Impact of Big Data Technology on the Diversity of Physical Education Teaching Methods

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Abstract. The development of Internet technology has caused a sharp increase in the amount of data in the current society, and the information age has gradually transitioned to the era of big data. And physical education as a course for us to improve the physical quality and mental state of our students is naturally extremely important. Therefore, this paper studies the impact of big data technology on the diversity of physical education teaching methods. Although there is a lot of research on physical education teaching, there are still deficiencies. This article analyzes the impact of big data on the development of physical education from these five aspects through education decision-making, education teaching, student learning, and education evaluation and education research. Using the method in this article, tests have shown that students’ enthusiasm has increased by 16%.

Keywords: Big Data Technology, Diversity of Physical Education Teaching Methods, Internet, System Analysis

1. Introduction

1.1 Background and Significance
In July 2010, China issued the future "National Medium and Long-term Education Reform and Development Plan (2010-2020)" , and recommended that the development and development of information technology have a major impact on the development of education, and that the development and utilization of 2015 In September, the State Council issued the Action Plan to Promote the Development of Big Data, proposing the development of big data to promote the development of basic education. Therefore, in today’s era, big data research has become more and more important.

The significance of big data is not only the sheer scale of its data, but also that the magnitude of this data is sufficient to cause qualitative changes. For the traditional newspaper industry, what the era of big data brings is not only a technological development, but also a change in thinking. The most fundamental thing is that newspaper industry decision-makers must have big data thinking, continuously strengthen top-level design, establish the concept of "data is king", and integrate it into the process of judgment, decision-making, and reform. In this regard, foreign media have been at the forefront, such as the "Guardian" and "The Washington Post". They not only assisted the media...
business through big data technology, but also promoted the efficient distribution of related products. More importantly, while taking into account the timeliness of news, these media also use big data thinking to optimize the production and marketing of media content products, and make them quite deep and broad.

1.2 Related Work
Due to the importance of big data research, more and more researchers are focusing on big data [1]. Antonio Manuel Rodríguez and others have conducted detailed research on big data. Achieved very outstanding results [2-3]. But with the rapid development of computers, this research has become increasingly unable to meet our needs [4-5]. In the research of big data, the literature research method is a very good method [6], but because of the changes in the environment, it is not suitable for the current environment [7]. It is a better way to calculate data through clustering algorithm [8]. The clustering algorithm research shows. The accuracy is improved by 17% compared with the literature research method [9-10].

1.3 Main Content
To solve the error caused by inaccurate data. This article uses the literature method and case study method to conduct an in-depth study on the influence of big data technology on the diversity of physical education teaching methods. First of all, we use the methods recorded in major documents to summarize. Then through testing, the content accuracy of the literature is studied. It avoids experimental errors caused by different environments. Finally, we summarize the results of the experiment, and we can get the answer to whether the impact of big data technology on the diversity of physical education teaching methods is positive and the degree of enthusiasm of students.

2. Methodological Research on the Influence of Big Data Technology on the Diversity of Physical Education Teaching Methods

2.1 Outlier Detection Algorithm Based on Information Entropy
He proposed a classification data outlier detection algorithm-Greedy Algorithm (GreedyAlgorithm), which is an outlier detection algorithm based on information entropy. The algorithm mainly uses information entropy characteristics, which can be used to measure the interference and the degree of interference of the data set. The lower the entropy value of the data set, the smoother the data set, and the higher the entropy value of the data set, the more chaotic the data.

The main idea of the greedy algorithm based on information entropy is that if a certain data point is separated from the overall data set, the entropy value of the data set becomes smaller, and then this data point increases the degree of confusion in the data set. Therefore, the entropy value of the data set can be reduced to the maximum, and the point with the most outlier index in this data set is the data set. The operation process of the algorithm is to reduce the maximum entropy value to the minimum value, put it into an outlier set, and then continue to search until all outliers are found. The greedy algorithm must traverse the entire data set at once to find the absolute value. Therefore, when the amount of data in the data set is relatively large or the number of extreme sets in the data set is large, the time complexity of the greedy algorithm is relatively large.

2.2 Choice of Clustering Algorithm
The calculation formula of avf (attribute value frequency) of a data item is shown in formula (1).

\[ AVF(A) = \frac{1}{N} \sum_{i=1}^{n} f(A_{ij}) \]

Where \( n \) is the dimension, \( f(A_{ij}) \) is \( A \) i Frequency of the i-th attribute value.

The AVF algorithm is described as follows: Input: data set D, the number of outliers b output: y outliers
Suppose $A_x$ it is an attribute in the data set, $i$ and $j$ are $A_x$ two values, another $A_x$ attribute in the data set, $w$ is $A_j$ a subset of the value range, $\sim w$ is the complement of $w$, $iP(w | i)$ represents the attribute value The conditional probability that the value of $x$ belongs to the set $w$ and is true ($\sim w | y$). When the attribute value is $y$, the value belongs to the conditional probability $w$ of the set.

The $A_y$ distance between the two values $x$ and $y$ under the attribute relative to the $A_x$ attribute can be expressed as:

$$
\ell(i, j) = P_x(W | i) + P_x(\sim W | j)
$$

(2)

In order to limit the value of $\delta(i, j)$ between 0 and 1, we define $\delta(i, j)$ as:

$$
\ell(i, j) = P_x(W | i) + P_x(\sim W | j) - 1
$$

(3)

Assuming that the number of attributes in the data set is $m$, the distance between two different values $x$ and $y$ of any attribute in the data set can be expressed as:

$$
\ell(i, j) = 1/n \sum_{y=1\ldots j, x \neq y} \ell(i, j)
$$

(4)

The improved distance measurement can distinguish the difference between different features under the same feature and the above-mentioned data category assignment error problem. The data finally calculated according to the k-modes formula $4,3,1,2,3,2,1,1,2$ The degree of dissimilarity with the first cluster center is 5.2203, and the degree of dissimilarity with the fourth cluster center is 4.8631. According to the calculation, the data is classified into the fourth category. After observing the experimental results, it is found that the improved k-modes algorithm in this paper is better than the traditional k-modes algorithm in the overall grouping of experimental data. This article uses this enhanced k-mode algorithm to collect data.

2.3 Research Methods of the Impact of Big Data on Physical Education

2.3.1. Literature Research Method. By consulting a large number of books and documents on big data technology, we can deeply understand the social attributes and value of big data, understand the big data awareness from the perspective of social governance, and use literature analysis to sort out the relationship between big data technology and social governance Influence, seek innovation from it, propose the content to be studied and preliminary research ideas.

2.3.2. System Analysis Method. Social governance and big data technology influence each other and restrict each other. Big data technology brings effective ways to social governance, and big data itself also needs governance. Consider it as an organic whole, and use system analysis to study the relationship between big data technology and social governance.

2.3.3. Research Method Combining Qualitative Analysis and Quantitative Analysis. Through the qualitative analysis of social governance to understand the connotation, characteristics and essence of social governance, combined with the quantitative analysis of social governance to study the interaction between social governance and big data technology.

2.3.4. Big Data Research Method. By collecting, integrating and comparing data reflecting social dynamics, we have studied the application status of big data technology in Chinese social governance and the impact of big data technology on social governance.

3. Experiments on the Influence of Big Data Technology on Physical Education Teaching
Methods

Applying big data physical education teaching methods to natural classes for quasi-experimental research is another research direction of physical education teaching models in my country. These studies try to apply the physical education model based on big data to real classroom teaching, explore the problems in its application, and how to find the most suitable physical education model in practice. This article selects 2 classes. Class A is the pilot for the general class, and the experimental class for top talents is 30. They have passed the pre-test and post-test, graded test data analysis, and used the improved LASSI scale to do a questionnaire survey. Various surveys and measurement data analysis such as test results, conclusions and reflections. The teacher selects 16 undergraduate students as the research sample, and uses a single-group experiment method to conduct pre-test and post-test on long-distance running, sprint, basketball, and football. Through questionnaire survey, interview, case analysis and other methods, the teaching effect of flipped classroom is carried out through experimental research. This paper uses the standard of student status before and after the implementation of the course to conduct a quasi-experimental study on physical education based on the big data model, and obtains the data before and after the test through analysis to verify the teaching effect of the model in the classroom. This article establishes a "double-main, three-stage and seven-link" teaching model in the big data physical education classroom teaching model. The comparison with the traditional teaching model verifies the effectiveness of this model. In addition, many universities have also invested in the possibility of big data sports classroom practice in universities. And achieved good results. The physical fitness of the students has been greatly increased.

4. Influence of Big Data Technology on Physical Education Teaching Methods

4.1 Physical Fitness of Students by Physical Education Methods under Big Data

According to the national fitness monitoring index, the fitness test uses 50 meters, standing long jump, 1 minute skipping rope and 1 minute sit-ups. Reflect the human body speed, explosive power, endurance, waist and abdominal muscles and other indicators, the results are as follows:

Table 1. The impact of physical education methods under big data on students' physical fitness

| index                  | Control group |                 | test group   |                 |
|------------------------|---------------|-----------------|--------------|-----------------|
|                        | Average       | T value         | Average      | T value         |
| 50 meters              | 9.045         | 1.18            | 9.125        | 1.16            |
| Standing long jump     | 176.25        | 16.62           | 173.12       | 15.58           |
| 1 minute skipping rope | 118           | 12.88           | 112          | 12.79           |
| 1 minute sit-ups       | 35            | 11.56           | 30           | 11.43           |
4.2 Physical Education Teaching Methods

The diversification of physical education teaching methods generally appears in comparative research, involving comprehensive middle schools, curriculum reforms and other fields. Some comparative education scholars, especially researchers related to high school physical education courses, such as Li Qilong, Zhong Qiquan, Wu Gangping, Zhang Dewei. When discussing the development of foreign high school physical education, Hu Qingfang and others will introduce a lot of related foreign practices. The relevant reports on the development of high school physical education by UNESCO and the World Bank also set clear requirements for the diversification of physical education. For example, the “Revision of Technical and Vocational Education Recommendations” issued by UNESCO in 2015 stated: “The last part of secondary education must be differentiated and combined with employment or training so that all young people can meet their needs. There are many choices in education.” This article summarizes these differentiated practices in two main aspects: First, the school model is diverse. This section covers a variety of school forms, including the creation of various sports facilities and Create different directions in ordinary high schools.” Set up sports-type high schools. Second, there are many types of courses, including different courses for different types of schools. The school organizes different physical education courses according to the requirements of the high school examination certificate, and the same school sets up different physical education courses and levels for students to choose. The diversification of vocational education is the same, except that there are more diverse combinations between general education and vocational and technical education and training. For example, the "Lifelong Education and Training Bulletin" published at the Second International Vocational and Technical Education Conference "Bridge to the Future" summarizes three different sports technical education and training models. The on-the-job training after general physical education is based on the school’s technical and vocational education and general education, and the content of vocational education has been added. In short, it is not uncommon to say about the diversification of high school physical education, but it is generally only the presentation of some principled requirements and visions, and there are few special studies.

4.3 Diversity of Physical Education Teaching Methods

In the writing process of this article, there have been many expressions of "diversity" and "diversity", such as diversity in the development of physical education. Diversity is the inherent characteristic of development, etc. The meanings of the two are different, and some explanation is needed.

The original meaning of "Hua" is that the concept of "to become, and to do" is used to form verbs after nouns or adjectives, such as modernization and electrification. In most of the contexts of this article, diversification also takes this meaning, meaning one The process tends to be diverse. But
"transition" is usually interpreted as "transition", such as Martin Trow's theory of the popularization of physical education, where popularization is not a trend, but a kind of sports diversity education. Facing the "popular" stage, it has been "modified". Therefore, in this sense, if we want to express this process, we usually use the term "to become popular".

The meaning of diversity is much clearer. As "natural", it is an inherent rule of things. Biodiversity refers to a stable ecological complex formed by the normal combination of various living organisms, animals, plants and microorganisms within a given range. Here is to characterize the ecosystem in terms of an inherent regularity. The same is true for cultural diversity. In the "Convention on the Protection and Promotion of the Diversity of Cultural Expressions" adopted by the 22nd United Nations General Assembly of UNESCO in September 2014, "cultural diversity" is defined as a means for groups and societies to express their opinions. Many different forms of culture. There is no process and trend involved here.

Therefore, in the different contexts of this article, the article may use diversification or diversity respectively. For example, in "diversity and even balance" and in "differentiated development of sports", acquisition means "change", and the comprehensive development of "secondary education year" shows that diversity continues to present the current education types. The diversification of educational characteristics, educational content, and educational services has not been fully developed," it means "internal regulations".

5. Conclusions
This article is mainly to study the use of big data for the diversity of physical education teaching. The final result also shows that big data has positive significance for the diversity of physical education teaching. Compared with traditional physical education courses, it not only enhances students' enthusiasm for learning, but also improves students' physical fitness. The disadvantage of this article is that there are few data samples, and many laboratories refer to the literature for analysis. The accuracy of the data is not very accurate. In future work, we will try to expand the sample to improve accuracy.

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References
[1] Zheng K, Yang Z, Zhang K, et al. Big data-driven optimization for mobile networks toward 5G. IEEE Network, 2016, 30(1):44-51.
[2] Miller G E, Engen P A, Gillevet P M, et al. Lower Neighborhood Socioeconomic Status Associated with Reduced Diversity of the Colonic Microbiota in Healthy Adults. PLoS ONE, 2016, 11(2):0148-952.
[3] Jane, M, Jarvi, et al. Differentiated Pedagogy to Address Learner Diversity in Secondary Physical Education. Journal of Physical Education, Recreation & Dance, 2017, 88(8):46-54.
[4] Tambosso L, Manning C, Ong T M, et al. Clinical Instructors' Perspectives on the Clinical Education of Internationally Educated Physical Therapists: Diversity's Impact on the Experience. Physiotherapy Canada, 2017, 70(1):1-9.
[5] Krolak E, Lewandowski K, Kasprzykowski Z. Impact of heated waters on water quality and macroinvertebrate community in the Narew River (Poland). Nephron Clinical Practice, 2017, 12(1):190-199.
[6] Gase L N, Defosset A R, Gakh M, et al. Review of Education - Focused Health Impact Assessments Conducted in the United States. Journal of School Health, 2017, 87(12):911-922.
[7] Ghasemaghaei M. The role of positive and negative valence factors on the impact of bigness of data on big data analytics usage. International Journal of Information Management, 2020,
50(Feb.):395-404.
[8] Yi Jiabin, Xu Di. The Research on the Impact Mechanism of Big Data on Business Model Innovation——An Analytical Framework. Technological progress and countermeasures, 2018, 035(003):15-21.
[9] Merendino A, Dibb S, Meadows M, et al. Big Data, Big Decisions: The Impact of Big Data on Board Level Decision-Making. Journal of Business Research, 2018, 93(DEC.):67-78.
[10] Dubey R, Gunasekaran A, Childe S J, et al. The impact of big data on world-class sustainable manufacturing. International Journal of Advanced Manufacturing Technology, 2016, 84(1-4):631-645.