



# BioTechnology

*An Indian Journal*

**FULL PAPER**

BTALJ, 10(6), 2014 [1442-1446]

## **Cheerleading humanities education value analysis under analytic hierarchy process**

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### **ABSTRACT**

Cheerleading is a kind of newly-development event in university sports education, is a stage physical training and featured sports event, due to its diversities and it owns rich humanities and entertainment, it is extremely favored by students. Cheerleading can let participants achieve fitness effects and also cultivate their own cooperative ability, aesthetic ability and innovation capacity. The paper carries out analysis of cheerleading from physical training, cooperative ability, aesthetic ability and innovation capacity four aspects, cheerleading physical education accounts for 90%, and humanities education accounts for 55.3%, and others accounts for 15.7%. It can indicate that cheerleading is not only a kind of important aerobics event, and also possess stronger cultural atmosphere. Therefore, the paper cans scientific state that cheerleading in university education should focus on humanities aspect cultivation.

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### **KEYWORDS**

Humanities education;  
Analytic hierarchy process;  
Cooperative ability;  
Physical training;  
Physiological function.

### **PREFACE**

Cheerleading is a kind of aerobics, and combines music with dances, it can improve participants mind and body as well as moral quality, and especially it can cultivate a people's aesthetic and value. Cheerleading is originated from America, in the beginning of 1980s, cheerleading went out of America and developed in places all around the world. Furthermore, Britain firstly founded cheerleading association in 1984; accordingly it became a country that possessed European largest cheerleading organization. Driven by British cheerleading organization, cheerleading has been rapidly developed in other countries of Europe. In 1998, they founded international cheerleading federation and included mem-

bers of countries as Russia, Sweden, Ukraine, Britain, America, Denmark, Finland, Germany, Hungary, Japan, and China Taiwan and so on. Until 2004, there are 38 countries organize and cultivate cheerleading in the world.

As a kind of new-style sports event, from 2000 to 2005, Chinese cheerleading has been rapidly developed under the help of Chinese aerobics rhythmic gymnastics association. Due to it is favored by teenagers and university students, China organized first university dynamic cheerleading challenge match in 2001, and had above 20 representative teams. Meanwhile, some universities also opened cheerleading course, such as Beijing Sports University, Shanghai Sports University and so on.

## CHEERLEADING HUMANITIES EDUCATION VALUE UNDER ANALYTIC HIERARCHY PROCESS

The paper establishes AHP model, before establishing model, the paper firstly carries out main factors analysis. Cheerleading can carry out analyses from four main directions. These are respectively physical exercise, innovation capacity, cooperative ability and aesthetic ability.

### Physical exercise

Cheerleading as Olympic Games competition event, it has performing significances and meanwhile it has higher requirements on its strength and movements. As one kind of university students' sports courses at ordinary time, aerobics has good effects on strengthen muscular strength, and with movement proceeding, it initially improve sportsman tendon, ligament, and muscular elasticity and further promotes body flexibility.

And cheerleading performance goes ahead with music; generally it lasts longer, and cannot change rhythm and pace at any time according to one's physical ability. And relative to other sports events, cheerleading also requires sportsman to have good body coordination, because good coordination let movement coherent and team in order, which is also the key to win the game.

### Innovation capacity

Cheerleading compares to other sports, it requires athlete especially should possess innovation capacity, because a section of complete aerobics needs members to make innovation and compilation on movements.

Therefore, the paper also endows it.

### Cooperative spirits

Cheerleading performance, especially in major matches, cooperative ability is the key factor to get excellent results. During training period, good cooperative ability can effective combine individual with entirety. At first, any one member should adapt team, in teaching, training members team cooperation is particular important; at ordinary time exercising and testing, both individual movement and formation changes require members cooperation. And, the kind of team spirits don't show at one time that needs to make repeated training in teaching period.

### Aesthetic ability

Cheerleading is a kind of sports event that perfectly combine with music and dance compilation during performing, it tests sportsman's aesthetic ability, so the paper endows weight value to aesthetic ability.

## MOLD ESTABLISHMENTS

### Construct hierarchical structure

The paper based on analytic hierarchy process, it quantizes aerobics. Establish target layer, criterion layer and project layer relations.

Target layer: Aerobics education.

Criterion layer: project influence factors,  $c_1$  is the physical exercise,  $c_2$  is cooperative ability,  $c_3$  is aesthetic ability,  $c_4$  is innovation capacity.

Project layer:  $A_1$  is humanities education,  $A_2$  is

TABLE 1: 1~9 scale table

Scale $a_{ij}$	Definition
1	factor I and factor j have equal importance
3	factor I is slightly more important than factor j
5	factor I is relative more important than factor j
7	factor I is extremely more important than factor j
9	factor I is absolute more important than factor j
2 4 6 8	Indicates middle state corresponding scale value of above judgments
Reciprocal	If compare factor I with factor j, it gets judgment value as $a_{ji} = 1/ a_{ij}$ , $a_{ii} = 1$

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physical education,  $A_3$  is entertainment education and then get hierarchical structure.

**Construct judgment (paired comparison) matrix**

Take TABLE 1 showed 1~9 scale table as evidence, it makes weight analysis.

At first, solve judgment matrix, according to above principle, reference 1-9 scale setting, and according to

TABLE 2: Comparison matrix

G	$c_1$	$c_2$	$c_3$	$c_4$
$c_1$	1	1/3	3	3
$c_2$	31/8	1	5	5
$c_3$	1/3	1/5	1	1
$c_4$	1/3	1/5	1	1

TABLE 3: Comparison matrix

$c_1$	$A_1$	$A_2$	$A_3$	$c_2$	$A_1$	$A_2$	$A_3$
$A_1$	1	1	1/3	$A_1$	1	5	5
$A_2$	1	1	1/3	$A_2$	1/5	1	5
$A_3$	3	3	1	$A_3$	1/5	1/5	1

TABLE 4: Comparison matrix

$c_3$	$A_1$	$A_2$	$A_3$	$c_4$	$A_1$	$A_2$	$A_3$
$A_1$	1	5	8	$A_1$	1	5	8
$A_2$	1/5	1	5	$A_2$	1/5	1	5
$A_3$	1/8	1/5	1	$A_3$	1/8	1/5	1

TABLE 5: RI value

n	1	2	3	4	5	6	7	8	9	10	11
RI	0	0	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49	1.51

experts and author's experiences and refer to lots of documents, it gets paired comparison matrix that are respective as TABLE 2-4.

**Hierarchical single arrangement and its consistency test**

Use consistency indicator to test:

Set in comparison matrix,  $\lambda_{max}$  is maximum feature value, n is order number of comparison matrix:

$$CI = \frac{\lambda_{max} - n}{n - 1}$$

CI value gets smaller that shows judgment matrix gets closer to completely consistent. CI value gets bigger, it shows known degree is lower.

**Hierarchy total arrangement and its consistency test**

$$A = \begin{Bmatrix} 1 & 1/3 & 3 & 3 \\ 3 & 1 & 5 & 5 \\ 1/3 & 1/5 & 1 & 1 \\ 1/3 & 1/5 & 1 & 1 \end{Bmatrix}$$

By column vector normalization  $\rightarrow \begin{Bmatrix} 0.214 & 0.192 & 0.3 & 0.3 \\ 0.075 & 0.577 & 0.5 & 0.5 \\ 0.121 & 0.115 & 0.1 & 0.1 \\ 0.201 & 0.115 & 0.1 & 0.1 \end{Bmatrix}$

Solve sum according to line  $\rightarrow \begin{Bmatrix} 1.066 \\ 2.22 \\ 0.386 \\ 0.386 \end{Bmatrix}$

Normalizat i on  $\rightarrow \begin{Bmatrix} 0.2515 \\ 0.555 \\ 0.0965 \\ 0.0965 \end{Bmatrix} = W^{(0)}$

$$AW^{(0)} = \begin{Bmatrix} 1 & 1/3 & 3 & 3 \\ 3 & 1 & 5 & 5 \\ 1/3 & 1/5 & 1 & 1 \\ 1/3 & 1/5 & 1 & 1 \end{Bmatrix} \begin{Bmatrix} 0.2514 \\ 0.555 \\ 0.0965 \\ 0.0965 \end{Bmatrix} = \begin{Bmatrix} 1.012 \\ 2.275 \\ 0.387 \\ 0.387 \end{Bmatrix}$$

$$\lambda_{max}^{(0)} = \frac{1}{4} \left( \frac{1.054}{0.257} + \frac{2.254}{0.786} + \frac{0.257}{0.045} + \frac{0.457}{0.078} \right) = 4.038$$

$$w^{(0)} = \begin{Bmatrix} 0.278 \\ 0.56 \\ 0.045 \\ 0.098 \end{Bmatrix}$$

Similarly, it can calculate judgment matrix:

$$B_1 = \begin{Bmatrix} 1 & 1 & 1/3 \\ 2 & 1 & 1/3 \\ 3 & 6 & 1 \end{Bmatrix}, B_2 = \begin{Bmatrix} 1 & 5 & 5 \\ 1/5 & 1 & 2 \\ 1/5 & 1/5 & 1 \end{Bmatrix}, B_3 = \begin{Bmatrix} 1 & 6 & 8 \\ 1/5 & 1 & 5 \\ 1/8 & 1/5 & 1 \end{Bmatrix}, B_4 = \begin{Bmatrix} 1 & 8 & 8 \\ 1/5 & 1 & 5 \\ 1/8 & 1/5 & 1 \end{Bmatrix}$$

Thereupon, it gets maximum feature value and feature vector as following show:

$$\lambda_{\max}^{(1)} = 3.64, \omega^{(1)}_1 = \begin{Bmatrix} 0.254 \\ 0.247 \\ 0.652 \end{Bmatrix}$$

$$\lambda_{\max}^{(2)} = 3.30, \omega^{(1)}_2 = \begin{Bmatrix} 0.557 \\ 0.281 \\ 0.1032 \end{Bmatrix}$$

$$\lambda_{\max}^{(3)} = 3.22, \omega^{(1)}_3 = \begin{Bmatrix} 0.625 \\ 0.236 \\ 0.154 \end{Bmatrix}$$

$$\lambda_{\max}^{(4)} = 2.98, \omega^{(1)}_4 = \begin{Bmatrix} 0.658 \\ 0.224 \\ 0.56 \end{Bmatrix}$$

Use consistency indicator to test:  $CI = \frac{\lambda_{\max} - n}{n - 1}, CR = \frac{CI}{RI}$

It gets judgment matrix  $A, \lambda^{(0)}_{\max} = 4.073, RI = 0.9$

$$CI = \frac{4.073 - 4}{4 - 1} = 0.24$$

$$CR = \frac{CI}{RI} = \frac{0.024}{0.90} = 0.027 < 0.1$$

It shows A inconsistency degree is valid and moves within permissible range, and can use A feature vector to replace weight vector.

(2) Similarly, to judgment matrix  $B_1, B_2, B_3, B_4$ , it does consistency test, and get weight vector.

Utilize hierarchical chart drawing out calculation results from target layer to project layer, as Figure 1 show.

Calculation structure as following:

$$\omega^{(1)} = (\omega_1^{(1)}, \omega_2^{(1)}, \omega_3^{(1)}, \omega_4^{(1)}) = \begin{Bmatrix} 0.624 & 0.185 & 0.252 & 0.575 \\ 0.234 & 0.240 & 0.089 & 0.286 \\ 0.136 & 0.575 & 0.66 & 0.139 \end{Bmatrix}$$

$$w = w^{(1)}w^{(0)} = \begin{Bmatrix} 0.252 & 0.575 & 0.624 & 0.185 \\ 0.089 & 0.286 & 0.240 & 0.240 \\ 0.66 & 0.139 & 0.136 & 0.575 \end{Bmatrix} \begin{Bmatrix} 0.567 \\ 0.056 \\ 0.104 \\ 0.273 \end{Bmatrix}$$

$$= \begin{Bmatrix} 0.553 \\ 0.290 \\ 0.157 \end{Bmatrix}$$

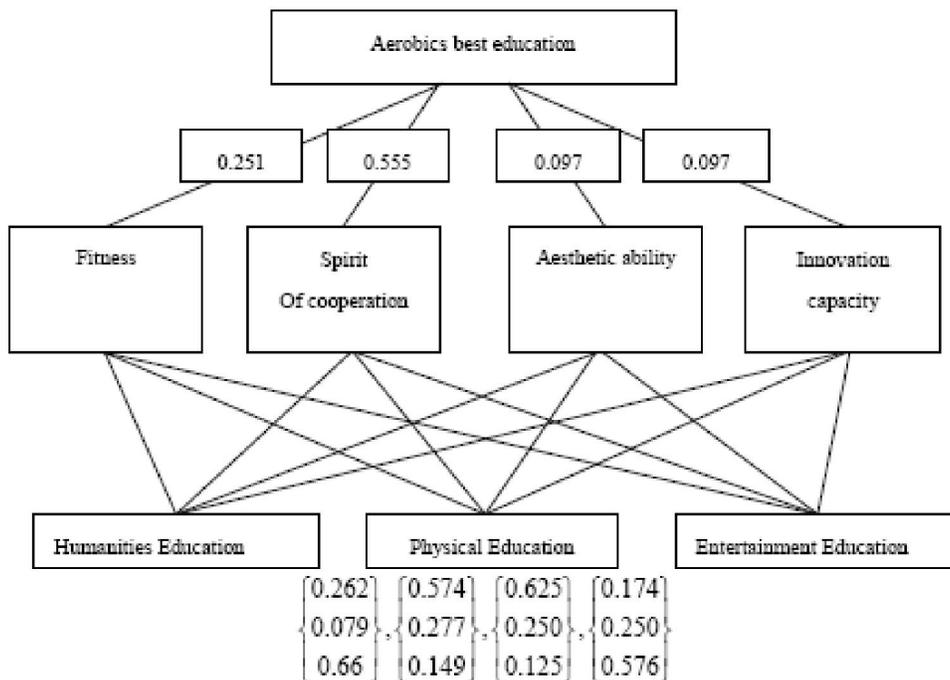


Figure 1: Hierarchical chart

TABLE 6 : Cheerleading training module

Item	Primary training	Medium training	Advanced training
Physical training	(1)According to competition rules and one's own strength, make training plans (2)According to different people physical qualities, carry out distributed practice.	(1)Look for team and members' features. (2)Care for member's physical strength integrity.	(1)Combine physical ability with humanities training.
Humanities training	(1)Take suggested music rhythm and beats training; (2)Organize some simple music games; (3)Self creates some simple movements.	(1) Adapt simple melodic training. (2) Try to adopt different music.	(1)Proceed with complex sorting exercises; (2)Foster movements unified capacity.

By achieved weight results, it is clear that the paper analyzes cheerleading from physical exercise, cooperative ability, aesthetic ability and innovation capacity four aspects, it gets that cheerleading physical education accounts for 29%, and humanities education accounts for 55.3% and others account for 15.7%. It can indicate that cheerleading is not only a kind of important aerobics event, and also possess stronger cultural atmosphere. Therefore, the paper can scientific state that cheerleading in university education should focus on humanities aspect cultivation.

To cheerleading training, by above obtained results, it gets reasonable training modules, as TABLE 6 show.

## CONCLUSIONS

Cheerleading is a kind of newly-development event in university sports education, is a stage physical training and featured sports event, due to its diversities and it owns rich humanities and entertainment, it is extremely favored by students. Cheerleading can let participants achieve fitness effects and also cultivate their own cooperative ability, aesthetic ability and innovation capacity. The paper carries out analysis of cheerleading from physical training, cooperative ability, aesthetic ability and innovation capacity four aspects, cheerleading physical education accounts for 90%, and humanities education accounts for 55.3%, and others accounts for 15.7%. It can indicate that cheerleading is not only a kind of important aerobics event, and also possess stronger cultural atmosphere. Therefore, the paper can scientific state that cheerleading in university education should focus on humanities aspect cultivation.

But, present stage is cheerleading early develop-

ment stage, Chinese cheerleading undertakings still have lots of drawbacks, the main drawbacks are: (1)cheerleading individual competitive level ability is not so high by comparing with developed countries; (2)Cheerleading still lacks of overall cooperative ability ; (3) Each region cheerleading development is imbalanced, and input is also imbalanced; (4) Each competition type is fewer, popularizing rate is small and competition input is lower and so on.

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