaxed and pleasant atmosphere. All joints of the body are controlled by at least two groups of muscles, including flexors of bending joints and stretching tendons of stretching joints. According to different situations, the position of bone rotation is also different. These muscles, stretching muscles, and gyrators need to be balanced in order to maintain health, but muscles with poor posture often fail to achieve balance. For example, flexors may be more tense than stretching muscles, resulting in uneven strength that can make joints more vulnerable. These effects will affect the shape of the bone and may cause bone deformation and dislocation. If you use posture exercises, you can gradually normalize the structure, and these muscles don't have to work overload.

![Figure 1. Students' interest in multimedia teaching](image)

4.4. Posture Correction Analysis

The types and proportions of spinal dyskinesia are shown in Figure 2. In posture assessment, subjects were asked to wear as little clothing as possible and stand next to a vertical downward line. From the side, the subjects stand behind the vertical line and observe whether the ears, acromion and trochanter are in the same vertical line. The suspension line is in the center of the body and the
acromion is the reference point. The evaluation is based on the maximum distance between the waist and the above mutual position. If the midline of the pelvis is parallel to the midline of the shoulder, the midline of the shoulder is at the same level as the midline of the shoulder. At this time, the pelvic position is normal, and not in the neutral position indicates that the pelvic position is incorrect. It can be seen from the test that the proportion of pelvic retroversion is the largest. When the pelvis is tilted backward, the whole center of gravity falls behind the body support point. Only quantity accumulation has not evolved to qualitative change. Therefore, the correction of body posture requires the active cooperation of the school. At ordinary times, more attention should be paid to the problem of students' body posture. Timely warning and timely correction should be made to form a good habit of paying attention to students' body posture at all times.

![Graph showing distribution of spine postures](image)

**Figure 2.** Types and proportions of spine postures

5. Conclusions

Dance education is an important part of high quality education. First of all, like sports, dance has the attribute of sports and plays an important role in strengthening the body. However, as an art activity, dance not only has the attribute of body movement, but also needs to coordinate all parts of the body in terms of rhythm, shape and aesthetic feeling. Through children's dance training to achieve self-training, self-discipline and awareness, is conducive to the physical and mental development and improvement.

Multimedia system can integrate voice, graphics, text, data, animation, etc. to save and process a large amount of information, and can mobilize children's interest in learning at the same time. This helps to cultivate children's non intellectual factors, fully stimulate their interest in learning and intrinsic motivation, and activate their thinking process.

As a new type of national strategic resources, big data can not only bring great economic value, but also bring about the change of thinking. Big data plays a technical support role in the correction of dance posture in multimedia teaching of preschool dance, which is of great significance to the healthy development of children.

References

[1] Wang X, Zhang Y, Leung V C M, et al. D2D Big Data: Content Deliveries over Wireless
Device-to-Device Sharing in Large-Scale Mobile Networks[J]. IEEE Wireless Communications, 2018, 25(1):32-38.

[2] Zhang N, Yang P, Ren J, et al. Synergy of Big Data and 5G Wireless Networks: Opportunities, Approaches, and Challenges[J]. IEEE Wireless Communications, 2018, 25(1):12-18.

[3] Kim H H, Swanson N R. Mining big data using parsimonious factor, machine learning, variable selection and shrinkage methods[J]. International Journal of Forecasting, 2016, 34(2):339-354.

[4] Miftachul H, Andino M, Pardimin A, et al. Big Data Emerging Technology: Insights into Innovative Environment for Online Learning Resources[J]. International Journal of Emerging Technologies in Learning, 2018, 13(01):23.

[5] Yudong C, Yuejie C. Harnessing Structures in Big Data via Guaranteed Low-Rank Matrix Estimation: Recent Theory and Fast Algorithms via Convex and Nonconvex Optimization[J]. IEEE Signal Processing Magazine, 2018, 35(4):14-31.

[6] Cui Z, Cao Y, Cai X, et al. Optimal LEACH protocol with modified bat algorithm for big data sensing systems in Internet of Things[J]. Journal of Parallel and Distributed Computing, 2019, 132(OCT.):217-229.

[7] Yuzhe W, Weiwen Z, Jiahui S, et al. Smart city with Chinese characteristics against the background of big data: Idea, action and risk[J]. Journal of Cleaner Production, 2017, 173(feb.1):60-66.

[8] Xiao-Li M. Statistical paradieses and paradoxes in big data (I): Law of large populations, big data paradox, and the 2016 US presidential election[J]. The Annals of Applied Statistics, 2018, 12(2):685-726.

[9] Samiya Khan, Kashish Ara Shakil, Mansaf Alam. Cloud based Big Data Analytics: A Survey of Current Research and Future Directions[J]. Computer ence, 2018, 03(5):107-117.

[10] Maldonado-Mahauad J, Perez-Sanagustin M, Kizilcec R F, et al. Mining theory-based patterns from Big data: Identifying self-regulated learning strategies in Massive Open Online Courses[J]. Computers in Human Behavior, 2018, 80(MAR.):179-196.