University taekwondo education model component factors consistency test analysis based on AHP

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ABSTRACT

The paper based on Analytic Hierarchy Process(AHP)method, firstly makes analysis of taekwondo from physical quality, self-confidence degree, anti-setback ability and educational attainments these four aspects, and takes consistency test. It gets cultural education accounts for 32% of education proportion, entertainment education accounts for 13% of education proportion, combat-style education accounts for 55% of education proportion. By analysis, it is clear that taekwondo is a kind of sport event focuses on combat-style education, but cultural education proportion is still very high. Research shows that university taekwondo education model should be a kind of combat-style education combining with cultural education.　　　© 2014 Trade Science Inc. - INDIA

KEYWORDS

Taekwondo education;
Analytic hierarchy process (AHP);
School education;
Consistency test.

INTRODUCTION

Taekwondo is a kind of sport that motion is simple, direct and practical, with core of attack and defense combating, on the basis of self-cultivation as well as on the purpose of tempering people's will and lifting people's spirits. It takes hand, foot and whole body parts which must move as entirety combination, and connect them according to scientific principle. Take taekwondo exercise can move whole body muscles, joints and nerves, it let human body all organs move by whole body movement, so that take physical training, stimulate brain cells growth, strengthen people strength and brains, develop people intelligence and mental potentials, improve people analytical ability, insight, judgment, and let people subject activities be more creative and constructive. Taekwondo strictly highlight etiquette, courtesy in train-

ing, and advocates "Begin with etiquette and end with etiquette", taekwondo etiquette, courtesy reflects taekwondo training essence, which is a person willpower tempering and moral quality perfection, how to let learners arrive at a kind of modest, tolerant, self-control, respectful, simple, honest and compliance personality quality in learning process, taekwondo formulates some etiquette, courtesy to restrict and normalize public behaviors, let learners under external form restriction guidance, consciously, unconsciously and during subtle influence, learn to respect others, meanwhile learn to respect oneself.

Taekwondo has been rapidly developing in China, and every university starts to popularize taekwondo exercise. For example, taekwondo association, taekwondo club and taekwondo course so on, until 2011, our country's taekwondo club members and in-

dividual members have arrived at 120939, and every university starts to introduce and popularize taekwondo exercise. As a sport event well received by university students, it is not just a kind of sport event to keep fit, due to its strong humanistic quality and morality atmosphere, not only can strengthen university students' physique, but also the more important is that it can correct university campus disharmony factors, cultivate university students' comprehensive quality education. However, from the perspective of whole society, the event organizing in school sports is not popular, its functions also haven't been really played, in order to define better teaching effects, in the following it applies Analytic Hierarchy Process(AHP) method to research on this subject.

TAEKWONDO AHP MODEL ESTABLISH-MENTS

At first according to each age phase requirements of taekwondo to carry out analysis, as Figure 1 show.

From Figure 1, it is clear that different age phases have different requirements on taekwondo; therefore the paper makes analysis of university students' current age phase.

Establish hierarchical structure

Based on analytic hierarchy process, it makes quantization on taekwondo. Establish objective layer, criterion layer and project layer relationships.

Objective layer: Taekwondo education

Criterion layer: Project influence factors, c_1 is anti-setback force, c_2 is self-confidence, c_3 is educational attainments, c_4 is physical quality training;

Project layer: A_1 is cultural education, A_2 is entertainment for education, A_3 is combat-style education;

By above, it gets hierarchical structure as Figure 2 show.

Factor analysis

(1)Anti setback force

Anti setback force is the tolerance that puts up with setback. When one comes across setback, if he can tolerant the setback, frequently setback occurrences let himself form into better anti setback ability. Taekwondo, comparing to other sports events, it has stronger anti setback force. By taekwondo long-term training, it can effective cultivate university students themselves resist setback ability. Taekwondo takes attack as defense, each motion requires powerful striking, motions should be stable, and therefore to taekwondo education model, anti-setback force is important evaluation factor to analyze taekwondo.

(2)Self-confidence

Taekwondo education steps is starting from dividing each basic motions, every motion should act in place, such as, front kick, back kick, side kick and other ba-
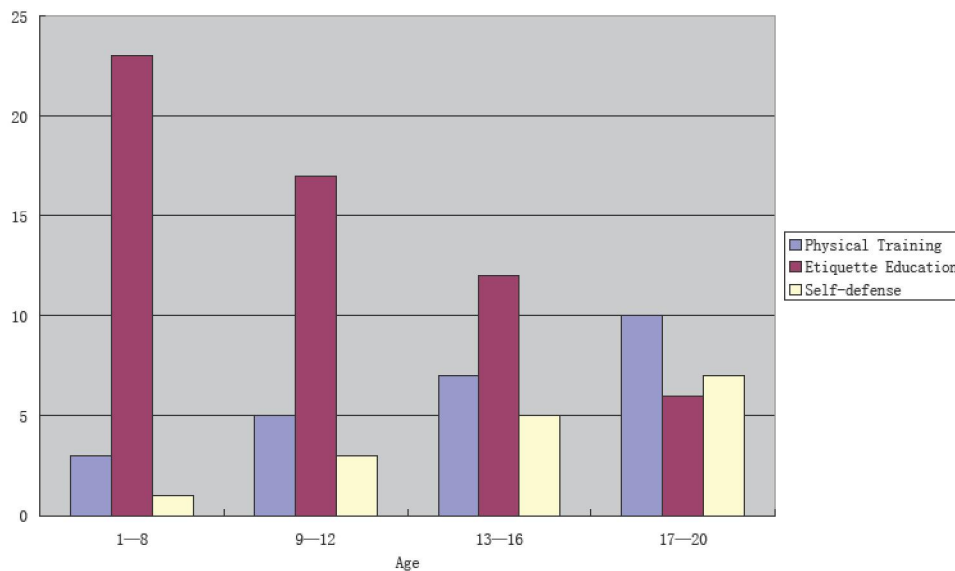

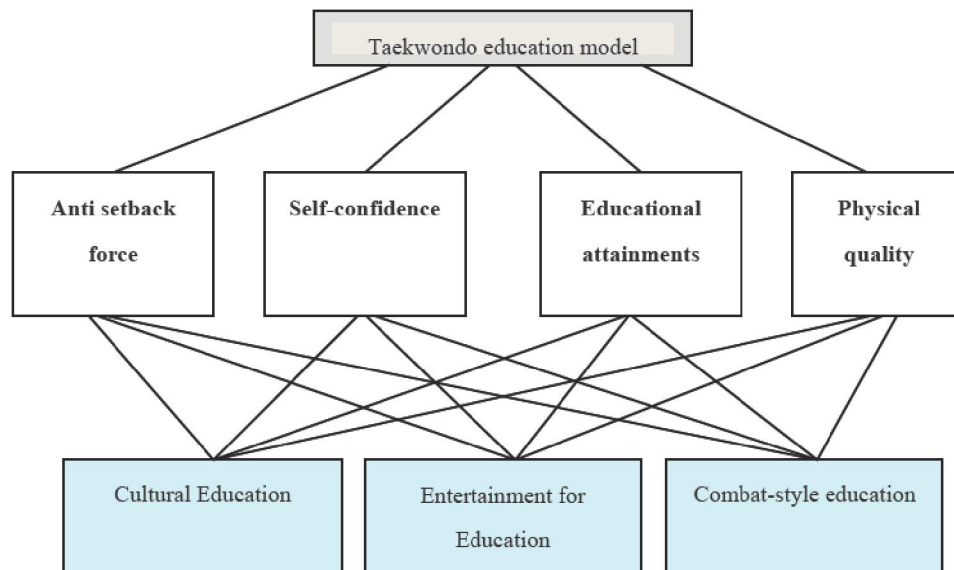**Figure 1 : Taekwondo age analysis chart**

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Figure 2 : Hierarchical structure

sic motions, every motion is future combat-style training basis, and, in later period it will connect every basic motion, which requires sportsman input lots of energy, therefore, to beginners, be able to make every basic motion well will surely increase sportsman confidence, and subsequent continuous exercising and achieved effects will surely increase sportsman self-confidence, which also provides essential confidence for future learning and life.

(3)Educational attainments

Taekwondo as a kind of internal and external refinement sport event, sportsman except for learning taekwondo every motion, and as a long-standing humanistic quality, taekwondo requires sportsman with etiquette quality and morality quality.

Now university students' morality and etiquette quality are not going well, especially individualism has very high occurrence probability in contemporary university students, due to individualism ignores others interest, collective interest and national interest, and also because of individualism, university campus occurs to many disharmony factors.

Taekwondo takes excellent inheritance of etiquette and morality, is a kind of strong cultural atmosphere sport event, especially its etiquette atmosphere can let university students get rid of anxious, self-conceited and other individualism behaviors.

(4)Physical quality

For physical training, with regard to other sports

events, taekwondo is also a kind of sport that enhances sportsman health.

CONSTRUCT JUDGMENT (PAIRED COMPARISON) MATRIX AND TEST

So-called Judgment matrix is describing every layer each element relative important degree to its previous layer element in the form of matrix. In order to let each factor carry out paired comparison and get quantified judgment matrix, it introduces 1~9 scale, it can refer to TABLE 1.

At first, solve judgment matrix, according to above principle, reference 1-9 scale setting, and according to experts and authors experience as well as refer to lots of documents, it gets paired comparison matrix under 4 criterions that are respective as TABLE 2, TABLE 3, TABLE 4, TABLE 5, TABLE 6

Hierarchical single arrangement and consistency test

Use consistency indicator to test: $CI = \frac{\lambda_{max} - n}{n - 1}$. From which λ_{max} is comparison matrix maximum feature root, n is comparison matrix order. CI Value gets smaller; judgment matrix gets closer to completely consistent. On the contrary, judgment matrix deviation degree from completely consistent would become larger.

Hierarchy total sorting and its consistency test

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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 $a_{ji} = 1/a_{ij}$, $a_{ii} = 1$

$$A = \begin{Bmatrix} 1 & 8 & 5 & 3 \\ 1/8 & 1 & 1/2 & 1/6 \\ 1/5 & 2 & 1 & 1/3 \\ 1/3 & 6 & 3 & 1 \end{Bmatrix}$$

$\xrightarrow{\text{Column vector normalization processing}}$
$$\begin{bmatrix} 0.603 & 0.470 & 0.526 & 0.667 \\ 0.075 & 0.059 & 0.053 & 0.037 \\ 0.121 & 0.118 & 0.105 & 0.074 \\ 0.201 & 0.353 & 0.316 & 0.222 \end{bmatrix}$$

$\xrightarrow{\text{According to the row sum}}$
$$\begin{Bmatrix} 2.266 \\ 0.224 \\ 0.418 \\ 1.092 \end{Bmatrix}$$

$\xrightarrow{\textbf{Normalization}}$
$$\begin{Bmatrix} 0.567 \\ 0.056 \\ 0.104 \\ 0.273 \end{Bmatrix} = W^{(0)}$$

$$AW^{(0)} = \begin{Bmatrix} 1 & 8 & 5 & 5 \\ 1/8 & 1 & 1/2 & 1/6 \\ 1/5 & 2 & 1 & 1/3 \\ 1/3 & 6 & 3 & 1 \end{Bmatrix} \begin{Bmatrix} 0.567 \\ 0.056 \\ 0.104 \\ 0.273 \end{Bmatrix} = \begin{Bmatrix} 2.554 \\ 0.225 \\ 0.422 \\ 1.110 \end{Bmatrix}$$

$$\lambda_{max}^{(0)} = \frac{1}{4}\left(\frac{2.354}{0.567} + \frac{0.225}{0.056} + \frac{0.422}{0.104} + \frac{1.110}{0.273} \right) = 4.073$$

$$w^{(0)} = \begin{pmatrix} 0.58 \\ 0.05 \\ 0.10 \\ 0.27 \end{pmatrix}$$

Similarly, it can calculate judgment matrix

$$B_1 = \begin{Bmatrix} 1 & 5 & 1/5 \\ 1/5 & 1 & 1/5 \\ 5 & 5 & 1 \end{Bmatrix}, B_2 = \begin{Bmatrix} 1 & 3 & 3 \\ 1/3 & 1 & 3 \\ 1/3 & 1/3 & 1 \end{Bmatrix},$$

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

Corresponding maximum feature value and feature

TABLE 2 : Comparison matrix

G	c_1	c_2	c_3	c_4
c_1	1	8	5	3
c_2	1/8	1	1/2	1/6
c_3	1/5	2	1	1/3
c_4	1/3	6	3	1

TABLE 3 : Comparison matrix

c_1	A_1	A_2	A_3
A_1	1	5	1/5
A_2	1/5	1	1/5
A_3	5	5	1

TABLE 4 : Comparison matrix

c_2	A_1	A_2	A_3
A_1	1	3	3
A_2	1/3	1	3
A_3	1/3	1/3	1

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TABLE 5 : Comparison matrix

c_3	A_1	A_2	A_3
A_1	1	5	3
A_2	1/5	1	3
A_3	1/3	1/3	1

TABLE 6 : Comparison matrix

c_4	A_1	A_2	A_3
A_1	1	1/5	1/8
A_2	5	1	1/3
A_3	8	3	1

vector in successive are:

$$\lambda^{(1)}{}_{max} = 3.31, \omega^{(1)}{}_1 = \begin{Bmatrix} 0.252 \\ 0.089 \\ 0.66 \end{Bmatrix}$$

$$\lambda^{(2)}{}_{max} = 3.12, \omega^{(1)}{}_2 = \begin{Bmatrix} 0.575 \\ 0.286 \\ 0.139 \end{Bmatrix}$$

$$\lambda^{(3)}{}_{max} = 3.30, \omega^{(1)}{}_3 = \begin{Bmatrix} 0.624 \\ 0.240 \\ 0.136 \end{Bmatrix}$$

$$\lambda^{(4)}{}_{max} = 4.05, \omega^{(1)}{}_4 = \begin{Bmatrix} 0.185 \\ 0.240 \\ 0.575 \end{Bmatrix}$$

Use consistency indicator to test(RI value as Table

TABLE 7 : RI value

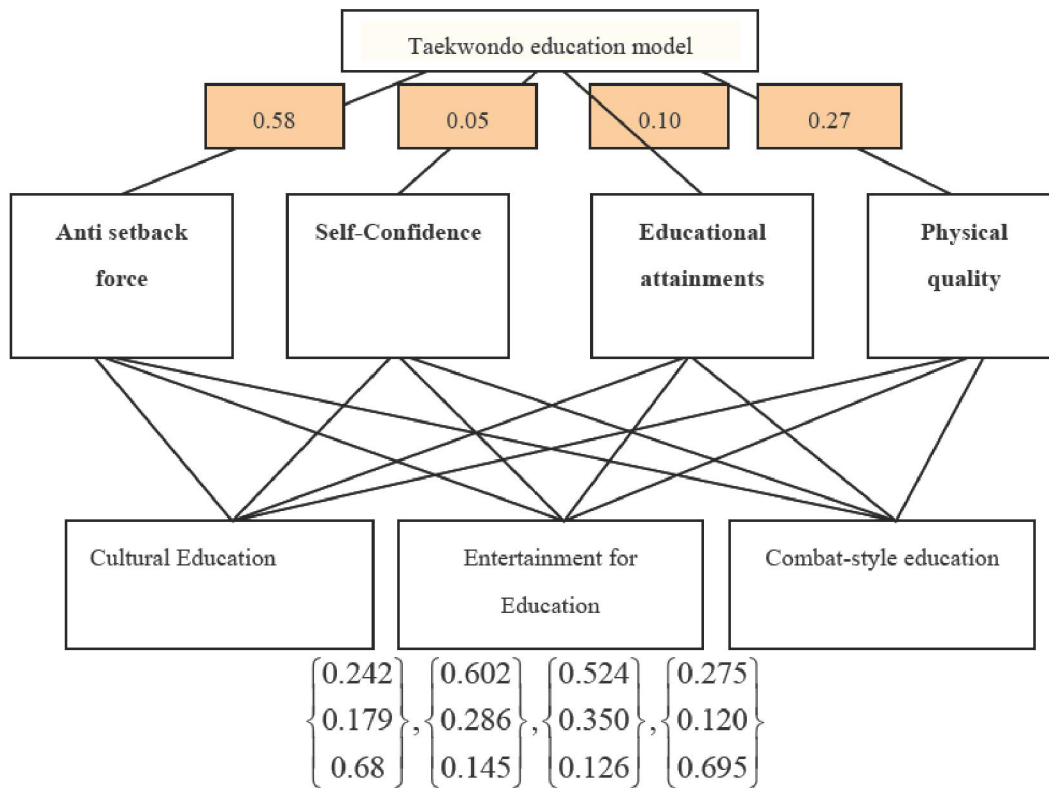| n	1	2	3	4	5	6	7	8	9	10	11
RI	0	0	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49	1.51

Figure 3 : Hierarchical structure chart

7): $CI = \dfrac{\lambda_{max} - n}{n-1}$, $CR = \dfrac{CI}{RI}$

(1) For 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 within permissible range, at this time it can use feature vector to replace weight vector.

(2) Similarly, to judgment matrix B_1, B_2, B_3, B_4 all passed consistency test by using above principle. Utilize hierarchical chart drawing out calculation results from object layer to project layer, as Figure 3 show.

Calculation result is as following:

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

$$w = w^{(1)}w^{(0)} = \begin{Bmatrix} 0.252 & 0.575 & 0.624 & 0.185 \\ 0.089 & 0.286 & 0.240 & 0.240 \\ 0.66 & 0.139 & 0.136 & 0.575 \end{Bmatrix} \begin{Bmatrix} 0.58 \\ 0.05 \\ 0.10 \\ 0.27 \end{Bmatrix}$$

$$= \begin{Bmatrix} 0.32 \\ 0.13 \\ 0.55 \end{Bmatrix}$$

CONCLUSIONS

The paper based on AHP method, firstly makes analysis of taekwondo from physical quality, self-confidence degree, anti-setback ability and educational attainments these four aspects, and takes consistency test. By physical education, especially by taekwondo education, it can not only improve sportsmen technology from system, and cultivate them from morality quality, cultural quality, anti-setback ability, self-confidence degree and other multiple perspectives. The research result is: cultural education accounts for 32% of education proportion, entertainment education accounts for 13% of education proportion, combat-style education accounts for 55% of education proportion.

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