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Discriminant analysis model-based sports dance teachers' professional quality development research

Xiningmeng Li^{1*}, Weixiao Liu²

¹Department of Physical, Xi'an University of Architecture and Technology, Xi'an 710055, Shanxi, (CHINA)

²Sports and Art Department, Xi'an Physical Education University, Xi'an 710068, Shanxi, (CHINA)

ABSTRACT

As a large-scale sports recreational event, sports dance also have certain promotion to Chinese sports development. And teacher is foundation of sports dance development, is the key to sports dance can sustainable develop or not. The paper carries out overall analysis of Chinese sports dance teachers' professional quality status, and proposes current stage sports dance teachers existing problems in professional quality aspect, and points out that sports culture, motor stereotype, artistic talent, general proficiency and the specialized theory knowledge are standards to evaluate a sports teachers' professional quality. On this basis, utilize discriminant analysis method, and further carry out model improvement, and establish evaluation criterion model about evaluating sports dance teachers' professional quality. Secondly, for sports dance teachers' professional quality influential numerous factors, it makes comprehensive evaluation, starts from sports dance teachers' age structure, teaching experiences, education background, sports dance teachers' technical ability, comprehensive ability and sports dance teachers' training, which provides theoretical support for above evaluation criterion model.

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KEYWORDS

Sports dance teachers;
Professional quality;
Discriminant analysis method;
Comprehensive evaluation.

INTRODUCTION

Sports dance mainly used to communication among people and recreational entertainment, it has a long history. Since continent of Europe started the event, with social advancement, sports dance has also gradually evolved and constantly added new contents.

Bi Fei in the article "University sports dance event education research", targeted institution of higher learning's sports dance education status, she made quantitative analysis, specific researched on sports dance

event development and future prospect, and got following conclusion: In current stage, advanced sports dance education relative world main power sports dance education, it mainly based on traditional education, its development was not fast enough, sports mode was not innovative enough. To further propel to Chinese sports dance education development, guided more students to join in sports dance profession, it should reform education system, innovate sports dance theory, solve problems targeted actual status to pursuit better development.

Zhao Jing-Hui in the article “Chinese sports dance teachers’ continuing education research”, he researched on Chinese sports dance development from the perspective of sports dance teachers, and combined with current stage existing problems and status to make feasible suggestions. The thesis pointed out that sports dance teachers were foundation of Chinese sports dance development, their professional quality cultivation was key problem, so in sports dance teachers’ cultivation process, it should focus on their continuing education issues, improve teachers’ professional levels, strengthen requirements of their theoretical guidance knowledge, so that propel to their comprehensive development.

Zhao Li in the article “Chinese sports dance organization status and counter measure research” took sports dance organization status as research basis, discovered problems by investigation and put forward corresponding countermeasures. The thesis pointed out that by far, Chinese sports dance technical level was still not very high, it still had certain deficiency in some special techniques, sports dance teachers, coaches’ professional levels were not perfect, it should further strengthen sports dance development.

The paper refers to predecessors’ research results, and consults lots of documents, and further utilizes mathematics discriminant analysis and comprehensive evaluation in view of sports dance teachers’ development trend, studies on Chinese sports dance teachers’ development trend so that puts forward feasible countermeasures for status.

MODEL ESTABLISHMENT

Sports dance is a kind of sports recreational type of event, its teachers’ professional quality directly af-

fects Chinese sports dance development. Professional knowledge, professional technology is the foundation to evaluate a teacher is qualified or not. To a sports dance teacher, its professional attainment is very important.

Below Figure 1 is Chinese sports dance teacher professional quality overall status, data is from “Chinese education comprehensive statistic yearbook”, Chinese statistics yearbook and general administration of sport of China’s relative investigation reports.

From above pie-shaped Figure 1, it is clear that Chinese sports dance teachers are mostly possessing sports dance professional quality, the ones that include all professional quality is relative little, even some still has deficiency, while it is quite deficient in fewer parts. It indicates Chinese sports dance teachers’ professional attainment is not very high, it should further intensify teachers’ professional knowledge, professional technology testing, improve teachers’ professional attainment, only then can improve sports dance development.

For Chinese sports dance teachers’ professional quality, by consulting lots of documents and scholars’ researches, combine with “Chinese education comprehensive statistic yearbook”, Chinese statistics yearbook and general administration of sport of China’s relative investigation reports, finally it gets sports culture, motor stereotype, artistic talent, general proficiency and the specialized theory knowledge these five items’ evaluation indicators are uppermost professional quality, following Figure 2 is five items’ evaluation indicators’ importance degree comparison.

Therefore, from above statistics Figure 2, it gets that evaluate sports dance teachers’ professional quality mainly considers artistic talent, general proficiency, the specialized theory knowledge, motor stereotype

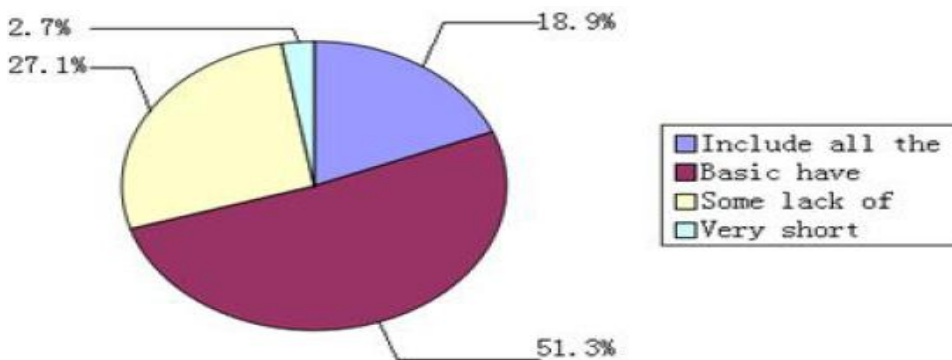


Figure 1 : Sports dance teachers’ professional quality

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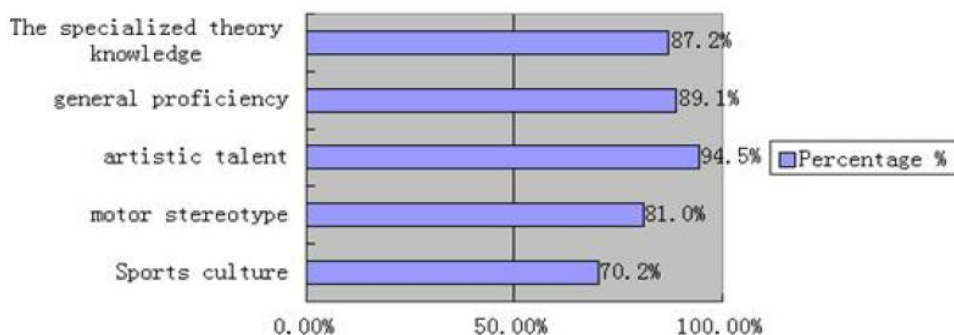


Figure 2 : The importance of the evaluation index

and sports culture. Thereupon, utilize discriminant analysis method, targeted these five items' indicators, it establishes discriminant analysis model, and further gets sports dance teachers' professional quality evaluation criterion.

Model preparation

Discriminant analysis is a kind of multiple statistical analysis method; it refers to observe on known evaluation indicators and according to observed data to make classification on evaluation objects. Discriminant analysis general steps are as following Figure 3:

Discriminant analysis refers to carry out discriminant analysis of historical data, and further establish discriminant function, and make classification of observed data. Here, utilize Bayes discriminant analysis to carry out standard research on Chinese sports dance teachers'

professional quality.

Below is obtained data from "Chinese education comprehensive statistic yearbook", Chinese statistics yearbook and general administration of sport of China's relative investigation reports, from which each kind of evaluation indicator adopts 10-point scale, total points are 50 points, and draw as following statistics TABLE 1.

Establish Bayes discriminant analysis model

Bayes discriminant analysis is a kind of method that analyzes two classes or multiple classes data, here juvenile volleyball athlete sports quality criterion should make analysis according to his age structure and gender, so use Bayes discriminant analysis is most suitable.

Under Bayes discriminant analysis discrimination criterion, established classification function form is:

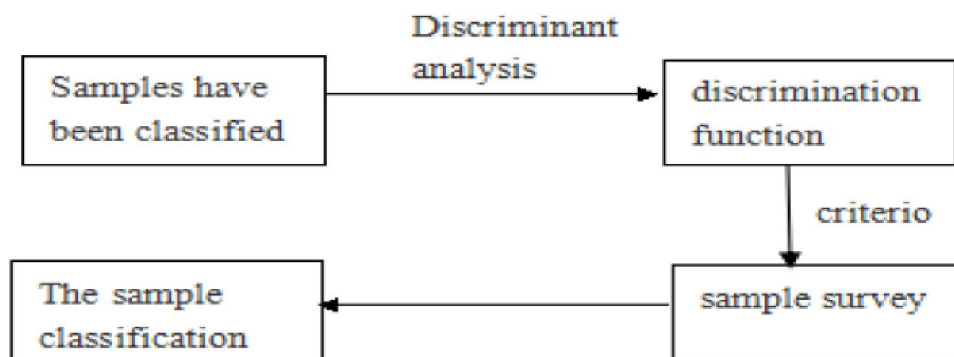


Figure 3 : Discriminant analysis step

TABLE 1 : 5 items evaluation indicators points' statistics

Respondents	Comprehensive score	Sports culture	Motor stereotype	Artistic talent	General proficiency	The specialized theory knowledge
1	30	4	6	8	7	5
2	31	5	5	7	8	6
3	28	4	6	7	5	6
4	32	6	7	6	8	5
5	31	4	5	9	6	7

$$\begin{cases} y_1 = c_{01} + c_{11}x_1 + c_{21}x_2 + c_{31}x_3 + \dots + c_{p1}x_p \\ y_2 = c_{02} + c_{12}x_1 + c_{22}x_2 + c_{32}x_3 + \dots + c_{p2}x_p \\ y_3 = c_{03} + c_{13}x_1 + c_{23}x_2 + c_{33}x_3 + \dots + c_{p3}x_p \\ \dots \\ y_n = c_{0n} + c_{1n}x_1 + c_{2n}x_2 + c_{3n}x_3 + \dots + c_{pn}x_p \end{cases}$$

That is to establish regarding observed indicators and observed objects linear function equations, every equation corresponds to a class discriminant criterion, from which $c_{0j}, c_{1j}, \dots, c_{pj}, j = 1, 2, \dots, n$ is estimated parameter. After establishing discriminant functions, input one discriminant correspondingly each parameter value into above discriminant parameter, and then it can know which class the object belongs to.

According to above data, make data processing, and establish Bayes discriminant analysis classification function equation set, so that define sports dance teachers' professional quality.

Establish Bayes discriminant analysis classification function

(A) Processing data

Utilize SPSS software to analyze above data, and then it can get following TABLE 2 classification function regarding sports dance teachers:

According to above coefficients TABLE 2, it can get classification functions about sports dance teachers' professional quality evaluation criterion:

$$y = 1.376x_1 + 1.025x_2 + 1.086x_3 + 0.191x_4 - 0.061x_5 + 8.111$$

Among them, y is the sports dance teacher professional quality comprehensive score, x_1 is sports culture, x_2 is motor stereotype, x_3 is artistic talent, x_4 is

general proficiency, x_5 is the specialized theory knowledge.

Improved Bayes discriminant analysis classification function

In order to improve discrimination accuracy, firstly add one item as prior probability, it makes improvements on above Bayes discriminant analysis classification function equations. Prior probability can properly improve discrimination accuracy, its defined criterion is according to lots of documents reports or previous a great deal of samples researches.

On the basis of prior probability, Bayes discriminant analysis classification function is converted into following form:

$$\begin{cases} y_1 = c_{01} + c_{11}x_1 + c_{21}x_2 + c_{31}x_3 + \dots + c_{p1}x_p + \ln(q(y_1)) \\ y_2 = c_{02} + c_{12}x_1 + c_{22}x_2 + c_{32}x_3 + \dots + c_{p2}x_p + \ln(q(y_2)) \\ y_3 = c_{03} + c_{13}x_1 + c_{23}x_2 + c_{33}x_3 + \dots + c_{p3}x_p + \ln(q(y_3)) \\ \dots \\ y_n = c_{0n} + c_{1n}x_1 + c_{2n}x_2 + c_{3n}x_3 + \dots + c_{pn}x_p + \ln(q(y_n)) \end{cases}$$

According to above sports dance teacher professional quality recent situations, it can define sports dance teacher professional quality prior probability respectively as $q(y) = 0.55$.

On the basis of considering prior probabilities, it can further respectively get about Bayes classification function about sports dance teacher professional quality as following:

$$y = 1.376x_1 + 1.025x_2 + 1.086x_3 + 0.191x_4 - 0.061x_5 + 8.111 + \ln(0.55)$$

That is:

$$y = 1.376x_1 + 1.025x_2 + 1.086x_3 + 0.191x_4 - 0.061x_5 + 7.513$$

TABLE 2 : Coefficients table

Model	Non-standardized coefficients		Standardized coefficients
	B	Standard error	Trial version
(Constant)	8.111	.000	
Sports culture	2.333	.000	1.376
Motor stereotype	1.013	.000	1.025
Artistic talent	1.444	.000	1.086
General proficiency	.222	.000	.191
The specialized theory knowledge	-.111	.000	-.061

a. Dependent variable: Comprehensive score

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Above is the sports dance teacher professional quality discriminant function.

(B) Define classification criterion

According to sports dance teacher each item professional quality evaluation indicators 10-point scale scoring criterion, now define following professional quality evaluation criterion:

Professional quality is unqualified: $y \leq 25$ scores;
 Professional quality is qualified: $25 \leq y \leq 30$ scores;
 Professional quality is good: $25 \leq y \leq 35$ scores; Professional quality is excellent: $35 \leq y \leq 50$ scores; According to above criterion, input one sports dance teacher sports culture, motor stereotype, artistic talent, general proficiency and the specialized theory knowledge these five evaluation indicators scores into above classification function, it get corresponding y value, and compare with above sports dance teacher professional quality evaluation criterion, it belongs to above range, then can judge a sports dance teacher professional quality.

Indicators for judging a sports dance teachers' professional quality have sports culture, motor stereotype, artistic talent, general proficiency and the specialized theory knowledge these five items, the five items professional quality indicators scores high-low represent a sports dance teacher professional quality high-low. Therefore, the judgment criterion can be used as sports dance teacher professional quality level evaluation criterion.

CHINESE SPORTS DANCE TEACHER PROFESSIONAL QUALITY INFLUENCES COMPREHENSIVE ANALYSIS

Targeted above analysis, it can get that criterion for evaluating a sports dance teacher is qualified or not mainly has sports culture, motor stereotype, artistic talent, general proficiency and the specialized theory knowledge these five items, and sports dance guiding teachers such five items quality influence factors are various, first analyze them one by one.

Chinese sports dance teacher basic information

(A) Sports dance teacher age structure

Chinese sports dance teacher is backbone of sports dance development in Chinese sports, excellent teachers can train excellent students. Below TABLE 3 is Chinese sports dance teachers' age distribution, data is from general administration of sport of China data, Chinese statistics yearbook and internet data investigation.

Draw above statistical table into following Figure 4, and make further statistical analysis:

From above sports dance teacher age distribution area chart distribution, it is clear that Chinese sports dance teacher age distribution concentrates on 30~50 years old, young teachers below 30 years old are quite little, on a whole it presents "aging" features. In future sports dance development process, it should positive encourage young teachers to go in for sports dance vocation, let revitalized teachers strength to replace

TABLE 3 : Sports dance teacher age structure distribution

Age	《30	31~35	36~40	41~45	46~50	》50
Percentage%	8.90%	19.70%	20.90%	29.70%	24.30%	5.40%

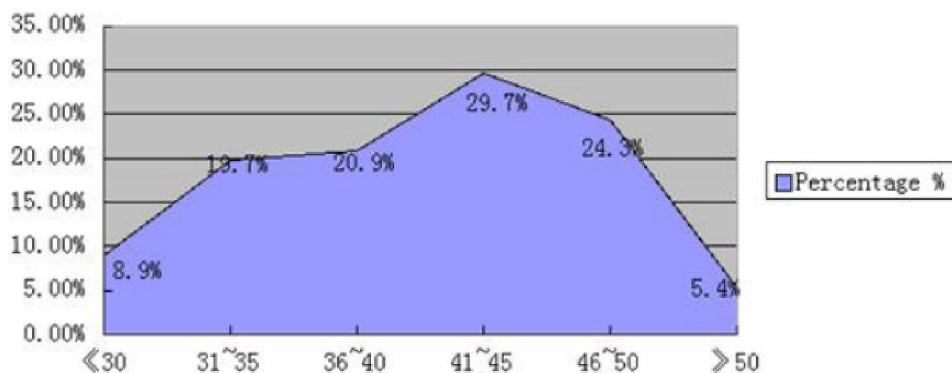


Figure 4 : Sports dance teachers' age structure distribution

senior teachers, so that let sports dance to develop towards younger.

(B) Sports dance teacher teaching experiences

As sports dance teachers, their teaching experiences are related to professional level, teaching experience accumulation. Generally, high teaching experiences' teachers tend to be more outstanding than young teachers in teaching courses, professional knowledge and other aspects. Below Figure 5 is Chinese sports dance teachers' teaching experiences statistical chart, data is from general administration of sport of China data, Chinese statistics yearbook and internet data investigation.

Draw above statistical TABLE 4 into following Figure 5, and make further statistical analysis:

From above statistical Figure 5, it is clear that Chinese sports dance teachers' teaching experiences are mostly in 3~5 years, above 5 years are relative fewer. On a whole, Chinese sports dance teachers' teaching years are higher, which also shows our country sports dance teachers' teaching experiences are relative rich and teaching quality is better from certain perspectives.

TABLE 4 : Sports dance teachers' teaching experiences

	< 1 years	1 ~ 2 years	3 ~ 5 years	> 5 years
Percentage%	5.90%	14.60%	55.40%	24.10%

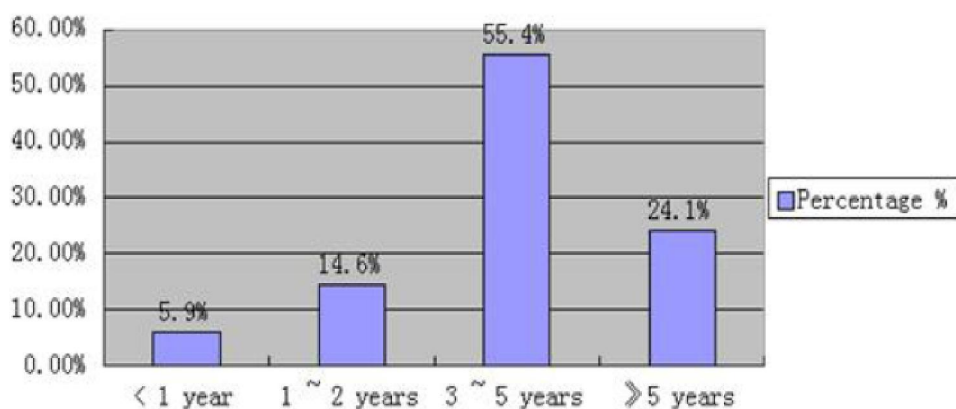


Figure 5 : Sports dance teachers teaching experience

(C) Sports dance teachers' education background

Sports dance is a kind of higher technical sports event; it is also strict with guiding teachers' education background. Education background high-low directly affects teachers' professional quality, motion technology and comprehensive competence so on. Below TABLE 5 is Chinese sports dance teachers' education background statistical table, data is from general administration of sport of China data, Chinese statistics

yearbook and internet data investigation.

Draw above statistical Table into following Figure 6, and make further statistical analysis:

TABLE 5 : Sports dance teachers' education background statistical table

	Graduate student	Regular college course	Junior college	No record of formal schooling
Percentage%	2.0%	30.4%	43.2%	24.4%

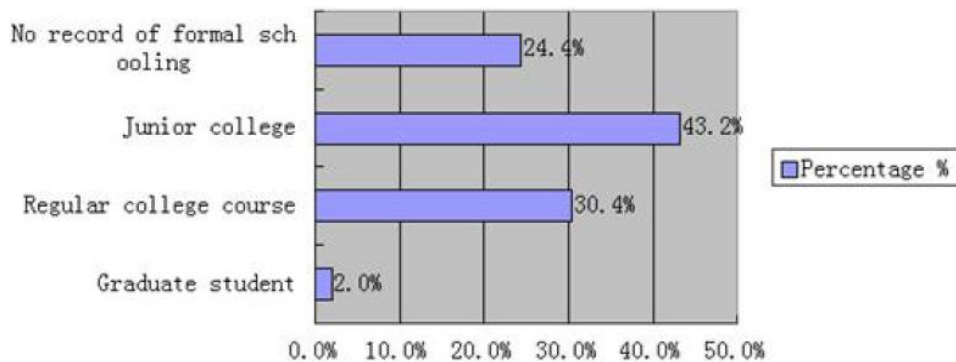


Figure 6 : Sports dance teacher qualifications

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By above bar statistical Figure 6 analyzing, it gets that Chinese sports dance teachers' education background is relative lower, most are taking regular college course and from junior college, education background as graduate student is fewer, and there is a big proportion of teachers have no record of formal schooling. To propel to sports dance development, it should strengthen sports dance teachers' professional level, employ high education background guiding teachers, only then can improve sports dance overall level.

Chinese sports dance teachers' training basic status

For sports dance teachers' professional quality level high-low, training them is a very important item. Thereupon, make statistics from general administration of sport of China data, Chinese statistics year-

book and internet data investigation as following TABLE 6 sports dance teachers' training influence factors data.

Draw above statistical Table into following Figure 7, and make further statistical analysis:

TABLE 6 : Sports dance teachers' training influence factors

Factor	Percentage %	Rank
Lack of learning money	78.4%	1
Lack of learning opportunities	67.6%	2
Management mechanism is not perfect	56.8%	3
Learning atmosphere is not strong	40.5%	4
The shackles of traditional ideas	18.9%	5
Subjective don't work hard	13.5%	6
Physical quality is not good enough	8.1%	7
Subjective interests are weaker	5.4%	8
Others	2.7%	9

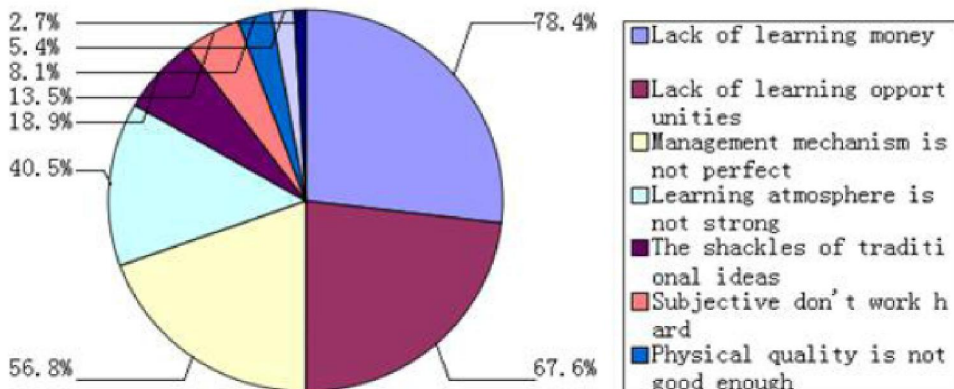


Figure 7 : Factors influencing the sports dance teachers training

From above pie-shaped chart analysis, it is clear that Chinese sports dance teachers' professional quality training influential main factors are lack of learning money and learning opportunities as well as management mechanism is not perfect, which are closely related to government investment and emphasis on sports dance education. To further improve sports dance education confronted status, it should increase government investment, expand sports dance impacts. In addition, sports dance teachers themselves impacts on training status are also very important, learning atmosphere is not strong, the shackles of traditional ideas, subjective don't work hard, physical quality is not good enough, interests are not thick and others are key factors that affect sports dance teachers when they take professional quality training, which should be avoided.

Chinese sports dance teachers' technical ability general situation

For a sports event, its sports technique essentials are very crucial. Generally, sports technique refers to an athlete body basic movement, body motion rhythm sensation, body motion coordination, movement path and movement time long or short and so on. And sports dance as a kind of sports event, is a strong technical sports event, its technique also has certain evaluation indicators.

Below TABLE 7 is a main indicator that evaluates Chinese sports dance teachers' technical ability high-low, data is from internet, Chinese statistical yearbook and other investigation reports.

Draw above statistical Table into following Figure 8, and make further statistical analysis:

TABLE 7 : Sports dance teachers’ technical ability indicators

Technique constitution	Body movement	Physical gestures	Cooperate with partner
Percentage%	94.5%	75.6%	75.6%

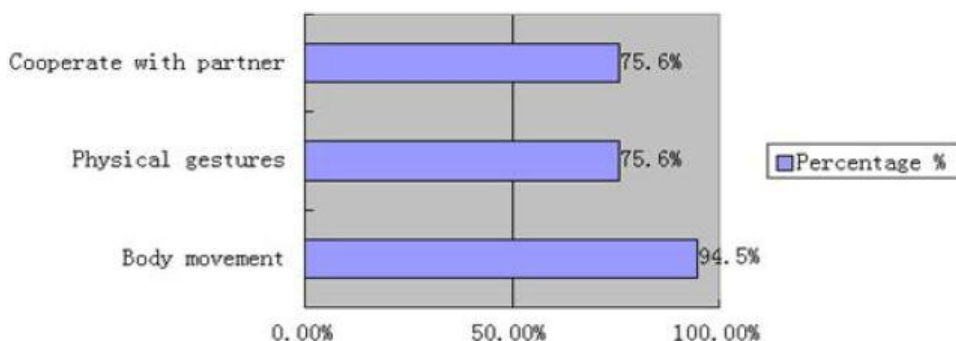


Figure 8 : Sports dance teachers’ technical ability index

By above statistical chart analysis, it gets conclusion that when evaluate Chinese sports dance teachers’ technical ability, it main considers his body movement, physical gestures and whether can well cooperate with partner or not. Among them, body movement is most important technical essential, is a foundation to evaluate a sports dance teacher is qualified or not. On this basis, it should also observe sports dance teachers’ physical gestures are elegant or not, have artistry or not, whether he can well cooperate with partner and jointly fulfill assigned task or not, these are technical essentials that a sports dance teacher should possess.

Chinese sports dance teachers’ comprehensive ability general situation

Sports dance teachers’ comprehensive ability is one of key factors to judge a teacher professional quality. Comprehensive ability mainly contains professional training ability, creative thinking, scientific research skills, organizational collaboration skills and communication skills. However, in these comprehensive abilities, their importance degrees are different.

Below statistical TABLE 8 is indicated comprehensive ability structural table by investigating Chinese sports dance teachers, from which percentage shows

TABLE 8 : Sports dance teachers’ comprehensive ability structure

Comprehensive ability composition	Very important	Relative important	Normal	Not so important	Not important
Professional training ability	100%	0	0	0	0
Creative thinking	90%	10%	0	0	0
Scientific research skills	70%	10%	20%	0	0
Organizational collaboration skills	80%	20%	0	0	0
Communication skills	70%	20%	10%	0	0

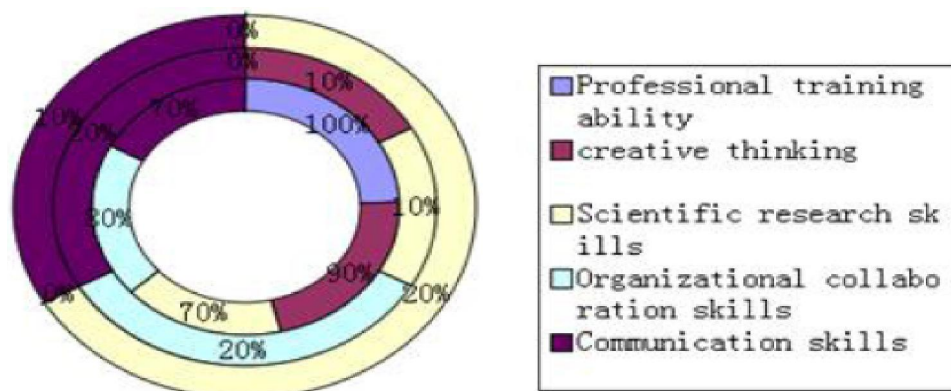


Figure 9 : Sports dance teachers’ comprehensive ability structure

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number of sports dance teachers percentage that think the item ability is important or not. Data is extracting from internet, general administration of sport of China relative investigation reports.

Draw above statistical Table into following Figure 9, and make further statistical analysis:

Above ring diagram shows in investigation on all sports dance teachers, they all think professional training ability is most important, secondly are creative thinking, organizational collaboration skills, scientific research skills and communication skills. Therefore, professional basic knowledge is most important to a sports dance teacher.

CONCLUSION

The paper firstly analyzes Chinese sports dance teachers' professional quality basic information, on this basis, it utilizes discriminant analysis method, and further studies on professional quality evaluation five items criterions, by establishing discriminant functions, it defines discriminant criterion, so that formulates sports dance teachers' professional quality evaluation criterions. In addition, considering things occurrence prior probabilities, it improves model so that let discriminant criterion to be more accurate.

On the basis of sports dance teachers' professional quality discriminant criterion researching, the paper makes integrated analysis sports dance teachers' professional quality influence factors from their age structure, teaching experiences, education background, sports dance teachers' technical ability, comprehensive ability as well as sports dance teachers' training. So that make further theoretical supplement on above professional quality evaluation criterions.

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