The Physical Educator Vol. 81 • pp. 63–78 • 2024
https://doi.org/10.18666/TPE-2024-V81-I1-11163

PEDAGOGY

A Pedagogical Content Knowledge–Based Course Classification Process for Physical Education Teacher Education Curricula

Dong Zhang and Yan Luo

Abstract

This study aimed to formulate a course classification process for identifying and classifying courses in the curriculum for physical education teacher education (PETE). The study recruited five experts in physical education (PE), PETE, and pedagogy. The participants were professors at a college in the Northeastern United States. The five participants were interviewed about how to identify a pedagogical content knowledge (PCK) course. A PCK-based classification process was formulated. Additionally, the second part of the study analyzed the curriculum of a PETE program in the Northeastern United States to elucidate the implication of the classification process. The PCK-based classification process can identify if a course is a PCK course and classify its level on the basis of the course syllabus. However, evaluators can collect evidence through additional paths, such as class observation. The process may increase the objectivity and credibility of the evaluation of the PETE curriculum and comparison studies.

Currently, the majority of states in the United States require teacher candidates to achieve at least a bachelor's degree in teacher education, whereas other schools require master's degrees. Physical education (PE) teachers are also living under this circumstance. In

Dong Zhang, Physical Education and Sports School, Soochow University. Yan Luo, Faculty of Physical Education, Fudan University. Please send author correspondence to dzhang@springfieldcollege.edu

the United States, students need to graduate from physical education teacher education (PETE) programs, which typically span 4 years, and to obtain teacher licenses to be qualified as PE teachers. For the teaching profession of PE, schools, parents, and society ask teachers to gain sufficient knowledge to educate school children. Moreover, teachers are expected not only to understand the subject matter but also to acquire sufficient ability to teach. Four forms of teacher knowledge include general pedagogical knowledge (related to instruction, organization, and management of classes), content knowledge (teacher understanding of the subject matter, such as games and sports), pedagogical content knowledge (PCK or content knowledge; the ability to help students understand the subject matter), and curriculum knowledge (ability to create the appropriate curriculum for courses; Shulman, 1986, 1987). Specifically, PCK denotes a combination of teacher knowledge, which includes instructional strategies to teach particular topics, the ability to create the appropriate curriculum in a particular field, understanding of student needs, and understanding of the meaning of teaching (Grossman, 1990, p. 25).

Studies of PCK in PE focus on several aspects. Many examine the relationship between teacher PCK and students learning performance (Creasy et al., 2012; Iserbyt et al., 2017; Kim et al., 2018). Alternatively, other studies target the development of PCK of preservice teachers (Jenkins & Veal, 2002) and assessment of the PCK of PE teacher (Araújo et al., 2017). The PETE curriculum is an essential part of a PETE program and needs continual assessment, review, and refinement. As such, the future of PETE programs is mainly dependent on the quality of the curriculum (Bahneman, 1996). In this regard, the framework of PETE programs needs to include three areas, namely, foundational subdisciplinary, curriculum and instruction, and PCK coursework and field placement experiences (Wiegand et al., 2004). PETE programs need to feature sufficient PCK courses, including those for teaching preservice teachers on the pedagogy of subject matters related to PE, which should be organized into three age-related sections, namely, elementary school, middle school, and high school.

However, despite the importance of PCK to PETE programs, research on the number of PCK courses offered by programs or the

use of PCK as the theoretical framework for analysis of the courses is limited. Traditional studies on course or curriculum analysis mainly emphasize structure and pedagogy issues, whereas others cite PCK or highlight the importance of PCK (Andriamampianina & Moussa, 2005). However, as a course analysis standard, PCK needs more sufficient scholarly attention. Through the lens of PCK, researchers or administrators can associate curriculum analysis with the teaching quality of preservice teachers, which PCK best represents. Thus, the objective of this study is to develop a PCK-based process for evaluating courses in PETE programs. Specifically, the study formulates a process for answering several questions:

- What should be the content of the PCK-based classification process?
- How should the PCK-based classification process be used?
- Which research areas should the PCK-based classification process be implemented?

The first section of this article pertains to the formulation of the PCK-based classification process, whereas the second pertains to the application of the process, using a PETE program as an example. This study is meaningful because scholars and administrators can use the process to estimate the occupancy of PCK courses in a PETE curriculum. Moreover, the outcomes can be used for comparison among PETE curricula and may be a valuable factor in evaluation of PETE curricula.

Method

This study aimed to formulate a PCK-based classification process for PETE curricula. One study on grounded theory used qualitative data to develop a theory, where the theory could be substantive, that was specific for a situation (Merriam & Tisdell, 2016). This study used interview data to build a practical classification process, whereas the data analysis process was inductive. In the second part, this study used a deductive process to assess a PETE curriculum and explain the use of the process, which was described in the first section.

Participants

The study purposefully selected faculty members who could provide insight into how the construct of PCK would traditionally be

embedded in a PETE curriculum. This study recruited five faculty members from the Department of Physical Education and Health Education of a college in the Northeastern United States. All faculty were experts on PCK and PETE who completed terminal degrees in education, teacher education, curriculum studies, or PE.

Data Collection

Interview

Data were collected through interviews with the five faculty members, who were provided with the necessary information about the study, semistructured interview guidelines, and institutional review board permits via email as an invitation to participate. All professors agreed to participate. Prior to the interviews, the participants signed informed consent forms and acknowledged the researchers would protect their rights and personal information. With their permission, the interviews were audiotaped with two smartphones in the case that one of the equipment failed. Interview guidelines were created on the basis of the research questions. An example interview questions was "What do you expect the students to do in a PCK course?" This question aimed to obtain information about the critical elements of a PCK course. Furthermore, all questions in the guideline were neutral and did not include any leading question.

PETE Curriculum

The study assessed the curriculum of a PETE program in the Northeastern United States to elucidate the use of the process. The syllabi of the courses were obtained from the department chair and instructors.

Data Analysis

The researchers transcribed all recorded interview data. Data analysis enabled the emergence of codes and themes from the research questions. This constant comparative process was intended to reduce data and construct themes that answered the research questions and provided cautious interpretations that represented the beliefs and experiences of the participants.

The PCK-based classification process was used in analysis of the sample curriculum. This elucidated the manipulation method. The curriculum was analyzed in three steps. First, all courses were

screened, and this allowed for selection of potential PCK courses requiring classification. The screening process was mainly dependent on course descriptions given that the class included any content knowledge related to PE. However, not all potential PCK courses were classified through this process. Thus, the full syllabi was read and courses that only included content knowledge and no pedagogical knowledge were excluded. The second step included analysis of PCK courses, in which each course was classified as a specific level out of five levels. Finally, the proportion of PCK courses in the PETE curriculum was calculated via level and credit hours.

Trustworthiness

The transcripts were double-checked with the participants for accuracy. We analyzed the data separately the first time then combined the results. Meanwhile, peer debriefing was used for avoidance of bias. We also requested the experts to review the data and results to ensure the efficiency of the classification process.

Results

Part I

Part I of the study aimed to analyze the interview data. This analysis answered questions about course screening, syllabus evaluation, critical elements of a PCK course, and PCK evaluation.

Course Screening

Physical Education Content Knowledge. The course screening required content or subject matter related to PE be included in the course due to the nature of PCK. The precondition of a potential PCK course was delivery of content knowledge for PE. Thus, the PCK-based classification process appropriately evaluated only potential PCK courses. Therefore, the first task was identifying the components of content knowledge for PE.

All participants made comments about content knowledge of PE including knowledge related to fundamental movements, sports, and physical fitness. Example comments included "Everything that is . . . related to movement, all things related to fitness, all things related to sports" and "It's like the things that you want students to learn to take away with them after stay 12 years of experience in PE."

They mentioned skill learning as one objective of PE. They also cited other types of knowledge, tactics, strategies, rules, and games, among other things related to fundamental movement, sports, and physical fitness, for inclusion in the content knowledge of PE. Example comments included "It could be skill cues. It could be the rules of sports or the objectives of sport" and "So, I mean that could be the rules of specific sports, the strategies of sports . . . it could be like other movement related."

The participant-provided standards were similar to the National Standards for K–12 PE of the Society of Health and Physical Educators (SHAPE America, 2014), but the SHAPE America standards included social skills and personal values as the objectives for student learning in PE. Thus, for the purposes of this study, content knowledge for PE needed to consist of all knowledge related to fundamental movements, sports, physical fitness, social interaction skills, and personal values. In the PETE curriculum, any course intending to prepare preservice PE teachers to teach at least one piece of content knowledge of PE was considered a potential PCK delivery course.

Pedagogical Content Knowledge for Physical Education. The next step was identifying the appropriate courses for assessment of the potential PCK courses selected on the basis of content knowledge for PE. This study used JeongAe's (2011) six components of PCK in PE, namely, knowledge of PE as a subject, physical curriculum, subject teaching methods, students' learning of physical activity, PE assessments, and PE instructional environment. This was an advanced step for screening potential PCK courses.

Methods Comparison. This study filtered courses for content knowledge for PE with the assumptions that these courses possibly included all potential courses delivering PCK and that other courses were inefficient in developing the PCK of students. Alternatively, the study assumed the PCK component method would filter out skill classes if the main objective of the courses for the preservice teachers was to learn instead of teach movement skills. Thus, this study used both standards, namely, content knowledge of PE and the PCK components of PE, for more effective course screening.

Evaluation Evidence

All interviewees reported the syllabus was the most important evidence for the course classification, with a syllabus providing useful information, including course description, objectives of the course, class schedule, assignments, and course expectations. Example comments included "I would come back to the objectives on the syllabus. What are the intended outcomes for the course? That should be the tip for what the focus is," "lesson plans of the faculty members, the syllabus, the course objectives would be, I think, the biggest indicator. And then what assessments the faculty member used to evaluate the student throughout the course. I think those would all be good pieces of evidence," and "I mean probably the syllabus; you could get most [evidence] from if you were trying to look at."

Alternatively, although a few participants cited the essentialness and usefulness of a syllabus, they also said it was insufficient. They addressed this concern by suggesting alternatives for gathering evidence for course classification such as observations and interviews with students and teachers. Example comments included "So, a syllabus, observations, interview with a teacher, interview with . . . a random group of students . . . should show a decent amount of [evidence]" and "Maybe do four observations over the course of the semester. Interview the teachers, interview the students, and start seeing, like, across all this collective, like, living data.

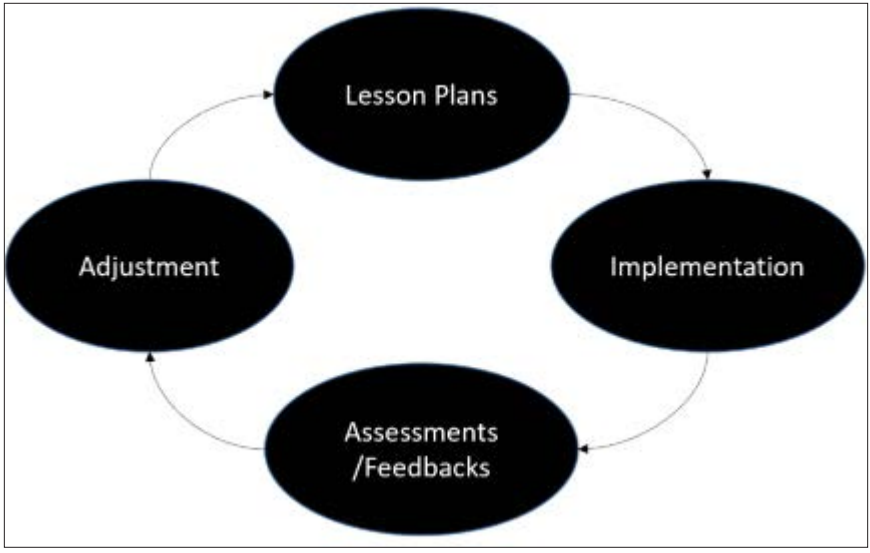
As such, the syllabus was the most important and necessary evidence for the classification process. Interviews and observations were extra resources for the evidence, but not be indispensable, because these methods cost more time and manpower.

Critical Elements of a PCK Course

The participants identified the four critical elements of a PCK course, namely, writing of lesson plans, implementing the plans, assessing learners or receiving feedback from instructors, and applying experiences to new lesson plans. An example comment was "Are they lesson planning? Are they implementing a lesson plan? Are they assessing within the implementation of the lesson plan? And how are they using data from assessing?"

Figure 1 illustrates a cycle, which explains the interconnections among these elements. The adjustments are derived from the

Figure 1
The Cycle of PCK Critical Elements



assessment and feedback steps and are accumulated throughout the process. Preservice teachers may obtain feedback or rethink their lesson plans during the writing and application. Moreover, adjustments can be derived externally, such as feedback from instructors, and internally, such as the experiences of preservice teachers.

Course Classification

Given its future application, classifying the process according to the opinions of the interviewees and the number of critical elements produced five levels , although a scale that is two degrees higher is appropriate for statistical analysis, even if the variable is noncontinuous, such as the Likert-type scale (Ary e. al., 2010):

- **Level 1.** The course is identified as a PCK course but does not expect students to practice any critical element.
- **Level 2.** The course expects students to implement one critical element.
- **Level 3.** The course expects students to implement two critical elements.
- **Level 4.** The course expects students to implement three critical elements.
- **Level 5.** The course expects students to implement all critical elements and repeat the cycle.

An example comment was "the next level might be that it's focused on general pedagogical knowledge, but . . . the students are going to be expected to . . . use some content knowledge . . . and then the next level might be that they are integrating . . . learning content within the course as well as pedagogical knowledge."

Part II

The second part of the study aimed to elucidate the use of the PCK-based classification process. An undergraduate curriculum was selected from a PETE program of a college located in northeast America. This 4-year program was for teacher licensure and required students complete a minimum of 120 credits. The curriculum included four parts, namely, general education program (40 to 46 credits), major requirements (grouped into 46 credits for core requirements, 5 credits for additional skill requirements, and 16 credits for specific field/practicum requirements), teacher licensure requirements (27 credits), and electives (a minimum of 120 credits). The syllabi were considered the primary evidence for this analysis.

Primary Course Screening

The subjects of the PCK-based process were courses that deliver PCK at certain levels. Courses not intended to teach content knowledge and PCK of PE were excluded from the analysis. The first step of the course screening ruled out the two sections of the curriculum, namely, general education program and electives. Specifically, the general education program aimed to develop the general knowledge of students about the world and society. This PETE program did not feature specific requirements compared with other programs in this department. Thus, courses under the general education program could not be considered a class that developed PCK and this study excluded electives for this reason. The program lacked a list of courses for elective enrollment. Thus, the students could take any class outside of the required courses to meet the requirement of 120 credits. However, the chance for a student to enroll a PCK course as an elective was meager and this could be ignored.

Advance Course Screening

Courses in another two sections, namely, major requirements and teacher licensure requirements, were the primary subjects of

analysis. However, not all courses in the two sections intended to develop the PCK of the students. At this step, all courses unrelated to content knowledge or PCK of PE were screened via the methods for identifying subjects using the PCK-based classification process. Meanwhile, all remaining courses after this screening step were further classified in the next step. Table 1 presents the result of the screening process. The syllabi of the courses were read as evidence for decision making. However, reading all information on the syllabi at this step was not a requirement. The course description and purpose were sufficient for determining whether a class delivered content knowledge or PCK of PE.

Table 1
Course Screen Result

Courses excluded—totally 45.5 credits	
Non–PE content knowledge concentration	**Non–PCK concentration**
Math course; College Writing I & II; Sheltered English Immersion; Foundations of Multicultural Education	Instruction to Dance; Physiology of Exercise & Lab; Kinesiology/ Biomechanics & Lab. Outdoor Pursuits; Psychology of Sport; Sociology and Heritage of Sport and Physical Education; Physical Health and Wellness; Anatomy and Physiology Concepts I & II and the Labs; Physics for Movement Science and the Lab

Course Classification

At this point, all courses retained after the screening process were at least Level 1 PCK courses because the class objectives were to instruct the students how to *teach* the content knowledge of PE. For further classification, the study analyzed the assignments and assessment methods of the classes.

Table 2 displays the result of the PCK course classification. Forty-nine credits of classes in the PETE curriculum were identified as PCK courses, including 7 credits Level 1 courses, 5 credits Level 2 courses, 1 credit Level 3 course, 3.5 credits Level 4 courses, and 32.5 credits Level 5 courses. Courses under Level 1 included goals to deliver a certain level of PCK but did not ask students to engage with

the four critical elements (Figure 1). The eight Level 2 classes had skill requirements and expected students to write lesson or practice plans but did not necessitate their application or implementation of authentic teaching. Only one class was classified as Level 3, because the course only expected students to write lesson plans and conduct peer teaching but excluded other critical elements. Courses under Level 4 shared similar structures, that is, instructors required the students to write plans, students taught appropriate age children through their plans, and instructors reviewed and provided feedback to students. However, teaching was a one-time experience. In other words, students were only allowed to teach again after receiving feedback from instructors. Level 5 courses included all classes for methods and fieldwork. The students were required to complete these courses by applying and repeating the cycle of PCK teaching multiple times.

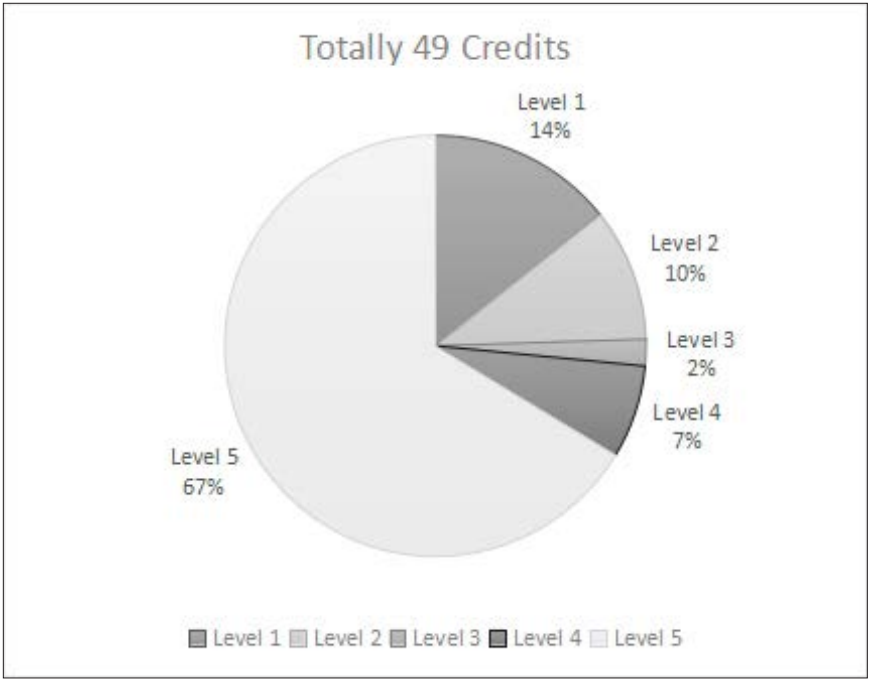
Table 2
PCK Courses Classification Result

Level	Credits	Course
1	7	Lifespan Motor Development; Motor Learning and Skill Acquisition; Outdoor Adventure; Physics for Movement Science Laboratory
2	5	The Skill Requirements Classes: Educational Gymnastics; Target Games; Basketball; Territorial/Invasion Games; Volleyball; Striking Games; Track and Field I; Racket Sports—Net and Wall Games
3	1	Fitness for Life
4	3.5	Skill Themes and Movement Concepts; Assessment in Movement and Sport & Lab
5	32.5	Instructional Strategies in Physical Education & Lab; Adapted Physical Education Programming; Adapted Aquatics; One Coaching and Officiating Course; Elementary Physical Education Methods and Pre-Practicum: Grade K–2 and Grade 3–5; Secondary Physical Education Methods and Pre-Practicum: Grade 6–8 and Grade 9–12; Specific Fieldwork/Practicum Requirements

Statistically, for the graduation requirement of 120 credits of the PETE program, 40.8% of courses aim to develop the PCK of students at different levels. Figure 2 depicts the proportion of the courses that compose each level in the PCK courses.

Figure 2

Distribution of PCK Courses



Discussion

This study aims to develop the classification process to identify and classify PCK courses in PETE curricula. In the United States, the majority of higher education programs are evaluated by government agencies, professional institutions (e.g., authorized universities or institutions), or departments to which the programs belong. The traditional evaluation methods for PETE curricula are typically qualitative (Melnychuk et al., 2011; Tjeerdsma & Metzler, 1998). However, results derived from the traditional evaluation system are considered subjective. Although rubrics and standards to guide evaluation are available, the conclusions are highly dependent on the personal opinions of evaluators. This study does not intend to

question the efficiency and professionalism of the traditional evaluation systems for PETE curricula. Instead, it proposes that adding irrefutable quantitative evidence increases the credibility of the conclusions of the evaluation.

The proposed PCK-based classification process can extract quantitative data from qualitative evidence. This process uses course credits to indicate the statistics of the PCK courses in a PETE curriculum. The logic of the course screening process logic is a course that can be considered a PCK course must meet two requirements. First, the course has to deliver content knowledge of PE. The National Standards of SHAPE America (2014) are widely recognized and used around North America (Walton-Fisette & Sutherland, 2020). In this regard, the process uses national standards to minimize the risk of missing a class related to content knowledge of PE. Second, a course can include PE content knowledge and develop the PCK of students at the same time. As such, the course can be considered a PCK course.

A key finding from the interviews is that most professors use methods classes to explain an ideal PCK course. The primary aim of a method class is to develop the PCK of students and enable them to apply these methods to fieldwork experience. Students can gain from a method course skills to not only teach physical activities and sports but also manage a class, teach different populations, communicate, and use other skills for inducing a teaching environment to teach (McCullick, 2000, p. 34). Thus, a typical method class can be considered the standard of PCK courses.

The statistics for PCK courses in a PETE curriculum lack high reference value if not compared to other curricula or standards. For example, the occupation of PCK courses in a PETE curriculum (in this study, 40%) may be relatively high or low according to standards or other curricula. Furthermore, the PCK-based classification process may be helpful to curricular comparison studies. The majority of studies compare the construction of different curricula (Andriamampianina & Moussa, 2005; Chi et al., 2007). According to the nature of qualitative research, the external validity of the results is highly limited. However, the comparison can be more straightforward and the results can be more transferable if the statistical result obtained through the proposed classification process is used.

Another issue of the traditional studies on curricular comparison is the lack of a lens or theoretical framework (e.g., Zhang & Chang, 2011). In essence, scholars discuss the lacking aspects of the target curriculum compared with the standard curriculum. Nevertheless, the evidence is weak. The PCK-based classification process can set the focus for studies on curricular comparison to render them less divergent and general.

Limitations and Future Study

One limitation of this study is the participants belong to the same PETE program. Thus, their philosophies and knowledge may be similar and be influenced by the program. Experts from other programs may provide different perspectives that can improve the classification process.

Future studies can use the PCK-based classification process to conduct multiple comparison of PETE curricula. Thus, researchers may create a standard for identifying the appropriate proportion of PCK courses in a PETE program or for comparing the results between the curricula, using a recognized excellent curriculum.

References

Andriamampianina, P., & Moussa, A. S. (2005). The training of physical-education teachers in France and China: A comparative analysis of curricula and attitudes. *International Review of Education / Internationale Zeitschrift Für Erziehungswissenschaft / Revue Internationale De L'education*, *51*(1), 23–34. https://doi.org/10.1007/s11159-005-0588-7

Araújo, R., Hastie, P., De Assunção Bessa Pereira, C., & Mesquita, I. (2017). The evolution of student-coach's pedagogical content knowledge in a combined use of sport education and the step-game-approach process. Physical Education and Sport Pedagogy, 22(5), 518–535. https://doi.org/10.1080/17408989.2017.1294668

Ary, D., Jacobs, L. C., Sorensen, C. K., & Walker, D. A. (2010). *Introduction to research in education* (9th ed). Wadsworth.

Bahneman, C.P. (1996). An analysis of the undergraduate physical education teacher certification requirements within institutions which offer a doctoral degree in physical education. *The Physical Educator*, *53*(4), 198–202. https://js.sagamorepub.com/index.php/pe/article/view/2331/0

Chi, S., Yan, R. Y., Yu, W. Y., & Chen, W. T. (2007). A comparative study of the current curriculum design of physical education major between China and the United States—taking Springfield College and shanghai university of sport as examples. *Jiangxi Educational Research*, 2007(11), 101–103. https://www.oriprobe.com/journals/jxjyky/2007_11.html

Creasy, J., Whipp, P., & Jackson, B. (2012). Teachers' pedagogical content knowledge and students' learning outcomes in ball game instruction. *ICHPER-SD Journal of Research*, *7*(1), 3–11.

Grossman, P. (1990). *The making of a teacher: Teacher knowledge and teacher education*. Teachers College Press.

Iserbyt, P., Ward, P., & Li, W. (2017). Effects of improved content knowledge on pedagogical content knowledge and student performance in physical education. *Physical Education and Sport Pedagogy*, *22*(1), 71–88. https://doi.org/10.1080/17408989.2015.1095868

Jenkins, J. M., & Veal, M. L. (2002). Preservice teachers' PCK development during peer coaching. *Journal of Teaching in Physical Education*, *22*(1), 49–68. https://doi.org/10.1123/jtpe.22.1.49

Kim, I., Ward, P., Sinelnikov, O., Ko, B., Iserbyt, P., Li, W., & Curtner-Smith, M. (2018). The influence of content knowledge on pedagogical content knowledge: An evidence-based practice for physical education. *Journal of Teaching in Physical Education*, *37*(2), 133–143. https://doi.org/10.1123/jtpe.2017-0168

McCullick, B. (2000). *Teacher's beliefs about PETE program governance, curriculum, and evaluation* (ED444996). ERIC. https://eric.ed.gov/?id=ED444996

Melnychuk, N., Robinson, D., Lu, C., Chorney, D., & Randall, L. (2011). Physical education teacher education (PETE) in Canada. *Canadian Journal of Education*, *34*(2), 148–168.

Merriam, S., & Tisdell, E. (2016). *Qualitative research: A guide to design and implementation* (4th ed.). John Wiley & Sons.

SHAPE America. (2014). *National Standards & Grade-Level Outcomes for K-12 PE*. Human Kinetics.

Shulman, L. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher*, *15*(2), 4–14. https://doi.org/10.2307/1175860

Shulman, L. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard Educational Review*, *57*(1), 1–22. https://doi.org/10.17763/haer.57.1.j463w79r56455411

Tjeerdsma, B. L., & Metzler, M. W. (1998). PETE program assessment within a development, research, and improvement framework. *Journal of Teaching in Physical Education*, *17*(4), 468–492. https://doi.org/10.1123/jtpe.17.4.468

Walton-Fisette, J. L., & Sutherland, S. (2020). Time to shape up: Developing policies, standards, and practices that are socially just. *Physical Education and Sport Pedagogy*, *25*(3), 274–287. https://doi.org/10.1080/17408989.2020.1741531

Ward, P., & Ayvazo, S. (2016). Pedagogical content knowledge: Conceptions and findings in physical education. *Journal of Teaching in Physical Education*, *35*(3), 194–207. https://doi.org/10.1123/jtpe.2016-0037

Wiegand, R., Bulger, S., & Mohr, D. (2004). Curricular issues in physical education teacher education. *Journal of Physical Education, Recreation, & Dance*, *75*(8), 47–55. https://doi.org/10.1080/07303084.2004.10607289

Zhang, D.-C., & Chang, L.-Y. (2011). Contrastive analysis of construction of sports specialty and curriculum in Chinese, American, British, Australian universities. *Journal-Wuhan Institute of Physical Education*, *45*(8), 75–80.