



Development Competencies of Junior Middle School Physical Education Teachers in Dongguan City

¹Guo Fengmin, ² Wanit Nirantranon and ³ and Prakrit Hongsaenyatham

^{1,2,3} Faculty of Sports Sciences and Technology, Bangkokthonburi University, Thailand

¹E-mail: 467872856@qq.com, ORCID ID: <https://orcid.org/0009-0009-9220-0213>

²E-mail: dang_wanit@yahoo.com, ORCID ID: <https://orcid.org/0009-0001-8927-8337>

³E-mail: prakitsport@gmail.com, ORCID ID: <https://orcid.org/0009-0009-2196-0258>

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Abstract

Background and aim: Based on the importance that the party and the country attach to school work; Dongguan's junior middle school physical education teachers shoulder a key role in connecting the past and the next. It is necessary to improve the competencies of Dongguan's junior middle school physical education teachers.

Methods and processes: This is application-oriented research. The number of participants in this study was 28 experts. The research process is as follows: (1) Collect relevant literature and materials and draft the "Indicator System for the Competency Development of Junior Middle School Physical Education Teachers in Dongguan City"; (2) Two rounds of Delphi surveys involving 19 experts; (3) 9 experts participate in the appreciation of the indicator system.

Result: 1) The positive coefficient of expert participation in the research is close to 90% > 70%, $Cr \geq 0.7$, the average score of expert opinion exceeds 4 points and exceeds 90%, $0 < W < 1$, $P < 0.05$, indicating that experts assume reliability. 2) In the first round of the expert's questionnaire, the Mean of B11, C26, C28, C33, and C40 is < 3.5 , $CV > 0.25$, and these indicators are deleted. The Mean of the remaining indicators is > 3.5 , $CV < 0.25$, so the remaining indicators are retained. 3) In the second round of the expert's questionnaire, The Mean of all indicators is > 3.5 , $CV < 0.25$, so all the indicators are retained.

Conclusion: The study constructed a competencies development index system for junior middle school physical education teachers in Dongguan City, including three dimensions: values, physical education ethics, and key competencies, with a total of 52 indicators.

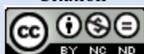
Keywords: Junior Middle School; Physical Education Teacher Competencies; Dongguan City

Introduction

Physical education teachers are the imparters of physical education and health knowledge, skills, and methods, the guides for students' physical and mental health, and the executors and implementers of physical education courses (Shi et al., 2017). This requires physical education teachers to carry out differentiated education and teaching work based on differences in students, courses, content, and environments.

Dongguan City has incorporated the construction of teaching staff into the education "expansion and quality improvement" project, focusing on strengthening the construction of teaching staff. According to statistics from the Dongguan Municipal Education Bureau, from 2016 to 2020, the number of full-time teachers in Dongguan City increased from 76,000 to 95,000, an increase of nearly 20,000 in five years, an increase of 26%. As an important part of the teaching staff, the number of physical education teachers is also increasing year by year. As of 2020, there are 1,375 junior middle school physical education teachers in Dongguan City. More than 90% of teachers are male. Most of them have bachelor's degrees. Most of them are 20-30 years old. More than 50% of junior middle school teachers only have junior or senior professional titles. The proportion is about 15%. The most important thing is that there are obvious differences in the competencies of junior middle school physical education teachers.

Over the past ten years, Dongguan City has formed a set of capacity-building experiences suitable for the city's junior middle school physical education teachers. However, there are still problems such as imbalance in the construction of the teaching team, insufficient transformation of knowledge and skills, and one-sided competency development, which fundamentally affects the viability of teachers' careers. sustainable development and the smooth development of school sports work.





Therefore, it is hoped that research, can provide a theoretical reference for the competency development of junior middle school physical education teachers, and at the same time provide a reference for the practical competency index system of junior middle school physical education teachers, to promote the development of all junior middle school physical education teachers.

Objectives

To develop the competencies model of junior middle school teachers for physical education in Dongguan city.

Literature Review

Current Situation of Physical Education Teachers

From the perspective of research on the overall status of the teaching staff, it mainly focuses on regional research. There are imbalances in the ratio of men to women and the structure of professional titles among middle school physical education teachers in Nanchang, especially the lack of senior teachers (Wen, 2016). Research by Wang (2020) shows that current physical education teachers hope to improve their personal teaching, scientific research, and teaching competencies. Among them, teaching competency is mainly reflected in three aspects: subject teaching knowledge, teaching design and implementation competency, and modern educational information technology application competency. He also divided physical education teachers into 5 years of teaching experience and 5-20 years of teaching experience based on different teaching years and pointed out that their different needs are self-reflection and teaching and research capabilities. Zhang, & Liao, et al. (2021) showed that there is a serious shortage of physical education teachers in rural schools and leaders do not pay attention to physical education subjects. Physical education teachers' professional qualities and competencies are insufficient, and their awareness and attitude toward independent development are insufficient.

Competencies of Physical Education Teachers

Many scholars have drawn their conclusions regarding the value concepts in physical education teachers' competencies. In the context of the COVID-19 epidemic, Ni (2020) emphasized that physical education teachers in the new era need to have middle moral qualities and professional ethics. In this new era, maintaining good professional ethics is the core of professional development. At the same time, physical education teachers also need to have firm beliefs and continuous enthusiasm. Yin, & Sun, (2014) pointed out that professional achievement requires correct concepts. Spinoza (2023) once said that 'the human mind has no other power except the power of thoughts and the power of forming correct ideas. Hu (2004) pointed out that the concept generally accepted by contemporary educators is that before teaching subject knowledge, students should first be educated to become moral people, the morality of teachers They are required to be loyal to the Party's educational philosophy, firm in the direction of socialist school running, thoroughly implement the Party's educational guiding ideology, and establish a correct view of education and talents. Teachers with firm ideals and beliefs are the key to achieving the goals of socialist education Support.

The Path to Improve Competencies of Physical Education Teachers

Research on physical education teachers' competency development paths mostly focuses on practical induction and summary. Ma (2020) take 7th National Primary and Secondary Schools Excellent Physical Education Class Exhibition as the research background, we summarized the key ways to enhance the teaching skills of middle school physical education teachers: First, colleges and universities responsible for training physical education teachers need to adjust talent training strategies according to needs, to ensure the initial quality of physical education; secondly, schools that implement middle school physical education courses should conduct comprehensive management, evaluation and adjustment in macro-strategy, meso-level continuity and micro-execution to ensure the achievement of teaching effects; finally, they should further promote "National Training Plan" to enhance the professional competencies and professional ethics of in-service middle school physical education teachers to meet the ultimate pursuit of physical education subjects in China's "General Middle School Physical Education and Health Curriculum Standards" (Chinese Ministry of Education, 2017).

Factors Influencing the Improvement of Physical Education Teachers' Competencies



Through a case study of physical education teachers, Zhang, & Feng, et al. (2022) pointed out that the motivation factors that affect their competency improvement include the support of school leaders, the recognition of parents and students, the strong need for self-development, the guidance and care of important others, Continuous learning, and lofty educational sentiment. Zhou (2022) pointed out the factors that affect the improvement of physical education teachers' competencies through educational narratives. In addition to their factors, family, colleagues, school leaders, and students are the four key factors. Jin (2022) studied the competency improvement of physical education teachers in rural primary schools in southern Ningxia and pointed out that the factors affecting the competency improvement of physical education teachers include health factors and motivation factors. Health care factors include two categories: teachers' work environment factors and teacher management system factors, which mainly include the attention of school leaders, support from government departments, schoolteacher management concepts, physical education teacher education and training systems, physical education teacher professional title evaluation and assessment systems, etc. Motivational factors are mainly divided into three categories: salary and welfare factors, work itself factors, and teacher self-realization factors, which mainly include salary reward methods, physical education teacher workload, and type, physical education teaching work, school leaders and parents' recognition and support, and physical education teachers' comprehensive competency.

Competencies Development Model for Physical Education Teachers

Zhou, & Gu, et al. (2018) mentioned in Opportunities and Challenges for the Professional Development of PE Teachers in the Process of "Internet + Education": that constructing a model based on creation and self-reproduction can promote the improvement of physical education teachers' competencies in educational concepts, professional knowledge, skills, and curriculum design, thereby optimizing the professional development of physical education teachers. Zhao et al. (2016) proposed that there are two types of professional development models for physical education teachers: conceptual models and physical models. The conceptual model is based on the identity of physical education teachers, and it is the individual's awareness of the teaching responsibility that he should bear as a physical education teacher, teaching obligations, teaching concepts, and necessary teaching foundations that should be upheld. Yan et al. (2022) pointed out the ecological system model for the professional development of physical education teachers in primary and secondary schools under the background of 'double reduction': 1) micro system: refers to the individual physical education teachers and the external ecological environment in direct contact with them, such as schools, Family, community, etc. 2) Intermediate system: refers to the environment formed by the interaction of two or more factors in the microsystem (such as the relationship between the school where the physical education teacher works and family life, etc.). 3) External System: Refers to those environments that have no direct contact with teachers but have an impact on their professional development, such as the economic and cultural development of the school's location, the level of teachers in the school, etc. 4) Macro system: refers to the content of the entire social environment in which an individual lives, including the values, customs, ethics, morals, etc. formed by different ethnic cultures and subcultures, covering all the contents of the micro, meson, and external systems.

Conceptual Framework

Taking the competency development of junior middle school physical education teachers in Dongguan City as the core of the research, we first sort out the relevant research theories, including concepts, content, current situation, influencing factors, paths, etc., and then build an indicator system for the competency development of junior middle school physical education teachers in Dongguan City, which provides the basis for the development of junior middle school physical education teachers in Dongguan City. Teacher development provides the theoretical basis and practical guidance.

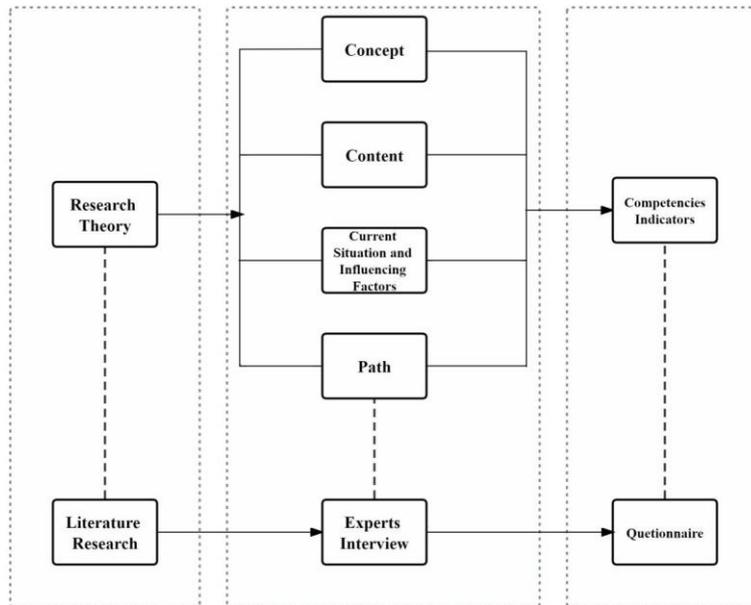


Figure 1 Conceptual framework

Methodology

Participants

To determine the content of the indicator system, 19 experts were selected and divided into four categories: university professors, administrative personnel, scientific research institution personnel, and teachers. Specific selection conditions include: 1) All candidates must be engaged in sports-related work. 2) University professors must all have professorial titles and have been engaged in sports work for more than 15 years. 3) Among the administrative personnel, there must be at least 2 personnel at a department level or above who have been engaged in sports-related administrative work for more than 10 years. (4) The personnel of the research institution must have deputy senior professional titles or above and have been engaged in sports-related research work for more than 15 years. 5) All teachers must be first-line junior middle school physical education teachers, and at least 3 of them must have deputy senior professional titles. Personnel with intermediate professional titles have been engaged in physical education teaching for more than 8 years, and at least 3 of them have been engaged in physical education teaching for more than 15 years.

Select 9 experts to conduct connoisseurship based on the indicator system. The specific selection conditions include: 1) All must be engaged in sports-related work. 2) University professors must have the title of professor. Those who have been engaged in sports work for more than 20 years. (3) Among the administrative personnel, they must hold positions above the department level and have been engaged in sports-related administrative work for more than 15 years. 4) Research institution personnel must have senior professional titles and have been engaged in sports-related research work for more than 20 years. 5) The teachers must be first-line junior middle school physical education teachers, have deputy senior professional titles, and have been engaged in physical education teaching for more than 15 years.

Research Instrument

Based on the “Compulsory Education Physical Education and Health Curriculum Standards (Chinese Ministry of Education, 2022)”, “Second School Teachers Professional Standards” and other documents, an expert questionnaire verification indicator system was compiled. The main contents include: 1) Basic information about the participants (including gender, age, education, nature of the unit, professional title, position, etc.). 2) The index content uses a Likert scale, with values ranging from 1 to 5, representing identity and attitude from low to medium.

Consult journals and books on relevant platforms to understand the content related to the competency development of junior middle school physical education teachers, and provide a research basis for building a competency index system.



Data Collection

Use the Star platform to enter expert forms and allocate funds to relevant experts from research institutions, administrative agencies, and junior middle schools to jointly conduct two rounds of surveys. The two rounds of surveys are 14 days apart. In the end, 19 were effectively recovered in the first round and 17 in the effective round. share. The Dongguan Junior Middle School physical education teacher competency development index system was sent to 9 experts through WeChat for appreciation. The experts responded with specific suggestions on the index system and follow-up research opinions.

Data Analysis

During the collection process of expert questionnaires, 19 were recovered in the first round and 17 in the second round. All returned questionnaires are valid, and the effective recovery rate is close to 90%. The initial test takes about 5 minutes, and the average time it takes for experts to fill out the form is about 8 minutes, and the answers to the questions are somewhat targeted. The quality of filling out the questionnaire was good.

Specifically, a descriptive analysis of the data was performed, followed by a reliability analysis. First, the expert positive coefficient, expert authority (Cr), expert opinion concentration degree (MJ), and expert opinion coordination degree (W) were tested. Then the content of the indicator system is verified by means and coefficients of variation.

Research Process

1) Summarize the literature on the content, influencing factors, and competency structure theory of junior middle school physical education teachers' competency development, and select content related to junior middle school physical education teachers' competencies.

2) Develop the research framework of the thesis and initially select research factors.

3) Design a Likert scale and formulate an expert questionnaire.

4) After two rounds of expert questionnaire collection, the content and weight of the indicators are determined.

5) Nine experts will provide opinions and next-step research suggestions on the determined competency index system.

Results

Descriptive statistics of participants

Based on research from literature, books, and policy documents, a framework for the development indicators of physical education teachers in middle schools in Dongguan has been constructed. However, there is a need to further clarify its scientific and rational basis. 28 experts were organized as research participants.

Following the methodology for indicator selection using the Delphi method as suggested by Cao (2022), the indicators in this study are filtered and refined to establish the final set of indicators. During the investigation, the professional titles, positions, working years, and familiarity with this research field of 19 experts were studied. The details are as follows:

Table1 Basic information of expert questionnaire participants (N=19)

	Title	Number of people	Percent
Working years	10-19 years	4	21.1%
	20-29 years	7	36.8%
	More than 30 years	8	42.1%
Job attributes	Manager	5	26.3%
	Researcher	7	36.8%
	Teacher	7	36.8%
	Professor or senior teacher	9	45%



	Title	Number of people	Percent
Professional title	Associate professor or senior teacher	5	25%
	first-level teacher	3	10%
	Section chief and above	4	21.1%
	Teaching and Research Fellow	3	10%
Position	Dean of University Physical Education College	4	21.1%
	Principal and Vice Principal	2	10.5%
	Middle-level school cadres or heads of physical education departments	6	31.6%

The connoisseurship participants are as follows:

Table2 Basic information of expert questionnaire participants (N=9)

	Title	Number of people	Percent
Working years	10-19 years	1	11.1%
	20-29 years	2	22.2%
	More than 30 years	6	66.7%
Job attributes	Manager	3	33.3%
	Researcher	3	33.3%
	Teacher	3	33.3%
Professional title	Professor or senior teacher	5	55.6%
	Associate professor or senior teacher	1	11.1%
	first-level teacher	0	-
	Section chief and above	2	22.2%
Position	Dean of University Physical Education College	3	33.3%
	Principal and Vice Principal	1	11.1%
	Middle-level school cadres or heads of physical education departments	3	33.3%

Reliability Analysis of the Expert Questionnaire

The expert positive coefficient represents the degree of the expert's relationship with a certain evaluation index. It is represented by the expert's participation rate in the eyes and the effective response rate of the questionnaire. The calculation method is the ratio of the number of experts participating in



the study to the total number of experts. The credibility and validity of this study the recovery rate is directly proportional to the relationship. It is generally believed that a recovery rate of less than 50% is the least ideal, a recovery rate of more than 60% indicates that experts are motivated, and a recovery rate of more than 70% indicates that experts are middle motivated (Su, J. P., 1989). The response rate and effective rate of the two rounds of questionnaires both reached over 70%, indicating that the experts' positive coefficient was middle and laid the foundation for the research.

Table3 Expert Positive Coefficient Statistics

Rounds	Distribute questionnaire	Return questionnaire	Valid questionnaires	The effective rate of questionnaires
Round 1	19	19	19	100%
Round 2	19	17	17	89.50%

The degree of expert authority is mainly determined by two aspects: expert judgment coefficient and familiarity with the consultation content. The specific formula is as follows: $Cr = (Cs + Ca)/2$

Ca represents the basis for judging the indicator items, including four categories: theoretical basis, practical experience, peer understanding, and intuitive feeling. The degree of impact is divided into large, medium, and small, and assigned values respectively. Cs represents the expert's familiarity with the item, which is divided into 5 levels and assigned values respectively. The expert authority coefficient $Cr \geq 0.7$ means that the consultation results are reliable, and the greater the Cr, the greater the degree of authority (Dong et al., 2007). According to the results of the expert questionnaire, the expert authority coefficients of both rounds were greater than 0.7.

Table 4 Expert authority coefficient table

		Judgments based	Familiarity	Authority coefficient
	Values	0.84	0.89	0.865
Round 1	Essential character	0.83	0.87	0.85
	Key competencies	0.89	0.94	0.915
	Values	0.85	0.89	0.87
Round 2	Essential character	0.84	0.88	0.86
	Key competencies	0.92	0.94	0.93

The degree of concentration of expert opinions is determined based on the average value of each indicator. The average score of the indicator is positively correlated with the concentration of important opinions of experts. MJ represents the number of experts evaluating the j-th indicator; Cij represents the rating value of the j-th indicator by the i-th expert. The larger the value of MJ, the lower the importance of the corresponding j indicator (Wang, C. Z., 2011). The proportion of items with an average index value middle than 4 points in both rounds was meddler than 90%, indicating that the experts' centralized evaluation of items was ideal. $M_j = \frac{1}{m_j} \sum_{i=1}^m C_{ij}$

Table 5 Concentration of expert opinions

Average score	Round 1		Round 2	
	Number of indicators	Percent	Number of indicators	Percent
4.5 < x ≤ 5	67	84.81%	50	75.76%
4 < x ≤ 4.5	6	7.59%	12	18.18%





The degree of coordination of expert opinions is mainly reflected by the coefficient of variation (CV) and the Kendall coefficient (W). The lower the coefficient of variation, the more consistent the experts' judgments on the importance of the indicator. The coefficient of variation, also known as the dispersion coefficient, is the difference between the standard deviation and the mean. Ratio. The absolute value reflects the degree of dispersion of the data. Kendall's harmony coefficient (Kendall' S W) is a correlation quantity calculated by calculating the correlation of multiple levels of variables. The value is between and 1. The lower the W value, the more expert it is. The lower the consistency (Zhag, Huang, et al., 2013), the specific following: $W = \frac{S}{1/12[K^2(N^3-N)-K\sum_{i=1}^k T_i]}$

Table 6 Degree of coordination of expert opinions

Rounds	Indicators	Number of cases	Kendall (Wa)	Chi-Square	df.	P
Round 1	First level indicator	19	0.421	16.000	2	0.000
	Second level indicator	19	0.523	119.199	12	0.000
	Third level indicator	19	0.416	490.589	62	0.000
Round 2	First level indicator	17	0.484	15.500	2	0.000
	Second level indicator	17	0.396	63.397	10	0.000
	Third level indicator	17	0.331	270.154	51	0.000

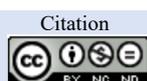
The expert positive level is close to 90%, the expert authority level is $Cr > 0.7$, 90% of the questions where expert opinions are concentrated on 4 points or above, and the expert opinion coordination degree is $1 < W < 1$, $P < 0.05$, indicating that the reliability of the questionnaire is middle.

To ensure the effectiveness of indicator screening, the measurement method of average value and coefficient of variation is adopted. It is generally believed that if the average value is lower than 3.5 and the coefficient of variation is greater than 0.25, it should be deleted (Luo, L. Q., 2011). A total of 19 expert questionnaires were distributed in the first round and 19 were recovered. A total of 19 expert questionnaires were distributed in the second round and 17 were recovered. Based on the results of two rounds of expert surveys, the average value and coefficient of variation are calculated, and the indicators are screened and weighted based on the opinions of experts.

In the first round of expert questionnaires distributed, the indicator system consisted of 3 first-level indicators, 13 second-level indicators, and 63 third-level indicators. After calculation through Excel and package software for data analysis, we get:

Table 7 The mean, standard deviation, and coefficient of variation of indicators in the first round

Three level indicators	Mean	S.D.	CV
A1 Values	5.00	0.00	0.00
A2 Essential character	4.58	0.51	0.11
A3 Key competencies	5.00	0.00	0.00
B1 Teacher's ethics	5.00	0.00	0.00
B2 Curriculum view	5.00	0.00	0.00
B3 Educational view	3.37*	1.16	0.35*





Three level indicators	Mean	S.D.	CV
B4 Institutional view	5.00	0.00	0.00
B5 Physical education science spirit	5.00	0.00	0.00
B6 Physical education morality	4.58	0.51	0.11
B7 Physical literacy	4.58	0.51	0.11
B8 Physical education design and implementation competencies	4.84	0.37	0.08
B9 Physical education organization and management competencies	4.74	0.45	0.10
B10 Physical education research and innovation competencies	4.95	0.23	0.05
B11 Physical education knowledge and updated competencies	3.16*	1.07	0.34*
B12 Physical education skills and demonstration coaching competencies	4.95	0.23	0.05
B13 Learning reflection and professional development competencies	4.89	0.32	0.06
C1 Adhere to teachers' ethics first and fulfill teachers' professional ethics	5.00	0.00	0.00
C2 Have firm professional beliefs, love education, and have professional ideals and professionalism	4.42	0.51	0.11
C3 Be a teacher by example, educate students by example and words, and be a guide and guide for students' healthy growth	4.79	0.42	0.09
C4 Have good psychological quality and handle relationships with students, parents, and colleagues correctly and positively	4.79	0.42	0.09
C5 Active learning and in-depth understanding of compulsory education physical education and health curriculum standards	4.21	0.42	0.10
C6 Adhere to and implement the curriculum concept of 'Health First'	4.79	0.42	0.09
C7 Based on core competencies, accurately understand the nature and objectives of the course	4.79	0.42	0.09
C8 Deeply understand the significance and value of the curriculum and give full play to the educational value of physical education	4.84	0.37	0.08
C9 Study and understand course content requirements in a targeted manner, and choose teaching content reasonably and scientifically	5.00	0.00	0.00
C10 Develop local curriculum and school-based curriculum based on the actual conditions of areas, towns, streets, and schools	5.00	0.00	0.00
C11 Adhere to the student-centered approach and implement the fundamental mission of cultivating moral character and cultivating people	4.84	0.37	0.08
C12 Deeply understand the significance and value of education and give full play to the educational value of physical education	4.47	0.51	0.11
C13 Be a role model and stick to the educational position	4.47	0.51	0.11
C14 Adhere to lifelong education and focus on developing students' lifelong learning competencies	4.42	0.51	0.11



Three level indicators	Mean	S.D.	CV
C15 Strengthen the concept of system, comprehensively study and understand the relevant systems, policies, laws, and regulations of school physical education	4.58	0.51	0.11
C16 Administer education by the law, implement and implement relevant requirements in school physical education-related systems, policies, and legal and regulatory documents	4.58	0.51	0.11
C17 Actively participate in the formulation of school physical education systems, policies, and legal and regulatory documents	4.58	0.51	0.11
C18 Actively guide students, parents, and society to participate in the management of education according to law	4.58	0.51	0.11
C19 Seeking truth and being pragmatic, insisting on taking a factual basis as an important prerequisite for school physical education work	4.58	0.51	0.11
C20 Respect the laws of education and the laws of physical and mental development of junior middle school students and provide suitable physical education for every junior middle school student	4.58	0.51	0.11
C21 Good at using scientific thinking to solve physical education problems	4.58	0.51	0.11
C22 Cultivate students to form scientific thinking	4.58	0.51	0.11
C23 Learn and apply scientific principles to combine knowledge learning, skill acquisition, competency development, and moral development of junior middle school students	4.58	0.51	0.11
C24 Care for students, respect their independent personality, be caring, responsible, patient and careful	5.00	0.00	0.00
C25 Have a teamwork spirit and actively carry out collaboration and communication	5.00	0.00	0.00
C26 Respect individual differences and proactively understand and meet students' needs	3.42*	1.22	0.36*
C27 Positive and optimistic, enthusiastic and cheerful, good at psychological adjustment	5.00	0.00	0.00
C28 Be diligent in learning and keep making progress	3.11*	1.20	0.39*
C29 Dress appropriately, be careful in your words and deeds and behave in a civilized and polite manner	5.00	0.00	0.00
C30 Understand the essence and essence of the excellent traditional culture of the Chinese nation	4.58	0.51	0.11
C31 Actively learn cultural knowledge and achievements in the field of physical education at home and abroad, both ancient and modern	4.79	0.42	0.09
C32 Cultivate oneself and teach, and learn to use cultural thinking to carry out school physical education work	5.00	0.00	0.00
C33 Develop an integrated plan for physical education inside and outside the classroom based on the location, time, school, and students	3.11*	1.10	0.35*
C34 Based on the principles of junior middle school education and the laws of physical and mental growth, scientifically formulate integrated plans inside and outside the classroom	4.95	0.23	0.05
C35 Based on the characteristics of junior middle school students' worldview, outlook on life, and values, focus on the educational function of physical education	4.47	0.51	0.11



Three level indicators	Mean	S.D.	CV
C36 Apply modern information technology means and tools to physical education design, implementation, and evaluation	4.58	0.51	0.11
C37 Guide and help junior middle school students learn to formulate study and training plans and actively participate in physical education	5.00	0.00	0.00
C38 Focus on learning and promoting junior middle school students to form positive learning motivation, learning attitude, and learning behavior	4.63	0.50	0.11
C39 Highlight the integration of structured knowledge and skills, carry out process evaluation, and focus on examining the development level of core competencies of junior middle school students	5.00	0.00	0.00
C40 Able to organize and complete physical education, extracurricular activities, training, and competitions in an orderly and efficient manner	3.47*	1.39	0.4*
C41 Use appropriate management methods and methods to effectively manage physical education	4.95	0.23	0.05
C42 Communicate effectively and establish positive relationships with colleagues, teachers, and students, and harmonious home-school relationships	4.89	0.32	0.06
C43 Pay attention to the connections between disciplines and select physical education tools and resources according to local conditions	4.95	0.23	0.05
C44 Establish a good teacher-student relationship and help junior middle school students establish a good peer relationship	4.84	0.37	0.08
C45 Actively respond to and properly handle emergencies	5.00	0.00	0.00
C46 Have problem awareness and be good at identifying and asking questions	4.89	0.32	0.06
C47 Apply research thinking and focus on combining research with work practice	5.00	0.00	0.00
C48 Study the actual work of physical education and innovate in content, form, means, resources, and environment	5.00	0.00	0.00
C49 Possess methods and means of physical education research	4.84	0.37	0.08
C50 Guide students to think independently and actively explore, and develop students' innovative competencies	5.00	0.00	0.00
C51 Take the initiative to write scientific research papers, apply for scientific research projects, and refine scientific research results	4.79	0.42	0.09
C52 Possess comprehensive knowledge of physical education subjects	5.00	0.00	0.00
C53 Interdisciplinary knowledge and expanded connections with other disciplines	5.00	0.00	0.00
C54 Actively participate in learning and update knowledge	5.00	0.00	0.00
C55 Master the basic principles of physical education skills, physical education techniques, and tactics, and have appropriate physical fitness levels and skill display or competition competencies	4.95	0.23	0.05
C56 Guide students to practice scientifically, and provide targeted explanations and error correction guidance promptly	5.00	0.00	0.00



Three level indicators	Mean	S.D.	CV
C57 Safety precautions and timely guidance of students to form correct physical education cognition	5.00	0.00	0.00
C58 Practice the concept of lifelong physical exercise, guide junior middle school students to form correct health concepts, and develop lifelong physical education habits	5.00	0.00	0.00
C59 Guide students to learn basic physical education skills, physical fitness, and special physical education skills	4.95	0.23	0.05
C60 Recognize teachers' professionalism and focus on their professional development	4.95	0.23	0.05
C61 Self-evaluate the effectiveness of education and teaching, reflect on and summarize the experience promptly	4.95	0.23	0.05
C62 Adhere to lifelong learning and take the initiative to update knowledge and interdisciplinary learning	4.89	0.32	0.06
C63 Develop scientific professional development plans, actively participate in necessary professional training, and improve professional quality	4.95	0.23	0.05

In the first round of the expert survey, the Mean of B3, B11, C11-14, C26, C28, and C33 were lower than 3.5, and the coefficient of variation (CV) was lower than 0.25, so delete these indicators and keep other indicators. After adjustments and corrections, the results of the second round of expert surveys all meet the conditions for indicator retention.

Determination of Indicator Weights

Weights are used to determine the importance of a certain metric. This study uses the average of the expert scoring results in the second round of the Delphi method to calculate the weight. The second-level and third-level indicators calculate the average value corresponding to the upper-level indicator respectively, and the three dimensions in the first-level indicator calculate the average value accordingly. Ultimately, the indicator weights are as follows:

Table 8 Indicator system content and weight

First-level indicators	Second-level indicators	Third-level indicators
A1 Values (0.3378)	B1 Teacher's ethics (0.1240)	C1 Adhere to teachers' ethics first and fulfill teachers' professional ethics (0.0331)
		C2 Have firm professional beliefs, love education, and have professional ideals and professionalism (0.0306)
		C3 Be a teacher by example, educate students by example and words, and be a guide and guide for students' healthy growth (0.0326)
		C4 Have good psychological quality and handle relationships with students, parents, and colleagues correctly and positively (0.0277)
	B2 Curriculum view (0.1116)	C5 Active learning and in-depth understanding of compulsory education physical education and health curriculum standards (0.0192)
		C6 Adhere to and implement the curriculum concept of "Health First"(0.0190)
		C7 Based on core competencies, accurately understand the nature and objectives of the course (0.0187)



First-level indicators	Second-level indicators	Third-level indicators
		<p>C8 Deeply understand the significance and value of the curriculum and give full play to the educational value of physical education (0.0185)</p> <p>C9 Study and understand course content requirements in a targeted manner, and choose teaching content reasonably and scientifically (0.0182)</p> <p>C10 Develop local curriculum and school-based curriculum based on the actual conditions of areas, towns, streets, and schools (0.0180)</p>
	B3 Institutional view (0.1023)	<p>C11 Strengthen the concept of system, comprehensively study and understand the relevant systems, policies, laws, and regulations of school physical education (0.0257)</p> <p>C12 Administer education by the law, implement and implement relevant requirements in school physical education-related systems, policies, and legal and regulatory documents (0.0261)</p> <p>C13 Actively participate in the formulation of school physical education systems, policies, and legal and regulatory documents (0.0254)</p> <p>C14 Actively guide students, parents, and society to participate in the management of education according to the law (0.0251)</p>
A2 Essential character (0.3067)	B4 physical education science spirit (0.1045)	<p>C15 Seeking truth and being pragmatic, insisting on taking a factual basis as an important prerequisite for school physical education work (0.0183)</p> <p>C16 Respect the laws of education and the laws of physical and mental development of junior middle school students and provide suitable physical education for every junior middle school student (0.0217)</p> <p>C17 Good at using scientific thinking to solve physical education problems (0.0211)</p> <p>C18 Cultivate students to form scientific thinking (0.0214)</p> <p>C19 Learn and apply scientific principles to combine knowledge learning, skill acquisition, competency development, and moral development of junior middle school students (0.0220)</p>
	B5 Physical education morality (0.1031)	<p>C20 Care for students, respect their independent personality, be caring, responsible, patient, and careful (0.0266)</p> <p>C21 Have teamwork spirit and actively carry out collaboration and communication (0.0263)</p> <p>C22 Positive and optimistic, enthusiastic and cheerful, good at psychological adjustment (0.0256)</p> <p>C23 Dress appropriately, be careful in your words and deeds and behave in a civilized and polite manner (0.0246)</p>
	B6 Physical literacy (0.0991)	<p>C24 Understand the essence and essence of the excellent traditional culture of the Chinese nation (0.0342)</p> <p>C25 Actively learn cultural knowledge and achievements in the field of physical education at home and abroad, both ancient and modern (0.0329)</p>



First-level indicators	Second-level indicators	Third-level indicators
		C26 Cultivate oneself and teach, and learn to use cultural thinking to carry out school physical education work (0.0320)
		C27 Based on the principles of junior middle school education and the laws of physical and mental growth, scientifically formulate integrated plans inside and outside the classroom (0.0136)
		C28 Based on the characteristics of junior middle school students' worldview, outlook on life, and values, focus on the educational function of physical education (0.0121)
	B7 Physical education design and implementation competencies (0.0757)	C29 Apply modern information technology means and tools to physical education design, implementation, and evaluation (0.0110)
		C30 Guide and help junior middle school students learn to formulate study and training plans and actively participate in physical education (0.0134)
		C31 Focus on learning and promote junior middle school students to form positive learning motivation, learning attitude, and learning behavior (0.0129)
		C32 Highlight the integration of structured knowledge and skills, carry out process evaluation, and focus on examining the development level of core competencies of junior middle school students (0.0127)
A3 Key competencies (0.3556)	B8 Physical education organization and management competencies (0.0719)	C33 Use appropriate management methods and methods to effectively manage physical education (0.0153)
		C34 Communicate effectively and establish positive relationships with colleagues, teachers, and students, and harmonious home-school relationships (0.0148)
		C35 Pay attention to the connections between disciplines and select physical education tools and resources according to local conditions (0.0130)
		C36 Establish a good teacher-student relationship and help junior middle school students establish a good peer relationship (0.0136)
		C37 Actively respond to and properly handle emergencies (0.0152)
	B9 Physical education research and innovation competencies (0.0709)	C38 Have problem awareness and be good at identifying and asking questions (0.0123)
		C39 Apply research thinking and focus on combining research with work practice (0.0121)
		C40 Study the actual work of physical education and innovate in content, form, means, resources, and environment (0.0112)
		C41 Possess methods and means of physical education research (0.0116)
		C42 Guide students to think independently and actively explore, and develop students' innovative competencies (0.0120)



First-level indicators	Second-level indicators	Third-level indicators
		C43 Take the initiative to write scientific research papers, apply for scientific research projects, and refine scientific research results (0.0118)
		C44 Master the basic principles of physical education skills, physical education techniques, and tactics, and have appropriate physical fitness levels and skill display or competition competencies (0.0164)
	B10 Physical education skills and demonstration coaching competency (0.0748)	C456 Guide students to practice scientifically, and provide targeted explanations and error correction guidance promptly (0.0145)
		C46 Safety precautions and timely guidance of students to form correct physical education cognition (0.0143)
		C47 Practice the concept of lifelong physical exercise, guide junior middle school students to form correct health concepts, and develop lifelong physical education habits (0.0133)
		C48 Guide students to learn basic physical education skills, physical fitness, and special physical education skills (0.0162)
	B11 Learning reflection and professional development competencies (0.0623)	C49 Recognize teachers' professionalism and focus on their professional development (0.0135)
		C50 Self-evaluate the effectiveness of education and teaching, reflect on and summarize the experience promptly (0.0166)
		C51 Adhere to lifelong learning and take the initiative to update knowledge and interdisciplinary learning (0.0158)
		C52 Develop scientific professional development plans, actively participate in necessary professional training, and improve professional quality (0.0164)

Discussion

Competencies of physical education teachers

Research results show that the competency development model of junior middle school physical education teachers is a structured whole that integrates knowledge, skills, and attitudes (Zhien et al., 2019; Yin, & Fu, et al., 2022; Cao, L. S., 2022; Chen, L.Y., 2021). Based on reasons such as competency fragmentation and teachers' passive development in actual work, this competency development model can stimulate teachers' autonomy in development (Zhang, R. F., 2017), and can help physical education teachers fully understand structured competencies and apply them to actual education and teaching among (Xie, H., 2010). The "Opinions on Comprehensively Deepening the Fundamental Task of Curriculum Reform to Build Morals and Cultivate People" mentioned that to build and cultivate students' core literacy system, to develop students' core literacy, it is necessary to improve and enhance the core literacy of physical education teachers. Therefore, the research is based on Dongguan the core competencies of physical education teachers in the city's junior middle schools radiate content from three dimensions: values, essential characters, and key competencies. This is consistent with the core competency structure of physical education teachers studied and proposed by Yin, & Fu, et al. (2022).

The value of junior middle school teachers for physical education

In today's social environment full of complex factors, physical education teachers' values play a decisive and key role in competency development. Physical education teachers must have firm values. Therefore, values are the priority in the Dongguan junior middle school physical education teachers' competency model. content, which is consistent with the views of many researchers (Demirel, D. H., 2017; Chen, L.Y., 2021; Fang, L., 2020). Specifically, the values include teachers' ethics, curriculum, and education. When facing students, teachers can adhere to teacher ethics first, not only fulfill teachers'



professional ethics, strengthen professional beliefs, adhere to the "health first" curriculum concept, thoroughly study various rules, regulations, and normative requirements, but also set an example, give full play to the value of education, educate junior middle school students through example and words, and help them establish correct values (Zhu, L. H., 2021).

The essential character of junior middle school teachers for physical education

If values are the commanding heights of morality, then sports character is the charm of physical education teachers. The quality of physical education teachers is of undoubted importance (Makorohim et al., 2022), but in the study, the author reorganized the physical education. The connotation of character mainly includes three aspects: sports science, sports morality, and sports culture. First of all, the work of junior middle school physical education teachers is an important link in the entire basic education stage. They must possess the spirit of sports science and clearly understand and appropriately apply sports science knowledge (Qu, M., 2020; Cao, L. S., 2022; Xie, H., 2010; Zhang, R. F., 2017). Secondly, junior middle school physical education teachers need to have excellent sports ethics, including caring for students, team spirit, optimism, being cautious in words and deeds, and being civilized, etc., so that they can establish a harmonious relationship with students (Zhu, L. H., 2021). Third, junior middle school physical education teachers need to strengthen their cultural construction, actively learn excellent Chinese and foreign cultures, and enhance the cultural connotation of school physical education work (Fang, L., 2020).

The Key competencies of junior middle school teachers for physical education

The competencies of junior middle school physical education teachers include all aspects, and different studies have different bases for dividing the competency content. But what is certain is that no matter how the competency content is divided, it is necessary to pay attention to its operability (Yin, & Sun, 2014). Starting from the actual situation of junior middle school physical education teachers in Dongguan City, and focusing on the basic teaching standards and requirements of Dongguan City, the junior middle school physical education teacher competency model is summarized into five aspects: First, physical education design and implementation capabilities, this competency has been used as a Basics (Cao, L. S., 2022; Liu, R. S., 2015; Li, M. M., 2022; Zhu, L. H., 2021; Li, J., & Bi, Y. L., 2018; Yuan, H. X., 2013), which shows its importance. Specifically, sports design and implementation capabilities mainly include design capabilities and implementation capabilities. The second is sports organization and management capabilities, which specifically elaborates on the development requirements of junior middle school physical education teachers from the aspects of the teacher-student relationship, method application, subject connection, colleague relationship, and emergency response (Zhu, 2021). The third is the competency of sports research and innovation. Based on the innovative ideas of problem-solving, sports research, and innovation are regarded as integrated competency. The idea of discovering problems, thinking about problems, and solving problems are used throughout to improve the research and innovation of junior middle school physical education teachers. and practicality (Chen, L. Y., 2021; Li, M. M., 2022; Li, J., & Bi, Y. L., 2018; Yuan, H. X., 2013; Yin, Z. H., & Wu, C. Y., 2009). The fourth is sports skills and demonstration and guidance capabilities. Special skills are an important feature that distinguishes physical education teachers from teachers in other subjects. They are also an important means to practice the concept of "health first". Physical education teachers not only need to master solid basic sports skills, but also have competencies such as analysis, error correction, guidance, and prediction that can not only guide students to participate in physical exercise but also penetrate health education and lifelong physical education (Ding, Y. L., 2020). The fifth is learning reflection and professional development capabilities. To achieve sustainable development, physical education teachers must establish a lifelong learning awareness and take the initiative to Reflect, think actively, study seriously, and integrate learning and competency improvement into education and teaching (Yin, & Tian, 2020; Zhu, 2021).

Recommendation

1. Strengthen the attention of the education administration department and relevant departments to the improvement of the quality of junior middle school physical education teachers.
2. Formulate policies suitable for the development of junior middle school physical education teachers and formulate corresponding policy implementation safeguards.
3. Encourage junior middle school physical education teachers in Dongguan City to establish a correct view of capacity building and strengthen independent learning.



4. Continue to deepen the research on competency indicators at each development stage of junior middle school physical education teachers in Dongguan City, and further improve the staged and targeted design of indicators.

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