

A Thorough Review of Pedagogical Content Knowledge (PCK) in TOBACCO Framework

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Pedagogical content knowledge (PCK) has been given a lot of attention in the academic field in recent years, in particular in studies of teacher cognition and teacher knowledge. It was first put forward by Shulman as part of the knowledge base required of teachers for teaching, and has provided a crucial way of thinking for many scholars when conducting deeper study into the relationship between teachers and teaching. Therefore, more empirical studies in various contexts have been encouraged to understand teachers' PCK and to offer suggestions for teacher education. Shulman also argued that PCK is the special mixture of content and pedagogy that represents teachers' personal understanding of the profession, and that teachers' teaching competence enables them to transform content knowledge into specific teaching methods for students from various backgrounds at different levels; however, he did not explain how this transformation happens. Thus, based on this research gap, the current review brought together the following key fields: teacher cognition, teacher knowledge including PCK, and teacher education and development. It argues that teachers' pedagogical knowledge intersects content knowledge from five different perspectives: teachers' views on knowledge base, language, learning, teaching, and reflection (TOBACCO framework) and proffers suggestions for English-language teacher education and development in China.

Keywords: PCK; teachers' views; teacher education & development; TOBACCO framework

Tob Regul Sci.™ 2021;7(5): 989-996

DOI: doi.org/10.18001/TRS.7.5.16

TEACHER KNOWLEDGE

Recently, the literature has argued that teaching is a profession, and this profession produces its own specialized knowledge essential to the practice; meanwhile, the teacher is considered to have a knowledge base that is developed in his or her teaching practice. The skills teachers need to master for teaching are regarded as the teachers' knowledge base, an

important issue in teacher education.¹

It was assumed for a long period of time that the knowledge teachers needed to teach was their subject matter, but what characterizes a qualified teacher in practice is not just subject matter knowledge. This is why there are always complaints from students about the inefficiency of professors in their classroom teaching.² Pedagogical content knowledge was first introduced by Shulman to represent a specific type of teachers' knowledge that distinguishes a teacher of a

A Thorough Review of Pedagogical Content Knowledge (PCK) in TOBACCO Framework subject from an expert on the subject.¹

It is important to be clear that teacher knowledge is a general technical term that covers a great variety of teacher cognition, due to the fact that different components of knowledge are intertwined in teachers' minds. This is relevant to teacher knowledge research where the main attention is on the complexity of cognition, the ways this develops, and the way this interacts with teachers' behaviors in classrooms. Consequently, it makes sense to investigate teachers' knowledge.

Many terms related to teacher knowledge have been applied in journal articles, each with a focus on a different aspect of teachers' knowledge,³ for instance, personal knowledge,⁴ situated knowledge,⁵ professional craft knowledge, action-oriented knowledge, and tacit knowledge. From all these a general picture can be drawn of how teacher knowledge has been studied in the past. Teacher knowledge in this study refers to all knowledge influencing a teacher's teaching practice.

A lot of educational research has been aimed at developing a knowledge base of teaching so as to put forward some suggestions for teacher education and development.⁶ As a well-known theoretical framework, Shulman's comprehensive explanation of the knowledge base for teaching, in which he defined a set of general areas of teacher knowledge for teaching, including pedagogical content knowledge (PCK), has been widely applied in educational projects. PCK has become central to the teacher knowledge base because the research on PCK indicates that it is closely related to a teacher's classroom teaching practice. PCK represents the teachers' professional knowledge and has been frequently referred to in journal articles.⁷

PEDAGOGICAL CONTENT KNOWLEDGE (PCK)

Origin and Definition

One of Shulman's research focuses was the cognition of teachers for professional practice. As mentioned above, pedagogical content knowledge was first put forward by Shulman in

1987 as part of a knowledge base of teachers for teaching. PCK acknowledges that the knowledge that teachers use while teaching in the classroom is different from both content knowledge and pure teaching skills. Pedagogical content knowledge is the special mixture of content and pedagogy that represents teachers' personal understanding of the profession.⁸⁻¹⁰ It also includes an understanding of students' learning difficulties. The PCK of EFL teachers, the focus of this review, can mainly be understood in terms of teachers' knowledge,⁸ language, learning, teaching,⁹ and reflection.

Characteristics

The above interpretation of PCK actually originated from people's re-recognition of classroom teaching. PCK is a kind of tacit or implicit knowledge, which is much more difficult to understand than explicit knowledge. The implicit knowledge that originates from personal practical experience displays features of irrationality (different teachers have different views), non-criticalness (it is lacking in logic), unawareness (it exists only in a teacher's mind), nonverbal description (it is beyond description), and individuality.

PCK Research

PCK has provided a crucial way of thinking for many scholars when they are conducting deeper study into the relationship between teachers and teaching. More empirical studies in various contexts have been encouraged to understand teachers' PCK and to offer suggestions for teacher education. PCK has been interpreted in research about teacher cognition as the thinking process of teachers and the practical characteristics of the teacher knowledge base. This line of research has also yielded the definition and characteristics of excellent teachers' pedagogical content competence.

Research Gaps

Researchers have pointed out challenges confronting PCK. For example, PCK is vague, without a specific and clear definition. Park and Oliver argued, "Although Shulman and his colleagues clearly focus on the topic of teacher

A Thorough Review of Pedagogical Content Knowledge (PCK) in TOBACCO Framework knowledge in ways that have deepened our understanding of the interconnections between content knowledge and pedagogical knowledge, their epistemological framing is difficult to isolate and analyze". Likewise, Fenstermacher had previously complained, "It has been difficult to portray a clear picture not only of how to scaffold PCK development in teachers but also of how to assess it once constructed". Huang and Ma also called for PCK to be explored in much more depth: for example, it is important to know how to define PCK more clearly, what specific criteria for evaluating teachers' PCK could distinguish PCK from other categories of teacher knowledge, and what a unified theoretical framework of PCK could look like. This study aimed to fill these gaps by suggesting such a framework.

THEORETICAL FRAMEWORK: TOBACCO

A teacher integrates several knowledge fields together to perform practical activities without dividing them separately while applying pedagogical content knowledge (PCK); they must be blended together using all the teacher's experience and wisdom. There is no compelling evidence that has proven that PCK is the combination of content knowledge and pedagogical knowledge or demonstrated how they are integrated. These two knowledge fields are not as simple as "one plus one equals two." In fact, they are closely connected in several aspects, namely, teachers' views on knowledge base, language, learning, teaching, and reflection (TOBACCO). Therefore, this study undertook an extensive exploration of teachers' PCK from these five perspectives.

To understand PCK and its development, the integrative model has been suggested as a theoretical framework and has been proven to be applicable by empirical evidence.⁶ The integrative model holds that PCK is the intersection of several categories of teacher knowledge, which may develop independently and then combine in the teaching behaviors of a teacher. Therefore, in the integrative model, PCK looks like a blend of types of teacher

knowledge.

That is to say, PCK is a particular teacher's knowledge and capabilities, integrating content knowledge and pedagogical knowledge. Teacher education ought to pay special attention to the sub-categories of PCK as a way to assist teacher learning. This has significant implications for understanding teachers' PCK in professional practice. To promote PCK development, it is wise to understand the different types of teacher knowledge so as to advance its development as a whole.

This model is good for the analysis of teacher practices for both novice and experienced teachers (Nilsson, 2009). Experienced and novice teachers should be organized to share their own teaching practices in the form of group discussion; in this way, they can learn from others' strong points in order to make up for their own deficiencies because experienced teachers usually have more organized knowledge than new and young teachers. If we can access the experienced teachers' PCK and summarize their professional practices, this would be beneficial for novice teachers; therefore, PCK should be included in teacher training.

In order to have a clearer understanding of the PCK applied in classroom teaching, it is necessary to discover the different kinds of knowledge teachers use in their classroom teaching and the relationships among them in a broader perspective. First of all, the relevant categories associated with PCK should be properly defined. This review argues that the PCK of EFL teachers consists of five integrative parts: teachers' views on knowledge, language, learning, teaching, and reflection. Each of these parts will be described in detail below. Then, the implications of this PCK framework for teacher education, and specifically EFL teacher education in China, will be discussed.

Teachers' Views on Knowledge

Teachers are wise at decision-making in the classroom: for example, they make decisions for many reasons beyond description in accordance with their cognition, understanding, and experience of classroom teaching. However, these decisions do not clearly originate from any particular pedagogical or teaching theory. In fact, this kind of experience is the integration of the knowledge involved in all aspects

A Thorough Review of Pedagogical Content Knowledge (PCK) in TOBACCO Framework

of classroom teaching. Teachers are making decisions according to their experience or wisdom: this decision-making is one important kind of PCK. Since it is an important aspect of pedagogical content knowledge, it definitely involves teachers' views on knowledge.

The correlation between teacher knowledge, classroom teaching, and teacher cognition is related to teachers' different views on knowledge: namely, declarative, procedural, or strategic.

Declarative View

This refers to knowledge that can be expressed using language, such as linguistic cultural knowledge in content knowledge, basic theory knowledge in theory knowledge, and teaching knowledge in practical knowledge. In English language teaching, all these represent knowledge that is related to the structure of the English language (pronunciation, grammar, and vocabulary), its functions, its culture, the essence of English teaching, English teaching principles, and regular approaches and techniques which cannot only be expressed and described with language, but also can be widely applied through textbooks and courses. Thus, declarative knowledge can be accurately, clearly, and easily accepted. It is a kind of common knowledge for communication and shared use.

Procedural View

This refers to knowledge that is used to accomplish things by using rules and concepts. It is comprised of the following elements: communication skills in content knowledge (for example, the skills teachers use when implementing linguistic and pragmatic rules to conduct communication), and design skills and management skills in practical knowledge (for example, the skills that teachers use in a variety of English teaching methods to plan and manage the classroom). The reason why these are regarded as practical teaching skills is that they are different from the key functions of narrative knowledge (such as memorization, understanding, analysis, comparison, criticism,

and consultation). These skills are mainly applied and acquired through actual practice. The entire process involves the knowledge-applier's individual awareness or innovation skills and techniques. Thus, its application and understanding is more personalized compared with narrative knowledge.

Teachers' Views on Language

The PCK used in classroom teaching is closely geared to language, language learning, and language teaching. In terms of language teaching, the contents taught are related to the language itself. According to Vygotsky's theory of language integration, language is a tool for mind-production that is featured in activities such as thinking, social exchanges, and self-adjustments, as well as reflection. Thus, it serves the function of promoting individual development. Typically, in the language education field, language is the tool that people use to express their ideas, accomplish interpersonal and social relationships, and conduct social exchanges.

Language teaching approaches are based on a teacher's views on language and language learning. Therefore, the most important indicator for why teachers select different teaching objectives and content may be their views on language and language learning. Based on that assumption, Richards and Rodgers summarized three views people usually have of language: structural, functional, and interactional.

Structural View

People who hold the structural view consider language to be a system of laws formed by structural components including phonetics, phonology, lexicology, morphology, semantics, syntax, and discourse. People who hold this view believe that once language learners get the hang of the structural rules of a certain language and acquire a certain amount of the vocabulary, they are likely to master this language.

Teachers who hold this view think that the purpose of classroom teaching is to help students understand and memorize words and grammar. Therefore, they arrange drills in their class activities, consolidating knowledge of language forms. They also neglect significance, function, and communicative strategies.

The structural view may make teachers tend to select grammar-translation, the direct teaching method, the audio-lingual method, and total physical response, which are teaching methods placing more emphasis on language structural knowledge.

Functional View

The functional view considers language to be not only a structural system but also a tool for social communication, as language learners generally learn, for example, English, for communicative purposes. Therefore, to master English, learners not only need to learn about the structural rules of the language itself, but they also have to understand the significance and function of the language in the process of social communication: that is to say, in addition to mastering some grammatical rules and a certain amount of vocabulary, language learners also need to learn how to express their ideas so as to achieve the functions of language.

Teachers who hold the functional view will probably pay more attention to students' basic skills of listening, speaking, reading, and writing, and related regular strategies when they have verbal communication. They provide students with as many different communicative opportunities as possible in class, such as pair work and group discussion under designated contexts, ensuring students' forms of verbal communication can be widely adapted. The functional view places more emphasis on students using language to act; therefore, teachers who hold this view may think highly of situational language teaching and communicative language teaching, which place more emphasis on functional language knowledge.

Interactional View

The interactional view emphasizes that language is a communicative tool and, on this basis, it places more emphasis on the actual relationship between language users. It holds that the ultimate goal of language learning is interaction between people through expressing

ideas using language; this can be achieved by building and maintaining interpersonal relationships through social intercourse. For this reason, the specific actions, ways of acting, processes of negotiation, and cultural norms of interactors when they talk should become the focus of language learners. If they only master a language's structural knowledge and vocabulary and understand how to apply rules and vocabulary to achieve regular functions, but do not master the specific behaviors and cultural rules of verbal communication particular to various contexts, it is hard to ensure that they can act appropriately and effectively. For example, learners need to understand the difference between delivering a speech at a conference and having a private conversation.

Teachers who hold the interactional view design more target tasks that are close to real life. This not only promotes students' stronger motivation in learning language, but it is also likely to encourage students to become more responsible for their communicative behavior. The interactional view places emphasis on providing students with more realistic tasks of communicative significance, helping students to learn by trying to use and practice their language in realistic social situations, so that they can acquire the experience of taking part in verbal communications in person and can put into practice different cultural rules.

Teachers' Views on Reflection

Shulman's model emphasizes reflection in a teacher's PCK development. Therefore, in teacher education, the dominant role of teachers' self-reflection on their teaching practice in their PCK development must be taken into consideration. Teachers' reflection on their teaching practice helps them be aware of their own knowledge.

Teachers are actually the most important factor affecting teaching and learning in the foreign language classroom, so teachers must understand the principles of their own development. Teachers' development is an extremely complicated cognition process. The learning theory of constructivism is also the theory fundamental to discussing teacher learning and cognition. Foreign language teachers must construct their understanding of foreign language teaching and learning from their individual teaching

practice and social exchanges. Reflective practice, as it was introduced by Schon, is not just a form of thought but is also integrated into teachers' practical activities. This is an approach that greatly assists teachers' development, as it can contribute to the development of teachers' personal knowledge of teaching.

Teachers have to try new ideas in their classroom teaching practice repeatedly based on their existing knowledge and experience. In addition, they have to confirm the varieties of personal knowledge related to their subject, such as foreign language teaching, and then examine, reflect upon, and revise their incorrect ideas to gradually establish their new understanding of teaching. It is this new understanding originating from practice that helps teachers' personal knowledge to improve and develop constantly. In other words, it is the individual sustainable development obtained from teaching practice, exchanges, and reflection that directs teachers' classroom teaching decisions and students' learning. Three types of teacher reflection have been outlined by scholars as follows.

Experience Thinking

When a teacher is delving into vague and abstract issues, typically his or her consideration of a topic is performed based on specific experiences. This kind of consideration is thus described as experience thinking. A teacher tends to address classroom teaching issues in accordance with the methods, principles, and standards, as well as the regular teaching approaches and skills, that are established by experts, scholars, and supervisors, but often does not deal with them using individual experience or intuition.

If a teacher is constrained by this approach to reflection in the long term, it is possible for him or her blindly to follow established theories and accordingly ignore his or her personal perceptions. In this case, it will be difficult for the teacher to achieve any kind of breakthrough in using more flexible teaching approaches and skills. It is also very difficult for teachers to improve their teaching knowledge if they pay

little attention to teaching objectives or particular teaching contents and teaching patterns, or do not attach any importance to their exchanges with students in the classroom.

Technical View

Teacher's technical reflection refers to the technical analysis of teaching skills. When conducting this kind of reflection, the teacher mainly focuses on relevant elements that directly have an impact on teaching performance. Some research has indicated that technical reflection enables the teacher to apply research results at technical levels and translate education theories into teaching practice. In their consideration of teaching skills in this type of reflection, teachers typically conduct rational analyses and discussions.

Therefore, teachers may utilize their own regular teaching experience as well as theory in this type of reflection. In addition, taking advantage of other people's practical experience is also beneficial. However, simple technical reflection may have teachers falsely believe that they are able to control all technical aspects of the entire teaching process, which can produce some harmful side effects. Firstly, teachers' individual views and the teaching influences caused by the particular teaching environment may be ignored, and secondly, teachers may neglect coordination with their classroom environment, which absolutely would negatively affect the learning and development of both the teacher and students.

Reflection-in-Action

When a teacher makes a decision in the classroom, accurate and complete individual comprehensive teaching knowledge is demonstrated by his or her intuition, including knowledge, experience, emotions, and thoughts. Additionally, the decision probably has an impact on students' learning at multiple levels. The reason why reflection that takes these factors into account is called reflection-in-action is that teachers who practice it are aware of the constraints of technical reflection.

In the changing classroom, they have to define and coordinate a variety of indefinite, unstable, and complicated classroom

A Thorough Review of Pedagogical Content Knowledge (PCK) in TOBACCO Framework

environmental factors, striving to enhance the joint learning and development of both teacher and students. Apart from that, the teacher is required to reference various kinds of relevant knowledge and experience to enhance his or her teaching knowledge constantly. It is the overall focus on the whole teaching process, not mere emphasis on technical issues during the decision-making process, that directly affects students' learning quality and teacher's professional development, including the blending of the teacher's professional attitudes and competence.

To summarize, five categories of teacher knowledge and their relationships to teachers' PCK were clarified above. One important mission for the teacher and the students is to learn, and the most significant factor that may impact their learning is how they view knowledge. Figure 1 helps us put the above views in order so as to form the conceptual basis for this study:

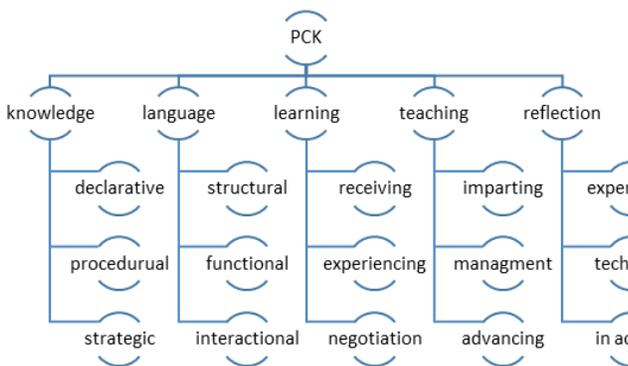


Figure 1

PCK TOBACCO Framework

TEACHER EDUCATION AND DEVELOPMENT

From the foregoing review of the literature related to PCK, it is clearly important to understanding teachers' professional development in terms of their knowledge. Thus, teachers' PCK research in different educational contexts should aim to offer suggestions for teacher education. For example, if the PCK of experienced teachers can be accessed and

documented, it may be helpful for the professional development of novice teachers.

Such teacher education for professional development includes updating teacher knowledge (that is, the combination of all related knowledge that teachers possess and that guides their acts of teaching in particular contexts). Professional development is essential for teachers, especially language teachers, since language, teaching practices, and expectations continue to develop. The complexity of teacher education demands ongoing professional development.

The process of EFL teacher education centered upon learning how to teach is obviously more complicated than the process of teacher education centered upon teaching how to teach, as it is not only related to the objective conditions of EFL teaching and the miscellaneous factors involved in a particular teaching situation, but is also associated with teachers' complex innermost worlds accessed when conducting teaching activities, and the obscure relation between teaching activities and teacher thinking.

In the process of teacher education, emotional factors and individual character should be highly emphasized. In teachers' development, emotion is relevant to cognition but, compared to cognition, more important. The development of teachers is related to their professional affect, teaching passion, love of students, and relationships with other teachers.

A hidden teaching factor is teachers' emotional development as well as their professional affect, both of which are closely attached to their own learning. Teachers who have a deep love for an educational career can basically be regarded as good teachers. Some teachers are reluctant to rethink their teaching practice profoundly, as they are afraid to detect problems in it that they will need to solve through exhaustive learning. From another perspective, it can be verified that truly excellent teachers are willing to learn under any circumstance: this willingness is derived from their individual development.

If teachers cannot develop well in their profession, they will not feel a real sense of accomplishment. For instance, teachers who are busy with repeated classes every day may even feel that their work is worthless. However, if they learn about students'

A Thorough Review of Pedagogical Content Knowledge (PCK) in TOBACCO Framework needs through communication and accordingly address the difficulties students encounter during the classroom teaching activities, step by step they will eventually gain approval and respect from their students. In this process, they can recognize that they have improved and feel a sense of accomplishment enhanced by their constant learning. Hence, they will feel a sense of well-being that will develop their initial and most important motives for striving at being a teacher.

CONCLUSION

The current review is situated in the general context of teacher knowledge research. It began with a discussion of teacher cognition and teacher knowledge in the literature in order to contextualize the current review. Moreover, the key theme of this review is PCK; therefore, to compose a conceptual framework for the future research, it reviewed the literature on PCK to connect English language teaching with teacher education and development. All in all, PCK can be reflected in the TOBACCO framework: a teacher's views on knowledge, which include declarative, procedural, and strategic views; on language, which include structural, functional, and interactional views; on learning, which include receiving, experiencing, and negotiation views; on teaching, which include imparting, management, and advancing views; and on reflection, which include experience thinking, technical, and reflection in action views.

Acknowledgements

This article is funded by higher education science project of Guangdong educational and scientific research for tertiary education in 2021: classroom practicum research on ideological and political development of college English textbooks from the perspective of language planning: a case study of Guangdong University of Finance and Economics.

One important person I want to thank as well is my respected teacher, Professor Han (who has already retired), for her constructive suggestions at the initial stage of composing the theoretical

framework of this review.

Author Declaration

This research is not funded by any organization related to tobacco production.

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