INFORMATION
TECHNOLOGY JOURNAL

Research and Establishment of High Schools Physical Education Teaching Multivariate Evaluation Model

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Abstract: The 21st century is the era of science and technology, science and technology depend on the talents, therefore it is necessary to strengthen the cultivation of talents. The high colleges and universities, as training talents, play a vital role in education. The 2008 Beijing Olympic Games, China's gold number ranked the world, therefore Chinese sports enterprise develop to an unprecedented height. The cultivation of sports talented person, cannot leave the universities and colleges' exploration in China. Based on this, this study research the establishment of high school physical education teaching evaluation's index and its multiple evaluation model, in order to establish the new common colleges and universities physical education teaching evaluation's model, so as to deal with common colleges and universities physical education teaching evaluation's problems, making the evaluation system more comprehensive, more scientific and more strong operability.

Key words: Physical education teaching, evaluation index system, multivariate evaluation model

INTRODUCTION

In order to master the higher school sports teaching results, it is necessary to do the related evaluate. However, it must establish the proper evaluation index system, and strengthen the exploration of multivariate evaluation model to realize the accurate and scientific evaluation. In Shao Weide, Li Qidi, Hu Jianhua's "school sports and physical education goals Recognition", the researchers analyzed the goals confusion between school sports and physical education. In which further determines the relationship between school sports and physical education teaching goals, determines the physical education teaching goals should be positioned " motor skill study" and the school sports goal should be positioned "improve sports ability". In Sun Bingchuan, Tang Cheng's "The Research of University Sports Teaching Evaluation System and Its diverse Evaluation Model", researchers analyzed the problems about the current Physical Education Teaching Evaluation System. It studied combine with the teaching rule, and finally set up a new ordinary university sports teaching evaluation system model so as to make the evaluation system more comprehensive and high maneuverability. In Hu Yonghong, Zhoudengchong, Wu Shaolan' s "Effective physical education teaching evaluation index system research", researchers use Delphi method establish effective physical education teaching evaluation index system according to the basic connotation and idea of the effective physical education teaching. Then use analytic hierarchy process to determine the index weights.

Therefore, the research for college physical education teaching evaluation index system has never been interrupted. In general, establish physical education teaching evaluation index system (refers to be evaluated factor) not only is the basis of the job evaluation but also the core of the job evaluation. In order to do well the construction of evaluation index system and multivariate evaluation model, the relevant personnel of higher school must continuously strengthen explore and research, hoping to find a more scientific, more effective and more accurate evaluation index system. The study on the basis of predecessors, the main research purpose is: Through research the physical education teaching evaluation index system and its diversity evaluation model, so as to provide more reference for colleges and universities sports teaching evaluation. And the main content of this research is: first, analyze the establishment of college sports teaching evaluation index system. Second, explore the establishment method of the higher school sports teaching evaluation index system. Third, study the establishment of higher school sports teaching evaluation index system model. (Bahga and Madisetti, 2013).

METHODS AND RESULTS OF INDEX SYSTEM AND MODEL

Research methods and objects: In the research process, read the evaluation of college sports teaching level books, collect related news stories; and combine with the instances of the construction of physical education evaluation to explore the pathways used in the evaluation

model. Starting from the plight of physical education evaluation, considering the existing models defect at this level, and provide a viable basis for sports evaluation criteria.

This study discusses object as follows: First, for the university multiple indicators of the evaluation of physical education to resolve the feasibility of construction of these indicators. Second, explore appropriate evaluation measures, and analyze impact on students of the techniques evaluations.

RESEARCH RESULTS AND CONCLUSIONS

After exploring the means for evaluation, attempt the model of constructed consistent with the purpose of sports teaching evaluation. This study constructs evaluation system run good in the sport teaching and gets a good effect. Such evaluation system in line with the fundamental laws of sports instruction, and highlight the real standards of physical education. This model with the guidelines and operational value, promote the modernization of physical education, standard the student's classroom behavior.

EXPLORATION OF HIGH SCHOOL PHYSICAL EDUCATION TEACHING EVALUATION INDICATOR SYSTEM'S CONSTRUCTION

Basic guiding thoughts of the construction: High school Physical Education teaching evaluation indicator system construction's basic guiding thoughts mainly have the following four aspects. Only follow this four basic guiding thoughts, can be better to establish the evaluation index system.

Physical education teaching effects, working conditions and condition evaluation should be combined with each other, but it is also not to say that must ensure the three aspects must reach each matter, but should highlight the key, grasp the key and nature link. So, the relevant evaluation factors should be screened well in specific rating and particularly should choose a good core project in screening (Alam *et al.*, 2013).

Now, the Physical Education teaching process belongs to a complicated process which is effected by the many factors. From here it can be seen that it not only should consider the elements, but also give a full consideration to process elements, so it will reflect the basic teaching rule, at the same time it can also reflect the teaching work's integrity. In other words, if can reflect the related views of a high school physical education generally, then in addition to diagnosis and improve the work in the general, and also can provide a kind of guarantee to the credibility of teaching evaluation (Belosi *et al.*, 2013).

The evaluation of the physical education teaching conditions, in addition to a high standard, but should take financial conditions into consideration fully and the purpose of doing that is to impel the local, the competent departments and schools to increase Physical Education teaching inputs and reasonable allocation of resources. High schools' running conditions are improved and the Physical Education teaching work is promoted and developed, so the students devote more interest and time to it and it also can effectively improve students' physical qualities (physical qualities, namely constitution, including many ways, shown in Fig. 1).

The evaluation of high school Physical Education teaching belongs to a process of combining static and dynamic evaluation. Only static and dynamic evaluation organic combination, can it realize the evaluation promotes the construction and the changing. At the same time also can play a certain guidance and supervision role to achieve the near and long-term work teaching goals.

Basic principle of constructing: In order to construct the Physical Education teaching evaluation system, it must grasp the basic principle and this study puts forward the following four basic principles:

Systematic principle: The systematic principle refers to that when establish the physical education teaching evaluation system should have connectivity, integrity and hierarchy. Specifically: firstly, the connectivity, it refers that the physical education teaching evaluation object in
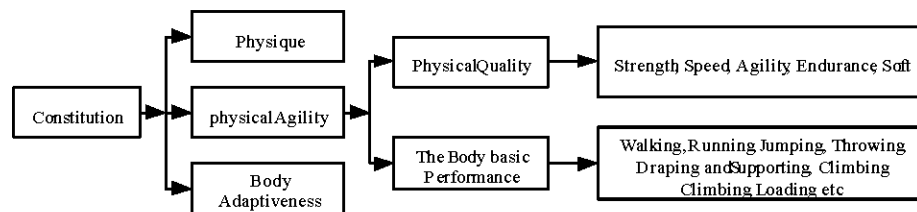

Fig. 1: Diagram of relevant contents contained in physical quality

big system, should strengthen the vertical and horizontal contact of the evaluated object and system's related factors. For instance, when the students evaluate time, students' family environment, basic level and the living environment should be fully considered and should be reflected in the index design. Secondly, integrity, it refers that the physical education teaching should conduct a comprehensive assessment to evaluated object in the process of evaluation. Such as the students evaluation, most schools only evaluate students' technical skills proficiency and ignore the other aspects of the evaluation, it does not favor the teaching purpose and do not have integrity. Thirdly, hierarchy, refers that the different object to evaluate different types should be adopted to different indicator system and evaluation standard, such as according to the differences of the schools' district and economic conditions to establish different system and standard (Li *et al.*, 2013).

Directional principle: No matter what kind of discipline, in the construction of teaching evaluation indicator system should have a direction. Such as philosophy, pedagogy, psychology and evaluation, through the comprehensive analysis of these subjects teaching evaluation system. This study concluded that the Physical Education teaching evaluation should be based on physical education target and properties and belongs to social activities that have purpose, so it must have directivity in the teaching evaluation. This study made the index of the premise(Marxism) clear in constructing the Physical Education teaching evaluation indicator system and fully understand its core is adhere to the direction of socialism with Chinese characteristics, so as to reflect the development, reformation and improved direction of China's sports education.

Acceptable principle: Acceptable principle means that in constructing the teaching evaluation index system should be in line with the premise of the objective reality, rather than a subjective idea, each indicator design should have basis to abide and according to follow. Specifically, acceptable principle can have the following several aspects: firstly, it should have adequate and reliable information and data sources. Secondly, it should pursue real and follow the students' physical and psychological development law. Thirdly, it should have flair, which can have effectively reaction to that the evaluation results. Fourthly, it should consider the human, financial and material resources and time and space conditions, the specific evaluation should be made a specific discussion to the specific problems. Fifthly, it must strive to "accurate" and "simple".

Measurable principle: Measurable principle refers that the set of total evaluation should have measurable characteristics in the specific evaluation, which means the index must be possible and can obtain positive results according to relevant observation and measurement tools. This requires evaluation from abstract to concrete and make it measurable (Dantas *et al.*, 2013).

Physical education teaching evaluation indicator system and the determination of the framework: Physical Education teaching evaluation indicator system mainly includes: the index set, the evaluation standards and the quantization symbols which reflect the connotation of evaluation objects. The main body frame belongs to the index and "index" and "evaluation object" are relative. Here let's take three level evaluation index system for example, as shown in Fig. 2.
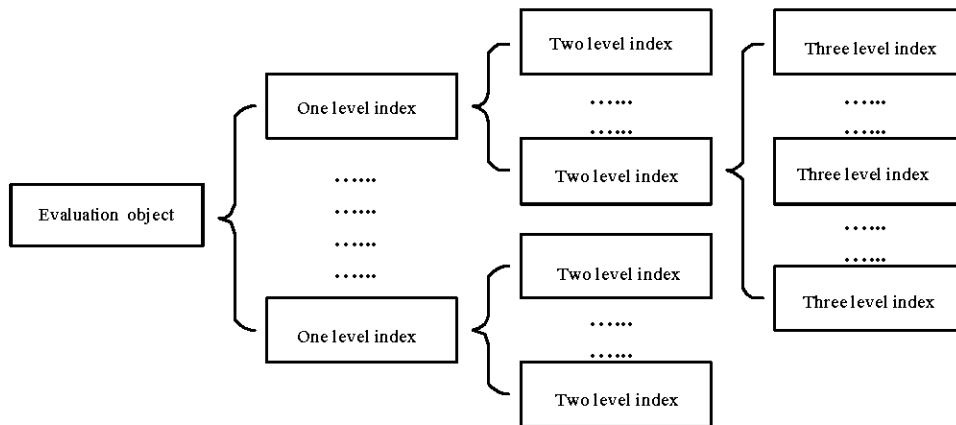

Fig. 2: Three evaluation index system diagram

In Fig. 2, for "one level index", it can not only look it as instructions indicators to "evaluation object", but also can regard it as a "secondary index" evaluation of the object; By analogy, if the "secondary index" continue to decompose, regard it as a "third index" evaluation of the object. In addition, if regard Fig. 1 as a greater index system son system, so the "evaluation object" will become an index of more system of indicators. Therefore, the reflection of the previous level project is the index of the next level project and the reflected previous level project is "evaluation object". In general, for the evaluation system, index series is more up, the index is more summarized and abstract; conversely, the more down, the more unique and specific.

Reliability and validity: During the construction of the Physical Education teaching evaluate indicator system should give a full consideration to the reliability and validity, specifically, and pay attention to the following several requirements:

- Different evaluation (assessment Team or individual, the same blow) using the same kind of index system, if the interval time is short, evaluate the same object, then the results of different evaluators shall guarantee high consistence, namely estimators' reliability should be high
- The same evaluation use the same evaluate sets and repeat evaluate an object, then the investigate results should also guarantee the high degree of consensus, namely the high reliability of heavy evaluation (Hallmark *et al.*, 2013)
- In terms of the validity of index system, the evaluate requirements is that the actual evaluation (index, standards, quantitative symbols, etc.) should highly coincide and be close with the targets

Evaluate standard and the determine of grade: In this study, the standard of the Physical Education teaching evaluate indicator system construction is: excellent, good, medium, bad, which related to the level of A, B, C, D, they are mutual correspondence. This standard and grade belong to common form and the design is simple, the operation is convenient, therefore it deserves to promote and refer.

CONSTRUCTION METHOD EXPLORATION OF HIGH SCHOOL SPORTS TEACHING EVALUATION INDICATOR SYSTEM

High school belongs to an integral part of China and has a pivotal position for the development of the country.

For the design of high school related discipline teaching evaluation index system must have strong technical and policy. The most important should sufficient run through China's education policy guidelines, as one of the fundamental basis of Physical Education Teaching Evaluation system Design. Through gradual decompose the sports teaching objectives to create a multi-level and multi-dimensional evaluation. To better construct high school sports teaching evaluation indicator system, must strengthen the research and exploration of the construction method, this article proposed the method reference for relevant career.

Decompose the teaching target, so as to form the level of target system: During designing high school sports teaching evaluation, take fully grasp the overall goal of physical education teaching as a foundation and then to determine all kinds of specific goals of the sports teaching evaluation. Of course, in a specific process, should be aimed at specific object to carry on the concrete analysis, only fully understand the evaluation of the object can properly evaluate target reasonable decomposition. When the evaluation index and its dimension are decomposed, should strengthen its response to the essential characteristics of the evaluation object and relevant internal links, in order to form a complete physical education teaching evaluation system, the sense of hierarchy can more in line with the Institute of Physical teaching evaluation index system.

Scientific and rational screening indicators using the classification and combined mode: The above steps have decomposed targets of the high school sports teaching evaluation and formed a hierarchical system structure. In preliminary draw up evaluation index and dimension, some can truthfully reflect the essential characteristics of evaluation object. But the others are unable to complete this kinds of tasks, for this type of indicator, it must carry on relevant screening and improvement. Indicators during the screening should use classification and combined mode to do scientific and reasonable selection, in particular, has the following three ways: One for theoretical inference method. For theoretical inference method, the basis theory and achievements include philosophy, psychology, pedagogy, sociology, management and evaluation and so on. According to these disciplines advanced theory achievement, reference to the physical education teaching evaluation index and scientifically screen and recognize for the establishment of sports evaluation index, in order to achieve the best effect. For example, when evaluate the level of development of the students 'intelligence they can from
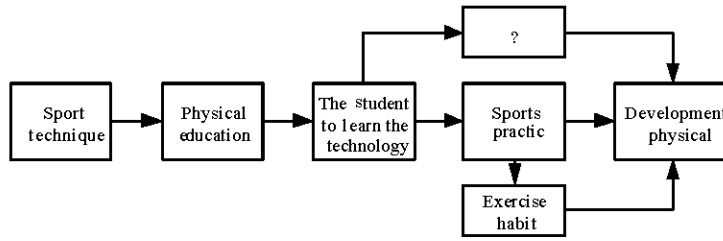
Fig. 3: Student movement technique to form exercise habit schematic diagram

the following aspects to measure. The students' imagination, attention, memory, observation, thinking ability, athletic skills (movement technology should change into sports habits can better promote their development, specifically as shown in Fig. 3). These elements should be included in the physical education teaching evaluation index system. Second is empirical method the experience has been a basic principle when do things, sometimes experience is useful, but sometimes experience does not, so must attach great importance to the use of experience. Here, the empirical method is to conduct a comprehensive analysis according to the index system, thus classified and merger, remove the difficult, reserve simple, eliminate the secondary and choose the main. Generally speaking, empirical method should be with the designer own experience to carry out the design, which require the designer must have a wealth of experience in practical, such evaluation index system designed more practical and operate more easy. This method has a wide range of applications in the actual operation, one can save time and secondly the design own scientific and accuracy. Third is expert judgment method. This method belongs to very high way, because it involved evaluation system professionals. And this law refers to that after the designer preliminary draw up evaluation index system, take it to consult relevant experts in the field. Expect to get the expert guidance, so as to make necessary improvement to make the design more perfect. This method has its own way, for example, is often used questionnaires consult, individual interviews and panel discussion, but according to the different situation carry on the correlation of choice or combination, with certain flexibility and worth learning.

Clear the connotation and denotation of each index: After complete the two steps above, the designers should determine teaching evaluation index to make clear related evaluation elements. And designers should clear the scope of evaluation elements, which helps the specific operation of the physical education teaching evaluation.

In addition, designers also should further clarify the various parts of the teaching mode indicators connotation and denotation. Which can express by formulas and standards and it is the most important work of design indicators. Specifically, there are two aspects: first, clear the connotation of evaluation index. Here Evaluation connotation refers to all aspects of the specific contents of an index evaluation, which is evaluation dimension, but also can be evaluated as the nature of the problem. Second, clear evaluation index extension. The evaluation index epitaxial refers to a range of indicators defined, clear every index epitaxial in indicators designing, so as to better promote the sports teaching evaluation work defined get more clearly defined response, prevent too wide or too narrow scope of the evaluation (Huthoff *et al.*, 2013).

Well drawn up a tentative evaluation system test and preliminary evaluation: After tentatively drawn up sports teaching evaluation index system, should do well relevant test and pre-assessment, especially pay attention to the matching problem between evaluation criteria system and weight system in the pre-assessment process. Select a small range of the evaluation object as a test point to pre-assessment, a test operation of the evaluation system to see whether it feasible and the feasible index validity for preliminary evaluation. After finishing test and preliminary evaluation, through the information feedback, find out the actual problems faced in the design. And then improve the index system, make sports evaluation index system more perfect and reasonable, thus more in line with the high school sports teaching evaluation system (Ali and Khan, 2013).

EXPLORS FOR THE CONSTRUCTION OF PHYSICAL EDUCATION TEACHING EVALUATION INDEX SYSTEM MODEL

In the front, it has set up the high school sports teaching evaluation index system and strive to meet the
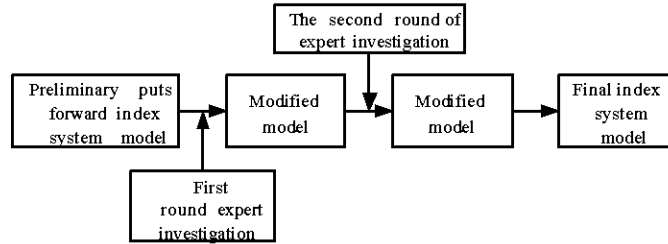
Fig. 4: A sports teaching steps of construction of the indicator system diagram
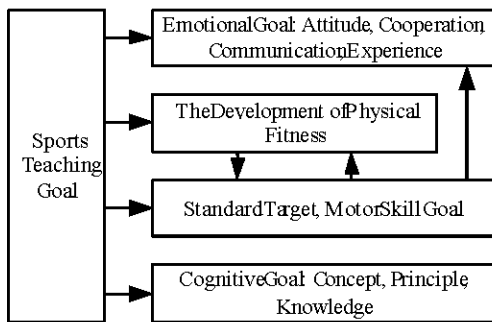

Fig. 5: A sports teaching goal structure diagram

basic principle, reliability and validity, etc, then this article will discuss the construction of mathematical models (as shown in Fig. 4, the physical education teaching evaluation system construction steps). For multi-factor screening and at all levels of factor relationship description and calculation, preliminary use experts consultation and comparison between two fuzzy judgment method, but also need the concept of toward the tree of graph theory. In particular, during the model building, first make sure to follow the basic principles and then according to the following two steps: First, to establish the mathematical model of Physical Education Teaching Evaluation Index System; ensure evaluation factors and weighting coefficient. Specifically, discuss as the following aspects:

Discussion of high school sports teaching evaluation index system mathematical model: For the overall goal of the higher school Physical Education Teaching (as shown in Fig. 5, a sports teaching target structure diagram), mainly is the school sports teaching work outstanding or qualified. And it has a very positive meaning to specifically change overall goal evaluation to target evaluation, in which canrealize the combination of total points, from small part to finally achieve the overall goal

of optimization evaluation. In general, the embodiment of the evaluation indicators include sub-goals item and factor items. These indicators constitute the evaluation index system. But for the overall goal evaluation, the sub-objectives evaluation and evaluation factors, use a special mathematical diagram (Gragh) directed tree to describe, this enables the evaluation index system structure more image and vivid. And the main structure of the directed tree includes two parts, one for point N (Notes), the second is directed Arc A (Arc). This kind of directed tree has its own calculation method and the specific shown below:

$$v = 100 \sum_{ijk} a_i a_{ij} a_{ijk} = aA + bB + cC + dD \qquad (1)$$

$$a + b + c + d = 100 \qquad (2)$$

For the Eq. 1 and 2, has the following provisions: First, A = 1.0, B = 0.8, C = 0.6, D = 0; Second, the calculation is divided into good and unqualified, the standard of excellence is a = 80, d = 5, unqualified standard is d = 20 (Yuan *et al.*, 2013).

Screening of the evaluation factors: As mentioned above, it should be based on the overall goal to determine the specific objectives. For high school sports teaching evaluation mainly aims at the sports teaching status, effect and conditions. Based on these to investigate and evaluate the sports teaching system running good or not, urged the school formed a good work and education environment and achieve high quality of physical education teaching at the same time. Based on this, in order to build a more optimized evaluation indicator system, should strengthen the construction of curriculum evaluation index system, through the expert consultation way to begin. In this study there are four main aspects of construction index (one class index): Teaching management, business level, teaching reform

and teaching effect, of course, the further refinement, it is known that it can be divided into 11 secondary indexes.

After the secondary index is clear, continue to materialize the indicators, then can get the evaluation factors and these evaluation factors belong to the three indicators. For the large number of evaluation factors, which belong to important, which belongs to key and which belongs effective need for further evaluation, judge obtained the most scientific and rational part as an evaluation factor and then give it "testability" and "importance". In order to achieve this goal, in a specific building, you need to consult a number of relevant experts, through the filling inquiry form way to do the specific good. After preliminarily determines the evaluation factor, further screening according to the evaluation factors testability importance, in order to comply with the relevant standard requirements (Qian *et al.*, 2013).

Addition, the importance and measurable belong to two aspects of content, the former is mainly targeted sub-goals or overall objective, while the latter represents the contrast between evaluation factor, but between the two is relatively and continuous development. In general, factor both with high important degree and measure degree are relatively high contribution to primary index and secondary index, so you can strengthen this factor inputs. In order to improve the effect of the Universities' Physical Education, then it should proceed to this kind of factor and used to call such factors as evaluation factors. Thus it can be seen, evaluation factors have certain conditions and must be screening. Of course, for those factors with small important degree and measure degree, usually delete.

Calculation of weight coefficient: For the weight coefficient of high school sports teaching evaluation indicator system, it refers to the relative importance of the evaluation factors, which means that each evaluation factor has the corresponding weight coefficient. This study involves index system mainly has three layers, each layer of evaluation index has its own weight coefficient and use expert consulting to calculate and determine each index weight coefficient. The concrete steps basic has two: first, determine the first and second level weight coefficient. Let dozens of experts mark and then statistic scores, the result as one of standards to determine the

weight coefficient. Second, the determination of the coefficient of the importance of the evaluation factors, the importance coefficient is shown as M_{ik} (i = 1,2,3 ... ki). The M_{ik} refers to in the same group of expert, use two-two comparison way, in determining the subsystem compare the contributions of relative importance of two factor target pair to objectives and scoring, statistics and summary. Examples:

A secondary index business level is mainly composed of three evaluation factors, hire thirty experts for two- two comparison and marking. Among them, the experts believe that in two factors the important one give one cent, not important give zero. After the thirty experts marking, summary and analyze the results (as shown in Table 1). In Table 1 the sum of row value is the total number of scores of relative factor, while the percentage is represented by the corresponding factor in the proportion of the group factor Total score. You can get the importance factor after finishing, will be able to (as shown in Table 1).

In expert advisory way, finishing the results to get the importance coefficients, this coefficient is easy to adjust and intuitive visible, when the importance coefficient is 0.5 and the following is deleted, 1.8 and above evaluation factors as core indicators should strengthen the attention.

CONCLUSION

High school sports teaching evaluation indicator system continuous exploration and innovation in the years and put into practice, has obtained the certain effect. This study involves the evaluation system applied in practice, the results show: the evaluation system can well reflect the physical education teaching basic law, its meaning and standards can be also reflected in the sports teaching, especially to reflect the level of the work and the actual situation. The system evaluation program has strong operability and certain orientation, so as to have pointed out the specific direction and promote the modernization and standardization of the management of physical education. In this study, the design of sports teaching evaluation index system and multiple evaluation models has some relevance for the teaching building and reform and evaluation of programs using a form of expression status output and comprehensive reflect the evaluation results.

Table 1: Ratio and importance of expert advisory evaluation factor (30 Experts)

Factor	M31	M32	M33	Sum of row value	Percentage	Importance
M31	---	8	14	22	24	2.5
M32	22	---	18	40	45	4.5
M33	16	12	---	28	31	3.2

M_{ik}: Importance coefficient of evaluation factors

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