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Grey relational degree-based chinese university physical education course teaching contents development research

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ABSTRACT

University students' physical education has important significances in improving Chinese university students' physical quality and psychological health. Research university students' physical education is also very important to promote physical education development in Chinese education circle. The paper makes concrete analysis of Chinese university students' physical education investment proportion in total education investment, and Chinese university student sports teaching items, extracurricular sports activity forms, sports teaching mode, it gets that current stage Chinese university student physical education existing problems in development process, and gives corresponding suggestions to problems. Apply grey relational degree method, establish grey relational degree method-based Chinese university student sports selecting courses trend research model, by calculating university students' satisfaction degree on each sports selecting course content and sports selecting course contents selection percentages, sports selecting courses class hour amount, selecting courses credits relational degree values, it compares present university students' satisfaction degree on sports selecting courses contents. And further get conclusion that Chinese university student physical education form is too single, set up items are more simple, which mainly based on basketball, football, volleyball and badminton so on traditional sports, and these events are main selections of university students' sports selecting courses, relatively sports dance and other events are little favored by university students, which is mainly affected by traditional sports awareness.

KEYWORDS

Physical education;
Grey relational degree method;
Relational degree value;
Education model;
Mathematical model.

INTRODUCTION

Physical education is an important part in students' education, is an important path to improve students' quality, cultivate the overall abilities of students. University students' physical education is one of constitutes in university students' education, is the key to promote university students' physical and psychological health and improve university students' attainment. At present, numerous scholars have already made researched on university students' physical education.

Cai Rui-Guang during the time of studying university students' physical education, by establishing university students' physical education evaluation system, made

comprehensive analysis of university students' physical education current stage existing problems, and combined with former scholars' researching conclusions, referenced lots of documents and field investigation obtained data to evaluate on Chinese university students' physical education, and further got that Chinese university student physical education evaluation should combine with current stage Chinese education basic conditions, make comprehensive analysis of education modes, education methods, education system and other factors so as to carry out comprehensive evaluation on Chinese university student physical education.

When studied on university student sports exercises behavior changes, Yin Bo got first hand investigation information by investigating on field interview, and combined with lots of documents, utilized sports transtheoretical model, empirical studied on university students' sports exercises behavior changes, its data information had reliability, and applied theoretical model had innovation. And further got the conclusion that in current stage, Chinese university students have already positive engaged in sports exercises, their exercises enthusiasm was very strong, but shortcomings were that sports exercises events were still relative single, forms were so simple.

Jiang Xiao-Zhen in university students' sports exercises habits formation research, made specific analysis of its influence factors, and utilized investigation data to make quantitative analysis of university students existing problems in sports exercises. The paper mainly takes six regular institutions of higher learning from Hohhot City, Inner Mongolia as examples, makes questionnaire survey on them, and carries out data processing by returning questionnaires, so that proposes that university students must bring into good sports exercise habits so as to improve their accomplishments, and improve physical quality.

The paper makes comprehensive analysis of Chinese university student sports exercises status, by understanding Chinese university student physical education investment occupied proportions in total education investment, and Chinese university student sports teaching set up items, sports teaching forms, extracurricular sports activities organization forms, it puts forward corresponding improvement suggestions on Chinese university student physical education development. On this basis, apply grey relational degree method; make quantitative analysis of university students satisfaction degree on each sports selecting course content and sports selecting course contents selection percentages, sports selecting courses class hour amount, selecting courses credits relational degree values, it compares present university students' satisfaction degree on sports selecting courses contents. Finally get conclusion that Chinese university student physical education form mainly based on basketball, football, volleyball, badminton and other traditional sports, its form is too single, set up items are so simple.

COMPREHENSIVE ANALYSIS METHOD-BASED UNIVERSITY STUDENT PHYSICAL EDUCATION BASIC INFORMATION RESEARCHES

University student physical education is an important path to cultivate university student quality, and improve university student physical and psychological health, as well as the key to train university student featuring an all-around development in morality, intelligence, physique and art. At present, Chinese university student physical education investment proportions have been increased, but physical education forms are still quite single, affecting by traditional sports awareness, most of universities are still based on traditional physical education, sports teaching modes are not quite advanced. With regard to this, to further propel to Chinese university student physical education development, discover and overcome its existing problems, it should positive reform teaching modes, and encourages university students to take physical exercises.

Chinese university student physical education investment

To a country, education investment proportion in its GDP is an evidence to judge whether a country takes prime strategic importance in the world or not, and meanwhile is also the fundamental basis to judge whether its leader focuses on education or not. At present, national universities have already set up basketball, tennis, volleyball, football, gymnastics, aerobics, cheerleading, swimming and others a series of sports items, physical education takes extremely important

roles in students' education in institutions of higher learning, physical education investment occupied proportions in education investment concerns whether student can health and all-around develop or not.

Above TABLE 1 is Chinese sport education investment amount in recent years, and its yearly percentage in total education investment, data is from "China's education comprehensive statistical yearbook". Draw above data into following statistical chart, and further analyze data presented features:

From above broken line Figure 1, it is clear that Chinese physical education investment basically remains stable, but physical education investment keeps large paces with total education investment by comparing. In view of physical education investment and total education investment proportions, it has been increased, but increment range is relative slow. To further propel to universities physical education development, it should increase physical education investment, expand physical education proportion in advanced education, and fuse sports fitness into university education.

TABLE 1 : Physical education investment status

Year	2007	2008	2009	2010	2011	2012
Physical education investment / ten thousand Yuan	69.32	72.45	65.17	73.68	78	72.14
The total education investment/ one hundred million Yuan	1174.7	1065.3	1135.8	1097.3	1124.1	1157.9
% of total education investment ratio	2.59	2.68	2.55	2.79	2.87	3.19

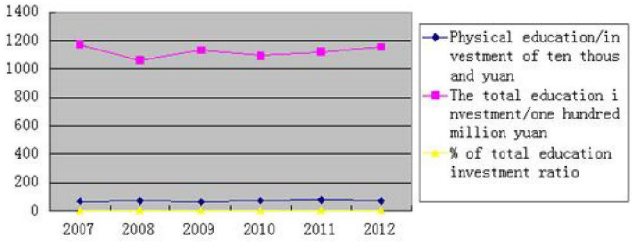

Figure 1 : The sports education investment situation

Chinese university students sports teaching set up items

University students' sports items set up type decides sports teaching development among university students, and directly affects university student satisfaction degree on physical education. According to investigation, university students' set up items generally are basketball, badminton, volleyball, football, roller skating, aerobics and so on, which mainly suffers field facilities, investment and other factors influences.

Below TABLE 2 is Chinese main university physical education course contents set up statistical TABLE, data is from "China's education comprehensive statistical yearbook", general administration of sport of China relative investigation report. Draw above data into following statistical chart, and further analyze data presented features:

From above pie-shaped Figure 2, it can get conclusion that Chinese university student physical education course mainly set up sports items are basketball, football, volleyball, badminton and sports dance. Universities that set up Like tennis, martial arts, swimming and other sports items are fewer. Analyze its causes that are mainly because these kinds of events have higher requirement on field and facilities, and not easily to grasp, and basketball, football, volleyball, badminton are relative widely events in traditional sports.

Chinese university students' sports teaching forms

To sports teaching, its forms are different, it mainly has ordinary physical education course, special physical education course, and optional course and so on. Generally speaking, physical education course teaching forms also affect university students' enthusiasm in participating in sports activities to a certain extent, rich sports teaching forms can attract more university students to participate in sports. Below TABLE are Chinese independent colleges and key universities' university student sports teaching forms comparative analysis TABLE 3.

TABLE 2 : University student physical education course contents

Course contents	Basketball	Football	Volleyball	Badminton	Sports dance	Aerobics	Tennis	Martial Arts	Roller skating	Swimming	Others
Percentage%	12.8	13.1	14.6	12.7	10.4	10.2	7.4	5.2	8.8	3.1	1.7

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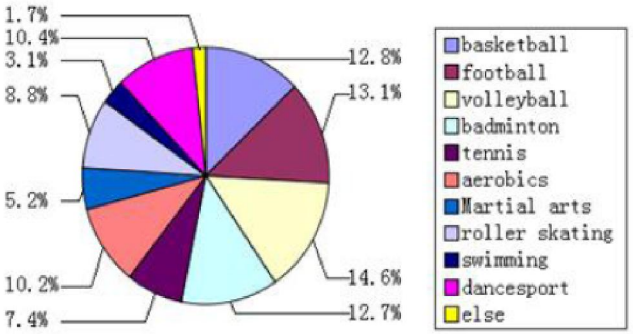

Figure 2 : College students' physical education content

exercise after class and class exercise are fewer, especially for class exercise. In future university education, it should insist on implementing morning exercises and calisthenics, and positive encourage university students to participate in class exercise and physical exercise after class, cultivate university student sports exercises enthusiasm.

Chinese university student sports optional course satisfaction degree

TABLE 3 : Chinese institutions of higher learning university student physical course teaching forms

	Ordinary physical education course	Special physical education course	Special improve class	Health care curriculum	Optional course
Independent college	9.3%	43.8%	3.1%	43.7%	0.1%
Key university	5.0%	40.0%	5.0%	50.1%	0.1%

Above TABLE 3 is Chinese independent colleges and key universities' university student physical education course forms table, data is from "China's education comprehensive statistical yearbook", general administration of sport of China and Chinese statistics yearbook relative investigation report. Draw above data into statistical chart by utilizing mathematical analysis method, further analyze and get conclusion:

By above bar-shaped statistical Figure 3, we can see that no matter independent college or key university, university student physical education course form is mainly special physical education course and health care curriculum. Independent college special physical education course forms proportion is higher than key university, but its sports health care curriculum teaching form is lower than key university, which is mainly affected by the two teaching cultivation ways, so they also present different emphasis in sports teaching.

Chinese university students' extracurricular sports activity organizational forms

At present, most of university students don't put emphasis on sports exercises, as an important teaching contents, university students' physical teaching position in university student education is very important. In general, school will organize morning exercises, calisthenics, class exercise and others to propel to university student sports exercise enthusiasm.

Below TABLE 4 is Chinese universities' extracurricular sports activity organizational forms table, from which data represents the sports activity organizational form applied universities occupied percentage. Data is from "China's education comprehensive statistical yearbook", general administration of sport of China and internet relative investigation reports.

TABLE 4 : Chinese universities' extracurricular sports activity organizational forms

	Satisfied	Dissatisfied	Not to matter
Independent college	58%	40.1%	1.9%
Key university	81%	16.9%	2.1%

Draw above data into statistical chart, and analyze conclusion:

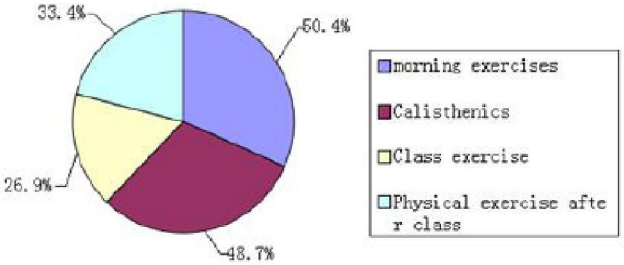

Figure 4 : Organization University extracurricular sports activities

From above pie-shaped Figure 4, it gets conclusion that nearly above half universities in China organize university students to participate in morning exercise, calisthenics, and implement "four morning exercises and one night exercise". Schools that organize physical

By above analysis of Chinese university students physical education basic information, it is clear that Chinese university students sports teaching physical education course teaching contents are based on traditional sports education, teaching forms are mainly special sports teaching and sports health care curriculum teaching, and positive organize university students to participate in morning exercises and calisthenics, these actions play positive roles in Chinese university student sports teaching development. In order to better analyze Chinese university student sports teaching status, now make investigation and analysis of independent college and key university student of university sports optional course satisfaction degree, and get conclusion.

Above TABLE 5 is a Chinese university' students' sports optional course satisfaction degree investigation table, data is from "China's education comprehensive statistical yearbook", general administration of sport of China and internet relative investigation reports. Among them, percentage represents independent college and key university students' numbers of people that are satisfied with sports optional course occupied proportion in totals, draw above data into statistical Figure 5, and analyze conclusion:

TABLE 5 : University student sports optional course satisfaction degree investigation

	Morning exercises	Calisthenics	Class exercise	Physical exercise after class
Percentage%	50.4%	48.7%	26.9%	33.4%

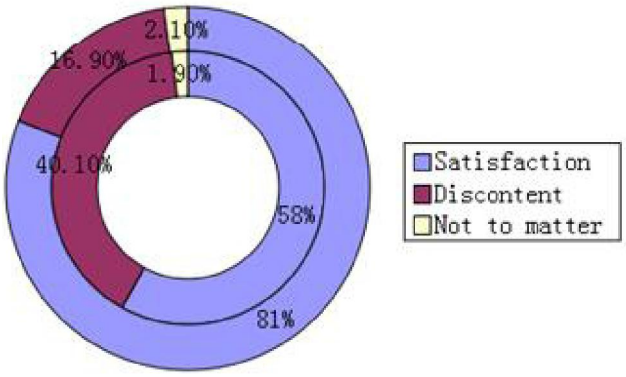

Figure 5 : University sports course satisfaction survey

By above data, it can get conclusion that most of students are relative satisfied with sports optional course, dissatisfied and attitude as not to matter are fewer. To independent college, there are 40.1% students dissatisfied with sports optional course, which is higher than key university on this point. It shows independent college should be improved in sports optional courses, it should absorb key university teaching system of sports optional course, reform self sports teaching mode, look for existing self shortcomings in university student sports education, and strive for letting more students to be satisfied with sports teaching.

GREY RELATIONAL DEGREE METHOD-BASED CHINESE UNIVERSITY STUDENTS SPORTS OPTIONAL COURSE TREND RESEARCH

Chinese university students have different trends in sports optional courses, to different sports events, their satisfaction degrees are different. Thereupon, utilize grey relational degree method to establish grey relational degree model regarding university students' sports optional course satisfaction degree and numerous optional courses contents, so that get university students most favored sports optional course, which provides references for Chinese university students sports teaching development, and further propel to Chinese university students sports teaching promotion in national range.

The purpose of grey relational degree analysis is on the basis of system overall development change, if system change and factor change trend are consistent, then the two relational degree is larger; if system change and factor change trend are inconsistent, or exist certain differences, then the two relational degree are small.

Data processing

On the basis of researching on Chinese university students' sports teaching status, it is clear that nowadays Chinese university student sports teaching contents are major in traditional sports, though there is some innovation, the strength is not so big. To make quantitative analysis of Chinese university students' main trend in sports optional course, further propel to Chinese university student sports teaching development, utilize mathematics grey relational degree method to analyze Chinese university students sports optional course satisfaction degree and numerous optional courses contents, and further get relative conclusion.

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Below TABLE 6 is consulted data from "China's education comprehensive statistical yearbook", general administration of sport of China and relative documents, and manual draw following statistical TABLE 6:

Establish model

(1) Record Chinese "three main balls" influence factors feature behaviors sequence as following:

$x_i^{'} = \left(x_i^{'}(1), x_i^{'}(2), x_i^{'}(3)\right)^T, i = 1,2,3$, from which correlation factor line sequence is:

$x_1^{'} = (12.8,13.1,14.6,8.8,12.7,10.2,10.4,7.4,5.2,3.1,1.7)$;

$x_2^{'} = (17,15,17,15,15,14,13,12,12,10,13)$;

$x_3^{'} = (1.5,1.5,1.5,1.5,1.5,2,2,1.5,1.5,2,1.5)$

Thereupon, it can get:

$$x_i^{'} = \begin{pmatrix} 12.8 & 13.1 & 14.6 & 8.8 & 12.7 & 10.2 & 10.4 & 7.4 & 5.2 & 3.1 & 1.7 \\ 17 & 15 & 17 & 15 & 15 & 14 & 13 & 12 & 12 & 10 & 13 \\ 1.5 & 1.5 & 1.5 & 1.5 & 1.5 & 2 & 2 & 1.5 & 1.5 & 2 & 1.5 \end{pmatrix}$$

(2) Define reference sequence

Take Chinese university student to sports optional course contents satisfaction degree sequence $x_0^{'}$ as reference sequence, that:

$x_0^{'} = (11.9,12.6,13.2,10.1,11.9,11.3,11.2,5.2,2.7,2.9,7.0)$

(3) Initialization method data processing

Utilize formula $x_i(k) = \frac{x_i^{'}(k)}{x_i^{'}(1)}$, to handle with relative factors line sequence, result is as following:

$x_1(k) = \frac{x_1^{'}(k)}{x_1^{'}(1)} = (1,1.02,1.14,0.69,0.99,0.80,0.81,0.58,0.41,0.24,0.13)$;

$x_2(k) = \frac{x_2^{'}(k)}{x_2^{'}(1)} = (1,0.88,1,0.88,0.88,0.82,0.76,0.71,0.71,0.59,0.76)$;

$x_3(k) = \frac{x_3^{'}(k)}{x_3^{'}(1)} = (1,1,1,1,1,1.33,1.33,1,1,1.33,1)$

(4) Calculate $\min\limits_{1\le i\le 3}\min\limits_{1\le k\le 3}\left|x_0^{'} - x_i(k)\right|, \max\limits_{1\le i\le 3}\max\limits_{1\le k\le 3}\left|x_0^{'} - x_i(k)\right|$

Input $x_1(k) = (1,1.02,1.14,0.69,0.99,0.80,0.81,0.58,0.41,0.24,0.13)$;

$x_2(k) = (1,0.88,1,0.88,0.88,0.82,0.76,0.71,0.71,0.59,0.76)$;

$x_3(k) = (1,1,1,1,1,1.33,1.33,1,1,1.33,1)$;

$x_0^{'} = (11.9,12.6,13.2,10.1,11.9,11.3,11.2,5.2,2.7,2.9,7.0)$

into above formula and get:

$$\min_{1\le i\le 3}\min_{1\le k\le 3}\left|x_0^{'} - x_i(k)\right| = 28.46,$$

$$\max_{1\le i\le 3}\max_{1\le k\le 3}\left|x_0^{'} - x_i(k)\right| = 29.55$$

(5) Calculate correlation coefficient

Correlation coefficient computational formula is as following:

$$\zeta_i(k) = \frac{\min\limits_{1\le i\le n}\min\limits_{1\le k\le m}\left|x_0^{'}(k) - x_i(k)\right| + \rho \times \max\limits_{1\le i\le n}\max\limits_{1\le k\le m}\left|x_0^{'}(k) - x_i(k)\right|}{\left|x_0^{'}(k) - x_i(k)\right| + \rho \times \max\limits_{1\le i\le n}\max\limits_{1\le k\le m}\left|x_0^{'}(k) - x_i(k)\right|}$$

Among them, ρ is resolution ratio, and $\rho \in (0,1)$, $\rho = 0.5$, ρ gets bigger and then relation is bigger.

Input $\left|x_0^{'}(k) - x_i(k)\right|$ each value, and can solve:

$\zeta_1 = (1.14,1.01,0.989,0.978,0.924,0.991,1.02,0.997,0.875,0.898,0.964)$;

$\zeta_2 = (1.14,1.11,0.996,0.987,0.893,0.975,1.201,1.012,1.114,0.989,0.976)$;

$\zeta_3 = (1.14,1.01,1.05,0.977,0.983,0.988,0.996,0.962,1.01,0.874,0.981)$

(7) Calculate correlation degree

TABLE 6 : Data statistical table

Course content	Basketball	Football	Volleyball	Roller skating	Badminton	Aerobics	Sports dance	Tennis	Martial arts	Swimming	Others
Percentage%	12.8	13.1	14.6	8.8	12.7	10.2	10.4	7.4	5.2	3.1	1.7
Class hour amount	17	15	17	15	15	14	13	12	12	10	13
Credit	1.5	1.5	1.5	1.5	1.5	2	2	1.5	1.5	2	1.5
Satisfaction degree%	11.9	12.6	13.2	10.1	11.9	11.3	11.2	5.2	2.7	2.9	7.0

TABLE 7 : Correlation degree value

Course content	Basketball	Football	Volleyball	Roller skating	Badminton	Aerobics	Sports dance	Tennis	Martial arts	Swimming	Others
Correlation degree	1.081	1.082	1.079	1.054	1.090	0.857	0.844	0.775	0.654	0.862	0.787

Use correlation degree computational formula $r_i = \frac{1}{m}\sum_{k=1}^{m}\zeta_i(k)$, input

$\zeta_1 = (1.14,1.01,0.989,0.978,0.924,0.991,1.02,0.997,0.875,0.898,0.964)$;

$\zeta_2 = (1.14,1.11,0.996,0.987,0.893,0.975,1.201,1.012,1.114,0.989,0.976)$;

$\zeta_3 = (1.14,1.01,1.05,0.977,0.983,0.988,0.996,0.962,1.01,0.874,0.981)$

And get:

$r_1 = 1.081, r_2 = 1.082, r_3 = 1.079, r_4 = 1.054, r_5 = 1.090, r_6 = 0.857, r_7 = 0.844$,

$r_8 = 0.775, r_9 = 0.654, r_{10} = 0.862, r_{11} = 0.787$

So that it get following data TABLE 7:

(8) Evaluation result

Draw above result into statistical chart, and analyze conclusion:

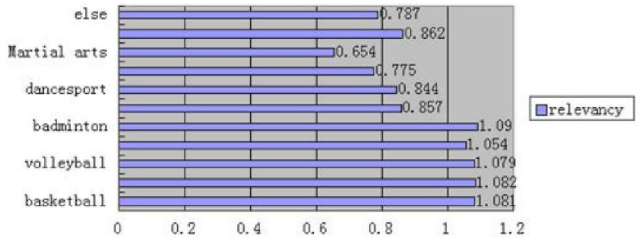

Figure 6 : Correlation value

From above bar statistical Figure 6, it can get conclusion that Chinese university student during sports course selecting, they relative tend to basketball, football, volleyball, roller skating, badminton and others traditional sports items, their correlation degree value are above 1.0, while to aerobics, sports dance, tennis, martial arts, swimming and other sports items course selecting trends are lower. Analyze main causes, which is mainly affected by traditional sports awareness, field construction, equipment is complete or not and other factors, and lead to university students mainly surround traditional, popularized sports item when select sports optional courses.

CONCLUSION

(1) The paper makes comprehensive analysis of Chinese university student sports exercises status, and finds out current stage Chinese university students sport teaching existing drawback and deficiency, and puts forward corresponding reformation opinions. By concrete analyzing Chinese university student physical education investment occupied proportions in total education investment, and Chinese university student sports teaching set up items, sports teaching forms, extracurricular sports activities organization forms, and further get conclusion.

(2) By above analysis, it is clear that Chinese university students' physical education has been taken seriously by relative education departments, its education investment has increased, but not very high. In addition, Chinese university student physical education form is too single, set up items are more simple, which mainly based on basketball, football, volleyball and badminton so on traditional sports, school that set up as tennis, sports dance and other items are relative fewer, though most of school organize morning exercises, calisthenics, class exercise and other collective class activities are relative fewer.

(3) On the basis of university students' sports education status analysis, apply grey relational degree method, establish relational degree model about university students' sports optional course trend, by calculating university students satisfaction degree on each sports selecting course content and sports selecting course contents selection percentages, sports selecting courses class hour amount, selecting courses credits relational degree values, it compares each sports selecting course popular degree among university students, so that set up sports optional course targeted university students' higher tendency several kinds of sports items to meet university students' requirements on sports optional courses.

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