Research on the Development of Education Level of University Sports Aesthetics Based on AHP

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ABSTRACT
Physical exercise becomes an important part of daily life, and the level of the education level of sports aesthetics affects people's standard of living. Using the analytic hierarchy process (AHP) in this article, from physical beauty, beauty, behaviours and emotions as well as the teachers consider four aspects, with college students of sports aesthetic feeling as the weight value of the four aspects, comprehensive evaluation of four cities Beijing, Shanghai, Shijiazhuang and Tianjin sports aesthetic education. The results show that the aesthetic education is the best sports Beijing, followed by Shanghai, the worst is Tianjin.

Keywords: aesthetic education, education level, analytic hierarchy process

INTRODUCTION

As the rapid changes in technology and fast development in economy today, competitive sports as an activity of relaxing the mind and releasing pressure, is highly favoured by people. Therefore, people's competitive sports requirements have also grown, which not only requires competition performance to be high, but also requires elegance of motions (Jiang et al., 2016; Gao & Wang, 2017).

In 2013, Jia Li in the article "Female university students' sports aesthetic standard sociology study", emphasized female university students had unique pursuit of sports beauty (Seyed, 2016). Due to school had shortage in aesthetic education, it affected female university students' sports aesthetic standard. The writer took female university students as research objects, utilized multiple research methods, and analyzed female university students' understanding view in shape. At present, female university students excessively pursued slim at the price of physical health, which appeared excessive blindness and had deficiency in implementation of correct sports aesthetics (Pu, 2013; Liu, 2017). The thesis took "how to form into correct sports aesthetic standard" as mainline, used sociology, pedagogy and sports science as well as other multiple disciplines knowledge as support, got further insight into sports aesthetic standard mistakes 'causes. The writer emphasized that university period was an important period for students forming into correct sports aesthetic standards, and school are obligated to guide students to set up correct sports aesthetic standard. Present social background was easier to lead students to the wrong region of wrong sports aesthetics. With regard to this, the writer presented country and all levels of government should reorganize, intervene with media platform, create correct sports aesthetic environment, and meanwhile all circles in society should also positive cooperate (Zhang et al., 2015). In 2011, Jin Xiao-Yue in the article "Chinese elementary and secondary school campus group dancing organizational aesthetic values deficiency and countermeasures analysis", emphasized that as social modernization process sped up, quality-orient education became an important part in students 'all-around development. Campus collective dancing was also the focus of

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State of the literature

- The development of human aesthetic education is a perennial hot topic.
- The aesthetic of sports is the embodiment of human progress, and there are few studies.
- Analytic hierarchy process (AHP) has filled the gap in the research of education.

Contribution of this paper to the literature

- The study found that college students' feelings about sports aesthetics were found to be the most beautiful.
- Comprehensive evaluation of sports esthetic education in Beijing, Shanghai, Shijiazhuang, and Tianjin, and Beijing health education is the best.
- The development of sports esthetic education level has a direct relationship with the level of a city sport, and the higher the level, the better the development of education.

quality-oriented education, and even important path for students carrying out good aesthetic education. Students' sports aesthetic education was inevitable requirement of present education reform, it was of important significance in students' sports techniques development as well as body and mental healthy growth (Zhang, 2012; Mi & Zhang., 2016). The writer comprehensive applied multiple research methods, took campus collective dancing as research objects, went deeper into exploring aesthetic education in teaching process, research result showed that causes of presents students 'deficiency in sports aesthetic standard include school lacking of propaganda education on sports beauty, students' understanding on sports beauty was not enough; school lacked of creative exhibition in sports beauty, and lacked of professional teachers' guiding in sports aesthetic education; in practical training, students lacked of sports beauty experience and interaction that was not convenient for students correct understanding sports beauty; body beauty, motion beauty and clothing beauty's banishment caused that students seldom saw really sports beauty. Therefore, the writer presented that school sports activities developing should fully integrate with aesthetic education, promote teachers 'aesthetic teaching level, strengthening students' sports dancing learning ability, increasing school professional sports aesthetic teachers' amount and reinforce sports aesthetic value propaganda in school. In 2009, Zhao Chong-Le in the article "Sports aesthetic education view study", emphasized that sports beauty had multiple expressions, while current physical education had great deficiency in aesthetic education. In sports teaching process, students didn't have the appreciation of sports aesthetics. The article combined with China current sports reform status and analyzed current sports aesthetic education existing problems from the perspective of aesthetics and aesthetic education. Therefore, the writer pointed out that it should strengthen sports teachers 'themselves aesthetic quality, fully look for sports teaching contents' aesthetic elements, strive for creating sports aesthetic atmosphere, promote sports process artistic development process and train students' aesthetic ability.

The paper will fully consider Beijing, Shanghai, Shijiazhuang and Tianjin sports aesthetic education levels from multiple perspectives so as to relevant problems 'subsequent research.

AHP MODEL ESTABLISHMENT

The model takes analytic hierarchy process as theoretical basis, takes Beijing, Shanghai, Shijiazhuang and Tianjin the four cities' sports aesthetic education status as research objects, researches from body beauty, movement beauty, behavioral and emotional beauty as well as teachers' beauty the four aspects, comprehensive considers the four cities' sports aesthetic education levels. AHP can solve relative tedious and vague problems' decision-making problems. Use the method to construct model, it roughly needs four steps: Establish hierarchical structure scheme; Construct every layer that fully used in judgment matrix; Hierarchical single arrangement and consistency test; Hierarchical total arrangement and consistency test; in the following, it respectively states each step detailed process.

Hierarchical Structure

AHP Solved problems are required to be hierarchic, orderly and logic. Only then it can construct hierarchical scheme (Zhang *et al.*, 2016). Let tedious problems' elements to form into multiple hierarchies according to its attributes, membership and its relations. Last hierarchical element plays a dominate role in next hierarchical relative elements. In general, these hierarchies can be divided into 3 types:

(1) Top layer: Only one element in this hierarchy, it normally is final target of analytic problems. The layer is also called target hierarchy.

(2) Middle hierarchy: In this hierarchy, it includes intermediate links that get involved to fulfill targets, which can be composed of some hierarchies that include multiple and multilayer criterion that required to consider. It can also be called criterion hierarchy.

(3) The bottom hierarchy: This hierarchy includes optional each method and way to fulfill targets. It can also be called measure hierarchy or scheme hierarchy.

Hierarchy numbers in hierarchical structure have something to do with problem's complicated degree as well as analysis detailed requirements, normally the hierarchy numbers are not limited, each element in every hierarchy governs less than 9 elements.

Judgment Matrix Construction

Each layer structure can show factors relationships, but in middle layer, each factor occupied proportion in target evaluation basically will not be fully the same, in the heart of evaluators, each factor has certain proportions.

When define each factor proportion that is to compare n pieces of factors $X = \{x_1, \dots, x_n\}$ to factor Z impacts. $Saaty$ and others proposed to carry out paired comparison among factors, and constructed comparison matrix method. That is to say, it selects two factors x_i and x_j every time, uses a_{ij} to express x_i and x_j to Z impacts ratios, all comparison is using matrix $A = (a_{ij})_{n \times n}$ to express, A has become judgment matrix between $Z - X$. From matrix, it is clear that if x_i and x_j to Z impact ratio is a_{ij}, then x_j and x_i to Z impact ratio is $a_{ij} = \frac{1}{a_{ij}}$.

Consistency Test

Matrix A corresponding maximum feature value λ_{max} feature vector W, it is the priority weight of same hierarchy corresponding elements relative importance to last hierarchy some element through normalization, the process is called hierarchical single arrangement. Though the process can reduce other factors interference, it is hard to avoid appearing inconsistency to some extent when integrate all comparison results. If comparison results are consistent, then A factor should also meet: $a_{ij}a_{jk} = a_{ik}, \forall i, j, k = 1, 2, \dots, n$

The positive reciprocal matrix that meets above formula is called consistent matrix. To easy define A can be accepted or not, it should test A inconsistency is very serious or not.

If A is consistent matrix, then

① A surely is positive reciprocal matrix.

② Transposed matrix A^T is consistent matrix.

③ A matrix any two lines are in proportions, and factors are above 0, therefore $rank(A) = 1$, so is the column.

④ In A, $\lambda_{max} = n$, n is A matrix order number. Other features roots of A is 0.

⑤ λ_{max} corresponding feature vector $W = (w_1, \dots, w_n)^T$, then $a_{ij} = \frac{w_i}{w_j}, \forall i, j = 1, 2, \dots, n$, so:

Table 1. University students' feeling about body beauty

Name	Number of people	Proportion (%)
Posture beauty	109	90.8
Health beauty	102	85
Lines beauty	90	75.5
Figure beauty	90	75.5
Bodily form beauty	78	65
Muscle beauty	63	52.5
Well-proportioned beauty	57	47.5
Robust beauty	34	28.3
Skin color beauty	16	13.3
Average value		59.267

Table 2. University students' feeling about movement beauty

Name	Number of people	Proportion (%)
Technique beauty	90	75
Coordination beauty	87	72.5
Rhythm beauty	86	71.7
Strength beauty	77	64.2
Molding beauty	75	62.5
Clothing beauty	71	59.2
Variation beauty	61	50.8
Agility beauty	60	50
Soft beauty	50	41.7
Equipment beauty	42	35
Average value		58.26

$$A = \begin{bmatrix} \dfrac{w_1}{w_1} & \dfrac{w_1}{w_2} & \cdots & \dfrac{w_1}{w_n} \\ \dfrac{w_2}{w_1} & \dfrac{w_2}{w_2} & \cdots & \dfrac{w_2}{w_n} \\ \vdots & \vdots & \ddots & \vdots \\ \dfrac{w_n}{w_1} & \dfrac{w_n}{w_2} & \cdots & \dfrac{w_n}{w_n} \end{bmatrix}$$

A is n order positive reciprocal matrix, when it is consistent matrix, when and only when $\lambda_{max} = n$ as well as when A is inconsistent, it surely has $\lambda_{max} > n$. Thereupon, use λ_{max} and n relationship to test whether A is consistent matrix or not.

In the process, it also includes hierarchical total arrangement and consistency test, due to article lengths are limited, no theoretical statements here, directly apply it in the following.

Data Collection

Data in **Table 1-4** is from the article "Cheerleading team movement aesthetic features and aesthetic education practice research".

Table 3. University students' feeling about behavioral and emotional beauty

Name	Number of people	Proportion (%)
Enthusiasm beauty	101	84.2
Cooperation beauty	97	80.8
Willpower beauty	81	67.5
Competition beauty	59	49.2
Boldness beauty	49	40.8
Endurance beauty	47	39.2
Wit beauty	46	38.3
Etiquette beauty	44	36.7
Morality beauty	40	33.3
Simple beauty	28	23.3
Average value		49.33

Table 4. University students' feeling about teachers' beauty

Name	Number of people	Proportion (%)
Appearance beauty	82	68.3
Teaching manner beauty	82	68.3
Language beauty	56	46.7
Demonstration actions beauty	95	79.2
Character beauty	101	84.2
Average beauty		69.34

It is clear for us from **Table 1**, body beauty includes posture beauty, health beauty, lines beauty and else nine items, university students have different feelings on every item, make equalization handling with the nine items' proportions as model establishment data basis.

It is clear for us from **Table 2** that movement beauty includes technique beauty, coordination beauty, soft beauty and others ten items, university students have different feelings on every item, make equalization handling with the ten items' proportions as model establishment data basis.

It is clear for us from **Table 3** that behavioral and emotional beauty includes enthusiasm beauty, cooperation beauty, willpower beauty and others ten items, university students have different feelings on every item, make equalization handling with the ten items' proportions as model establishment data basis.

It is clear for us from **Table 4** that teacher's beauty includes appearance beauty, teaching manner beauty, willpower beauty and others five items, university students have different feelings on every item, make equalization handling with the five items' proportions as model establishment data basis.

CONSTRUCT SPORTS AESTHETIC EDUCATION OPTIMAL CITY MODEL

The purpose of the model establishment is looking for sports aesthetic education optimal city among the four cities. Therefore, target layer is sports aesthetic education optimal city. Considering sports aesthetic education includes four aspects, so criterion layer includes four elements those are respectively body beauty, movement beauty, behavioral and emotional beauty and teacher's beauty. The model scheme layer includes Beijing, Shanghai, Shijiazhuang and Tianjin the four cities.

Table 5. Four factors importance comparison

	Percentage (%)	Arrangement
Body beauty	59.267	2
Movement beauty	58.26	2
Behavioral and emotional beauty	49.33	1
Teachers beauty	69.34	3

Table 6. Target layer paired comparison matrix

A	B_1	B_2	B_3	B_4
B_1	1	1	2	1/3
B_2	1	1	2	1/2
B_3	1/2	1/2	1	1/2
B_4	3	2	2	1

Table 7. Criterion layer paired matrix one

B_1	P_1	P_2	P_3	P_4
P_1	1	3	5	4
P_2	1/3	1	3	2
P_3	1/5	1/3	1	1/2
P_4	1/4	1/2	2	1

Table 8. Criterion layer paired matrix two

B_2	P_1	P_2	P_3	P_4
P_1	1	1/2	2	3
P_2	2	1	3	4
P_3	1/2	1/3	1	2
P_4	1/3	1/4	1/2	1

Table 9. Criterion layer paired matrix three

B_3	P_1	P_2	P_3	P_4
P_1	1	3	5	6
P_2	1/3	1	3	4
P_3	1/5	1/3	1	2
P_4	1/6	1/4	1/2	1

Table 10. Criterion layer paired matrix four

B_3	P_1	P_2	P_3	P_4
P_1	1	3	4	5
P_2	1/3	1	2	3
P_3	1/3	1/2	1	2
P_4	1/5	1/3	1/2	1

Judgment Matrix Construction

Judgment matrix construction firstly needs to define criterion layer's four factors importance comparison. Sort out **Table 1-4** average values and can get **Table 5**.

Due to body beauty and movement beauty ratios are basically the same, so rank the two in the same position in **Table 5**. According to Table 5 data, we establish target layer paired comparison matrix as **Table 6** shows.

And then, establish criterion layer paired matrix, data contents are as **Table 7-10**.

Table 11. Hierarchical total arrangement

Criterion		Body beauty	Movement beauty	Behavioral and emotional beauty	Teacher beauty	Total arrangement weight
Criterion layer weight		0.2066	0.2241	0.1382	0.4311	
Scheme layer single arrangement	Beijing 1	0.5462	0.2772	0.5637	0.5402	0.49
	Shanghai2	0.2323	0.4673	0.2576	0.2304	0.29
	Shijiazhuang3	0.0838	0.1601	0.1095	0.1470	0.13
	Tianjin 4	0.1377	0.0954	0.0692	0.0825	0.09

The model covered algorithm can implement by *Matlab* software program, therefore it can get computed result is as **Table 11**.

It is clear from **Table 11** data, best sports aesthetic education is Beijing, secondly is Shanghai, the worst is Tianjin, in order to more intuitional express analytic result. it is clear for us that in evaluation result, Beijing's sports aesthetic education is of the highest proportion among the four cities, so Beijing is regarded as best city in sports aesthetic education.

CONCLUSIONS

Analytic hierarchy process mainly includes two steps, firstly it should make abstraction on solved practical problem and let it to be a hierarchical structure of certain logic relations, and then make qualitative comparison for the problem, and define quantitative parameters. But in step two, during transformation process from qualitative relations to quantitative relations, people subjective intervention degree is larger so the result accuracy will be affected. The paper applies analytic hierarchy process into comparing sports aesthetic education status in Beijing, Shanghai, Shijiazhuang and Tianjin the four cities, gets the conclusion that Beijing is the best city in sports aesthetic education. Combining with practical conditions to analyze, Beijing as main hosting city in 2008 Olympic Games, people has unique sports complex. Therefore, sports aesthetic education level will also improve accordingly.

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