Research on Fuzzy Comprehensive Evaluation of Sunshine Sports in Colleges and Universities

Dongbo Wang¹, Wenjuan Lu²

¹College of Physical Education, Hubei Normal University, Huangshi435000, China
²College of Economics and Management, Hubei Normal University, Huangshi435002, China

Abstract

In line with interpretations of Central Document No. 7 Notice on the Implementation of the National Health Standards for Students, Notice on Carrying out Sunshine Sports for Hundreds of Millions of Students in China and others, based on the actual situation of physical education in Colleges and Universities, the study analyses the practical experience of developing sunshine sports for students in colleges and universities. After consulting with experts on their opinions and suggestions, we set up 6 primary indexes and related secondary indexes and prepare SERVQUAL education evaluation system to ensure the scientificity and systematicness of the whole evaluation index system. The purpose of this study is to evaluate the systematicness and completion of sunshine sports education in ordinary colleges and universities, and then propose measures and direction for improvement.

Key words: Higher education, Sunshine sports, Comprehensive evaluation.

1. RESEARCH BACKGROUND

1.1 Literature review

Sunshine sports is a form of higher education, which guides students to build a positive sports spirit, form a good exercise habit and eventually form a healthy movement mentality and the outlook on life and values (Shi, 2014). The sunshine sports teaching ranges widely and research achievements in recent years show that the understanding of sunshine sports is based on sports, sports culture, construction of campus culture, sports psychology, sports spirit and other aspects (Zeng and Wu, 2014). Whether the ordinary colleges and universities can establish effective teaching mode in daily teaching, and guide students' movement mentality to generate the optimal arrangement based on three dimensions of physical education curriculum, sports psychology and values is the development direction of sunshine sports (Qian and Wang, 2011). Then, if the achievement of this teaching goal is judged, it is the key question that the ordinary colleges and universities pays attention to. Based on a new design of the SERVQUAL evaluation system, the study analyzes the evaluation method of sunshine sports according to the relevant teaching variables, so as to obtain more accurate teaching evaluation judgment (Ma, 2011). In order to prove the fuzzy judgment of the feasibility of teaching model indicators in the comprehensive evaluation system of ordinary colleges and universities, and further improve the teaching planning to build a perfect physical education model for college students, so as to achieve the effectiveness of sunshine sports education mechanism.

1.2 Research purpose

From previous sports teaching process, it can be found that if students have good sports psychology, it’s relatively conducive to the development of relevant courses. But if the students keep resistant to sports itself, then the implementation of physical education in sports must deviate from the main line of education target (Li and Wang, 2014). The fundamental question is whether the teachers construct the sunshine sports thinking for students, which can stimulate the students' sports potential and the participation of sports activities (Hao and Gao, 2011). Therefore, for ordinary colleges and universities, sunshine sports education, sunshine sports activities and sunshine sports mentality are the most fundamental goal of physical education (Yang and Zhang, 2010). Therefore, this study, through the design of fuzzy comprehensive evaluation system, analyzes the
feasibility of ports education model in ordinary colleges and universities and puts forward the teaching innovation strategies, aiming at raising the integration and cooperation of the sunlight sports education in ordinary colleges and universities.

2. DATA AND METHODOLOGY

2.1 General data

Taking the relationship and the law of various factors of carrying out the sunshine sports in ordinary colleges and universities as the objects, we particularly choose Jilin University, Xiamen University and Yunnan University to carry on the data research. This study analyzes the practical experience and theoretical summary of generality of three ordinary universities in carrying out the sunshine sports in ordinary colleges and universities. The questionnaires are collected from students of three colleges and universities, and some interference factors were excluded from the survey, such as the filling of questionnaires in reference to other people's opinions, or more than 1d recycling feedback. 7,528 actual questionnaires are sent out and 6,698 questionnaires are collected, with an effective recovery rate of 88.97%.

2.2 Questionnaire index

According to such high-end academic conferences as the 20th Report of Research Papers on the National College Track and Field Athletics, 2010 International Sports Academic Forum and Sunshine Sports Achievements Exhibition and evaluation of special supervision on sunshine sports in colleges and universities, the study sends a questionnaire to the experts and leaders of the Ministry of Education to consult experts' opinions and suggestions on the evaluation index and index weight of sunshine sports. Through two rounds of expert investigation, the evaluation index system of sunshine sports in colleges and universities is determined under the condition that experts' opinions are basically agreed. Six primary indexes and related secondary indexes are set up and a SERVQUAL education evaluation system is developed to ensure the scientificity and systematization of the whole evaluation index system.

2.3 System analysis

The study systematically analyzes the development of sunshine sports in ordinary colleges and universities, constructs the evaluation index system and the evaluation method with the multi-index comprehensive evaluation, compares the evaluation indexes of the sunshine sports in colleges and universities, and from the practice summary to the theoretical research, make judgments on the development of the sunshine sports in colleges and universities.

2.4 Mathematical statistics

Statistical analysis was conducted on all the data involved in the questionnaire. The relevant data collected above are analyzed by SPSS19.0 statistical software. With the statistical data of relevant data, and in combination with the SERVQUAL evaluation system, the study carries out the weight comparison and calculation. According to the LIKERT scale, the collected information is divided into five grades to measure the completion degree and education quality of the sunshine sports education in colleges and universities.

3. FUZZY COMPREHENSIVE EVALUATION MODEL OF SUNSHINE SPORTS IN COLLEGES AND UNIVERSITIES

3.1 Variable selection of SERVQUAL evaluation system

Based on the collection of questionnaires from three comprehensive universities, this study records the measures and organizational forms of physical education in ordinary colleges and universities at present, and in combination with the feedback information of college students, designs the relevant variables of SERVQUAL evaluation system. Its main items include effectiveness, reliability, value, assurance, care and brand, as shown in Table 1.

Table 1 Reference variables of education evaluation system of university sunshine sports
### 3.2 Analysis of parameter factors

First, reference variable of effectiveness: For evaluating the final effect of sports education in colleges and universities, students' exercise habits and the theoretical level, sports level, sports skills and sports standards are taken as the main reference variables (Zhao and Yao, 2010).

Second, reference variable of reliability: According to the interviews with college students, it's essential to collect the students' evaluation on the quality of physical education, and then make clear the quality of physical education in colleges and universities. The secondary reference variables include physical education trust, physical education culture, physical education science, teaching planning arrangement and others.

Thirdly, reference variable of value: According to the teaching methods of college physical education and the feedback information of organization activities, it's necessary to collect the substantive value of sports research direction, including such contents as whether the students effectively enhance the sports values, whether students have been improved in the effective period, whether students can develop high cultural accomplishment, the daily sports teaching ability of sports teachers and other.

Fourth, reference variable of assurance: To investigate sports education projects and evaluate infrastructure in colleges and universities, including the scale of stadiums, the quantity and renewal rate of sports subjects in libraries, sports teaching equipment, etc. To assess the students’ comprehensive evaluation of college sports facilities from the students’ feedback, with satisfactory, medium, general, and poor as the four evaluation criteria to measure the physical education infrastructure in colleges and universities, and the recommendations of sports teachers as a measurement guide (Yao and Zhao, 2010).

Fifth, reference variable of care: To evaluate the humanistic solicitude of sports teachers for students' psychological counseling through the feedback information of students, with such reference variables as daily teaching assistance, whether sports teachers understand students' sports needs, the frequency of communication between sports teachers and student, students' satisfaction towards teachers and others.

Sixth, reference variable of brand: It mainly focuses on the popularity of the university itself in the sports field of other areas and the rankings of students from the university in sports events, the research results and awards of the teachers or research groups (Liu and Zhang, 2010). Therefore, it is clear whether the university has high reputation in sports education, so as to clarify the implementation of sunshine sports education.

### 3.3 Evaluation steps of Sunshine Sports

For the first step, according to the feedback information of college students, sunshine sports education expectation value E and the actual perceived value P of sunshine sports education are designed comprehensively. According to the LIKERT scale, the information is divided into five levels: strongly agreed, agreed, basically agreed (whatever), disagreed and strongly disagreed, with the scale ranging from five to one. The students’
feedback information is collected and sorted and then analyzed through SPSS 19.0 statistical software to obtain the evaluation scale of sunshine sports education in ordinary colleges and universities.

For the second step, according to the quantization standard of the SERVQUAL evaluation system, the reference value weights are designed for the related fraction, that’s,

$$SQ = \sum_{j=1}^{6} w_j \frac{1}{n} \sum_{i=1}^{n} (P_{ji} - E_{ji})$$  \hspace{1cm} (1)

Where, SQ represents the quality of the perceived education service of sunshine sports education by college students, $j = 1, 2, 3, 4, 5$ and 6.

$P_{ji}$ represents the actual perceived value of the item i under the $j^{th}$ index.

$E_{ji}$ represents the expected value of the item i under the $j^{th}$ index in term of sports education in ordinary colleges and universities.

$W_j$ represents the weight of every primary index, that’s, the comprehensive evaluation value of the importance of sunshine sports education for college students.

$n$ represents the total number of tested items under the $j^{th}$ index.

For the third step, the feedback information of ordinary college students is evaluated by the calculation results in an average manner to further obtain the fuzzy value of service quality of sunshine sports education:

$$SQ_{AV} = \frac{\sum_{i=1}^{N} SQ_i}{N}$$  \hspace{1cm} (2)

Where, $SQ_{AV}$ represents the average educational service quality score of physical education college students obtained.

$SQ_i$ represents the education quality score of students from the $i^{th}$ ordinary university.

$N$ represents the total number of students from ordinary colleges and universities in the samples of the study.

3.4 Fuzzy comprehensive evaluation index of sunshine sports

The service quality score of sunshine sports education in ordinary colleges and universities has the following three situations:

First, $SQ_{AV} = 0, P_i = E_{i}$, students’ actual perception is consistent with the expected value of sunshine sports education.

Second, $SQ_{AV} > 0, P_i > E_{i}$, students' actual perception is higher than the expected value of sunshine sports education.

Last, $SQ_{AV} < 0, P_i < E_{i}$, students’ actual perception is lower than the expected value of sunshine sports education.

4. FUZZY COMPREHENSIVE EVALUATION RESULTS OF SUNSHINE SPORTS

4.1 Feedback credibility of educational evaluation

There must be the issue of credibility in the measurement results of the feedback information. If the feedback information is repeatedly used, the consistency of the calculation results would be repeated. Therefore, according to the LIKERT scale for variable analysis standard of internal consistency, the higher the Cronbach coefficient $\alpha$ is, the greater the credibility is (Feng and Xu, 2008). Devellis thinks that when Cronbach coefficient
α is 0.65 ~ 0.70, which is recorded as the acceptable range, it’s indicated that statistical data has objective reliability. When α is 0.7 ~ 0.8, which can be regarded as valid data with higher credibility, it’s trustworthy. While α is 0.8 ~ 0.9, it’s indicated that the results of this study have absolute objective credibility. Therefore, α is lower than 0.65, it’s necessary to revise reference variables.

4.2 Statistical results of educational evaluation

According to the statistics of SPSS19.0 statistical software in the study, the following conclusions are drawn as shown in Table 2.

<table>
<thead>
<tr>
<th>dimensionality</th>
<th>effect</th>
<th>reliable</th>
<th>value</th>
<th>ensure</th>
<th>care</th>
<th>brands</th>
<th>scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>indicators</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>3</td>
<td>26</td>
</tr>
<tr>
<td>α values</td>
<td>0.835</td>
<td>0.811</td>
<td>0.827</td>
<td>0.765</td>
<td>0.729</td>
<td>0.698</td>
<td>0.901</td>
</tr>
</tbody>
</table>

The actual perception of sunshine sports education is evaluated by college students and Cronbach coefficient α of the total scale of statistical results is 0.901, which is greater than the standard of 0.8, the credibility coefficient α aimed at the basic research, and the scale coefficient α is completely higher than the coefficient value of 0.65, which indicate that the credibility of the study is higher (Wang, 2008). Although the coefficient α of brand is slightly lower than 0.7, the credibility is still within the minimum acceptable range, and thus it’s not necessary to revise again. In the future studies, if the better credibility cannot be reached after the readjustment of sample structure, it’s necessary to consider whether to delete or revise the testing items of the scale. According to the analysis of statistical data results, the coefficient α is greater than 0.7 in terms of effectiveness, reliability, value, assurance, care and brand of sunshine sports education in the study, which proves that the expected value of the credibility evaluation of the overall scale is good.

4.3 Calculation results of education evaluation

According to the above statistical data, the following calculation results are obtained:

\[ SQ_{AV} = - (0.25 \times 0.728 + 0.24 \times 0.612 + 0.18 \times 0.665 + 0.15 \times 0.742 + 0.10 \times 0.702 + 0.08 \times 0.587) = -0.676 \]

From the results of the study, it can be found that \( SQ_{AV} \) is negative, which proves that sunshine sports education still has some shortcomings in ordinary colleges and universities. According to the above analysis results, the relevant coefficients are taken into the reference variable dimension of the evaluation system of sunshine sports education designed in advance so as to obtain the improvement direction of the sunshine sports education in colleges and universities. The test results of

\[ SQ = \sum_{i=1}^{n} w_i \left( \frac{1}{N} \sum_{i=1}^{n} (P_i - E_i) \right) \]  

and

\[ SQ_{AV} = \frac{\sum_{i=1}^{n} SQ_i}{N} \]  

show that sunshine sports education in colleges and universities has the following problems to be further improved and implemented.

First of all, the implementation of sunshine sports education still needs to be strengthened. The value of effectiveness evaluation is \( P - E = 0.59 \), which shows that the current college students still have poor sports performance indicators. However, the feedback information of universities shows that curriculum completion is higher, so the measures for optimizing teaching effectiveness need to be further verified (Zhang, 2014). From some students’ personal views on curriculum arrangement, the sports teaching design is equivalent to the sports activities of the groups, and students don’t perceive a high degree of experience and integration. Based on the implementation of the sunshine sports education, it’s necessary to re-designed physical education supplementary courses, including aerobics and fitness projects, attract students to participate in with optimized teaching model
and improve the effectiveness of sunshine sports education.

Secondly, in the reliability evaluation of college sunshine sports education, the difference value is P - E=-0.68, which confirms that some students still feel have no confidence in physical education of colleges and universities. It's clear from the result of assurance P E=-0.65 that the college students are not completely satisfied with the infrastructure of campus sports (Wu, 2015). From the analysis of this dimension, colleges and universities should further improve the construction of sports education venues and related facilities. If the students have stronger needs for special physical training, which also should be supported, it's necessary to use limited teaching field through the club activities, clubs and elective course mode to expand sports range and create a more favorable sports environment for students.

Finally, the difference value P-E of brand, care and value p-e is respectively 0.37, 1.02 and 0.65, which reflects a higher level of education in the construction of these three dimensions in ordinary colleges and universities. However, from the analysis of sports culture construction in ordinary colleges and universities, the sunshine sports is an educational system model based on a higher cultural foundation, and the fuzzy comprehensive evaluation of this model is still in the research stage (Tang, 2009). If colleges and universities shift their teaching focuses only based on the results of this study, there will be a more serious steering bias. Therefore, it is suggested that the colleges and universities still guarantee the long-term education level in the three dimensions of brand, care and value, and appropriately adjust the construction standards of such three dimensions as effectiveness, reliability and assurance, and take the sunshine sports as core objectives to improve the teaching planning and measures and further implement the development of the sunshine sports in colleges and universities.

5. CONCLUSIONS

In the construction of the evaluation index system of sunshine sports in colleges and universities, this study follows the related national policies and regulations of carrying out sunshine sports and puts forward the index selection principle in combination with the actual situation of school sports. The evaluation indexes focus on systematicness, scientificity, effectiveness and operability. The weight is determined scientifically to highlight the focus and orientation in order to reflect the actual situation and obvious problems in carrying out sunshine sports for college students, define the development direction, stimulate the school's work enthusiasm by supervision, evaluation and recognition, form the situation where typical cases demonstrate, backbones lead, and experience gives guidance, fully mobilize the initiative for mutual learning, communication and common improvement among schools, and finally establish the long-term operating mechanism of sunshine sports, providing guarantee for the deeper development of sunshine sports in colleges and universities. At the same time, we should also see that this study is an exploratory research, the theory and practice of sunshine sports in colleges and universities also continues to be enriched and tested, and the fuzzy comprehensive evaluation system of sunlight sports also needs to be constantly enriched, revised and improved in practice.

ACKNOWLEDGMENTS

Hubei Education Science Program “Construction and empirical study of the evaluation index system of campus football integration development” (item number: 2016GB069). Ministry of Education Human Society Planning Project “Research on the construction of excellent teachers' post model and the coupling mechanism of physical education talents under the background of University Transformation Development” (item number: yja890031).Hubei Provinclal Education Department humanities and Social Sciences General Projects “Research on leisure sports and urban construction based on people's livelihood sports view -- Taking Huangshi city as an example”(item number: 16Y100).

REFERENCES

liu X.M., Zhang Y.F. (2010). Research on the mode of sunshine sports for college students in heilongjiang
province, Ice and snow sports,32(05), 75-79.