





# “Evaluation index system of practical abilities of P.E. students at Chinese universities”

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# EVALUATION INDEX SYSTEM OF PRACTICAL ABILITIES OF P.E. STUDENTS AT CHINESE UNIVERSITIES

## Abstract

With the continuous increase of requirements for P.E. talents' qualities, there occurs higher disharmony between cultivation goals and modes for P.E. talents and social demands. Hence, it is necessary to review the evaluation index system of practical abilities for university students majoring in P.E. to enhance the betterment of cultivation goals and modes for P.E. professionals and its teaching quality. The goal of this study is to establish the evaluation index system of practical abilities for P.E. professionals. This paper uses document analysis and expert grading methods to construct the concrete indexes of the evaluation system and calculate the weight indexes of three levels of practical abilities employing the analytic hierarchy process. The results highlighted that the most significant weights have, respectively, moral education ability in the first-level indexes, teachers' code of ethics in the second-level indexes, and role model leading ability in the third-level indexes. The institution process of the evaluation index system in the research is scientific and reliable, which provides a theoretical reference for the evaluations of the education cultivation and professional abilities of students majoring in P.E. at Chinese universities.

## Keywords

Chinese universities, ability evaluation, P.E., practical ability, moral education, evaluation index

## JEL Classification

I21, D83

## INTRODUCTION

P.E. students are reserved talents for P.E. workers in China, and evaluating students' practical ability is a critical step in P.E. teaching. Practical abilities of students broadly refer to the fact that with scientific and cultural knowledge as a theoretical base, Chinese colleges and universities realize the transformation from learned theories to various abilities through practice. This is the demonstration and application of students' abilities in various aspects and the ultimate value embodiment of their overall abilities. In the narrow sense, students' practical abilities mean their comprehensive ability to think and move to combine theoretical knowledge with practical activities in the practical work of study, research, productive labor, management, cultural life, and other aspects (Liu, 2007). The level of students' professional ability is the key to evaluating if a student is a talent, can meet the needs of society, and can go to employment smoothly. The constant evolution of the cultivation way for P.E. students in higher education establishments has become the key to improving the professional abilities of graduates majoring in P.E. so that they can be perfectly competent for later education and teaching work (An et al., 2005).

With the improvement of P.E. teaching objectives, the existing evaluation system of practical abilities has been unable to meet the current needs of education and teaching. The direction and emphasis of eval-

uation in this system have also deviated from the current teaching realities. Moreover, there are some problems, such as the incompleteness of evaluation indexes, unreasonable weights, and singularization of evaluation methods, as well as limitations and incompleteness in the evaluation content and dimension (Zhao, 2013; Peng, 2020). In the past, some universities paid more attention to students' theoretical knowledge than their practical abilities (Zhong, 2007). However, with society's development, employers put higher requirements on the practical abilities of students majoring in P.E., which shows that society has a higher demand for talents' practical abilities and comprehensive qualities. Meantime, there are some deviations between the cultivation goals and modes of talents in HEIs and the demands of society. However, one must have solid and excellent practical abilities to adapt to and create a new scene of P.E. training (Chen, 2013). Hence, it is of great theoretical value and practical significance to evaluate and cultivate the practical educational ability of students majoring in P.E. (J. Yang, 2020).

The goal of the evaluation index system of practical abilities of students majoring in P.E. is to solve the problems of the inconsistency between the training goals and modes and social demands. Moreover, there are issues associated with the ungrounded change of the talent-training program, the rigidity of the training mode in the process of talent cultivating, and the objective deficiency of the evaluation of the teaching effect. Thus, the evaluation system should give full play to the substantive benefit function of escalating the adaptive social ability of P.E. talents and realizing self-value, enriching the theoretical research of practical ability of P.E. subject at a certain level. In order to achieve this goal, this study analyzes the weight of system indexes. Furthermore, it determines the influencing factors to improve the training level of P.E. professionals significantly to promote the steady and high-quality development of China's sports cause.

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## 1. LITERATURE REVIEW

Zhang (2007) believes that a long-term mechanism and system for cultivating practical abilities should be established for the student training of P.E. majors in colleges and universities, and practical teaching links of these majors should be strengthened. Feng et al. (2016) pointed out that practical ability assessment should be strengthened in the professional training index system, and practice and application should be emphasized. The basic framework and mathematical model of the scientific evaluation index system for practical ability will play a positive role in establishing the evaluation system of practical ability for students majoring in P.E. (Jiang, 2012). All the practical ability indexes of P.E. students are not balanced, and the weight of the abilities of P.E. teaching and extracurricular sports organization is higher than average (Zhao et al., 2018).

Li (2012) and Liu (2007) believe that in the process of P.E., the four indexes of teaching ability (explanation ability, error correction, motivation ability, and organizational management ability) were more important than other indexes. Shan (2013) utilized the fuzzy comprehensive evalua-

tion method to conclude that indexes of teaching organization, management ability, and language expression ability of postgraduates majoring in physical education are generally weaker. Deng (2009), Zhao (2011), and Cai et al. (2015) believe that "practical ability" refers to those psychological and physiological characteristics that can be used to stabilize and regulate the individual's ability to solve practical problems. Therefore, students' practical abilities should be assessed and cultivated by constructing the evaluation index system from the four perspectives: their practical motivation ability, general practical ability, special practical ability, and comprehensive application practical ability.

You et al. (2018) constructed the evaluation model and assessment method of sports practice innovation ability from the three dimensions (academic level, innovation ability, and entrepreneurship awareness). Zhao et al. (2018) concluded that teaching ability is the core of the evaluation index of P.E. students' practical ability. Wu (2012) suggested that the evaluation index system standard of practical ability of P.E. majors should be adjusted to strengthen the evaluation of explanation and demonstration in physical education teaching ability.

The talent cultivation objectives and modes of P.E. majors are out of step with the social demands, which embody that the students' practical abilities are weak. Thus, there is a gap between the students' moral education ability, physical education teaching ability, sports training ability, sports scientific research ability, and the requirements of students' training goals. In addition, the development of the branches of each ability is imbalanced (Wu, 2008). The practical ability of P.E. majors is the core ability to cultivate P.E. professionals in colleges and universities (Y. Zhou, 2017). Wu (2008) utilized time, content, and action sequence paths to study the practical ability of students. The study emphasized that the classroom teaching of P.E. practical ability should be combined with social production and life.

Culturing teachers' good teaching morals is an essential step in teachers' vocational ethics in HEIs (Li, 2019). The adherence to the transformation from moral thinking to ethical thinking of teachers' vocational morals in HEIs and the establishment of scientific and reasonable assessment mechanisms are significant to the development of Chinese higher education (Xu, 2019). Teachers' vocational morals are a unique moral code abided by teacher groups (Q. Zhou, 2017). The participation of P.E. students in the evaluation process in a structured and targeted way is conducive to the cultivation of evaluation ability and better participation in training (Gloria et al., 2015).

There are effects of resource sharing and interaction between the training of physical education students' practical ability and the reform of physical education work (Lv & Bian, 2007). Practice teaching is a vital link to realize the cultivation of applied talents. The quality of education is determined by teachers' teaching ability. Thus, it is necessary to strengthen their practice and teaching abilities and construct a "multilayer, three-dimensional, and open" practice teaching system (Liu & Liu, 2019; Z. Yang, 2020). The cultivation of P.E. students' abilities should be carried out from the following dimensions: teacher's ethics education, teaching expression ability, teaching organization ability, teaching design ability, ability to adapt to the teaching environment, self-study and reform ability of P.E. teaching, and social competition ability (Wang et al., 2002). Wang et al. (2002)

believe that training students' learning ability in physical education teaching also involves class organization, teaching methods, teaching materials, and a load of learning tasks.

With social work getting more and more specialized, higher education institutions should realize the connection between P.E. and the demands of society to train professional talents and perfect the diversified evaluation system. Therefore, the humanities and education courses and teaching practice activities should be added to the students majoring in P.E. (Han, 2005). Fang (2011) and Zhou (2007) concluded that teaching ability is the most critical ability that students should possess through the research on the weight of the teaching ability's index of students in P.E. majors. Zhang (2019) studied three dimensions of athletics teaching ability of students majoring in P.E., namely basic abilities, practical abilities, and moral cultivation abilities. The study concluded that the abilities in all dimensions better mastered are, respectively, teaching ability in basic abilities, action demonstration and error correction ability in practical abilities, and fighting and challenging ability in moral cultivation. Furthermore, the cultivation of P.E. students' abilities should follow the principles of being planned, progressing step by step, and having associativity, practice, and individuality (Zhang & Wang, 2000).

Ghofrani and Golsanamlo (2012) found that most students have a positive perception and attitude toward P.E. classes, and boys have a more positive attitude toward physical education courses than girls. Talaghir (2017) integrated P.E. goals into a high-quality performance management system and concluded that the standards of educational goals were achieved at the academic level through learning plans. Cui (2018) suggested building a dual system of teaching evaluation content and teaching skills of Wushu to improve the Wushu teaching ability of the students majoring in P.E.

Wang et al. (2020) believe that the cultivation plan should stimulate the scientific research interests and abilities of students majoring in P.E. To integrate HEIs' ideological, moral education, and professional education well, it is necessary to escalate the ideological education ability of professional course teachers. Moreover, it is worth creating an

ideological, moral, and professional education assessment system (Li, 2019). P.E. major is specially designed for the cultivation of P.E. teachers, and the practical ability of students is the fundamental core of P.E teachers' vocational skills (Zhang & Liu, 2018). The escalation of the self-education ability of university students is an essential means to strengthen self-education and school management, improving students' level and effect of self-education (Zhang, 2013). The correct understanding and mastering of P.E. independent learning ability can lead many university students to integrate into fitness sports and enhance their body qualities and comprehensive literacy (Xue, 2022).

To sum up, scholars in China and abroad mainly elaborate on the practical ability, teaching ability, personal skills, and other branch ability evaluation of students majoring in P.E. from a microscopic perspective. However, there are few macro studies and explanations on the practical ability evaluation index system of students majoring in P.E. Therefore, this paper has a particular reference value.

Based on the literature review, this study puts forward the following hypotheses:

- H1: In the moral education ability, the weight of teachers' moral code factor is the most significant.*
- H2: In the vocational practical ability, the weight of the professional practical ability factor is the most significant.*
- H3: In the general practical ability, the weight of the self-education factor is the most significant.*
- H4: In the learning development ability, the weight of the self-directed learning ability factor is the most significant.*

## 2. METHODOLOGY

Delphi method and mathematical statistics are used for this analysis. Opinions are solicited from selected expert groups in the form of questionnaires. Experts are invited to analyze and list in-

dexes according to their own understanding of the practical abilities that P.E. students should have. After the collation of expert opinions and theoretical demonstration, the index system was determined. Expert evaluation and judgment determine the screening indexes, with a score range of 1-5. The weights of indexes at all levels are determined according to the given score. The evaluation index system revised by empirical research has been recognized by experts, tested, and tried in teaching at middle and primary schools.

According to the relevant data from expert interviews, the questionnaire for constructing the evaluation index system of the practical ability of students majoring in P.E. was designed. SPSS 17.0 was used for the statistical processing of the data and results of the expert survey, and the weights that met the requirements were screened out and retained (random consistency ratio  $CR < 0.05$ ). Finally, the weight coefficients of the first, second, and third indexes of P.E. students' practical ability were obtained in the evaluation index system. In the subsequent practical ability test, mathematical statistics are used to calculate the final score.

### 2.1. Index selection

The practical ability of students majoring in P.E. includes much theoretical knowledge and practical skills. It is also the core ability that university students must possess in the future teaching of P.E. This study preliminarily illustrates the basic structure of the evaluation index system. Combining theoretical research with the investigation was done based on the theory of scientific teaching evaluation. According to the Measures of the Implementation of Common High Schools Normal Majors Certification (Provisionally) issued by the Ministry of Education in 2017, the Professional Standards of the Teachers for the Primary and Secondary Schools and the Curriculum Standards for Teachers' Education established the evaluation index system. Cultivating objectives, cultivating direction, curriculum setting, and curriculum objectives of P.E. majors in colleges and universities were combined. The content of the relevant evaluation index system as the referred standards and the experts' and scholars' argumentations and suggestions on the practical ability of students majoring in P.E. were analyzed.

**Table 1.** Practical ability indexes of students majoring in physical education

Target layer	Primary index	Secondary index	Tertiary index	
The practical ability of students majoring in P.E. education	A1 Moral education ability	B1 Codes of ethics for teachers	C1 Patriotic and law-abiding	
			C2 Have the spirit of due diligence	
	B2 Ability to practice teacher morality	C3 Role model leading		
		C4 Willingness to work on sports		
	A2 Vocational practice ability	B3 Ability to master theoretical knowledge	C5 Have positive emotions	
			C6 Have a proper attitude	
			C7 Theories and methods of modern education and teaching	
			C8 Theories and methods of physical education	
			C9 Theories and methods of extracurricular physical education	
			C10 Theory and method of training competition	
			C11 Theories and methods of educational psychology	
			C12 Theories and methods of sports psychology	
			C13 Theories and methods of sports human science	
			C14 Theories and methods of sports safety and Prevention	
			C15 Theories and methods of healthcare knowledge	
			B4 Professional practice ability	C16 Classroom teaching ability
				C17 Ability to organize health activities
				C18 Ability of sports training guidance
			A3 General practical ability	B5 Self-education ability
	C20 Healthy physique			
	C21 Elegant body and mind			
	C22 Consciousness of self-surpassing			
	C23 Strengthen physical quality			
	C24 Improve ideological and moral qualities			
	C25 Improve the level of intelligence			
	C26 Promote the development of thinking			
	C27 Improve the ability of aesthetics			
	C28 Establish the concept of lifelong sports			
	A4 Learning development ability	B7 Independent learning ability	C29 Ability of P.E. scientific research	
			C30 Ability of lifelong learning	
		B8 Responsive ability to practice	C31 Career planning ability	
			C32 Ability to analyze problems	
		B9 Ability of communication and cooperation	C33 Ability to solve problems	
			C34 Ability of reflection and evaluation	
			C35 Ability of team synergy	
			C36 Skills of communication	

ed. Thus, the paper constructed the relevant index system through a detailed analysis of practical abilities from multiple perspectives and levels. All levels of indexes in this index system are selected and determined by experts. In addition, according to the questionnaires, 4 first-level indexes, 9 second-level indexes, and 36 third-level indexes were summarized for further screening (Table 1).

## 2.2. Data sources

Two rounds of questionnaire surveys were carried out with the experts of P.E. education from colleges and universities in Henan Province and students majoring in P.E. from the Physical Education School of Henan University as the in-

vestigated objects. The first round comprised designing the questionnaires for teachers and students and sending them to experts, scholars related to the P.E. major, and students majoring in it. Then, according to the collected questionnaire, data statistics are conducted.

Next, based on the first round of the questionnaire survey, some questions of the questionnaires were supplemented and modified. After this, the second round of the questionnaire survey was conducted. The questionnaires of teachers and students were distributed to the P.E. experts of colleges and universities in 18 prefecture-level cities such as Zhengzhou, Kaifeng, and Luoyang of Henan Province, and the P.E. students from the Physical Education School of

Henan University through an electronic network. Among them, 100 questionnaires were sent out to students, and 95 were recovered, with a recovery rate of 95%. There were 92 valid questionnaires, with an effective recovery of 96.8%. A total of 20 expert questionnaires were sent out, 18 were recovered with an effective recovery rate of 90%, and 18 were effective with an effective recovery rate of 100%.

### 3. RESULTS

#### 3.1. Institution of judgment matrix

According to the Saaty (STA) registration form of relative importance, a particular evaluation scale is assigned to each degree by the questionnaire of P.E. students' practical ability evaluation index weight. Therefore, experts need to compare each index in pairs according to the importance of each index and fill in the evaluation scale according to the corresponding score. The importance level of this paper is shown in Table 2.

According to the evaluation index system of P.E. students' practical ability put forward by experts, the indexes at all levels are compared in pairs. Moreover, the statistical results of assigned values are judged and analyzed (Table 3).

#### 3.2. Weight calculation

The evaluation index system of P.E. students' practical ability includes three levels. In order to reflect the relationship among indexes more objectively,

the single-layer ranking calculation is adopted first. Single-layer ranking refers to the weight of ranking the importance of an index at the next level affiliated with the index calculated according to the judgment matrix. For example, the main index at the first level of A1 Moral education ability: the weight of ranking the importance of B1 Teacher ethics and B2 Ability to practice teacher ethics are calculated referring to the judgment matrix. In this paper, the purpose of calculating the relevant data of the evaluation index system of P.E. students' practical ability is to understand the weight order of all indexes in the practical ability of P.E. students in colleges and universities. By calculating the weight of every single index, ranking the weight of the comprehensive index is finally worked out. It is divided into five steps to calculate the single-layer weight ranking of indexes at all levels.

##### 3.2.1. Single-layer sorting (weight) calculation and one-off inspection

It is necessary to calculate the item  $M_i$  of each row element of the judgment matrix; the formula is:

$$M_i = \prod_{j=1}^n a_{ij} ; \quad i = 1, 2, \dots, n. \quad (1)$$

According to the judgment matrix table of the case expert, the calculation of the item of the grade scale of each row of the expert's primary index is as follows:

$$M_1 = 1 \cdot 1 \cdot 3 \cdot 3 = 9,$$

$$M_2 = 1 \cdot 1 \cdot 5 \cdot 5 = 25,$$

**Table 2.** Form of relative importance degree

Scale	Meaning
1	Indicates that the two factors have equal variability
3	Indicates that one factor is slightly more important than another
5	Indicates that one factor is significantly more important than another
2,4	Is the median value of the above adjacent judgments
If factor A and factor B are compared and judged to be 3, then factor B and factor A are compared and judged to be 1/3.	

**Table 3.** Primary indexes of expert judgment matrix

Factors	A1 Moral education ability	A2 Vocational practice ability	A3 General practical ability	A4 Learning development ability
A1 Moral education ability	1	1	3	3
A2 Vocational practice ability	1	1	5	5
A3 General practical ability	1/3	1/5	1	1
A4 Learning development ability	1/3	1/5	1	1

$$M_3 = \frac{1}{3} \cdot \frac{1}{5} \cdot 1 \cdot 1 = \frac{1}{15},$$

$$M_4 = \frac{1}{3} \cdot \frac{1}{5} \cdot 1 \cdot 1 = \frac{1}{15}.$$

**3.2.2. Calculation of the n-th root of the grade scale product of each line**

The formula of the n-th root of the item is:

$$\bar{W}_i = \sqrt[n]{W_i}. \tag{2}$$

According to the judgment matrix of case experts, P.E. experts have four primary indexes of students' practical abilities. The root of n = 4 in each line is:

$$W_1 = 1.7321, \quad W_2 = 2.236, \\ W_3 = 0.5081, \quad W_4 = 0.5081.$$

**3.2.3. Calculation of the eigenvector of the n-th root of the scale product m of each row**

$$\bar{W}_i = \frac{W_i}{\sum_{j=1}^n W_j}. \tag{3}$$

According to the judgment matrix of the case expert, the paper substitutes the item and the root of the power. The results of the eigenvector (weight) of the expert's primary index judgment matrix are as follows:

$$\bar{W}_1 = \frac{1.7321}{(1.7321 + 2.236 + 0.5081 + 0.5081)} = 0.3475,$$

$$\bar{W}_2 = \frac{2.236}{(1.7321 + 2.236 + 0.5081 + 0.5081)} = 0.4486,$$

$$\bar{W}_3 = \frac{0.5081}{(1.7321 + 2.236 + 0.5081 + 0.5081)} = 0.1019,$$

$$\bar{W}_4 = \frac{0.5081}{(1.7321 + 2.236 + 0.5081 + 0.5081)} = 0.1019.$$

**3.2.4. Calculation of the maximum eigenvalue of individual (expert) judgment matrix λmax**

The maximum eigenvalue formula of the judgment matrix is:

$$\lambda_{\max} = \sum_{i=1}^n \frac{(AW)_i}{nW_i}. \tag{4}$$

According to the judgment matrix of the case expert, the paper substitutes the item, root of power, and eigenvector to calculate the maximum feature, first calculate aw, and then max. As a result, the aw results of the expert's major index judgment matrix are as follows:

$$AW = \begin{pmatrix} 1 & 1 & 3 & 3 \\ 1 & 1 & 5 & 5 \\ \frac{1}{3} & \frac{1}{5} & 1 & 1 \\ \frac{1}{3} & \frac{1}{5} & 1 & 1 \end{pmatrix} \cdot \begin{Bmatrix} 0.3475 \\ 0.4486 \\ 0.1019 \\ 0.1019 \end{Bmatrix},$$

$$AW_1 = 1 \cdot 0.3475 + 1 \cdot 0.4486 + 3 \cdot 0.1019 + 3 \cdot 0.1019 = 1.4075,$$

$$AW_2 = 1 \cdot 0.3475 + 1 \cdot 0.4486 + 5 \cdot 0.1019 + 5 \cdot 0.1019 = 1.8151,$$

$$AW_3 = \frac{1}{3} \cdot 0.3475 + \frac{1}{5} \cdot 0.4486 + 1 \cdot 0.1019 + 1 \cdot 0.1019 = 0.4094,$$

$$AW_4 = \frac{1}{3} \cdot 0.3475 + \frac{1}{5} \cdot 0.4486 + 3 \cdot 0.1019 + 3 \cdot 0.1019 = 0.4094,$$

$$\lambda_{\max} = 4.033.$$

**3.2.5. One-off test of calculating judgment matrix**

The formula of the one-off test of the judgment matrix is:

$$CI = \frac{\lambda_{\max} - n}{n - 1}. \tag{5}$$

The maximum eigenvalue formula of the individual (expert) judgment matrix is put into max, and the one-time test results of the case expert judgment matrix are as follows:



$$CI = \frac{\lambda_{\max} - n}{n - 1} = 0.011.$$

Table 4 shows the average random consistency index RI.

**Table 4.** Average random consistency index RI

n	1	2	3	4	5	6	7	8	9	10	11	12
RI	0	0	0.52	0.89	1.12	1.26	1.36	1.41	1.46	1.49	1.52	1.54

Note: n = 4, RI = 0.89.

Random one-time ratio:  $CR = CI / RI = 0.011 / 0.89 = 0.0124 < 0.1$ . When  $CR < 0.1$ , it can be considered that the hierarchical single-sorting structure has satisfactory consistency. Otherwise, it is necessary to adjust the element value of the judgment matrix. The random one-time ratio of the evaluation index of practical ability of students majoring in P.E. education of the expert, in this case, is 0.0124, which is less than 0.1. The weight of the first-level index in the evaluation index of the expert's practical ability was worked out in the score value in Table 3 (as shown in Table 5).

Among the main indexes of the practical ability of the students majoring in P.E. in colleges and universities, the weight of A1 Moral education ability is 0.409, followed by the weight of A2 Vocational practice ability of 0.351, the weight of A3 General practice ability is 0.120, and the weight of A4 Learning development ability is 0.120. According to the expert questionnaire, A1 moral education is the core ability for P.E. students in colleges and universities. The P.E. major pays more attention

to cultivating professional skills. However, by the investigations of these first-level indexes of A1 Moral education, A2 Vocational practical ability, A3 General practice ability, and A4 Learning development ability, it was found that for the cultivation of students majoring in P.E., moral education takes precedence over skill education.

The weight of the secondary-level index of students' practical ability in P.E. majors refers to the weight of the secondary-level index under the same primary index (Table 6).

For example, under the main index of moral education ability, the weight of B1 Teachers' moral norms is 0.819, and the weight of B2 Educational perception ability is 0.181. In order to ensure the comparability of indexes at all levels, total weights are selected for horizontal comparison of three-level indexes. That is, first-level indexes are multiplied by second-level indexes, and second-level indexes are multiplied by third-level indexes. The results of total weight show that B1 Code of ethics of teachers, B4 Professional practice ability, B5 Self-education ability, and B7 Independent learning ability are the core four secondary indexes.

According to the hierarchy analysis of the three-level indexes of practical ability of students majoring in P.E. from 20 experts, in order to facilitate the analysis of the weight of each secondary-level index and the overall impact of 36 three-level indexes on practical abilities of P.E. students, the data are summarized in Table 7.

**Table 5.** Weight of primary indexes

Primary index	A1 Moral education ability	A2 Vocational practice ability	A3 General practical ability	A4 Learning development ability
Weight	0.409	0.351	0.120	0.120

**Table 6.** Comprehensive weight of secondary-level indexes

Primary index	Secondary index	Weight	Comprehensive weight
A1 Moral education ability	B1 Code of ethics of teachers	0.819	0.335
	B2 Educational perception ability	0.181	0.074
A2 Vocational practice ability	B3 Ability to master theoretical knowledge	0.320	0.112
	B4 Professional practice ability	0.680	0.239
A3 General practical ability	B5 Self-education ability	0.673	0.081
	B6 Ability to educate students	0.327	0.039
A4 Learning development ability	B7 Independent learning ability	0.612	0.073
	B8 Ability to rethink the vision	0.274	0.033
	B9 Communication and cooperation ability	0.114	0.014

**Table 7.** Comprehensive weight of the third-level indexes

Primary index	Secondary index	Tertiary index	Weight	Secondary comprehensive weight	Total comprehensive weight	
A1 Moral education ability	B1 Code of ethics of teachers	C1 Can be patriotic and law-abiding	0.117	0.096	0.039	
		C2 Have the spirit of due diligence	0.352	0.288	0.118	
		C3 Role model leading ability	0.531	0.435	0.178	
	B2 Ability to practice teacher morality	C4 Willingness to work on sports work	0.567	0.103	0.042	
		C5 Have positive emotions	0.192	0.035	0.014	
		C6 Have a proper attitude	0.240	0.044	0.018	
A2 Vocational practice ability	B3 Ability to master theoretical knowledge	C7 Theories and methods of modern education and teaching	0.152	0.049	0.018	
		C8 Theories and methods of P.E.	0.118	0.038	0.013	
		C9 Theories and methods of extracurricular P.E. teaching	0.204	0.065	0.023	
		C10 Theory and method of training and competition	0.151	0.048	0.017	
		C11 Theories and methods of educational psychology	0.092	0.029	0.010	
		C12 Theories and methods of sports psychology	0.047	0.016	0.006	
	B4 Professional practice ability	C13 Theories and methods of sports humanistic science	0.046	0.015	0.005	
		C14 Theories and methods of sports safety and prevention	0.079	0.025	0.009	
		C15 Theories and methods of healthcare knowledge	0.099	0.032	0.011	
		C16 Classroom teaching ability	0.545	0.371	0.130	
		C17 Ability to organize health activities	0.131	0.089	0.031	
		C18 Ability of sports training guidance	0.232	0.158	0.056	
		C19 Ability of social service	0.091	0.062	0.022	
		B5 Self-education ability	C20 Healthy physique	0.455	0.306	0.037
			C21 Graceful body and mind	0.358	0.241	0.029
C22 Consciousness of self-surpassing	0.187		0.126	0.015		
C23 Strengthen physical quality	0.343		0.113	0.014		
B6 Ability to educate students	C24 Improve ideological and moral qualities		0.203	0.066	0.008	
	C25 Improve the level of intelligence		0.114	0.037	0.004	
	C26 Promote the development of thinking		0.090	0.029	0.003	
	C27 Improve the ability of aesthetics		0.063	0.021	0.002	
	C28 Establish the concept of lifelong sports	0.190	0.062	0.007		
A3 General practical ability	B7 Independent learning ability	C29 Ability of P.E. scientific research	0.289	0.177	0.021	
		C30 Ability of lifelong learning	0.400	0.245	0.029	
		C31 Career planning ability	0.311	0.190	0.023	
	B8 Ability to respond to practice	C32 Ability to analyze problems	0.379	0.104	0.013	
		C33 Ability to solve problems	0.518	0.143	0.018	
		C34 Ability of rethinking and evaluation	0.103	0.028	0.003	
		B9 Communication and cooperation ability	C35 Ability of team synergy	0.632	0.072	0.009
			C36 Skills of expression and communication	0.368	0.042	0.005
		A4 Learning development ability				

According to the weight analysis of the practical ability evaluation indexes of students majoring in P.E. in colleges and universities, the results are concluded as follows. The most important core competencies of P.E. students are C3 Model

leading ability (0.178), C16 Classroom teaching ability (0.130), C2 Have the spirit of due diligence (0.118), C18 ability of sports training guidance (0.056), and C4 Willingness to work on sports work (0.042).

## 4. DISCUSSION

Employing literature review, weight analysis, and preliminary tests, the evaluation conclusions from the experts and teachers have more substantial consistency and correlation. Moreover, the method of evaluation index system is simple and feasible, has high reliability, with evaluation results accurate and objective. The consistency of the weights of all levels of indexes is satisfactory, which can describe and reflect the condition of P.E. students to master practical ability with reasonable practicability. The institution of the evaluation index system is in accordance with the requirements of the current certification standards for teachers' majors. It is consistent with the current national requirements for the quality of sports talent cultivation. It can be used as a guide reference for the ability training, performance assessment, systematic evaluation, and cultivation objectives of students majoring in P.E.

The result proves that considering H1, B1 Code of ethics of teachers in the second-level index under the A1 Moral education ability in the first-level index. In addition, C3 Role model leading ability in the third-level index has the most significant weight, which is consistent with this theoretical hypothesis. The role model leading ability of P.E. teachers in teaching can make students form an excellent attitude to affairs and develop good quality (Miao & Zhou, 2020). P.E. is one of the most direct and effective carriers of moral education, which is beneficial to maximize the efficiency of physical education teaching (Wang & Fan, 2020).

Considering H2, as practitioners of P.E. work, physical education teachers should educate and cultivate students' practical ability with their practical actions (Diao & Dong, 2012). Liu (2021) points out that P.E. in colleges and universities can give full play to cultivating talents by fostering morality for forming college students' ideological concepts and values.

Higher education institutions should take students as the leading role, steering students to take the initiative to improve their willingness to educational practice. C16 Class teaching ability in the third-level index under the A2 Professional practical ability ranks second in weight in the compre-

hensive index, which is consistent with this theoretical hypothesis. These findings support Zhao et al. (2018), Liu and Liu (2019), Zhang and Wang (2021), and Z. Yang (2020). However, the teaching ability the scholars referred to is defined in such a broad sense that it is easily confused with other indexes of practical abilities. In contrast, the indexes in this paper refer to the teaching ability in P.E. class, whose definitions are more precise and easy to implement, improving the intuition and maneuverability of the evaluation results. The viewpoints of Wang et al. (2020), Ghofrani and Golsanamlou (2012), and Kim (2016) were generalized in this paper. The evaluation index system is significantly featured with B8 Ability of responding to practice and B9 Ability of communication and cooperation, affiliated to the index of A4 Learning development ability in the first-level index. This is a practical test and evaluation of the integration of theories and practice for the students majoring in P.E. in the new era, conducive to the understanding and mastering of the decision-makers. When using this evaluation index system, the evaluators are required first to be thoroughly familiar with the requirements of this system, weigh the hierarchy differences of three levels, and strive to be objective and fair.

Considering H3, the self-education ability of students majoring in P.E. is the subject of self-education betters their ideological level and practical ability to meet the demands of society based on the relevant requirements of society and self-value realization. The self-education ability of P.E. students has the most considerable weight in the general practical ability, which is consistent with this hypothesis. Among the third-level indexes, C20 Healthy physique is the base of self-education to the most significant weight. Therefore, Kuang and Mei (2012) believe that healthy physique education should be paramount in P.E. teaching in higher education establishments.

Considering H4, with HEIs as the principal circumstances of P.E. students' independent learning, if one wants to develop modern P.E. work in universities, one must enhance the talents with comprehensive ability focusing on the cultivation of independent learning ability. Independent learning is the precondition and base of establishing the lifelong study of the whole population. Hence,

it is essential to cultivate students' independent learning ability, achieving lifelong study. Among the third-level indexes, C18 Ability to instruct sports training is also vital for students majoring in P.E., which agrees with the viewpoints of Gould and Caswell (2006). Gong and Zhang (2016) believe that one must cultivate lifelong awareness of P.E. in college education and improve students' physical and mental health and healthy physique level. Huang and Xue (2009) believe that only by loving students can P.E. teachers understand students' current situations and trends and do well in P.E. teaching. However, in terms of the content of training students' practical ability, the key points should be given prominence to be based on the actual conditions in a gradual way, with interworking among all disciplines, and meantime the theories combined with the practice.

Through the research on the weight of the evaluation indexes of P.E. students' practical ability in HEIs, it is found that the code of ethics of teachers, professional ability, self-education ability, and independent learning ability in the second-level indexes, their factors of weight in the first-level index are the most prominent. The "four virtues" of a good teacher in China refer to the "four qualities" of teachers who have ideals and beliefs, moral sentiments, solid knowledge, and benevolence. The C3, C2, and C4 systems are consistent with these viewpoints and requirements, which is of great help to the improvement of P.E. students' practical abilities. On the other hand, it is found that there are some deficiencies in the promoting

of students' B2 Education perception ability and B9 Communication and cooperation ability, and not enough attention is paid to C26 Promote the development of thinking, C27 Improve the ability of aesthetics, and C34 Ability of rethinking and evaluation.

This paper is only a part of the field of physical education research, and the research object is limited to P.E. majors. In the evaluation index system institution, the number of effective questionnaires of expert surveys is limited. Hence, there is a one-sidedness, with the efficacy results relatively single. However, compared with the previous research, the evaluation index system of P.E. students' practical ability constructed in this paper evaluates the practical ability of P.E. students from a macro perspective, covering more comprehensive content with more integrity. From the perspective of the content of indexes, the expressions of the evaluation indexes set by this paper are dealt with in the aspect of semantic optimization and improvement compared to the previous set of indexes. Hence, the indexes are easier to understand, readable, and filled with more operability in the use process. However, this study teased out and summarized the micro contents established by the previous scholars and can reflect the P.E. students' practical ability. In the future, it is expected to provide further valuable suggestions for the supply relationship of the three dimensions of talent cultivation, student ability, and social demand of P.E. majors in colleges and universities.

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## CONCLUSION

This study aims to standardize the training process of P.E. students' practical abilities in HEIs. Based on the training objectives of P.E. students, through literature review, Delphi method, and analytic hierarchy process, the evaluation index system of P.E. students' practical abilities is constructed. The research results are scientific and operable. The paper shows that moral education is the core ability in the evaluation index of professional abilities of students majoring in physical education in HEIs. The cultivation of students majoring in P.E. is based on the practical abilities of application and the theoretical knowledge of sufficiency. Therefore, it is necessary to combine skills with moral education in teaching practice.

The evaluation index can make a horizontal comparison of the actual grasp of the practical ability of students majoring in P.E., which can better promote the cultivation of the practical ability of these students and perfect the relevant indexes of the system. It is also convenient to set relevant courses in testing the assessment of the teaching quality of physical education. However, experts from other regions in China were not included in the Delphi consultation stage of this paper, and hence it has certain

limitations. In the follow-up research, the reliability and validity of the evaluation indexes should be verified through a broader range of investigations mainly based on this index system. The critical points of the subsequent research should use these results to guide P.E. training and teaching, with them being verified and revised in practice.

## AUTHOR CONTRIBUTIONS

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