

PE-PCK Training of PE Normal Students under the Guidance of Excellence

Ximei Xu

Qujing Normal University, Qujing, Yunnan, 655011, China

Abstract:

PE-PCK is an important knowledge in the core accomplishment of excellent physical education teachers. It is a comprehensive embodiment of the knowledge applied in physical education teaching practice in a specific situation. It is the integration of personal knowledge and experience acquired by physical education teachers, as well as the unique professional knowledge of physical education teachers. This paper discusses the connotation, characteristics and generation path of PE-PCK theory by using literature method and comparative analysis method, compares and analyzes the PE-PCK knowledge composition and source of PE normal university students and outstanding PE teachers, and analyzes the current PE normal university students' PE-PCK training content and characteristics. Found normal PE - PCK excellence quality cultivation of sports the cultivation of the need to increase the teaching aim and teaching cases and the accumulation of experience in teaching practice, put forward the reform of sports teachers training mode, increase the case teaching, demonstration teaching and training methods such as teaching reflection and discussion for the cultivation of the pre-service teachers PE - PCK provide theoretical support.

Keywords: Excellence, Normal PE students, PCK measures.

I. INTRODUCTION

In the 13th Five-Year Plan for the development of national education, it is pointed out that we should deepen the reform of undergraduate education and teaching, improve teachers' ability and quality, and cultivate famous teachers, which point out the direction for the development of education.^[1] Therefore, it is the mission of the PE teacher training school to strive to build a group of high-quality, and professional PE teachers, which is also an important way to ensure the quality of PE teaching in primary and secondary schools.

PCK, a concept first put forward by Delman in 1980s, is regarded as the unique knowledge in the field of teachers' professional knowledge, which is different from other industries, and

also the most general knowledge to be taught in the field of disciplines. PE-PCK, short for pedagogical content knowledge of PE teachers, is the professional core literacy knowledge that they should possess, which affects the quality and specialization of PE teachers. However, there are some problems in PE-PCK training of PE normal students in colleges and universities, such as incomplete education and training system of PE normal skills and lack of specialized training of PE teaching skills.

Based on the related research of PE-PCK theory, this paper makes a comparative analysis of the differences between PE-PCK components and formation paths of PE-PCK of normal PE students and excellent teachers, and explores the excellent characteristics and formation of PE-PCK in the discipline teaching knowledge training of normal PE students with the guidance of excellent output, so as to provide path reference for cultivating the excellent characteristics of PE-PCK of students majoring in PE.

II. METHODOLOGY

2.1 Literature review method

In the official websites of such as the Ministry of Education, 285 journals and doctoral dissertations were selected as the document basis of this study by consulting relevant policy documents on education, and by using "PCK", "excellent teachers" and " pedagogical content knowledge" as the key words in CNKI to conduct thematic search on relevant documents.

2.2 Comparative analysis approach

In the existing literature, the composition elements and generation paths of PE-PCK between normal PE students and excellent PE teachers were compared and analyzed to explore the differences between them and the characteristics of PE-PCK of excellent PE teachers, and to provide the basis for exploring paths for cultivating the excellent characteristics of normal PE students.

III. DISCUSSIONS AND ANALYSIS

3.1 Introduction to PE-PCK Theory

3.1.1 Definition of PE-PCK theory

PCK (Pedagogical Content Knowledge), a concept first put forward by Professor Delman

from Stanford University in 1980s, aims to solve the problem of division between subject knowledge and educational knowledge, improve educational education and enhance the quality of trained teachers. As a special knowledge of teachers, PCK integrates various knowledge and experience acquired by itself, especially the knowledge presented in the context of subject teaching after the integration of subject knowledge and educational knowledge. It refers to the teaching knowledge of PE subject, which can be formed only when the original knowledge structure is fused and transformed and presented and perfected in the teaching situation.

3.1.2 Elements of PE-PCK

After analyzing and sorting out the composition of PCK, different researchers have put forward different elements of PE-PCK (see Table I). Generally speaking, PE-PCK should be composed of subject matter knowledge, curriculum knowledge, student knowledge, context knowledge, knowledge of PE teaching objectives, knowledge of PE teaching strategies, knowledge of PE learning evaluation, knowledge of PE teaching organization and management, knowledge of PE teaching methods, knowledge of PE teaching environment and so on. According to the concept that curriculum is the collection of subject-matter content (narrow sense), both subject matter knowledge and curriculum knowledge are collectively referred to as curriculum knowledge. In addition, according to the connotation of teaching strategies, the context knowledge, knowledge of PE teaching methods, knowledge of PE teaching organization and management and knowledge of PE teaching environment are integrated into knowledge of adopting targeted teaching strategies. Finally, the composition of PE-PCK is divided into five parts: curriculum knowledge, student knowledge, knowledge of PE teaching objectives, knowledge of PE teaching strategies and knowledge of PE teaching evaluation.

Table I. Composition of PE-PCK

EXPERTS	COMPOSITION OF PE-PCK
LIN JINGPING ^[2]	PE-PCK consists of subject matter knowledge, curriculum knowledge, teaching knowledge, student knowledge and context knowledge.
ZHANG XIAOLING, ZHANG QINGWEN ^[3]	It includes some elements, such as the knowledge of PE teaching objectives, PE curriculum, PE teaching strategies, the knowledge of students' understanding in PE teaching and the knowledge of PE learning evaluation.
ZHAO FUXUE, CHENG CHUANYIN ^[4]	The PCK structure of P.E. teachers is divided into seven elements: knowing well the knowledge of P.E. teaching objectives and values, integrating P.E. curriculum knowledge, perfecting the content knowledge of P.E. subjects, strengthening the knowledge of P.E.

ZHANG LEI ^[5]	teaching methods, acquiring the knowledge of students and their characteristics, creating the knowledge of P.E. teaching situations and mastering the knowledge of P.E. teaching evaluation.
LI WEIDONG, ET AL. ^[6]	PE-PCK is divided into four dimensions, namely, knowledge about subject-matter content, knowledge about students, knowledge about teaching strategies and knowledge about teaching evaluation. The five elements of PCK consist of six aspects of knowledge: student knowledge; knowledge of PE objectives; teaching matter knowledge; teaching organization and management knowledge; knowledge of PE teaching methods; teaching evaluation knowledge.
ZHANG LEI, DONG GUOYONG AND WU RONGRONG ^[7]	The six dimensions of PCK content structure model for PE teachers are: knowledge of teaching objectives, knowledge of students, knowledge of teaching content, knowledge of teaching environment, knowledge of teaching methods and knowledge of teaching evaluation.

3.1.3 Attribute and generation of PE- PCK

PE-PCK has its own characteristics. Different researchers, in their research on the characteristics and attributes of PE-PCK (see Table II), think that PE-PCK should have the characteristics of practicality, individuality and integration, that is to say, PE teachers' PCK is formed by the continuous integration of relevant knowledge in their continuous teaching and practice. Moreover, this formation is not inherent, but a process that needs to be integrated with various kinds of knowledge. Because it is also a dynamic process of continuous generation, dynamics, generation and integration are collectively referred to as integration here. In addition, Zhang Xiaoling and Zhang Qingwen also believe that PE-PCK is professional, situational and interactive^[3], that is, it is knowledge generated by individuals with certain professional knowledge in specific situations, which emphasizes that PE-PCK is knowledge dynamically formed by individuals in specific situations on the premise of professional knowledge, and different professional knowledge and teaching situations are also the key points that distinguish PE teachers from teachers in other disciplines. Therefore, in addition to the individual, practical and integrated features of PCK, PE-PCK should also have the professional and situational features that distinguish it from other subject teachers' PCK.

Table II. Research on PE-PCK attributes

EXPERTS	FEATURES OF PE-PCK
ZHANG XIAOLING, ZHANG QINGWEN ^[3]	PE-PCK is dynamic, generative and practical.

ZHANG LEI ET AL ^[7] .	PE-PCK is integrated and individual, practical and generative, situational and interactive.
JIANG SU, YACHUAN ^[8]	LI PE-PCK is individual, practical, integrated and professional.
GAO PENG, YUCHAO, JIANGCHUAN ^[9]	LI PE-PCK is characterized by the diversity of its constituent elements, the integration of its knowledge and content, the discipline of serving teaching, the situational nature of its generating ways, and the silence of its existing ways.

At present, Chinese scholars have proposed the existing pre-service and post-service training approaches for PE-PCK (as shown in Table III) in their research on the development approaches of pre-service and post-service PE-PCK, and also proposed solutions to the problems existing in the existing approaches. The existing pre-service PE-PCK training approaches for PE teachers mainly include the setting of relevant curriculum contents, teaching practice and probation, simulation teaching, presentation and other measures. As for the PCK courses, there are school PE courses, PE teaching theory courses, and even PE teaching material analysis courses in some schools. However, the targeted PE teaching skills and training courses for normal students are lacking, and a systematic teaching skills training system has not yet been formed. The lack of specific and targeted evaluation and guidance forms in the practice and probation of PE normal students can not effectively lead their PE-PCK reflection and formation. The short time of practice and probation results in that some students' practice and probation become mere formality and no PE for specific objects is carried out. Practice in the form of simulation teaching, such as segment teaching and presentation, is often divorced from the reality of real teaching scenes, lacking pertinence, and can not be effectively designed and implemented according to the physical and mental development characteristics of primary and secondary school students. Presentation lessons are not combined with practical teaching, just talking on paper. To solve these problems, scholars have put forward to add PE-PCK-related courses, increase case teaching, establish cross-disciplinary internship mode and increase internship time, expand internship channels, strengthen internship cooperation among universities, primary and secondary schools, and attach importance to teaching reflection and diversified evaluation.

Table III. PE-PCK generation paths

EXPERTS	PE-PCK GENERATION PATHS
QUE YUEQING ^[10]	Pre-service learning background, internship experience, post-service PE teacher training and post-service teaching experience are the main sources of PCK for new teachers.

-
- CHAI JIAO ET AL^[11] Offering PE-PCK related courses, integrating teaching staff, establishing cross-disciplinary practice mode, and diversifying sports learning evaluation are the ways to develop PE-PCK.
- CHEN
JIANYING^[12] In the pre-service education of normal universities, case teaching should be strengthened and a simple statistical scale should be designed to feed back the interns' PCK.
- ZHANG LEI^[5] He pointed out the advantages and disadvantages of domestic teaching practice, and at the same time, discussed the open educational practice mode in foreign countries, which was far longer than domestic practice time, as well as various forms of campus practice and closer cooperation between universities, primary and secondary schools.
- ZHANG
XIAOLING,
ZHANG
QINGWEN^[13] Teaching practice, lesson study and simulated class are the important ways to implement PE-PCK development. Practical teaching methods and scenes should be provided to promote the development of PE-PCK through the accumulation and refinement of teaching experience.
- JIANG SU, LI
YACHUAN^[8] Some ways such as increasing normal skill classes, expanding practice channels and advocating reflection on normal skill learning are put forward.
-

3.2 Connotation and PE-PCK Composition of Excellent PE Teachers

3.2.1 Connotation and accomplishment of excellent PE teachers

The word "excellence" means "excellent" and "beyond average", so excellent PE teachers should be those who are excellent and beyond average. In the *Standards and Guidance for Professional Development of Teachers in Primary and Secondary Schools—Physical Education and Health*, the development of PE teachers is divided into three stages: from novices to maturity, from maturity to proficiency, and from proficiency to excellence, and it is pointed out that the stage from maturity to excellence focuses on the effect of years of cultivation of excellent teachers, and focuses on the actual impact and contribution to student development, school organization development and subject development^[13]. At this point, excellent PE teachers refer to those PE teachers who have influenced and contributed to the development of students, school organizations and disciplines. In these three stages of development, the development of each element of PE teachers' literacy and ability structure is different in development speed, development level and interpersonal differences, which provides the possibility for cross-section cultivation of our literacy.

3.2.2 PE-PCK PE-PCK in accomplishment and ability structure of excellent PE teachers

Excellence is obtained by comparison. Because different people pay attention to different aspects of development in the development process of PE teachers, it is unfair to define excellent teachers in a single way. Some concrete achievements are often used as indicators to judge whether PE teachers are excellent or not. He Jinpeng, a scholar, pointed out that core literacy is a comprehensive reflection of knowledge and ability, and an operable and observable indicator system to evaluate excellent PE teachers.^[14] In the *Standards for Professional Development of Teachers in Primary and Secondary Schools—Physical Education and Health*, the literacy and ability structure of teachers are divided into two dimensions: professional foundation and professional practice, and the result indicators of professional foundation and professional practice that excellent teachers should possess are pointed out. In the professional foundation dimension, the results indicators that excellent teachers should possess in teaching and subject teaching knowledge mainly include educational theoretical literacy, subject teaching theoretical knowledge and teaching cases, teaching experience, teaching ideas and teaching strategies^[13].

3.3 Comparison of PE-PCK between Existing PE Normal Students and Excellent PE Teachers

3.3.1 Comparison of PE-PCK elements

Dr. Zhang Lei found in the study of P-PE-PCK by preparing lessons that the PCK knowledge of the PE normal students includes the knowledge about the content of the PE discipline, the knowledge about the students, the knowledge about the PE teaching strategies, the knowledge about the PE teaching evaluation, the knowledge about the PE teaching objectives and the knowledge about the safety education environment.^[5] The research on this method of preparing lessons is mainly based on the summary, comparison and analysis of students' lectures and interviews with these knowledge sources after lectures. It comprehensively summarizes and analyzes the knowledge and sources of PCK for normal PE students.

By comparing the discussion with the main content of PE-PCK knowledge composition of excellent PE teachers in the discussion of PCK result indicator of excellent PE teachers in the *Standards for Professional Development of Teachers in Primary and Secondary Schools—Physical Education and Health*, it is found that excellent PE teachers have more prominent requirements for PE teaching cases, PE teaching experience and teaching ideas in the development of PCK. Experts such as Bai Biwei^[15] and Zou Yi^[16] have pointed out in the comparison of PCK between novices and expert teachers that expert teachers attach more

importance to students' knowledge and are better able to select teaching contents suitable for students and identify difficulties and difficulties in teaching among different students. They are more able to use teaching evaluation and teaching strategies in a mature and perfect way and pay more attention to diversified teaching evaluation methods and knowledge presentation strategies in practice schools.

To sum up, on the one hand, the analysis of the relationship among the elements of PE teaching in teaching theory shows that excellent teachers or expert teachers have more advantages in dealing with the relationship among students, PE teaching objectives, PE teaching strategies and teaching contents, and are more able to choose PE teaching strategies for students to achieve their goals, that is to say, their teaching is more targeted; On the other hand, excellent teachers are better than PE normal students in owning and grasping teaching cases, teaching experience and teaching ideas.

Therefore, the analysis and cultivation of teaching pertinence should be paid attention to in the training of various contents of the excellent characteristics of the PCK for the PE normal students.

3.3.2 Comparison of PE-PCK sources

In the research on the PE-PCK sources of excellent teachers, scholars found that apart from the ways to obtain pre-service PE-PCK knowledge in the normal school stage, there are also demonstration lessons, reflection and reconstruction of practical PE teaching activities, and self-teaching and research activities. A comparative analysis of PE-PCK sources of novice teachers and expert teachers who graduated from normal colleges and universities shows that PE normal students lack research on excellent teaching cases, demonstration teaching observation and learning from first-line PE teachers, and experience, reflection and discussion from first-line practical teaching. In contrast, the front-line PE experts and teachers pay more attention to the research of teaching cases and the discussion from colleagues.

Therefore, it is necessary to be good at digging out the existing excellent teaching cases of first-line PE teachers, strengthen the accumulation of cases, practical experience from first-line teaching, strengthen the frequency of reflection and discussion, and increase the observation and learning of first-line PE teachers' demonstration teaching when cultivating PE-PCK excellent characteristics of college PE normal students.

3.4 Cultivation of PE-PCK Excellence of PE Normal Students under PCK Theory

Based on the discussion on the connotation of excellent PE teachers and the PE-PCK that should be possessed, comparison and analysis on the relevant contents of the PCK of the college sports normal students, the cultivation of the excellence characteristics of the PCK of the college PE normal students requires attention paid to the targeted analysis and practice of the PE teaching and to the practical experience, observation, study and discussion from the front line of the PE teaching.

3.4.1 Establishing a multi-party cooperative training system for cross-disciplinary PE teaching

Under the background that China is paying more and more attention to the value of PE discipline and the training of PE teachers, some colleges and universities have already made practical attempts to build a skill teaching and training system in normal universities, and have also built some effective PE teaching models. However, in most schools, a scientific and complete standardized training system has not been formed, and problems such as lack of practice and time of classroom teaching skills training and neglect of preparation training before educational practice are common in the training of normal students. In the discussion of PE-PCK generation path and the source of excellent features, it is believed that the accumulation of educational practice and teaching experience should be increased in the training of PE normal students. Cross-section teaching mode can be adopted, and specialized training of PE teachers can be received, so as to strengthen cooperation and communication between universities and primary and secondary schools, to ensure that students can receive and experience PE in primary and secondary schools every semester, and to make full use of the resources of local famous PE teachers in primary and secondary schools, and to guide and guide students through their demonstration. In addition, the management of students' educational practice inside and outside the school should be further standardized, the evaluation rules of practice should be improved, the evaluation of PE-PCK related knowledge analysis before teaching implementation, the evaluation of PE-PCK representation during implementation and the evaluation of teaching reflection and improvement after implementation should be emphasized, and the excellent characteristics of PE-PCK of students should be scientifically and standardized.

3.4.2 Constructing a case teaching model of PE-PCK training course

A comparative analysis of PE-PCK sources between PE normal students and excellent PE teachers shows that excellent teachers or expert teachers pay more attention to the research of teaching cases. Using case teaching mode to cultivate PE-PCK excellence of PE normal students can not only lead their teaching through excellent teaching cases, but also subtly

cultivate their normalization consciousness and reflection ability of teaching and research, and also help them accumulate a large number of excellent teaching cases, increase teaching experience and knowledge, and make up for the lack of teaching case study and teaching experience accumulation. In the teaching practice of the training courses, teachers can equip students with corresponding teaching cases for observation, study and discussion in combination with relevant PE teaching knowledge, and encourage students to consult and accumulate and share relevant cases, so that students' theory can be closely linked with teaching practice, observe, learn and reflect on teaching practice, thus forming their own cognition and laying the foundation for improving their PE-PCK.

3.4.3 Strengthening teaching practice training for specific student groups

A comparative analysis of PE-PCK elements between normal college students majoring in PE and excellent PE teachers shows that excellent PE teachers are more able to select and use the knowledge of students, teaching strategies, teaching objectives, and teaching evaluation, and to select corresponding contents, teaching emphases and difficulties and treatment strategies for specific students, and to carry out diversified evaluation, which is closely related to their rich practical teaching experience. Such teaching experience often comes from a specific stage of students. They are more familiar with the characteristics and basis of students by contacting with students in actual teaching, and their understanding of students is an important basis for choosing strategies and contents. Therefore, it is necessary to strengthen the teaching practice training of students majoring in PE in normal colleges and universities for a certain group of students in reality, so that the teaching practice of PE normal students can be closely linked with the reality of teaching objects, so as to have students in mind and do everything for students. The selection of contents, methods, objectives and evaluation methods should be based on students' foundation and characteristics.

IV. CONCLUSIONS

In the three stages of PE teachers' development from "novices to maturity", "maturity to proficiency" and "proficiency to excellence", the development of PE-PCK can be cultivated in different stages without strict order for the development of the elements that make up PE-PCK, which makes it possible for the cross-stage cultivation of PE-PCK excellent characteristics for PE normal students. Based on the analysis and reference of PE-PCK constitution characteristics and generation paths of excellent PE teachers, this paper aims to provide reference for PE-PCK excellence characteristics training of PE normal students and suggestions and reference for training high-quality and professional PE teachers.

ACKNOWLEDGEMENT

The paper was supported by Special subject of educational scientific research of CSE: Research on PE-PCK construction of Physical education normal students with excellent orientation. Project number: 17TY3131049ZB.

REFERENCES

- [1] (2017) The State Council. Notice of the State Council on the issue of the 13th Five-Year Plan for the Development of National Education Jan
- [2] Lin JP (2002) Research on the subject teaching knowledge of physical education teachers and students. Taipei: Taiwan Normal University: 160-162
- [3] Zhang XL, Zhang QW (2016) E-PCK: The cornerstone of improving pre-service physical education teachers' skills. *Journal of Shanghai University of Sport* 40 (1): 85-89
- [4] Zhao FX, Cheng CY (2016) Research on the research procedure and practice path of P.E. teachers' case based on PCK structure. *Journal of TianJin University of Sport* 31(5): 388-392
- [5] Zhang L (2016) Research on the reform of surgical teaching based on the development of P-PE-PCK: From theory to practice. East China Normal University Mar
- [6] Li WD, et al. (2017) Comparative analysis of pedagogical content knowledge (PCK) between first-time P.E. teachers and experienced P.E. teachers. *Shandong Sports Science & Technology* 39(4)
- [7] Zhang L, Dong GY, Wu RR (2017) PCK of sports teachers from the perspective of specialization: conceptual model and characteristics. *Sports Sciences Researches* 21(1)
- [8] Jiang S, Li YC (2019) Analysis on training path of normal skills of physical education specialty from the perspective of PCK Theory. *Journal of Hubei Sports Science* 38 (9)
- [9] Gao P, Li YC, Yu JC (2018) Research on strategy of promoting effectiveness of post-service education for PE teachers from the perspective of PCK. *Journal of Beijing University of Physical Education* 41(5)
- [10] Que YQ (2003) Research on the discipline teaching knowledge of initial physical education teachers. *Journal of Physical Education* (35): 193-206
- [11] Chai J, et al. (2011) Research on the professional ways of training P.E. teachers by pedagogical content knowledge. *Journal of Xi'an Physical Education University* 28(3): 363-366
- [12] Chen JYing (2012) PCK difference between physical education practice teacher and experience teacher. *Physical Education Teaching* (10): 36-37
- [13] Chen YF (2012) Standards and guidance for professional development of primary and secondary school teachers - sports and health. Beijing: Beijing Normal University Press Sept: 18
- [14] He JP (2017) Connotation and practice exploration of core quality of excellent P.E. teachers. *Journal of Sports* 24(2)
- [15] Bai BW, Qin YD (2013) A difference study on the pedagogical content knowledge (PCK) of novice teachers and expert teachers in the field of science. *Early Childhood Education* (7, 8): 49-52
- [16] Zou Y (2014) A comparative study of PCK between novice and expert science teachers based on a case study of Zhejiang Province. Shanghai: East China Normal University May