

The Teaching Situation of Gymnastics as a General Course of Physical Education Major in Colleges and Universities Based on Data Mining

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Abstract: With China's reform and opening up and the continuous improvement of people's living standards, China's education is also in constant reform and development, and quality education is constantly improving. Whether gymnastics can be taken as the content that people are willing to choose in fitness, and whether it can open up a new path for college students' employment, it is very necessary to explore and study the current situation of gymnastics general course (GGC) teaching for physical education major (PEM)s in colleges and universities (CAU). Based on data mining (DM), this paper studies the current teaching situation of gymnastics as a general course for PEMs in CAU. Through the methods of investigation, statistics and data analysis, this paper analyzes the characteristics, requirements and basic situation of the general gymnastics course for PEMs in CAU; Through a brief analysis of the DM technology, this paper applies it to the research on the current situation of GGC teaching in CAU. Through the research and analysis, this paper puts forward the teaching countermeasures of GGC.

1. Introduction

The bare handed gymnastics and formation in the general gymnastics course are the basic skills that a qualified physical education (PE) teacher in primary and secondary schools must master, which are almost necessary in every PE class. In terms of communication ability, the protection, help and cooperation projects of gymnastics are conducive to students' active integration into the collective, improve their sense of responsibility, and enhance their sense of trust in the collective. In terms of enhancing the adaptation to the natural environment, gymnastics can not only strengthen the physique, but also enhance the students' spatial perception and sense of balance, and improve the body's ability to cope with changes. Therefore, to study the practicability of gymnastics teaching (GT), we better implement the cultivation of students' abilities in all aspects of GGC teaching, to make GT more optimized, not only can promote the construction of GGC, to better promote gymnastics, but also provide reference for the reform of GGC.

With the popularization of quality education throughout the country, increasingly attention has been paid to the reform of GT in CAU. In particular, the teaching of gymnastics as a general course of PE in CAU should be reformed from the social reality and the needs of the times. Experts and scholars have studied the general GT materials, teaching contents, teaching methods, assessment, and other aspects [1]. At present, the main problems in GT for PEMs in CAU are that students' basic teaching abilities and practical ability have not been paid attention to, and the teaching content is out of line with social needs. Therefore, it is of great application value and social significance to study GGC teaching from the perspective of practicality [2].

Gymnastics is a major course of PE in CAU. The new educational ideas should be implemented in the curriculum, and the GT should be practical, proceeding from reality. This paper makes a questionnaire survey on the current teaching situation of gymnastics as a general course in five education colleges and departments, analyzes the teaching syllabus, and conducts a questionnaire survey on PE teachers in primary and secondary schools through literature review. Based on DM technology, this paper makes a comparative study on the teaching status of GGC in colleges and departments of PE, as well as the status quo of PE teaching in primary and secondary schools. It provides reference for the teaching of general gymnastics courses in CAU to better adapt to enhance the practical reform of general gymnastics courses [3-4].

2. Current Situation of GT for PEMs in CAU

The teaching content can only be accepted and mastered by students through teachers' teaching. Teachers must use different teaching methods in the teaching process to achieve teaching. Good teaching methods can not only better present the teaching content to students and make them more acceptable, but also attract their attention, enhance their interest, and achieve the effect of attracting jade.

2.1. Characteristics and Requirements of GGC for PEMs in CAU

GGC for PEMs in CAU is a very practical basic course. GGC of PEMs in CAU contains rich and colorful contents. It is not only an important part of PE teaching in various schools, but also often used for physical exercise of employees in organizations, communities, and other enterprises [5]. PE teaching and military training can not be separated from the use of basic gymnastics; competitive gymnastics is the basic event in sports. There are many competitive gymnastics events, simple and complex. It can not only comprehensively exercise the human body and improve all aspects of physical fitness, but also selectively exercise parts of the body according to actual needs. Therefore, to improve the practicality of GGCs for PEMs in CAU, to optimize GT is more conducive to the promotion of gymnastics [6].

2.2. Basic Situation of GGC Teaching for PEMs in CAU

2.2.1. Analysis on the selection of teaching materials for GGC of PEM in CAU

Table 1: Textbook Selection of GGC for PEMs in CAU

Types of textbooks	Edited by teachers college	PE Institute	other
Number of selected universities	2	2	1
percentage (%)	40%	40%	20%

PE textbooks are the basic tools of PE teaching activities and the main tools of teachers' teaching and students' learning. Good PE textbooks can not only guide students to learn by themselves, but also attract students' interests. It can be seen from Table 1 that among the five CAU surveyed, two

CAU selected the Gymnastics textbook compiled by normal universities, two CAUSS selected the gymnastics textbook compiled by the Institute of PE, and the other one selected the textbook compiled by the university. Therefore, there is no definite teaching material for GGC of PEM in CAU. Each school has selected different teaching materials according to their own conditions, and there is no uniform standard for selecting teaching materials.

2.2.2. Analysis of teaching contents of GGC for PEMs in CAU

The selection of PE teaching content should be based on the objectives of PE curriculum, the needs of students, the laws of physical and mental development, the needs of social development, and the characteristics of PE teaching materials. Gymnastics as a compulsory course for students majoring in PE should also take the needs of social development as an important consideration in the formulation of the content [7]. After graduation, the students trained by PEM in CAU are mainly engaged in PE teaching in primary and secondary schools. Therefore, the content of general GT for PEMs should meet the needs of PE teaching in primary and secondary schools [8].

Analysis of the content of formation exercise: In the practice of PE teaching, formation exercises can not only make students form a good body posture, but also enhance the discipline of the classroom and students' collectivism. As a qualified PE teacher, you must be familiar with the common team command and queue transfer [9].

Table 2: Queue formation teaching content comparative analysis table

Action Type	Number of college teachers	Percentage (%)	Number of primary and secondary school teachers	Percentage (%)
In situ queue action	23	100	95	100
Queue action during travel	23	100	95	100
Queue changes during travel	23	100	34	35.8
Graphic progression	23	100	95	100
Formation change	23	100	54	56.8
Spread and close	23	100	95	100

It can be seen from Table 2 that the selection rate of the six types of formation in the general GT of PEMs in CAU is 100%, which fully covers the teaching content of formation in primary and secondary schools. It shows that the teaching of formation in CAU can fully meet the needs of similar movements in primary and secondary schools, and basically adapt to the teaching content of PE and health classes in primary and secondary schools.

2.2.3. Analysis of Teaching Methods of GGC for PEMs in CAU

PE teaching method is the most flexible part that PE teachers can choose in PE classes. Among them, each teaching method has its own advantages and limitations. According to the existing conditions and circumstances, it is a practical problem that every PE teacher must consider to choose the best teaching method to achieve the best teaching effect [10].

It can be seen from Table 3 that gymnastics teachers in CAU mainly adopt the following teaching methods in the teaching of general gymnastics courses: explanation and demonstration method, decomposition exercise and complete exercise method, protection and help method, repetition exercise method and error correction method. These methods are the main methods in the teaching of general gymnastics courses [11- 12].

Table 3: Questionnaire on Main Teaching Methods of Gymnastics in CAU

teaching method	Number of people selected	Percentage (%)	ranking
Explanation of the Model Law	23	100	1
Decomposition exercise and complete exercise	23	100	1
Protection and Assistance Act	23	100	1
Target teaching method	12	52.2	4
Game method	16	69.6%	2
Error correction	23	100	1
Cooperative learning method	10	43.5	5
Heuristic approach	7	30.4	6
Competition method	13	56.5	3
Group teaching method	6	26.1	7
Multimedia teaching method	7	30.4	6
Questioning	10	43.5	5
Repetitive practice method	23	100	1
other	1	4.3	8

3. Analysis of DM Technology

3.1 DM Algorithm and Process

The process of DM can be summarized as three parts: data preprocessing, DM, and interpretation and evaluation of results.

Data preprocessing: The data used to prepare for DM cannot be directly processed under normal circumstances. This is because these data may have many defects that cannot be directly accepted. For example, the processed data is noisy, incomplete, or even inconsistent. In order to avoid some unnecessary interference and make the mining results closer to reality, it is usually necessary to conduct relevant data preprocessing operations before the formal implementation of mining.

DM: find the current teaching situation of GGC for PEMs in CAU, which involves the discovery of association rules. Then choose to use group rule mining algorithm for mining operations, and finally get valuable instructions.

Interpretation and evaluation of results: Not all strategies found are valuable and easy to implement. In fact, the basic process is often difficult to complete in one way and can often walk back and forth in a link to achieve the desired effect.

Let M be the data set, and the category set is $\{S_1, S_2, S_3, \dots, S_K\}$. Select an attribute W to divide M into multiple subsets.

Let W have n values $\{w_1, w_2, w_3, \dots, w_n\}$ that do not coincide with each other. Then M is divided into n subsets $S_1, S_2, S_3, \dots, S_n$ bounds, where the value of all instances in M_i is w_i .

Let: $|M|$ be the number of instances in dataset M , $|M_i|$ be the number of instances in $W=w_i$, $|S_j| = \text{freq}(S_j, M)$ be the number of instances in S_j category, $|S_{jw}|$ be the number of instances in $W=w_i$ category.

(1) Category information

$$H(S) = -\sum_j p(S_j) \log_2(p(S_j)) = -\sum_j \frac{|C_j|}{|M|} \log_2\left(\frac{|C_j|}{|M|}\right) \quad (1)$$

(2) Class conditional entropy

The set M is divided according to the attribute W , and the divided category conditions are:

$$H(S|W) = -\sum_j p(w_j) \sum_j p(S_j | w_i) \log_2(p(C_j | w_i)) = \sum_{i=1}^n \frac{|M_i|}{|M|} \times \inf o(M_i) = \inf o_w(M) \quad (2)$$

(3) Information entropy of attribute W

$$H(W) = -\sum_i p(w_i) \log_2(p(w_i)) = \text{split_inf } o \quad (3)$$

3.2 Implementation of DM

During DM, the following steps are required:

Before DM, it is necessary to determine the target and object of mining, and then further study the problems that need to be mined, and carry out mining according to the established target to improve the success rate of mining; after the target is determined, the mining model is established.

After the model is successfully established, data collection will start. Generally, collecting data requires more time and energy. It is not only necessary to select representative data in a large database, but also to enter data. However, if the previous data entry and classification are completed, the workload in this step will be reduced a lot, and the relationship between the mining content and other influencing factors needs to be determined.

After completing the above steps, start data preprocessing. Different algorithms are used in data processing, so the data models that need to be established are different. Therefore, data preprocessing is required before mining to establish a data model that meets the algorithm and improve the quality of DM.

4. Research on the Current Situation and Countermeasures of GT for PEMs in CAU based on DM

4.1 Research on Teaching Methods of GGC for PEMs in a City's CAU

In the teaching process of GGC, the teaching methods commonly used are: explanation and demonstration exercise method, target learning method, small group teaching method, learning and guiding teaching method, cooperative learning teaching method, situational teaching method, heuristic exploration method, and game method. In this paper, the general gymnastics course of PEM in CAU in A city was investigated and analyzed. The statistics of teaching methods of GGCs for PEMs in CAU in A city are shown in Figure 1.

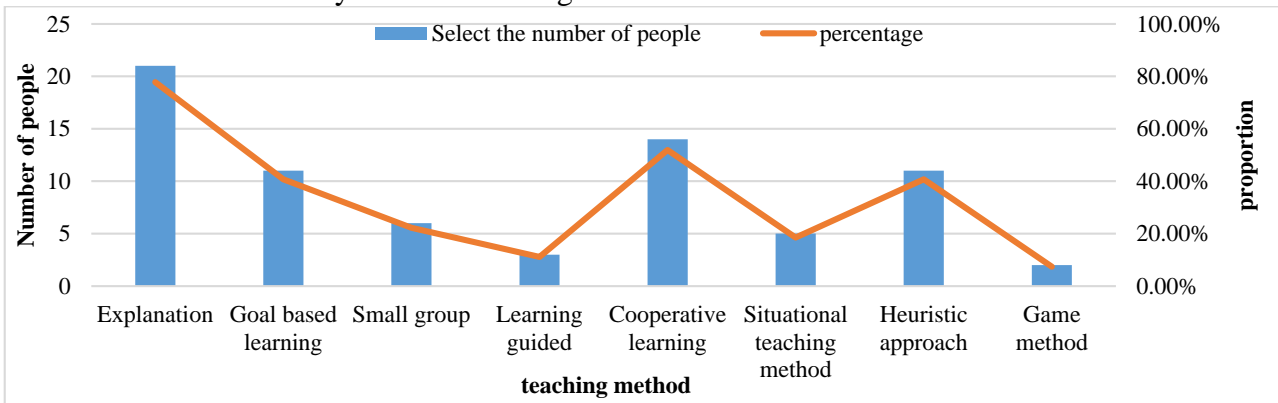


Figure 1: Statistical Table of Teaching Methods for Gymnastics as a General Course of PEM in CAU of City A

The results in Figure 1 show that the selection rate of teachers who explain the demonstration exercise method is the highest, 77.8%. This is due to the large content and difficulty of GT. The explanation and demonstration exercise method is simple and easy, which can solve this problem well. The situational teaching method is 18.5%, the learning guided teaching method is 11.1%, and the game method is 7.4%. These teaching methods have a great effect on improving the students' active participation and ability, but it needs enough teaching time as a guarantee. The insufficient class hours of GGC for PEMs in CAU has limited the application of gymnastics teachers' teaching methods to a certain extent.

4.2 Research on Teaching Content of GGC for PEMs in a City's CAU

The examination and evaluation of GGC is an important link to achieve the goal of GT, which is related to the development and progress of students. The role of the test on students' learning effect. Through a semester of hard work, the students' learning effects can be directly demonstrated through the assessment, which can reflect the students' mastery of this course. The statistics of the assessment contents of GGCs for PEMs in CAU in City A are shown in Figure 2.

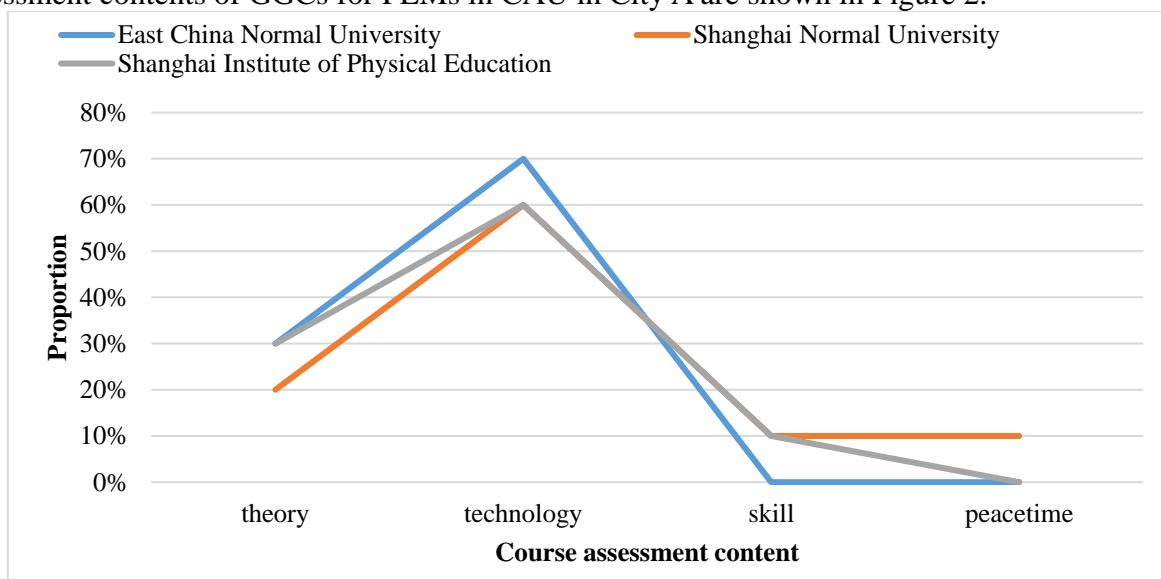


Figure 2: Proportion of the content of GGC assessment for PEMs in CAU in A city

The results in Figure 2 show that the general gymnastics course examination content of East China Normal University includes theory and technology, and the scores account for 30% and 70% of the total scores, respectively; the assessment contents of Shanghai Institute of PE are theory, technology and skills, with scores accounting for 30%, 60% and 10% of the total scores respectively; The assessment of Shanghai Normal University consists of four parts: theory, technology, skills and ordinary performance. The scores account for 20%, 60%, 10%, and 10% of the total scores, respectively. From the perspective of the examination content and the proportion of the examination content of GGCs for PEMs in CAU, CAUS all pay more attention to gymnastics technical examination and gymnastics theory examination, especially the technical examination occupies an absolute position, while the skill examination only accounts for a small part, and the usual results are evaluated according to attendance, learning attitude and other aspects.

4.3 Countermeasures to Improve the Current Teaching Situation of GGC for PEMs in CAU

4.3.1 Properly Increase the Class Hours of General Gymnastics Courses to Ensure the Teaching Quality

Gymnastics is the most basic general course, which is basically not learned well, and the pursuit of setting up new sports projects leads to the lack of practicality of the knowledge learned by the trained talents, which makes them unable to be competent for the basic work of school PE and basic PE teaching. It is inadvisable to pick sesame and lose watermelon because of the small expense.

4.3.2 Adjust the General GT Content and Attach Importance to the Teaching of Basic Gymnastics Content

It is necessary to add basic content to the teaching content of GGC for PEMs in CAU. It is an important factor that must be considered in the teaching of general gymnastics courses for PEMs in CAU to attach importance to the practicality of the teaching contents of general gymnastics courses, and the teaching contents can be directly used in the future teaching and work of students. In terms of teaching content, teachers can appropriately increase the teaching of basic gymnastics, practical gymnastics, gymnastics games, and other practical gymnastics content.

4.3.3 Change the Assessment Method and Attach Importance to the Cultivation of Teaching Ability and Practical Ability

In the general, GT, students should not only firmly grasp the movement technology and be able to complete the movement demonstration process, but also have strong teaching ability and be able to teach the learned movements to students. Teachers should not only be able to skillfully process and simplify the actions in the class, but also be able to skillfully protect and help students complete the actions. With the constant popularization of GT in school sports. We should not only cultivate excellent teachers who can skillfully complete the demonstration of movements in technology, but also can successfully teach the gymnastics content in the sports classroom in skills.

5. Conclusions

The 21st century is an era of rapid economic development and a generation of talented people. Whether the graduates finally cultivated by the university can contribute to socialist modernization determines the quality of talent cultivated by the university. Gymnastics is one of the main sports events in China. It is not only an Olympic event, but also a popular event in general sports. Gymnastics course is the main course of PEM in CAU and is the main form and way to achieve the training objectives. Gymnastics is an important backbone course in sports CAU, and its role is crucial to the training of sports teaching talents. The current situation of GGC teaching based on DM for PEMs in CAU needs further research.

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