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The study on comprehensive evaluation model for sports teaching quality

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ABSTRACT

The evolution of sports teaching is a kind of important mode of teaching evolution in school. With the development of society, Universities and Colleges developed in-depth comprehensive research and showed general concerns on sports teaching evaluation. The establishment of a perfect system in physical education is a new requirement that the new historical period entrusted on the Institutions of Higher Education in China because it has a far-reaching impact on improving national quality and physical quality. The paper builds a historical system for the sports teaching, also builds model of sports teaching in theory. By constructing a basically thought of fuzzy comprehensive evolution by using the principle of maximum membership degree and fuzzy linear transformation, and considering various influence relevant to the assessment of the things, one goal towards reasonable integrated assessment on another thing can be reached. After that, rationality and effectiveness of comprehensive evaluation model are verified through two practical examples in different locations, which prove that the evaluation results are in good level. Therefore, the verification proved that the model is accurate, which achieved practical application that evaluation model fuzzy mathematics plays a part on the students' physical quality. © 2014 Trade Science Inc. - INDIA

KEYWORDS

Sports teaching;
Fuzzy logic;
The comprehensive evaluation system;
The teaching quality;
Mathematical model.

INTRODUCTION

As an important part in school education, sports teaching are a key factor for improving students' physical health, strengthening their bodies and promoting their normal growth.

Sports teaching can be combined with other teaching courses in school to cultivate talents. Evaluating sports teaching training level is an important tool to check it, which is also a complex job with various factors. For always, Evaluation on sports working is described based on the remarks such as "Whether or qualified teaching

earning" "basically-qualified", "under qualified", or "well-qualified", "not good", "better" or "difficult" and so on. However, this evaluation model is not quantitative comments but an empirical evaluation; thus, it is difficult to make concrete and objective evaluation.

Many people have made efforts to do research on sports teaching and made achievements, which provides favorable conditions for current scholars from all sectors of society to research it, and provides the motivation for the development of people's health. For instance, Chenyukun's study on duration Evaluation has deep theoretical value for improving the quality of sports

teaching, Nowadays, we are faced with the new historical figures in the new century, and China is constructing innovative country. Also, We are faced with the further deep research to the new sports curricula teaching. For this, he made specific and deep discussion on how to improve the evaluation system of sports education, what kind of evaluation theory could be constructed, and how to judge the sports teaching comprehensively, objectively and fairly^[2].

Shenxiaoqiang thinks that the evaluation of sports teaching is related to the information collected by the public and fair procedures, which is a system evaluation course. Furthermore, this study contributes to the improvement of sports teaching performance and developing the students' sports quality^[3], Zhangjun thinks that the purpose of sports teaching evaluation is to develop sports education cause in a higher level. And it is a fair, objective and comprehensive evaluation activity targeted at teachers' job effect and professional quality^[4]. Some people like Zhaxianfeng, Muyingjie made narration, aimed at sports teaching, which is a procedure and result for sports teacher's potential value. The final goal is to cultivate more high—quality talents for physical education cause^[5], Liyuhua, who wrote the book named On the Evaluation View by Sports Teachers in 21st century, explained that physical education in universities carries out a process which is a perfect combination for intelligence and physical strength, for art education and intellectual education. He proposed building a comprehensive evaluation mechanism designed for sports teachers, which is required to perform relative evaluation to several aspects of teachers' performance and effect index, responsibility index; quality index. {2}In the article, Analysis on sports teachers Evaluation values from Harmonious Education Construction, Zhuzhihua and Zhushaohua put forward the construction of harmonious sports education system based on comprehensive evaluation system of sports teaching, which is the basic way and tool for constructing socialist harmonious society, Therefore. It has important and practical significance to attach importance to comprehensive evaluation of education.

The paper analyzed the factors that affect sports teaching based on the previous research result. Instead of quantitative evaluation for value, previous evaluation result is determined according to experience, so it is

difficult to give an objective and detailed evaluation. This thesis attempted to employ Fuzzy methods to evaluate sports teaching training level, which is for seeking a more objective and quantitative evaluation method, Thus, Fuzzy methods are employed to make a comprehensive judgment towards sports teaching quality, for which theoretical basis is provided through the analysis of the fuzzy algorithm. Meanwhile, the rationality and effectiveness of this model are verified through practical application.

FUZZY COMPREHENSIVE EVALUATION MODEL

The comprehensive evaluation of sports teaching is influenced by many factors, but these factors are fuzzy and uncertain, so, it is hard to make a judgment using precious methods, for the more reasonable establishment for comprehensive evaluation system of sports teaching, we presented fuzzy mathematic comprehensive evaluation model.

Through the basically idea that fuzzy comprehensive evolution is constructed by using the principle of maximum membership degree and fuzzy linear transformation, which is the main theoretic basis, and considering various influence relevant to the assessment of the things, one goal towards reasonable integrated assessment on another thing can be reached. Thus, the methods and procedures of comprehensive evaluation are carried out by fuzzy mathematics as follows [4]:

First, the object of evaluation should be determined, and it is influenced by the way that “n “factors affect single variable, whose factors set is u , the definition is $u = (u_1, u_2, u_3, \dots, u_n)$ and $u_i (i = 1, 2, 3, \dots, n)$ defined. Due to the different weight, the impact degree to certain judgment is not the same. Suppose that the weight distribution is a_i $a_i = (a_1, a_2, a_3, \dots, a_n)$, in which, $a_i (i = 1, 2, 3, \dots, n)$ is the weight value of Formula2, It is dear that $a_i \geq 0$ and $\sum_{i=1}^n a_i = 1$. If each

factor a_i contains m sub factors and factors set is $u_i = (u_{i,1}, u_{i,2}, u_{i,3}, \dots, u_{i,m})$, so, the corresponding

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weight value, is $a_i = (a_{i,1}, a_{i,2}, a_{i,3}, \dots, a_{i,m})$

For a the $u_{i,j}$ weight value, It's known from common

sense knowledge that $a_{i,j} \geq 0, \sum_{j=1}^m a_{i,j} = 1$, a evalua-

tion index collection, can be constructed like this:

$v = (v_1, v_2, v_3, \dots, v_s)$. Corresponding evaluation ob-

jects can be divided into s grades. suppose

$v_1, v_2, v_3, \dots, v_s$ we set a quality evaluation from the high-

est to the lowest, such as "excellent", "good", "passed"

"failed" and so on.

After defining the quality evaluation for the index every

factor $u_{i,j}$, the fuzzy comprehensive evaluation result

for factor u_i is performed. Sup-

p o s e $u_{i,j} (j = 1, 2, 3, \dots, m)$,

$r_i = (a_{i,1}, a_{i,2}, a_{i,3}, \dots, a_{i,m}) * (r_{i,1})^T, i = 1, 2, 3, \dots, n$,

fuzzy comprehensive

Evaluation index set V

Through synthetic calculation of the fuzzy matrix, the

comprehensive evaluation results can be calculated. The

result is as follows:

$b = a * r = (a_1, a_2, a_3, \dots, a_n) * (r_1, r_2, r_3, \dots, r_n)^T,$

$= (b_1, b_2, b_3, \dots, b_n)$ from the fuzzy set, a definite evalua-

tion grade can be obtained by using maximum evalua-

tion degree method. Due to $B_k = \{B_i\}$, the grade for

its final evaluation result is k

THE COMPREHENSIVE EVALUATION MODEL FOR SPORTS CURRICULUM TEACHING

The total evaluation set

The total evaluation set

$u = (u - qualitative analysis$

$u - quantitative analysis)$

Among them:

$u - qualitative = (u_1 \ u_2 \ u_3) = (Peer evaluation ,$

Student assessment , Expert evaluation)

$u - quantitative = (u_4 \ u_5 \ u_6) = (Certificates ,$

performance , Student achievement)

The establishment for the weight of single factor

The asymptotic concomitant probability, the weight

of single factor and Kendall's correlation coefficient

were calculated through relevant statistics. TABLE 1

and TABLE 2 are shown as follows:

From TABLE 2 above, it is known that the asymp-

TABLE 1 : Respective weight values

Mean	Rank
a_1	0.502
a_2	0.297
a_3	0.201
a_4	0.607
a_5	0.210
a_6	0.191

TABLE 2 : Kendall's correlation coefficient and the asymptotic concomitant probability

N28	
<i>Kendall's Wa</i>	0.941
<i>Asymp.Sig</i>	0.001

otic probability, *Asymp.Sig* is 0.001, which is less than

0.01, and its w Kendall's correlation coefficient is 0.940,

from this, it can be seen that the related coefficient is

outstanding. Thus, the data in table 1 need correcting

to obtain $a_1=0.5, a_2=0.3, a_3=0.2, a_4=0.06,$

$a_5=0.21, a_6=0.19, 0$

Establishing weight proportion sets

$a - comprehensive = (a - qualitative ,$

$a - \text{quantitative}) = (0.5, 0.5)$

Among which:

$a - \text{qualitative} = (a_1 \ a_2 \ a_3) = (0.5 \ 0.25 \ 0.25)$

$a - \text{quantitative} = (a_4 \ a_5 \ a_6) = (0.6 \ 0.20 \ 0.20)$

Thus:

$a - \text{Qualitative comprehensive} = 0.5 *$

$(0.5 \ 0.3 \ 0.2) = (0.25 \ 0.15 \ 0.1)$

$a - \text{Quantitative comprehensive} = 0.5$

$*(0.6 \ 0.20 \ 0.20) = (0.3 \ 0.105 \ 0.095)$

Thus:

$a - \text{comprehensive} = (0.25 \ 0.15 \ 0.1$

$0.3 \ 0.105 \ 0.095)$

Establishing comprehensive fuzzy matrix of sports curriculum

$$b = a * r = a * \begin{pmatrix} u_1 \\ u_2 \\ u_3 \\ u_4 \\ u_5 \\ u_6 \end{pmatrix} = (0.25 \ 0.15 \ 0.1 \ 0.3 \ 0.105 \ 0.095) * \begin{pmatrix} u_1 \\ u_2 \\ u_3 \\ u_4 \\ u_5 \\ u_6 \end{pmatrix}$$

MODEL APPLICATION

The investigation is carried out among the students in a school, sports courses taken for example. The result showed that 5% of courses, which is taken by 2 teachers, are poor; 20%, which is taken by 8 teachers, are in the middle level; 27.5%, which is taken by two teachers 11, are good; 47.5%, which is taken by 19 teachers, are excellent. Afterwards, the result from a questionnaire survey to the ten teachers showed that no course is poor, 10% of the courses, taken by 2 people, are in the intermediate level, 30% of the courses are good, which is from 3 people, 60% of the courses are good. Finally, we gave out ten pieces of appraisal form. Form this, it turned out that on one is poor, 20% are in the medium level, 2 people in total; 30% are good, 3 people in total, 50% are excellent, 5 people in total:

$$b = a * r = a * \begin{pmatrix} u_1 \\ u_2 \\ u_3 \\ u_4 \\ u_5 \\ u_6 \end{pmatrix} = (0.25 \ 0.15 \ 0.1 \ 0.3 \ 0.105 \ 0.095) * \begin{pmatrix} 0.5 & 0.3 & 0.2 & 0 \\ 0.475 & 0.275 & 0.2 & 0.05 \\ 0.6 & 0.3 & 0.1 & 0 \\ 0.16 & 0.44 & 0.344 & 0.56 \\ 1 & 0 & 0 & 0 \\ 0.16 & 0.28 & 0.52 & 0.04 \end{pmatrix} = (0.4245 \ 0.3049 \ 0.243 \ 0.028)$$

Therefore, from the matrix above, it's clear that the poor level accounts for 0.028, the middle for 0.243, the good for 0.3049, the excellent for 0.4245.

Students, leaders, colleagues, experts, respectively from four different fields were selected to perform the judgment to sports teaching curriculum. Table 3 shows the judgment, and the weight values of evaluation index for level result model of the evaluation factor is as follows:

According to the principle of maximum membership degree, it is known that the sports teaching effect is good. Suppose that four levels are assigned respectively as 40 for the poor, 60 for the medium, 80 for the good, 100 for the excellent, the result of the sports teaching curriculum is like this:

$$b = 0.4245 * 100 + 0.3049 * 80 + 0.243 * 60 + 0.028 * 40 = 82.512$$

So, the teaching quality is good.

According to the weight above and calculation based on fuzzy operator model, the results of sports teaching attitude are as follows:

$$r_1 = a_1 * r_1 = (0.568 \ 0.098 \ 0.225 \ 0.109) * \begin{pmatrix} 0.750 & 0.217 & 0.033 & 0 & 0 \\ 0.800 & 0.167 & 0.017 & 0.017 & 0 \\ 0.517 & 0.333 & 0.150 & 0 & 0 \\ 0.850 & 0.133 & 0 & 0 & 0.017 \end{pmatrix} = (0.713 \ 0.229 \ 0.054 \ 0.002 \ 0.002)$$

TABLE 3 : the statistical table for sports course evaluation

First level index	Weight value	Second level index	Weight value	evaluation (person)				
				unqualified	qualified	middle	good	excellent
Teching ability	0.157	u_{11}	0.267	0	1	2	5	52
		u_{12}	0.298	0	0	5	11	44
		u_{13}	0.215	0	0	3	14	43
		u_{14}	0.220	0	0	5	21	34
Teaching effect	0.148	u_{21}	0.347	0	1	26	26	25
		u_{22}	0.284	0	0	42	42	11
		u_{23}	0.206	0	0	50	50	9
		u_{24}	0.163	1	2	21	21	33
Teaching attitude	0.164	u_{31}	0.568	0	0	0	2	13
		u_{32}	0.098	0	0	1	1	10
		u_{33}	0.225	0	0	0	9	20
		u_{34}	0.109	0	0	0	0	8
Teaching contents	0.301	u_{41}	0.432	1	6	23	17	13
		u_{42}	0.186	3	2	14	19	22
		u_{43}	0.117	0	0	25	8	27
		u_{44}	0.265	0	2	26	14	18
Teaching methods	0.230	u_{51}	0.236	0	0	4	37	19
		u_{52}	0.297	0	0	2	36	22
		u_{53}	0.182	0	0	3	43	14
		u_{54}	0.285	0	0	3	22	35

$$r_2 = a_2 * r_2 = (0.568 \ 0.098 \ 0.225 \ 0.109)$$

$$\begin{pmatrix} 0.750 & 0.217 & 0.033 & 0 & 0 \\ 0.800 & 0.167 & 0.017 & 0.017 & 0 \\ 0.517 & 0.333 & 0.150 & 0 & 0 \\ 0.850 & 0.133 & 0 & 0 & 0.017 \end{pmatrix}$$

$$= (0.713 \ 0.229 \ 0.054 \ 0.002 \ 0.002)$$

From the calculating procedures above, it can be concluded that the evaluation results are as below:

M e d i u m :

$$r_2 = a_2 * r_2 = (0.294 \ 0.259 \ 0.372 \ 0.058 \ 0.017)$$

Good: $r_3 = a_3 * r_3 = (0.392 \ 0.559 \ 0.049 \ 0 \ 0)$

E x c e l l e n t :

$$r_4 = a_4 * r_4 = (0.728 \ 0.204 \ 0.063 \ 0.005 \ 0)$$

G o o d :

$$r_5 = a_5 * r_5 = (0.317 \ 0.578 \ 0.091 \ 0.011 \ 0.003)$$

From the weight above, the result of further fuzzy evolution can be as follows:

$$b = a * r = (r_1 \ r_2 \ r_3 \ r_4 \ r_5)^T$$

$$= (0.165 \ 0.300 \ 0.231 \ 0.158 \ 0.147)$$

$$\begin{pmatrix} 0.712 & 0.229 & 0.054 & 0.002 & 0.002 \\ 0.293 & 0.259 & 0.372 & 0.058 & 0.017 \\ 0.393 & 0.559 & 0.049 & 0 & 0 \\ 0.728 & 0.204 & 0.063 & 0.005 & 0 \\ 0.318 & 0.578 & 0.091 & 0.011 & 0.003 \end{pmatrix}$$

$$= (0.457 \ 0.362 \ 0.155 \ 0.020 \ 0.006)$$

From above, the evaluation result is in excellent level, which is more accurate than before. Besides, through the combination of the result and weight value, the general evaluation conclusion can be x :

$$x = a * r = a * (0.326 \ 0.210 \ 0.304 \ 0.160)$$

$$\begin{pmatrix} 0.218 & 0.346 & 0.215 & 0.117 & 0.003 \\ 0.395 & 0.326 & 0.204 & 0.067 & 0.007 \\ 0.318 & 0.415 & 0.196 & 0.021 & 0 \\ 0.457 & 0.362 & 0.155 & 0.076 & 0.005 \end{pmatrix}$$

$$= (0.324 \ 0.365 \ 0.230 \ 0.076 \ 0.004)$$

From this matrix, it can be seen that the maximum evaluation value is 0.365, thus, it can be concluded that the teaching quality is good.

CONCLUSIONS

The comprehensive evaluation model of sports teaching is influenced by many factors, so we applied the fuzzy mathematic methods to the comprehensive evaluation, which proved a clear advantage. The model is scientific when it is constructed and evaluated in terms of sports assessment theories and practice, which can provide rich

guidance and suggestions on sports evaluation theories for schools. We employ fuzzy mathematic way to perform sports comprehensive evaluation without the requirement of completely accurate and quantitative evaluation, which provided a method of processing quantitatively for sports teaching by way of transforming qualitative analysis into quantitative analysis. In the model, the distribution of weight is the most important, different curriculum teaching mode can be evaluated comprehensively, only according to different curriculum teaching weight, therefore, this model has extensiveness.

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