



Construction of public PE teaching evaluation based on AHP method system

Zhang Zejun¹, Lv Xiaomei² and Li Xiaotang¹

¹Lanzhou University of Technology, Lanzhou City, China,

²Hebei Institute of Physical Education, Shijiazhuang City, Hebei, China

ABSTRACT

Physical Education and objective evaluation system can effectively improve teaching effectiveness. In order to find a more objective and scientific teaching evaluation system, this paper designs use AHP method to construct a public sports teaching evaluation system, including the teaching process, teaching effectiveness, teaching evaluation three indicators and evaluation systems were evaluated to determine the index weights concluded: teaching methods to improve the health level, in the form of teaching organization occupies an important position in the evaluation system evaluation. Thus, in the public physical education, in order to improve the quality of teaching, innovative teaching methods should be highlighted in order to improve students' health for the purpose of taking into account the form of flexible teaching organization.

Key words: Public sports programs, AHP method, teaching evaluation, Physical Education, Indicator System

INTRODUCTION

Public sports curriculum is one of the courses that are more popular and widely accepted. Whether the quality of curriculum implementation is good or bad is directly related to the physical health standard for the students, it plays a very important role on the health development for the students, and the contemporary college students are the future builders and successors of the motherland, the healthy body is the premise and the foundation of doing something. It is a very meaningful work that we do a good evaluation of public sports teaching effect. In the background of the PE curriculum reform, the PE of university has become an important part of all-round development of students, but in the long process of the university PE teaching we only pay attention to the teaching task and classroom order to a great extent, we ignored the evaluation of classroom effect and the assessment of knowhow quality for students.

The evaluation of PE teaching is an important link and aspect of improving the quality and characteristics of teaching for the common colleges. The so-called teaching evaluation is the activities that we take advantage of a series of feasible evaluation techniques and means evaluate teaching process and effect, in order to determine the difference between teaching situation and expectation, and the way of teaching problem solving ability. Its fundamental purpose is to ensure the improvement the teaching and learning effect, it is the qualitative and quantitative measurement of the teaching process and the results according to the educational purpose and principles of a subject, and then makes a value judgment and provide basis for development level of students and improving of teaching. That we ascertain the role of teaching evaluation system in physical education is a prerequisite to achieve the teaching objectives. The reasonable evaluation of teaching has positive significance that can improve teaching methods, optimize the teaching mode, develop teaching effectiveness, and improve the teaching quality.

Through the research of the foreign periodicals, we find that the specialized research article for physical education teaching evaluation is not much, the typical article is that Ant ú Nez P é rez had physics teaching evaluation pattern reference to the research of physical education teaching evaluation, He published "Physical education evaluation,

teacher's scientific and social path"[1], Lian-xiang Fan and Ling-yun Pan in "Lack and return of P. E. teacher's rationality"[2] for physical education teaching evaluation made a descriptive comparison.

At home, Zhang Xiuhua [3] research fitness theory and fitness skills which is based on the research of physical education of college students, who develop the lifelong physical training consciousness and interest, and reconstruct of university sports curriculum system and evaluation system. Song Qiang [4] through the method of literature and interviews have the analysis on PE teaching that pointed out the operation of sports curriculum goals was difficult, and the all-round development of students was ignored, teaching evaluation was not scientific, at all he put forward the opinions to solve the problem. Some researchers have the comparative study of domestic and foreign teaching evaluation method. They analyze and evaluate the system of American, British, Japanese sports teaching, and they reconstruct a new evaluation system, which provide some reference for the reform of university sports teaching appraisal [5-6]. LuoPing [7] construct the factors Analysis of the pluralistic evaluation, He evaluate specifically the practice of PE Teaching in China, and obtain the effective suggestions. According to the research on College PE teaching, Wang Shouwen [8] support the reform and innovation of the textbook system, He innovate teaching mode and method and he think that the sports curriculum evaluation system is the crux of the teaching reform of physical education curriculum. Fan Ruqing [9] also published in 2011, "sports teaching evaluation system", the article describe implementation meaning and effectiveness of the physical teaching evaluation from three aspects, the aspects consist of the sports teaching evaluation indexes, the theoretical basis, the establishment of physical education evaluation system principle.

THE NECESSITY ANALYSIS OF AHP METHOD

The analytic hierarchy process (AHP) is the multi-objective decision of combination of qualitative and quantitative analysis method which can solve a complex problem [10]. With decision person experience, we judge the relative importance if it can achieve the goal of the standard, and each standard reasonably give each decision weight, it will calculate rank by weight of each solution, and effectively apply to those subjects cannot be solved with quantitative method. Its characteristic is the combine of qualitative and quantitative decision, according to the thinking and psychological regular, decision process has quantity and graduation [11]. AHP analysis method is a system which is widely used in system science.

In the past literatures good quantitative evaluation methods for public sports teaching have been not found, we use economics research methods to study the sports teaching problems, this is a new attempt this year for cross discipline, through calculation and inference, the conclusion can provide data support for the construction of evaluation index system of physical education, it also can improve the objectivity and science of index system. In 2011, Hu Yonghong [12], Zhou Dengsong published a paper "the evaluation index system research of effective physical education teaching" in Journal of Beijing Sport University, the effective indexes of middle school sports teaching evaluation are analyzed, it relates to the AHP method, they put forward the intension of effective sport teaching include three aspects of effect, efficient and benefit; the ideas of the effective physical education teaching pay attention to overall progress and development of students. And they promote student learning. Xiong Tao [13] in March this year published "study on the construction of school physical education teaching evaluation system from the perspective of AHP", make a descriptive study of physical education teaching evaluation, however, public sports curriculum system has its own particularity, but also different from the professional physical education curriculum teaching, therefore, the method has creative and certain theory value, if public sports teaching base on its own characteristics. It will provide scientific support for the objective evaluation of teaching effect of public sports curriculum.

THE EVALUATION SYSTEM CONSTRUCTION OF TEACHING EFFECT OF PUBLIC SPORTS CURRICULUM

We make the construction graph, which is aimed at Index system of physical education teaching evaluation, the following is the analysis process:

- (1) We inquire expert advice. The structure diagram of the public physical education curriculum evaluation system hierarchy is shown in figure 1.
- (2) According to the "saaty1-9 ratio scale table", we compare with two among factors with quantization, and we construct judgment matrix.
- (3) According to the judgment matrix, we compute feature vector, and do the consistency check.
- (4) We come to the total sorting tables, analyze, demonstrate and then make a decision.

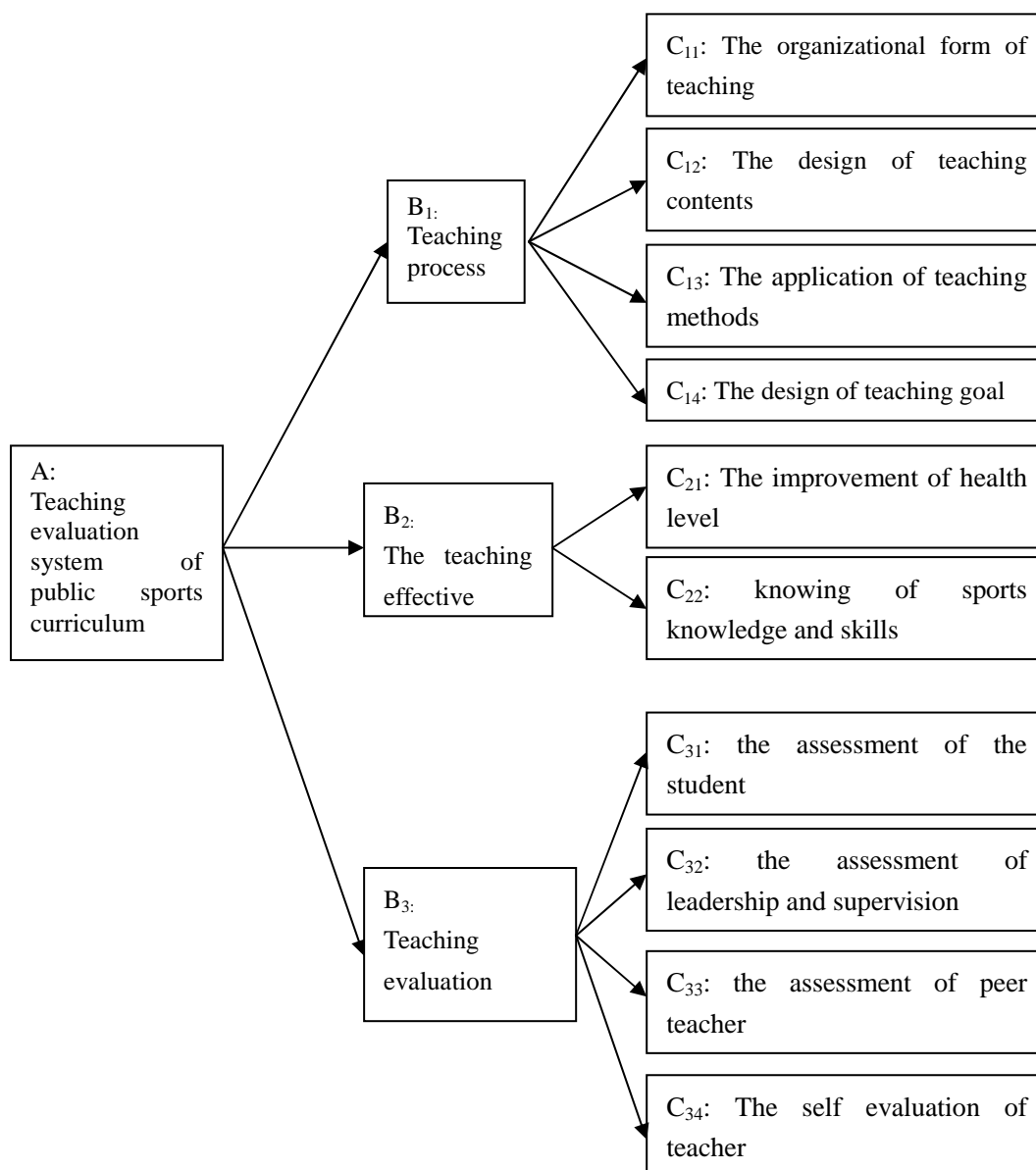


Fig.1: Block diagram of public sports curriculum evaluation system

RESULTS AND ANALYSIS

4.1 The establishment of B_1 , B_2 , B_3 for the judgment matrix A (Table 1)

Table 1: B_1 , B_2 , B_3 for the judgment matrix A

A	B_1	B_2	B_3
B_1	1	2	3
B_2	1/2	1	2
B_3	1/3	1/2	1

The first step, the eigen vector W_i :

$$w_1 = \sqrt[3]{1 \times 2 \times 3} = \sqrt[3]{6} = 1.82$$

$$w_2 = \sqrt[3]{1.5 \times 1 \times 2} = \sqrt[3]{3} = 1$$

$$w_3 = \sqrt[3]{0.33 \times 0.5 \times 1} = \sqrt[3]{0.165} = 0.55$$

$$\sum w_i = 1.82 + 1 + 0.55 = 3.37$$

The second step, the normalization that:

$$w_1 = \frac{1.82}{3.37} = 0.54 \quad w_2 = \frac{1}{3.37} = 0.3 \quad w_3 = \frac{0.55}{3.37} = 0.16$$

The third step, the test of consistency:

The maximum Eigen value calculation of judgment matrix (λ^{\max}):

$$\overline{W}_i = \begin{pmatrix} 1 & 2 & 3 \\ 0.5 & 1 & 2 \\ 0.33 & 0.5 & 1 \end{pmatrix} \begin{pmatrix} 0.54 \\ 0.3 \\ 0.16 \end{pmatrix}$$

$$\overline{W}_1 = 1 \times 0.54 + 2 \times 0.3 + 3 \times 0.16 = 1.62$$

$$\overline{W}_2 = 0.5 \times 0.54 + 1 \times 0.3 + 2 \times 0.16 = 0.89$$

$$\overline{W}_3 = 0.33 \times 0.54 + 0.5 \times 0.3 + 1 \times 0.16 = 0.89$$

$$\begin{aligned} \text{Then, } \lambda^{\max} &= \sum \frac{\overline{W}_i}{n \times W_i} = \frac{\overline{W}_1}{3 W_1} + \frac{\overline{W}_2}{3 W_2} + \frac{\overline{W}_3}{3 W_3} \\ &= \frac{1.62}{3 \times 0.54} + \frac{0.89}{3 \times 0.3} + \frac{0.49}{3 \times 0.16} \\ &= 3.01 \end{aligned}$$

Bring into

$$CI = \frac{\lambda^{\max} - n}{n - 1} = \frac{3.01 - 3}{3 - 1} = 0.005$$

And by checking the table AHP-2 "1-9RI table" that, RI=0.58

$$\text{Bring into } CR = \frac{CI}{RI} = \frac{0.005}{0.58} = 0.0086$$

For $0.0086 < 0.10$, the consistency test is passed.

The routing process can be obtained, in the evaluation of public physical education curriculum teaching effect factors, the evaluation of teaching process is dominant, follow by the teaching effect, including raising the students' health, knowing of sports foundation knowledge and skills, the third one is "teaching evaluation" factors, the factors mainly refer to the assessment of the students, leadership, supervision, peer teacher and self evaluation of teacher.

4.2 The establishment of C21, C22 for the judgment matrix B2 (Table 2).

Table 2: C21, C22 for the judgment matrix B2

B ₂	C ₂₁	C ₂₂	W _{2i}
C ₂₁	1	2	0.6667
C ₂₂	1/2	2	0.3333

Judgment matrix is two bands, i.e. $\lambda^{\max} = 1.3333$, $CI_{2j} = 0$, $RI_{C2} = 0$ the consistency test is passed.

4.3 The establishment of C31, C32, C33, C34 for the judgment matrix B3 (Table 3)

Table 3: C31, C32, C33, C34 for the judgment matrix B3

B ₃	C ₃₁	C ₃₂	C ₃₃	C ₃₄	W _{3i}
C ₃₁	1	2	3	5	0.47
C ₃₂	1/2	1	3	4	0.31
C ₃₃	1/3	1/3	1	3	0.15
C ₃₄	1/5	1/4	1/3	1	0.07

The eigen vector W_{3i}

$$\overline{W}_{3i} = \begin{pmatrix} 1 & 2 & 3 & 5 \\ 0.5 & 1 & 3 & 4 \\ 0.33 & 0.33 & 1 & 3 \\ 0.2 & 0.25 & 0.33 & 1 \end{pmatrix} \begin{pmatrix} 0.47 \\ 0.31 \\ 0.15 \\ 0.07 \end{pmatrix} \begin{matrix} \overline{W}_{31} = 1.89 \\ \overline{W}_{32} = 1.275 \\ \overline{W}_{33} = 0.615 \\ \overline{W}_{34} = 0.291 \end{matrix}$$

$\lambda_{\max} = 4.08$, $CI_3 = 0.026$, $CR = 0.045 < 0.10$, the consistency test is passed. 4.4 we obtain the total rank table by the rank test of all the index system.

Table 4: the total sorting table of composite indicators

A	B ₁	B ₂	B ₃	The composite weight	The total rank
	0.54	0.3	0.16		
C ₁₁	0.37	0	0	0.1998	3(※)
C ₁₂	0.14	0	0	0.0756	5
C ₁₃	0.38	0	0	0.2052	1(※)
C ₁₄	0.11	0	0	0.0594	7
C ₂₁	0	0.67	0	0.201	2(※)
C ₂₂	0	0.33	0	0.099	4
C ₃₁	0		0.47	0.0752	6
C ₃₂	0		0.31	0.0496	8
C ₃₃	0		0.15	0.0240	9
C ₃₄	0		0.07	0.0112	10

Note: "※" is the key index (weight was more than 0.1)

From the above discussion, in many factors that affect the physical education teaching evaluation system, the improvement of health, the application level of teaching methods and teaching organization form have the dominant position, they have 0.606 (0.2052+0.201+0.1998) weight, and account for 60.6% of all the evaluation index therefore, we can say, the level of students' health is the intuitive index to evaluate the effect of physical teaching, scientific and rational teaching methods, novel and strict teaching organizational form assure the premise of sports teaching. three indexes which focus on public sports teaching effect are relatively scientific, they can objectively reflect the "strong body" effectiveness of the physical education, to a certain extent, they also reflect the sports teachers' professional level and teaching quality, therefore, in order to improve teaching effective of the public physical education curriculum, we need to be made efforts for the two back factors so as to improve the health level of the students, and realize the goal of PE teaching.

CONCLUSION

Along with the deepening of the reform of teaching, the aims of sports scholars are to seek objective, scientific and reasonable evaluation system for a long time, the main purposes of teaching evaluation is the diagnosis of teaching and learning and the reaching degree of curriculum objectives, it is the important basis and way which improve of curriculum construction. Through the research and exploring, we should develop fully main part of the students and the teachers' leading by means of the combination of qualitative and quantitative evaluation; we establish gradually the evaluation system of school physical education curriculum, which becomes more perfect.

Students are the main body of physical education teaching, the students' health is the visual indicators which evaluate the effective of physical education teaching and the scientific and rational teaching methods, and the novel and strict organization form are the premise of sports teaching.

Acknowledgement

I am grateful to the sponsorship provided by Teaching Project supported project (201052) by Lanzhou University of Technology.

REFERENCES

- [1] Antúnez Pérez; ángel Z.; Aranguren Rincón; Carmen, *Educere*, **2005**, (9), 481-486.
- [2] Lian-xiang Fan; Ling-yun Pan; Xiao-yong Yang, *J. of Wuhan Ins. of Phy. Edu.*, **2009**, (43), 86.
- [3] Zhang Xiuhua, *J. of Beijing Sport, Univ.*, **2002**, (4), 511-513.
- [4] Song qiang, *Sport. Sci. Res.*, **2011**, (4), 75-78.

-
- [5] Nandan V. Shinde; Prashant U. Tompe; Mrinalini C. Damle; Ashwini R. Madgulkar, *J. of Chem. and Phar. Res.*, **2013**, 5(8), 85-90.
- [6] Xue Wenmin; Dong Xiaoqi, *Cont. Edu. Res.*, **2010**, (11), 110-111.
- [7] Luo Ping; Tan Baoming, *Teaching and Management*, **2010**, (1), 64-65.
- [8] Wang Shouwen, *Chi. Hig. Edu. Res.*, **2007**, (5), 88-89.
- [9] Fan Ruqing, *Teaching and Management*, **2011**, (6), 65-66.
- [10] P. Sanjay Sarathy, *Qua. & Qua.*, **2013**, (47), 2049-2063.
- [11] Nikzad Manteghi; Mohmmad Jafar; Haddadpoor Jahromi, *Proc. Tech.*, **2012**, (1), 481-484.
- [12] Hu Yonghong; Zhou Dengsong, *J. of Beijing Spor. Univ.*, **2011**, (34), 81-85.
- [13] Xiong Tao, *Phy. Edu. of school.*, **2013**, (3), 41-42.