

Research on the Evaluation Index Model of Professional Literacy of Kindergarten Physical Education Teachers

¹Yiran Gu, ^{2*}Wiradee Eakronnarongchai, and ³Ekasak Hengsuko

**Corresponding author*

Major of Physical Education and Health Education, Udon Thani Rajabhat University, Thailand

E-mail: ¹644045712@qq.com, ^{2*}wiradee.e@gmail.com, ³ekasak.he@udru.ac.th

Received April 9, 2025; **Revised** May 8, 2025; **Accepted** May 30, 2025

Abstract

This study aimed to 1) explore the meaning and components of professional literacy of kindergarten physical education teachers, 2) study the evaluation index model for professional literacy of kindergarten physical education teachers, and 3) construct the evaluation index model for professional literacy of kindergarten physical education teachers. This study employed the Delphi method for model design and utilized the Analytic Hierarchy Process (AHP) to construct the model. The instruments used included the SPSS and YAAHP, as well as methods such as expert interviews and questionnaire surveys, to study and construct the model.

The research findings revealed the following:

1. The two-round Delphi method identified the evaluation indicators for the professional literacy of kindergarten physical education teachers.
2. The evaluation index model for the professional literacy of kindergarten physical education teachers included 3 primary indicators and 16 secondary indicators.
3. According to the weight calculation and hierarchical ranking results of the evaluation index model of professional literacy among kindergarten physical education teachers, the most important first-level index was 1) professional philosophy and ethics, with a weight of 0.5021, followed by 2) professional competence, with a weight of 0.2822, and 3) professional knowledge, with a weight of 0.2158.

The resulting model provided a structured foundation for professional development programs and informs national policy initiatives aimed at enhancing early childhood physical education.

Keywords: Evaluation index model; Professional literacy; Kindergarten physical education teachers

Introduction

Early childhood is an important foundation period in the whole life cycle, and it is a high-speed growth period and critical period for human physical development. For children aged 3–6 years old who have not yet differentiated their physical and mental abilities, sports are a comprehensive, multi-faceted, and holistic activity centered on the body, which has a profound impact on children's motor development, bone strength, cardiopulmonary function, cognitive ability, and so on. Early childhood is the initial stage of consciousness formation. By engaging in high-quality physical activities, we can awaken the subjective consciousness of future sports power builders from the cognitive, subjective, and behavioral levels. As an important component of high-quality development of preschool education, early childhood physical education plays a crucial role in promoting the harmony of children's body and mind and achieving all-round development, and has gradually gained attention and importance from various sectors such as the government, society, and families. Giving full play to the important function and value of sports in promoting children's health, implementing the Healthy Children Plan, and promoting the priority supply of health services will become an inevitable choice for the strategic deployment of "Healthy China", as well as a natural move to implement national strategies and meet the needs of the times. In the process of the development of Chinese early childhood sports, relevant theories and practices have achieved all-round development and stood at the highest point in history.

"Education is based on teachers". The quality of education depends on the level of professionalism of teachers, and China attaches great importance to the professional development of teachers in order to improve the quality of education. In order to strengthen the construction of the teaching staff, China has issued many policy documents and guidance in recent years. At the same time, China has formulated corresponding professional standards for general teachers, and put forward specific indicators and requirements for teachers' professional literacy. However, there is a lack of evaluation standards for the professional literacy of kindergarten physical education teachers. Based on this, it is of great significance to study the evaluation index model for the professional literacy of kindergarten physical education teachers.

Based on the above information, the researchers conducted research on the construction of an evaluation index model for the professional literacy of kindergarten physical education teachers

and selected 15 five-star kindergartens in Kunming as empirical samples. The results of this study provide valuable guidance for the sustainable development of the professional literacy of kindergarten physical education teachers, play an important role in the high-quality development of kindergarten physical education, and provide a reference for the theoretical research and practice of kindergarten physical education.

Research Objectives

1. To explore the meaning and components of professional literacy of kindergarten physical education teachers.
2. Study on the evaluation index model for professional literacy of kindergarten physical education teachers.
3. Construct of the evaluation index model for professional literacy of kindergarten physical education teachers.

Literature Review

In this study, the researcher examined pertinent documents and research, and the findings have been organized into the following topics:

General Teacher Professional Literacy

Teacher professional literacy is a realistic demand of contemporary teacher education, and how to improve teacher professional literacy is the main issue for teacher education. This requires that the content composition of teacher professional literacy must be clarified. Scholars have diverse understandings of the content and connotation of teachers' professional literacy.

Scholars from different countries have put forward different opinions on teacher literacy. Teachers' professional literacy includes subject knowledge, behavioral skills, and personality skills (Garcia & Lewis, 2014). Teacher professional development should focus on the improvement of teachers' morality and educational emotions (Hargreaves, 1995). The study of teacher professional literacy should be combined with Spencer's (1993) "literacy iceberg model" to creatively construct a structural model of teacher professional literacy, integrating the three aspects of teacher professional literacy: professional philosophy, professional knowledge, and professional skills into a complete system. These three aspects are interrelated and influence each other, and together constitute the structure of teacher professional competence (Qiao, 2023). Teacher literacy should include: educational concepts that are compatible with the times, extensive and broad professional

knowledge, proficient educational and teaching skills, adept classroom management skills, flexible and agile educational wit, interpersonal skills, keen insight and research abilities, personality charm of educational wisdom, ability to learn and update professional knowledge, stable and healthy physical and mental literacy, and other aspects (Yu, 2001).

Professional Literacy in Physical Education (PE)

Western countries regard improving teachers' professional literacy and professional accomplishment as the main content of teachers' professional development, and through the development of professional standards, they stipulate the professional literacy that teachers should possess, such as "knowledge, skills, and character".

The professional standards for Chinese physical education teachers, using a combination of qualitative and quantitative research methods to develop a professional standard indicator system for pre-service physical education teachers, which regulated the professional literacy that Chinese physical education teachers should possess. Professional technical skill indicator system based on teacher professional standards, which has high reference value for further refining professional standards (Shen, 2024).

Evaluation Frameworks

At present, the Chinese physical education teacher literacy certificate mainly refers to the entry literacy for physical education teachers, while the evaluation after entry mainly refers to the evaluation of professional titles, lacking a more detailed and comprehensive evaluation. Constructing a hierarchical and progressive comprehensive evaluation index system is a problem that every discipline should consider. All researchers believe that teachers' professional literacy include "knowledge", "ability", "ideal" and "concept" related to the profession, and these common understandings become the key and stable elements in the structure of teachers' professional literacy.

Conceptual Framework

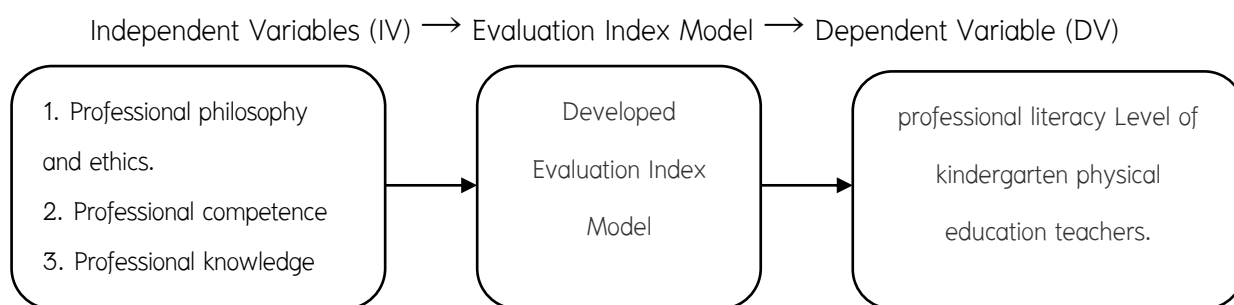


Figure 1 Conceptual Framework

Research Methodology

1. Qualitative Phase – Expert Interviews

- Develop an Expert Interview Outline based on a literature review.
- Conduct semi-structured interviews with 15 well-known university professors specializing in early childhood physical education in China and globally. The experts were chosen based on their academic credentials, research contributions, and professional experience in the field. Diversity in geographic representation, gender, and academic roles was considered to ensure balanced perspectives.

- Identify key issues in the current evaluation system of professional literacy of kindergarten physical education teachers. The number of interviewees was determined by the principle of data saturation, at which point no new themes or insights emerged from additional interviews.

2. Delphi Method – Expert Consensus on Evaluation Indicators

Round 1: Design & Administer Initial Screening Questionnaire

- Develop “First Round Screening Questionnaire” based on interview findings.
- Distribute to 15 selected experts in early childhood physical education.
- Analyze responses to identify initial evaluation indicators.

Round 2: Refine Indicators Using Delphi Method

- Develop “Second Round Screening Questionnaire” for further refinement.
- Experts provide feedback to reach a consensus on key indicators.

The Delphi method was chosen for its structured approach to expert consensus, though it is acknowledged that its reliance on subjective judgment may introduce bias and limited generalizability.

3. AHP (Analytic Hierarchy Process) – Weighting the Indicators

- Design an AHP Questionnaire for experts to prioritize and weight the indicators.
- Use AHP analysis to establish the hierarchical structure and determine the relative importance of each indicator.

While AHP provides a systematic approach to decision-making and ensures logical consistency, a known limitation is its sensitivity to inconsistencies in pairwise judgments and the complexity of interpretation when involving multiple criteria.

This multi-phase methodological framework ensured a rigorous and participatory approach to model development, enhancing both the reliability and practical relevance of the resulting evaluation index.

Research Results

1. Selection of Professional Literacy Indicators

This study names all indicators to facilitate data result input. For details, please refer to Table 1.

Table 1 Indicator Naming

Primary Indicators	Secondary Indicators
A: Professional Philosophy and Ethics	A1: Understanding and knowledge of career
	A2: Attitude and behavior towards students
	A3: Attitudes and behaviors in education and teaching
	A4: Teachers' self-cultivation
	A5: Cognition of children's physical education
B: Professional competence	B1: Teaching ability
	B2: Research ability
	B3: Management ability
	B4: Educational ability
	B5: Competitive ability
	B6: Organizational capability
C: Professional knowledge	C1: Pedagogical content knowledge
	C2: Educational knowledge
	C3: Sports knowledge
	C4: Professional skills and knowledge
	C5: Safety protection knowledge

This study identified evaluation indicators for the professional literacy of kindergarten physical education teachers through expert interviews. Using the Delphi method, 15 experts and professors specializing in kindergarten physical education were selected to score the indicator model. After calculating the correlation coefficient of the results of the two rounds of consultation, it was found that the average importance of each indicator in the first round reached 75 % with a score of 4 or above; The average importance of each indicator in the second round reached 100% with scores of 4 or above, and the scores became increasingly concentrated, indicating that

through the two rounds of Delphi survey, the experts' opinions on the importance of the indicators were basically consistent. The results of the study are shown in Table 2, Table 3 and Table 4.

Table 2 Distribution of Expert Ratings in the First Round

	Average rating	Index	Percentage	Effective percentage	Cumulative percentage
Effective	3.5–4	2	12.5	12.5	12.5
	4–4.5	10	62.5	62.5	75.0
	4.5–5	4	25.0	25.0	100.0
	Total	16	100.0	100.0	

According to Table 2, presents the distribution of expert ratings from the first round of the Delphi survey. The results indicate that the majority of indicators (62.5%) received average ratings between 4.0 and 4.5, reflecting a high level of expert agreement on their relevance. Additionally, 25.0% of the indicators were rated between 4.5 and 5.0, suggesting strong consensus on their importance. A smaller portion (12.5%) received moderate ratings between 3.5 and 4.0. All 16 indicators met the effectiveness criteria and were considered suitable for inclusion in the second Delphi round.

Table 3 Distribution of expert ratings in the Second Round

	Average rating	Index	Percentage	Effective percentage	Cumulative percentage
Effective	4–4.5	9	56.3	56.3	56.3
	4.5–5	7	43.8	43.8	100.0
	Total	16	100.0	100.0	

According to Table 3, presents the distribution of expert ratings from the second round of the Delphi survey. The results indicate that 56.3% of the indicators received average ratings between 4.0 and 4.5, while 43.8% were rated between 4.5 and 5.0. This reflects a consistently high level of expert consensus regarding the relevance and importance of the indicators. All 16 indicators met the effectiveness criteria and were validated for inclusion in the final construction of the evaluation index model.

Table 4 Comparison of Kendall's tau-w between two rounds

	First round	Second round
Index	16	16
Kendall's tau-w	0.346	0.357
Chi-square value	336.420	338.858
P-value	0.000*	0.000*

*p < .05

According to Table 4, calculated using SPSS 26.0 software, the coordination coefficient W for the first round is 0.346, with a P value of $0.000 < 0.05$. Kendall's tau- w for the second-round increases to 0.357, with a P value of $0.000 < 0.05$, indicating significance. This suggests that the experts have a high level of recognition and consistency towards the results.

2. Overall hierarchical sorting

Table 5 Overall hierarchical ranking

Primary Indicators	Secondary Indicators	Indicator weight	Comprehensive weight	Sort
A: Professional Philosophy and Ethics 0.5021	A1: Understanding and knowledge of career	0.3079	0.155	1
	A2: Attitude and behavior towards students	0.1724	0.087	3
	A3: Attitudes and behaviors in education and teaching	0.1317	0.066	7
	A4: Teachers' self-cultivation	0.1037	0.052	9
	A5: Cognition of children's physical education	0.2843	0.143	2
B: Professional competence 0.2822	B1: Teaching ability	0.1333	0.038	11
	B2: Research ability	0.2548	0.072	5
	B3: Management ability	0.1128	0.032	13
	B4: Educational ability	0.1052	0.030	14
	B5: Competitive ability	0.1452	0.041	10
	B6: Organizational capability	0.2487	0.070	6
C: Professional knowledge 0.2158	C1: Pedagogical content knowledge	0.2495	0.054	8
	C2: Educational knowledge	0.1313	0.028	15
	C3: Sports knowledge	0.1541	0.033	12
	C4: Professional skills and knowledge	0.3557	0.077	4
	C5: Safety protection knowledge	0.1094	0.024	16

From Table 5, According to the weight results, the ranking of the indicators is as follows: Professional Philosophy and Ethics (0.5021), Professional competence (0.2822), Professional knowledge (0.2158).

3. Weight calculation model result

Through weight calculation, an evaluation index model for the professional literacy of preschool physical education teachers has been constructed, consisting of three primary indicators: professional philosophy and ethics, professional competence, and professional knowledge. 16 secondary indicators: Understanding and knowledge of career, Attitude and behavior towards students, Attitudes and behaviors in education and teaching, Teachers' self-cultivation, Cognition of children's physical education, Teaching ability, Research ability, Management ability,

educational ability, Competitive ability, Organizational capability, Pedagogical content knowledge, educational knowledge, Sports knowledge, Professional skills and knowledge, Safety protection knowledge. For details, refer to Figure 2.

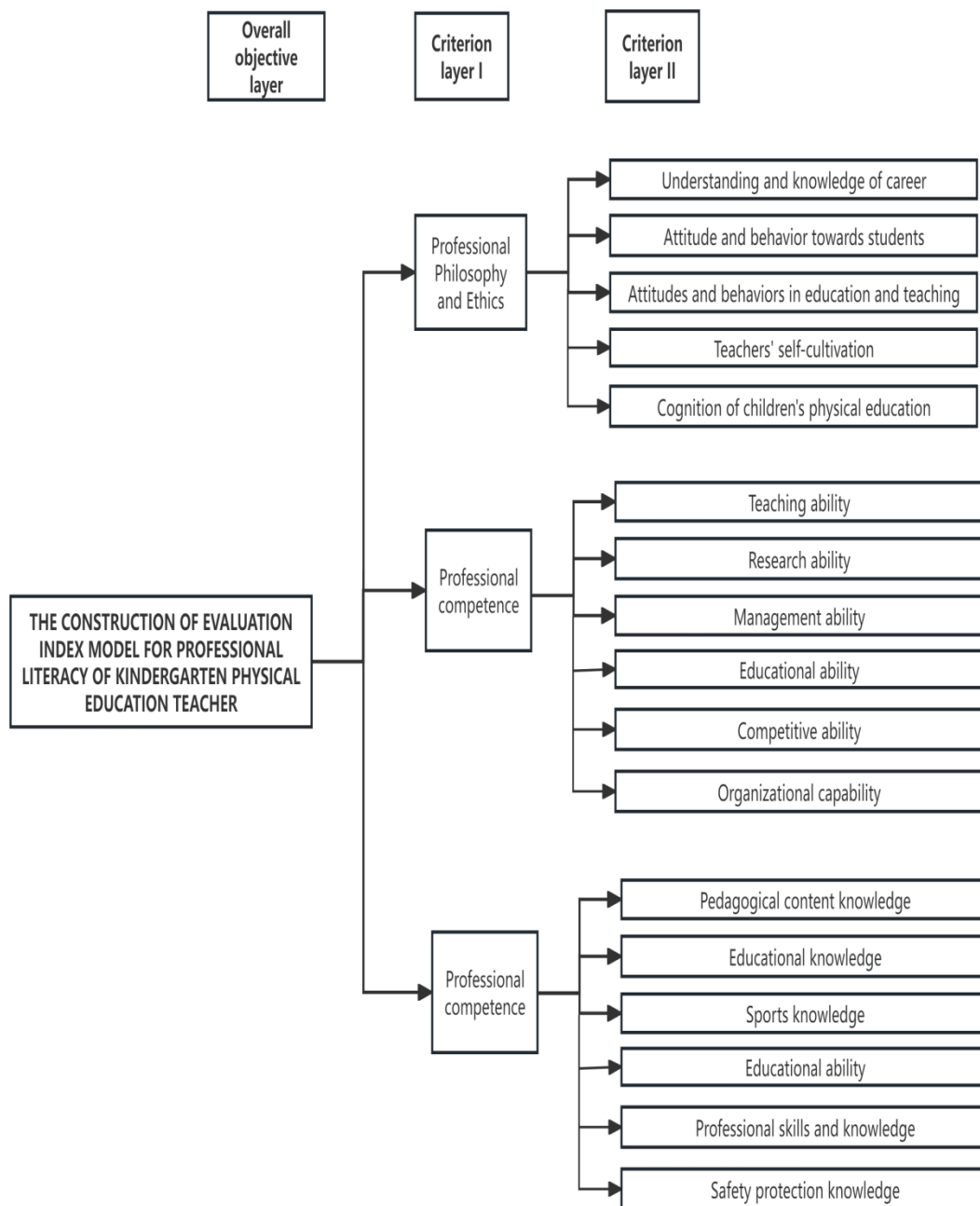


Figure 2 Evaluation index model for professional literacy of kindergarten physical education teachers

Discussions

1. Alignment with National Policies and Theoretical Foundations

The research results indicate that this study combines the teacher professional literacy evaluation index model proposed by the Ministry of Education of China, employing a method that integrates literature review and expert interviews to explore the evaluation index model of professional competence for kindergarten physical education teachers. The selection results of the model indicators are consistent with the basic connotation of teacher professional literacy proposed by Rao (2016). This theory emphasizes that a teacher's professional literacy is a comprehensive reflection of skills, knowledge, and other aspects demonstrated in the process of educational practice, playing a directional, professional, and irreplaceable role in educational implementation. This aligns with the theory of influencing factors on teacher professional literacy proposed by Day and Sachs (2004). This theory emphasizes that the improvement of teacher professional literacy is determined not only by the teacher's intrinsic motivation but also influenced by various factors such as school support and social environment, and all these factors should be integrated into a complete system.

2. Contributions to Model Development and Professional Training

The research results indicate that this study constructed an evaluation index model for the professional literacy of kindergarten physical education through the Delphi method and Analytic Hierarchy Process (AHP). This model adheres to principles such as scientific validity, rationality, and effectiveness, ultimately establishing 3 primary indicators and 16 secondary indicators. The subject teaching knowledge (PCK) that physical education teachers should possess consists of content knowledge, pedagogical knowledge, student knowledge, and contextual knowledge, which influence each other. The research findings align with the teacher stage development theory proposed by He (2019). As professionals, teachers undergo a developmental process from immaturity to maturity in terms of professional ideals, ethics, qualities, abilities, and knowledge, representing the growth journey of teachers. This is a gradual process, where teachers continuously enhance their professional literacy, which is beneficial for clarifying professional ideals and improving physical education professional literacy.

3. Comparative Insights and Model Advancements

Compared with previous evaluation models, this study provides a more targeted approach for the early childhood physical education context. It emphasizes not only what competencies are needed but also how they can be prioritized and systematically developed. The use of AHP further

enhances precision in weighting indicators, which distinguishes this model from more general or unstructured frameworks in the literature.

4. Limitations and Future Considerations

Despite its contributions, this study acknowledges certain limitations. The model, while comprehensive, is relatively static, and may require periodic revision to remain responsive to dynamic educational environments, curriculum reforms, and evolving professional demands. Moreover, the reliance on expert consensus, though methodologically sound, could introduce subjectivity that might not fully capture regional or institutional diversity.

Future research may consider longitudinal validation, application in diverse settings, and integration with digital evaluation tools to enhance adaptability and practical impact.

Knowledge from Research

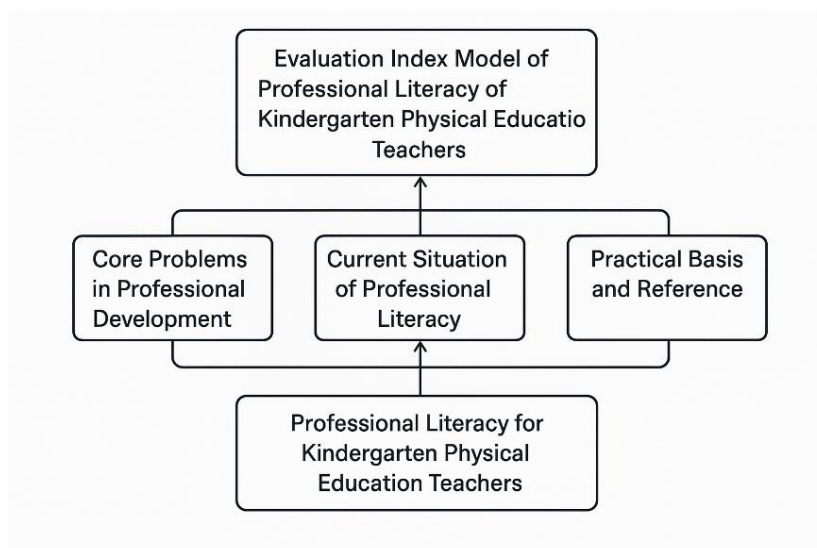


Figure 3 Knowledge from Research

Based on the analysis and summary of the professional literacy of kindergarten physical education teachers, combined with 15 expert interview materials, this paper studies the evaluation index model of professional literacy of kindergarten physical education teachers, aiming to solve the core problems in the professional development process of kindergarten physical education teachers, change the current situation of relatively weak professional literacy of kindergarten physical education teachers, and gradually move from a relatively disordered state to a standardized state. To provide practical basis and reference for the subsequent construction of an evaluation index model for the professional literacy of kindergarten physical education teachers. By

constructing the model, it is of great value and key role in the development of professional literacy for kindergarten physical education teachers, and relevant indicators will be further improved and tested in subsequent research.

Conclusion

This study is based on a literature review and combines the teacher professional competency model proposed by the Ministry of Education of China. First, using the two-round Delphi method, it identifies the evaluation indicators for the professional competency of kindergarten physical education teachers. Second, following relevant principles and steps, it constructs a model based on the Analytic Hierarchy Process (AHP), which includes 3 primary indicators and 16 secondary indicators. The three primary indicators are: 1) professional philosophy and ethics, 2) professional competence and 3) professional knowledge. The 16 secondary indicators are as follows: (1) Understanding and knowledge of career, (2) Attitude and behavior towards students, (3) Attitudes and behaviors in education and teaching, (4) Teachers' self-cultivation, (5) Cognition of children's physical education, (6) Teaching ability, (7) Research ability, (8) Management ability, (9) Educational ability, (10) Competitive ability, (11) Organizational capability, (12) Pedagogical content knowledge, (13) Educational knowledge, (14) Sports knowledge, (15) Professional skills and knowledge, (16) Safety protection knowledge. The construction of this model helps optimize the training system for kindergarten physical education teachers in China and provides certain theoretical support and practical exploration for the high-quality development of children's physical education in China.

According to the weight calculation and hierarchical ranking results of the evaluation index model of professional literacy of kindergarten physical education teachers, the most important first-level index was 1) professional philosophy and ethics, with a weight of 0.5021, followed by 2) professional competence, with a weight of 0.2822, and 3) professional knowledge, with a weight of 0.2158. Among the secondary indicators, the most important are A1, understanding and knowledge of the career, A5, cognition of children's physical education, A2, attitudes and behavior towards students, C4, professional skills and knowledge, B2, research ability, B6, organizational ability.

Suggestions

It is recommended that kindergarten administrators and physical education teachers establish new evaluation concepts and update their physical education teaching philosophies, with the goal of comprehensive development. They should strengthen lifelong training and learning for physical education teachers in their schools, continuously improving the professional literacy of the teachers. National education departments should integrate these indicators into PE teacher evaluation systems. Pre-service training institutions should revise curricula based on the model's core domains. At the same time, this research model is also applicable to kindergartens and early childhood education institutions across various provinces in China.

Regarding the evaluation criteria for the professional literacy of kindergarten physical education teachers, with the changes in teaching reforms and the demands on teachers over time, the methods and weight distribution of the evaluation model for teachers' professional literacy will be affected to varying degrees. Therefore, it is necessary to consider the historical context and needs, the results of international standards, and the characteristics of China, continuously revising and improving the indicator model.

References

- Day, C., & Sachs, J. (2004). *International handbook on the continuing professional development of teachers*. Open University Press.
- Garcia, J. A., & Lewis, T. E. (2014). Getting a grip on the classroom: From psychological to phenomenological curriculum development in teacher education programs. *Curriculum Inquiry*, 44(2), 141–168.
- Hargreaves, A. (1995). Development and desire. In T. Gusky, & M. Huberman (Eds.), *Professional development in education* (pp. 9–35). Milton Keynes: Open University Press.
- He, Y. (2019). A developmental theory of teacher professionalism: From novice to expert. *Modern Education Science*, 17(2), 33–40.
- Qiao, J. (2023). A study on the structural model of teachers' professional literacy based on the literacy iceberg theory. *Journal of Educational Research and Practice*, 13(2), 45–57.
- Rao, C. (2016). Teacher professional literacy and quality education: Theoretical perspectives. *China Education Review*, 24(3), 15–21.
- Shen, R. F. (2024). Research on the influencing factors of UGC knowledge sharing in the metaverse library based on AMOS. *Information Exploration*, 2(5), 109–116.

- Spencer, L. M., & Spencer, S. M. (1993). *Competence at work: Models for superior performance*. John Wiley & Sons.
- Yu, Y. (2001). The composition and characteristics of teachers' professional literacy. *Teacher Education Research*, 13(4), 22–28.