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Construction of Intelligent Teaching Decision System for College Physical Education Based on Big Data Analysis

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Abstract: *It is difficult for the normal PE (physical Education) to arouse students' interest in PE, resulting in low participation in sports activities and inability to exercise. It is essential to enhance the effect of PE in universities. To arouse students' interest in physical education, school have organized physical education classes. By using the ID3 decision tree algorithm to compare students' comprehensive abilities in traditional teaching and intelligent teaching, it can be concluded from relevant sample tests that logic, music, and interpersonal communication had the highest T-test values, which were 4.625, 4.827, and 4.708, respectively. The data results of intelligent teaching had significantly improved compared to traditional teaching. The comparison between traditional teaching and intelligent teaching showed that through intelligent teaching, students have significantly improved their intelligence in language, music, and interpersonal communication. However, there has been little progress in the three dimensions of logical intelligence, spatial intelligence, and motor intelligence.*

Keywords: *Big Data Analysis, College Physical Education Teaching, Intelligent Teaching, Systems*

1. Introduction

In an era when big data processing technology was not yet mature, the massive data processing generated in the field of education could only develop basic functions such as computation and analysis. In building a good teaching environment for the promotion of intelligent campuses in universities, it is first necessary to explore the teaching value hidden in educational data at a deeper level, and determine the role of educational big data in subject construction, teaching mode adjustment, and teaching system optimization. Along with the continuous dissemination and application of computer network technology in all fields, PE reform with digital multimedia platforms is of paramount importance. Alam A developed a digital teaching platform to meet the needs of modern social network and abundant network resources. The construction of a platform consists of several phases: analysis, design, development, execution and assessment. Alam A, with the method of literature review and experimental study, analysed the validity of the teaching methods on the digital multimedia platform and the traditional teaching method. Alam A found that digital physical education teaching platforms can fully mobilize students' enthusiasm [1]. Guan C mainly analyzed the status quo of PE teaching in colleges. Due to the rapid development of AI, he carried out a study on how to enhance the effect of PE teaching, and made a comparative analysis of PE teaching in some university. It has been proved that AI based PE can significantly improve students' strength, speed, stamina and agility. It provided more important reference and reference for improving the effect of PE teaching[2]. Quennerstedt M believed that the only truly sustainable goal of physical education is more physical education. In order to achieve this goal, Quennerstedt M criticized education. The critical information includes: (i) restoring a certain perspective on children in education, (ii) restoring the openness of physical education, (iii) restoring the art of physical education teaching, which is about being educational and criticizing the educational situation. Therefore, Quennerstedt M believed that one should start with the purpose of education - the why - and then decide what to do and how to do it[3]. In the teaching of PE, innovative teaching ideas and methods, teaching methods and procedures, the teaching evaluation method is beneficial to the improvement of the PE classroom atmosphere, and the successful enhancement of the PE teaching effect.

Taking advantage of the flexibility and popularity of the Internet to bring more students closer to

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sports and master more sports skills is an effective way to fully mobilize students' subjective initiative and improve teaching effectiveness. Multimedia digital platforms provide a new direction for the development of college physical education. They also promote the development of physical education and the dissemination of sports technology.

2. Intelligent Teaching System for Physical Education in Universities

2.1 Theoretical Characteristics of Traditional Teaching

In the view of traditional intelligence theory, the focus of teachers' unified education is to cultivate students' speech, language intelligence, mathematical and logical intelligence, and implement the same curriculum. The teaching method is single, and the implementation of unified and standardized exams does not fully stimulate students' learning enthusiasm, and the students' subject status is not well played, which suppresses the unique personality of each student and does not receive sufficient development [4]. In traditional teaching, excessive emphasis is placed on the intelligence of language and logical mathematics, while neglecting the cultivation of students' various intelligences such as sports, music, interpersonal relationships, and self-awareness. This leads to the suppression of students' intelligence in these areas, and their intellectual advantages are difficult to fully reflect [5]. This not only reduces students' successful experience in learning, but also a waste.

2.2 Theoretical Characteristics of Intelligent Teaching

Applying the theory of multiple intelligences to teaching practice to explore new teaching methods can achieve the unity of "subject" and "dominance", and change the traditional single and singular teaching mode. Adopting a "small group" learning model, passive practice is transformed into positive thinking based on students' physical, psychological, and personality development needs. This achieves a transition from imparting to guiding, and from dull to joyful, thereby forming a joyful, relaxed, united, and upward learning atmosphere [6]. In the "multi intelligence teaching", there are various forms of classroom teaching, including cooperative learning, theme teaching, multimedia teaching, after-school group work, etc. This strong sense of belonging makes every student willing to participate in their own performance and evaluation [7]. This has a positive effect on cultivating students' language intelligence, interpersonal intelligence, and spatial intelligence, and enhancing their independent exploration ability.

2.3 Application of Intelligent Teaching Mode in College Physical Education

Based on the multi intelligence teaching model, the course objectives were designed. Applying the multi intelligence teaching model to college physical education teaching can improve students' intelligence, skills, cognitive abilities, and emotions, for example [8]. From the perspective of intellectual goals, physical education teachers should not only guide students to learn sports tactics, but also let them show the main points of action. Moreover, it is necessary to apply a collective approach in practical training, and to analyze and correct one's shortcomings in sports through other knowledge such as biochemistry and mechanics. In this way, learners' language intelligence, mathematical intelligence, sports intelligence, introspective intelligence, social intelligence, etc., can be improved through comprehensive platform training [9]. From a teaching perspective, learners need to be able to roughly understand and train in the form of decomposed actions while watching and simulating the teacher's technical operations, ultimately completing the overall movement. From the perspective of emotional goals, it can help students enhance their interest in physical education subjects. While mastering teaching actions, it can also be used to cope with setbacks encountered in learning.

Diversified teaching content: Implementing a multi intelligence teaching model in college physical education requires more emphasis on targeted teaching content, and should reflect interest, modernity, and innovation. In the process of practical operation, the content of the course is divided into basic, extended, and research. Basic courses, for instance, may adopt basic theory, extended courses can adopt applied skills and skills, while research-based courses are courses centered on solving practical problems [10]. In terms of course content, teachers can add some interesting games to the course content according to the requirements of the curriculum outline, increase the fun of the course, and stimulate students' enthusiasm for sports.

A new teaching method has been constructed based on the multi intelligence teaching model. In physical education teaching, teachers can choose different intellectual tools and teaching methods

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based on different teaching content and objectives to adapt to the individual development of students [11]. For example, to enhance students' spatial intelligence, corresponding motion symbols, motion icons, and multimedia methods can be used to enable students to accurately grasp the location of space. In order to improve students' rhythm intelligence, some corresponding music can be added to track and field or aerobics, so that students can experience the musical sense and rhythm ability through these music. In addition, competition and team cooperation are also effective in improving the efficiency of classroom teaching.

Comprehensive assessment and evaluation: In the past, teaching has always been based on exam scores as the main evaluation method. Multiple intelligence theory should be applied to assess students throughout the entire learning process, such as daily learning attitude, skill mastery level, theoretical knowledge mastery, and practical ability. Through comprehensive evaluation, students' comprehensive abilities can be improved [12].

It is necessary to introduce "multi-intelligence" into higher education. In practice, it should fully understand the problems in the teaching process and improve the target. The content, the teaching method, the evaluation, and the evaluation of the teaching according to the "multi-intelligent" theory, so as to improve the teaching quality and improve the students' comprehensive ability [13].

2.4 Design of Intelligent Teaching System for College Physical Education

The overall architecture of an intelligent decision-making system for university sports education, designed on the basis of large data sets, can be divided into three levels: data layer, support layer, and decision-making layer. The functional division of the individual system structures is shown in Figure 1.

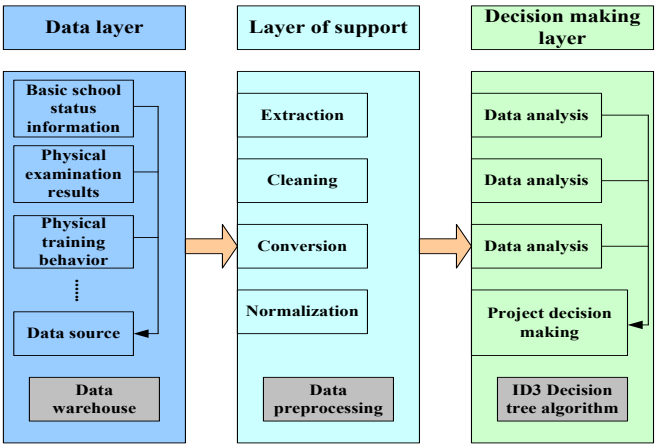

Figure 1: Framework of Intelligent Teaching Decision System for College Physical Education

Decision System Data Layer: There are lots of data types and sources in the data layer, such as the basic academic information of the students, the results of the sports examination, the results of the sports competitions, and the activities of the sports training, etc. According to different data channels, there are two methods: one is to collect data internally on campus, and the other is to collect data externally on campus [14]. The data layer is the most basic layer of the system, and its function is equivalent to a data warehouse, providing a strong data support for sports data mining and decision analysis.

Decision system support layer: The support layer completes the information exchange between data and decision layers, and provides a bridge for the support layer, providing data sources for the support layer. At this level, the method described in Figure 1 can be used to standardize the heterogeneous and complicated data, and get the uniform description of PE teaching data by extracting, format cleaning and transformation. Finally, a standardized data interface is used as a tool to transfer the processed data to the decision level [15]. The data in the support layer is not chaotic, but is expressed and stored in a hierarchical way, so it can satisfy the requirement of multi-dimension data mining.

Decision making level of the decision-making system: based on the data mining results, the decision-making level analyzes the learning effect, teaching quality and physical education teaching problems of college students, and relies on the mathematical analysis model and data mining algorithm of system integration to achieve [16]. At this level, a data mining function was implemented, and the designed system was based on the ID3 decision tree algorithm to mine the physical education scores of

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college students and analyze their learning behavior. Finally, an intelligent teaching decision plan was generated.

2.5 ID3 Decision Tree Algorithm

The results of data mining are the basis for generating intelligent teaching decision-making plans for college sports. As a typical data mining method, decision trees can not only analyze the characteristic trends of large-scale sports data, but also accurately predict the future development trends of sports teaching decision-making [17]. Based on the discrete characteristics of physical education data in universities, the ID3 decision tree algorithm is selected from multiple types of decision tree algorithms as a mining tool for the teaching decision system to deeply mine information such as physical education scores, sports training characteristics, learning behavior trends, etc. [18].

In the ID3 Decision Tree, entropy represents the degree of uncertainty in the transaction, which is the amount of information (in general, a lot of information refers to too many uncertainties in the background of this period). The formula for entropy is:

$$Entropy = -\sum_{i=1}^{n} p(x_i) * \log_2 p(x_i) \tag{1}$$

Among them, $p(x_i)$ is the probability of classification x_i appearing, and n is the number of classifications.

When using the ID3 decision tree algorithm, Formula (2) can be used:

$$E（G）= \sum_{i=1}^{c} \frac{A_i}{A} \log_2 (\frac{A_i}{A}) \tag{2}$$

In the calculation of the original information entropy, A represents the number of samples mined in the decision tree, c represents the total existence category, and A_i represents the number of samples in C. When updating the ID3 decision tree algorithm, Formula (3) can be used:

$$E（G，H，J）= \sum_{i=1}^{c} \frac{a_j(i)}{a_j} \log_2 (\frac{a_j(i)}{a_j}) \tag{3}$$

In the formula, H represents the attribute of the root node, and $a_j, a_j(i)$ is the planning of the CI sample. On this basis, a decision tree algorithm for ID3 was proposed and applied to data mining in physical education teaching.

3. Intelligent Teaching Experiment in College Physical Education

3.1 Experimental Data Objects

The data selected students from M university for experimental analysis, with a total of 40 people selected as the experimental subjects.

Taking the PE curriculum of normal higher educational institutions as the study object, the teaching content and exam content of traditional teaching and intelligent teaching were basically the same. In the experiment, intelligent tutoring applies multiple intelligence theory while traditional tutoring applies traditional teaching methods. On this basis, multiple intelligence test were conducted for traditional teaching and intelligent teaching respectively.

In the experiment, it should be noted: ① The significant effect of the age of the subjects on the development of their multiple intelligence, the age difference between the subjects during the experiment should not exceed 3 years. This study focused on subjects aged 19-21. ② By using a single blind method, the subjective psychological factors of the subjects were eliminated, making them unaware of their own experiments.

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3.2 Statistics of Physical Education Teaching Data in Universities

The theory of multiple intelligences and college physical education are organically integrated, making students the main subjects of learning and applying psychology and other related theories to practice. The relevant theoretical groups would be divided into eight groups: Language, Logic, Space, Movement, Music, Interpersonal Communication, Reflection, and Observation. The application of each group in practice would be statistically categorized into four categories: widely used, moderately used, infrequently used, and never used [19-20]. The statistical results can be shown in Figure 2.

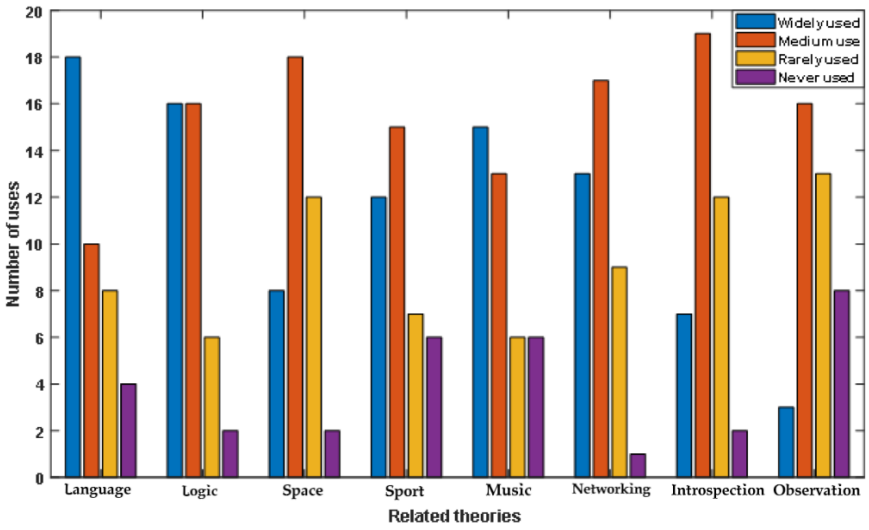

Figure 2: Statistical Results of Practical Teaching Related Theories

From the statistical results, it can be seen that the theories of space, introspection, movement, music, and observational intelligence are the most widely used among the statistical standards that have never been used. In order to analyze the accurate use of relevant theoretical groups in intelligent teaching, the six most widely used theories were selected for analysis. The six most widely used theories are: language, logic, space, motion, music, and interpersonal communication [21].

4. Conclusions

In the past, excessive emphasis on students' sports skills in university physical education resulted in disharmonious development between different levels of intelligence. On this basis, a university physical education teaching guided by multiple intelligences has been proposed, which has significantly improved the comprehensive qualities of college students in all aspects. Applying the theory of multiple intelligences to college physical education teaching can effectively enhance the intelligence of college students in various aspects and promote their comprehensive development.

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