

A Study on the Pedagogical Content Knowledge of Medical English Teachers in Medical Universities in China: The Problems and Strategies

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Abstract

In the global healthcare environment, medical exchanges between China and various countries and regions are increasing, and the demand for medical English professionals is also increasing (Li, 2022). The quality of cultivating medical English professionals cannot be separated from the construction and development of medical English teaching staff. Previous research has found that one of the ways to promote the professional growth of medical English teachers is to improve their pedagogical content knowledge. It is the fusion of subject matter knowledge and pedagogical knowledge, the core of teacher professional knowledge foundation, and the basic prerequisite for promoting teachers' professional growth. Pedagogical content knowledge is a link between theoretical knowledge and classroom practical knowledge. Studying the pedagogical content knowledge of medical English teachers is beneficial in identifying the problems that exist in the professional development process of medical English teachers. Through investigation, this study aimed to understand the pedagogical content knowledge of medical English teachers from the four dimensions: i) knowledge of content and language integration, ii) knowledge of teaching contexts and objectives, iii) knowledge of teachers and students, iv) knowledge of teaching strategies, in order to find out the potential problems, analyze the causes and make out the corresponding strategies. The results showed that the development of pedagogical content knowledge of medical English teachers in medical universities in China is not satisfactory and there still exist many problems in many aspects such as the deviation of knowledge of content and language integration, unfamiliarity of knowledge of teachers and students, lack of knowledge of teaching contexts and objectives, and insufficiency of knowledge of teaching strategies. Based on the development vision of medical English teachers' pedagogical content knowledge, this study analyzed the underlying causes and proposed some strategies. This study intended to

provide further exploratory value for the study of pedagogical content knowledge of medical English teachers, which will contribute to promoting the professional development of medical English teachers. Theoretically, it will enrich the relevant theories of pedagogical content knowledge from a micro level. Practically, it will help medical English teachers to flexibly master and apply pedagogical content knowledge and quickly adapt to the role of teachers to achieve efficient classrooms, thus truly achieve their professional development.

Keywords: Pedagogical Content Knowledge, Medical English Teachers, Medical Universities, Problems And Strategies, Professional Development

Introduction

American scholar Schulman first proposed pedagogical content knowledge (PCK) in 1986. Once this concept was proposed, it immediately attracted widespread attention from scholars in the educational world. From domestic and foreign literature, the research on PCK has mainly gone through three stages. The first stage was the static research on PCK in the 1980s. The second stage was the dynamic research on PCK in the 1990s. The third stage is from the end of the 20th century to the present, where research on PCK has emerged in a disciplinary and diversified manner (Zheng et al., 2013). On the one hand, scholars have introduced some new research methods and perspectives, and on the other hand, they have also introduced PCK into specific disciplines, resulting in a disciplinary orientation of PCK. Throughout the research on PCK both domestically and internationally, there are still shortcomings in the study of PCK in different disciplines, mainly limited to research content and methods. The existing studies mainly focused on studying its connotation, composition, and characteristics, but there is less research on its status quo and development (Zhang, 2020). In addition, most studies focused on PCK research for content teachers. Few studies focused on the PCK development of English teachers, especially medical English teachers. The PCK development of medical English teachers directly affects the quality of higher medical education and the cultivation of high-end medical English professionals and is closely related to the professional development of medical English teachers (Liu & Li, 2022). The PCK development of medical English teachers is the process by which medical English teachers integrate subject matter knowledge with pedagogical knowledge in classroom teaching practice. PCK can effectively guide medical English teachers in teaching and is an important guarantee for achieving efficient classrooms. Many medical English teachers still cannot adapt to the medical English teaching environment in a timely manner when facing real medical English classrooms (Li, 2022). This has brought the confusion and pressure to medical English teachers. The situation motivates this study to contemplate how such important PCK should be mastered and applied by medical English teachers, thereby further solving the confusion in medical English teaching. Therefore, studying the PCK of medical English teachers is beneficial for discovering the problems that exist in their professional development process, identifying the reasons, and proposing corresponding strategies. This is conducive to promoting the development of medical English teachers, thereby improving the quality of higher medical education and professional cultivation in China.

In view of this, this study explored the PCK of medical English teachers in medical universities in China, which has certain practical significance. Due to the relatively rare research on PCK of medical English teachers, this study summarized the connotation and components of PCK for medical English teachers by means of studying the PCK in English subject. Then, this study

described the problems of medical English teachers' PCK and analyzed the causes. Finally, this study proposed some strategies towards the development of medical English teachers' PCK.

Concept of Pedagogical Content Knowledge of English Teachers

Since Schulman (1986) proposed the concept of pedagogical content knowledge, it has attracted widespread attention from scholars both in China and abroad. After the 1980s, scholars in the foreign language field also began to pay attention to PCK, and research on PCK of English teachers emerged like mushrooms after rain.

Foreign scholars

Andrews (2003) believed that PCK of English teachers was a type of knowledge that integrates English curriculum knowledge and English pedagogical knowledge. This knowledge involves teachers' language awareness, language fluency, and the impact of specific situations on students' understanding and mastery of specific themes and content. Evans and Depaepe (2016) believed that PCK of English teachers was the management ability of English teachers for students to learn specific content in a certain context, which integrates knowledge of learning management and curriculum design.

Although foreign researchers have conducted relatively little studies on PCK of English teachers, the related research on the connotation of PCK of English teachers has always been the focus in the domestic academic community.

Chinese Scholars

Han et al (2021) defined PCK of English teachers as the knowledge formed by the integration of English teachers' teaching objectives, curriculum knowledge, student knowledge, pedagogical knowledge, and personal knowledge. Wu (2021) believed that English teachers' PCK is an integrated knowledge generated by integrating English subject matter knowledge and English pedagogical knowledge. After conducting research on the teaching process, Deng (2022) pointed out that the PCK of English teachers was the knowledge that teachers used critical reflection, analogy, metaphor, examples, and other methods to process and transform subject matter knowledge based on the laws of foreign language teaching and students' psychological characteristics during the teaching process in order to present to students.

In summary, different experts and scholars at home and abroad have examined English teachers' PCK from different perspectives, and different scholars have proposed their own definitions of English teachers' PCK, but there is no unified conclusion. However, most scholars have mentioned English subject matter knowledge, English pedagogical knowledge and knowledge related to students to varying degrees (Worden, 2018).

Based on current research on English teachers' PCK, this study defines it as: English teachers, in the context of English teaching, establish reasonable teaching concepts under the guidance of English teaching objectives, take students' learning situations as the starting point, effectively use teaching strategies, enrich and activate classroom teaching content, fully consider and integrate relevant teaching knowledge, and make reasonable teaching decisions, transform English subject matter content knowledge into the knowledge that students can easily understand and accept.

Based on the above definition of PCK of English teachers, this article starts from the nature, characteristics, and professional cultivation goals of medical English. The concept of medical English is as follows: medical English is the language used for medical exchange and communication, which is an organic fusion of medicine and English, including medical professional knowledge, language application knowledge, cross-cultural communicative knowledge, etc., with characteristics of purposefulness, constructiveness, interdisciplinarity, and comprehensiveness.

Components of Pedagogical Content Knowledge of English Teachers

Foreign scholars

Tsui (1999) believed that the knowledge structure of English teachers consisted of four parts: i) subject matter knowledge, ii) general pedagogical knowledge, iii) contextual knowledge, iv) PCK. Andrew (2003) pointed out that PCK of English teachers consisted of six parts: i) teacher language awareness, ii) subject matter knowledge, iii) knowledge related to students, iv) curriculum knowledge, v) teaching context knowledge, vi) teaching knowledge.

Chinese Scholars

Liu (2013) proposed six components of PCK for middle school English teachers: i) teaching objective knowledge, ii) curriculum knowledge, iii) subject matter knowledge, iv) learner knowledge, v) pedagogical knowledge, vi) personal knowledge. Wu and Yu (2017) explored the transformation of English teachers' PCK from six dimensions: i) English teaching purpose knowledge, ii) English subject content knowledge, iii) English strategy knowledge, iv) student knowledge, v) English teaching context knowledge, vi) English evaluation knowledge. Zhao (2017) divided PCK of College English teachers into five categories: i) knowledge of orientation and purposes of teaching, ii) knowledge of instructional strategies, iii) knowledge of assessment, iv) knowledge of students' understanding, v) knowledge of curriculum. Wu et al. (2018) believed that PCK of English teachers included: i) English subject matter knowledge, ii) English skill knowledge, iii) English pedagogical knowledge, iv) educational theory knowledge. Mi (2020) believed that there were five components of PCK for primary school English teachers: i) knowledge about English teaching concepts, ii) knowledge about English teaching content, iii) knowledge about students, iv) knowledge about English teaching strategies, v) knowledge about English learning evaluation. Li et al (2022) believed that the four components that constituted PCK were: i) knowledge of English teaching objectives, ii) curriculum knowledge, iii) knowledge of student understanding, iv) knowledge of teaching strategies.

Based on scholars' analysis of PCK, combined with the characteristics of the English language discipline, and considering the uniqueness and interdisciplinary nature of medical English, this study preliminarily divides medical English teachers' PCK into the following initial five components: i) knowledge of orientation and purposes of teaching, ii) knowledge of instructional strategies, iii) knowledge of assessment, iv) knowledge of students' understanding, v) knowledge of curriculum.

Components of Pedagogical Content Knowledge of Medical English Teachers

Through questionnaire investigation on 201 medical English teachers, this study analyzed the data by using the Statistical Package for Social Science (SPSS) 24.0 software to conduct exploratory factor analysis. It was determined that the components of medical English

teachers' PCK are: i) knowledge of content and language integration, ii) knowledge of teaching contexts and objectives, iii) knowledge of teachers and students, iv) knowledge of teaching strategies.

Knowledge of Content and Language Integration

Knowledge of content and language integration highlights the integration of medicine and English, emphasizing the disciplinary characteristics of medical English. Knowledge of content and language integration is the core of medical English teachers' PCK, and it is the most basic knowledge and important guarantee for medical English teachers to carry out teaching activities. The understanding and mastery of knowledge of content and language integration by medical English teachers affects their own level of PCK development and directly affects the effectiveness of classroom English teaching. Therefore, firmly mastering the knowledge of content and language integration is an important prerequisite for the development of English teacher PCK. Knowledge of content and language integration includes knowledge of English language and culture, language communicative skills, medical professional knowledge, and the ability to apply the acquired language knowledge and skills for communication in the medical field (Hu et al, 2017). This requires medical English teachers to proficiently master the basic English knowledge and skills, medical knowledge, and cross-cultural communicative knowledge, be familiar with the content of medical English textbooks, and timely understand the cutting-edge dynamic knowledge of medical English teaching.

Knowledge of Teachers and Students

Knowledge of teachers and students includes the teacher's knowledge about themselves and knowledge about students' understanding. This knowledge emphasizes teachers' understanding of their own knowledge structure, their sense of teaching effectiveness, and their grasp of students' learning level in teaching materials and assessment methods, highlighting their understanding of themselves and their students. The knowledge that teachers possess about students mainly refers to the fact that teachers should fully understand the characteristics of students' learning, understand the difficulties and possible misconceptions that students may encounter when learning specific topic knowledge, understand the current level of knowledge that students have, and teach on this basis (Mu et al., 2018). In terms of medical English, medical English teachers should fully consider students' prior basic English knowledge and medical professional knowledge level before teaching, and then design teaching. The selected teaching strategies should also fully consider students' interests and motivations in order to stimulate students' internal learning motivation. That is to say, it is necessary to construct their own teaching knowledge closely around the student as the main body in order to promote students' internalization of knowledge.

Knowledge of Teaching Contexts and Objectives

Knowledge of teaching contexts and objectives can be divided into broad and narrow senses. The broad sense refers to the political, economic, cultural, and other social backgrounds in which learners are located. The narrow sense refers to the actual teaching situation in universities, classes, and classrooms, which affects the teaching environment by influencing teachers and students. It mainly examines the teacher's understanding of the class context, learning atmosphere, student situation, as well as their impact on the teacher's teaching objectives, highlighting the interactivity between the teaching context and objectives. English is a language and a tool for achieving interpersonal communication (Pan, 2015). Therefore,

for medical English learners, the teaching context is very important. Knowledge of teaching contexts and objectives refers to medical English teacher's perception and understanding of the classroom environment, which is then preset to guide students to acquire language and culture knowledge, medical professional knowledge, and cross-cultural communicative skills through dialogues in the created teaching context. The creation of teaching contexts should also be based on students' existing language knowledge level, comprehensively analyzing students' basic knowledge of the subject, stimulating students' interest in medical English learning, and enabling them to actively and creatively learn in the created contexts. At the same time, a good teacher-student relationship will also be conducive to creating teaching contexts for medical English and promoting students' learning.

Knowledge of Teaching Strategies

Teaching strategies are the principles that guide teachers to effectively carry out classroom teaching in specific teaching contexts and the teaching behaviors they adopt to achieve expected teaching objectives. It can promote students' understanding of content knowledge through specific methods and means (Cheng, 2018). Therefore, knowledge of teaching strategies is to transform medical knowledge into language knowledge that students can easily understand and absorb through effective classroom teaching design, and then exercise students' medical English communicative skills and cultivate their medical English thinking through the creation of specific situations and conditions. Teaching strategies can be divided into universal strategies and specific strategies. Universal strategies refer to teaching strategies used for various course types, including organizational strategies, incentive strategies, questioning strategies, and evaluative strategies. Specific strategies refer to teaching behaviors used to cultivate listening, speaking, reading, and writing abilities, which can be divided into vocabulary teaching strategies, reading teaching strategies, listening and speaking teaching strategies, writing teaching strategies, and language knowledge and skills teaching strategies.

Problems of Pedagogical Content Knowledge of Medical English Teachers

Deviation of knowledge of content and language integration

Knowledge of content and language integration is a solid foundation for medical English teachers to engage in medical English education. Good knowledge of content and language integration is a manifestation of the professionalism of medical English teachers. The results showed that medical English teachers' mastery of English subject matter knowledge can meet the basic language needs for medical English teaching. This is related to the increase in the entry threshold for medical English teachers. The results also showed that 100% of medical English teachers have a bachelor's degree or above. These teachers have received systematic English professional education in universities, and their English subject matter knowledge is relatively solid. However, there are still some problems for medical English teachers in terms of professional knowledge and cutting-edge knowledge related to medical English teaching. Firstly, the results indicate that the vast majority of medical English teachers mainly focus on consolidating students' basic language knowledge and skills in class, but there is a lack of medical knowledge. They only treat medical knowledge as fragmented knowledge. Secondly, medical English teachers only popularize some medical knowledge from textbooks in the classroom and do not expand at all. They explain less and only focus on topics, which indicating that medical English teachers do not pay enough attention to medical knowledge and have always remained at the superficial level. According to the results, although most

medical English teachers have professional knowledge in the English subject and can handle English teaching, only 10.3% of medical English teachers are willing to actively learn about the cutting-edge dynamic knowledge of medical English teaching. This indicates that there is a certain deviation in the knowledge structure of medical English teachers.

Unfamiliarity of Knowledge of Teachers and Students

Understanding the physical and mental development of students, mastering the learning characteristics and individual qualities of different students, and understanding their own knowledge structure and teaching efficacy are indispensable steps for medical English teachers to master and develop PCK (Wang, 2015). The results indicate that the mastery of knowledge of teachers and students by medical English teachers needs to be improved. Specifically, it is difficult for medical English teachers to effectively predict the knowledge that students may misunderstand, and to promptly correct medical English errors that students are prone to. It is difficult for medical English teachers to analyse the causes of errors based on the actual situation of students and effectively help students understand the knowledge they have learned in the actual teaching process, resulting in poor teaching effectiveness. The results also showed that medical English teachers have a good grasp of students' English learning characteristics and understand the overall knowledge level of the students they teach. However, due to the heavy teaching tasks in daily life, it is difficult to provide personalized guidance for students, and there is a lack of understanding and attention to the individual students' medical English knowledge level. This indicates that medical English teachers have a certain deficiency in knowledge of teachers and students.

Lack of Knowledge of Teaching Contexts and Objectives

There is a relatively significant difference between medical English classroom teaching and classroom teaching in other disciplines. Therefore, medical English teachers need to create appropriate language contexts in medical English classrooms. Creating good language contexts helps to arouse students' interest in learning, stimulate their motivation to learn medical English, and achieve twice the result with half the effort in medical English classroom teaching. The results of the questionnaire showed that medical English teachers have the lowest score in terms of knowledge of teaching contexts and objectives, with only 2.98 points, which is lower than the theoretical median. The results of interview of 4 in-service medical English teachers (Teacher H, W, Y, Z) also showed that medical English teachers only stay in traditional activities such as simple pictures, animations, etc. in creating medical English teaching contexts, and follow each step of the lesson plan step by step, lacking creativity in English contexts. Secondly, due to concerns about teaching progress and other issues, medical English teachers are almost unable to implement full-English teaching in the classroom, which is not conducive to developing students' English thinking. Furthermore, medical English teachers only focus on teaching medical English to students in textbooks, without creating some interesting classroom backgrounds and scenarios to liven up the classroom atmosphere and increase students' learning motivation. They cannot effectively organize students to improve their ability to learn medical English through observation, experience, and other methods. This indicates that medical English teachers are not proficient in knowledge of teaching contexts and objectives, are lack of innovative spirit, and are unable to effectively improve the quality of medical English classroom teaching to meet the teaching objectives, nor can they effectively improve their PCK level.

Insufficiency of Knowledge of Teaching Strategies

In order to achieve the predetermined goals of medical English teaching, medical English teachers must also have flexible and diverse medical English teaching strategies in the face of complex teaching content and process. According to the questionnaire and interview results, medical English teachers are able to actively use knowledge such as motivative strategies to stimulate students' learning interest. However, due to the limited ability of medical English teachers to organize classroom activities, there is a lack of knowledge of organizational strategies. In terms of questioning strategies, although medical English teachers may ask questions in the classroom, they are only limited to discussing problems and do not further guide students to think deeply, which cannot effectively cultivate students' thinking abilities. In terms of evaluative strategies, medical English teachers are currently paying attention to the survival stage, and more often use exam scores as the only indicator of students' learning effectiveness, which is not conducive to cultivating students' key competencies. In terms of specific teaching strategy knowledge, medical English teachers can apply relevant strategy knowledge such as listening, speaking, reading, and writing that they have learned in university. However, the questionnaire results showed that 79.6% of medical English teachers lack sufficient teaching experience. Although they have acquired rich theoretical knowledge in school, in actual teaching, theory and practice cannot be effectively combined. This indicates that knowledge of teaching strategies of medical English teachers is comparatively weak.

Causes for the Problems in Pedagogical Content Knowledge of Medical English Teachers***The lack of targeted post-employment training***

The main body of the training organization and the trainees should strictly follow the targeted and timely nature of the training as important principles for training organization and implementation. From interviews with three in-service medical English teachers, it can be found that nowadays, relevant education departments and universities have carried out some related post-employment training activities to help in-service teachers grow rapidly. However, PCK has a clear subject specialization. PCK between different disciplines has inherent heterogeneity. Subject knowledge, as a fundamental element in the production of PCK, determines that PCK has a deep disciplinary imprint (Shulman, 1986). PCK has strong professional nature, and specialized subject training is essential and accompanied by teaching practice operations in order to have a corresponding impact on the effectiveness of teachers' classroom teaching (Worden, 2018). However, from interviews with three in-service medical English teachers, it can be seen that universities generally do not organize specialized training for medical English subjects, and some are only instructions issued by higher education departments, requiring teachers to observe high-quality course videos. During the interview, it was also found that the teacher's ability to watch high-quality video classes is only a formality, completing tasks assigned by superiors. In the in-depth interview with Teacher Z on whether the university has organized corresponding activities to promote the construction of medical English teacher PCK, he said, *"the university does not hold such teaching activities. It may be due to insufficient teaching staff. Occasionally, we are asked to observe high-quality courses online, but the effect is not very obvious because there are significant differences in the subject nature of our medical English, and many things are copied, resulting in a situation of maladjustment."* It can be seen that although relevant education departments and universities have organized some activities to promote the growth of teachers, in-service training is difficult to provide targeted training based on the specific problems that medical

English teachers face in the actual teaching process. Only integrating teachers' PCK into listening to and observing high-quality courses is not conducive to the development of PCK for in-service medical English teachers.

The Mere Formality of Teaching and Research Activities

In order to promote the professional growth of teachers, the most common is the subject teaching and research activities frequently held by universities. Teaching and research activities are conducted with teachers as the research subject, focusing on various specific educational and teaching problems faced by teachers during the practical teaching process. The purpose is to promote the comprehensive development of students and the professional growth of teachers. However, although medical English teaching and research activities are nominally carried out every week, there is a lack of effective guidance on the content and form of the activities. Relying solely on the gathering and chatting of the teaching and research group, the teaching and research activities have not played a practical role. From interviews with three in-service medical English teachers, we can find that medical English teaching and research activities are mainly focused on dealing with higher-level examinations. Teacher Z said, *"The teaching and research activities organized together by the Academic Affairs Office usually only involve taking a photo, passing a photo, and filling out a form."* The medical English major started relatively late in China, so medical English teachers are very eager to be led by experienced subject experts and grow quickly. Although the university has set up corresponding medical English teaching and research activities, there is a lack of effective supervision and support in the specific implementation process and most of them have become empty words. Therefore, teaching and research activities have not played a practical role and have not provided favorable conditions for the professional development of medical English teachers.

The Need to Improve Teaching Reflection Ability

Schulman (1986) once emphasized, for professionals, the most difficult thing is not to adapt to new theoretical knowledge, but to learn from experience. Academic knowledge is necessary for professional work, but sometimes it is far from enough. Therefore, professionals must cultivate the ability to learn from experience and think about their own practice. From this, it can be found that teachers who only have teaching experience cannot naturally transform and form PCK, they need to have a dialogue with themselves, engage in proactive, persistent, and meticulous thinking. Therefore, teachers must learn to reflect independently and deeply, combining reflection with teaching actions, in order to continuously comprehend and correct themselves, and ultimately form their own PCK. However, due to the late establishment of the Medical English major in China, medical English teachers may have weak reflective awareness and limited reflective abilities due to their short practical teaching time and insufficient teaching experience. According to the interview between the author and Teacher W, Teacher W said, *"During class, I realize which part of my presentation is not good enough, but I won't repeat this knowledge point in class, which would waste time. Then I will leave it for the reflection section of teaching after class, but sometimes I forget it when I am busy preparing for classes or having meetings. However, personally, I think teaching reflection is still very helpful for the construction of PCK for medical English teachers. However, I have too many distractions to put high weight on the teaching reflection."* From the interview with Teacher W, it can be found that in-service medical English teachers are aware of the importance of teaching reflection. However, the excessive amount

of daily teaching tasks and the cumbersome nature of other projects in the school hinder their ability to improve their reflective skills. Meanwhile, in the conversation with Teacher H, he said, *“After each class, I still reflect on the strengths and weaknesses of my class. However, I teach two ordinary classes, and in one class I cannot teach too much knowledge. More importantly, I reflect on how to control the classroom. I think teaching reflection is still helpful for the construction of PCK, at least in terms of teaching strategies. However, I am not very interested in this aspect, so I only occasionally have teaching reflection after class. I also found that I couldn't reflect on anything meaningful, so the reflection gradually weakened.”* From the conversation with Teacher Z, it can be observed that the teacher's reflective ability is a complex thinking activity, not just a simple classroom review. Therefore, in-service medical English teachers should not only enhance their awareness of self-teaching reflection, but also improve their teaching reflection ability.

The Insufficiency of Self-development Ability

For in-service medical English teachers, their students' relatively weak foundation in English and lack of a strong interest in learning English can also affect their expectations of students and teaching enthusiasm. As Teacher Y said, *“In my spare time, I will improve myself with some relevant medical English professional knowledge. I believe that accumulating knowledge in education and teaching is enough in my daily life. The students I teach have a poor foundation and do not have a high interest in learning. I think teaching is an activity for both parties, and relying solely on teachers is not very effective. Currently, there is no specific plan for the development of my own PCK. If the school can provide targeted training, I think it would be better.”* The requirements and expectations of students are important conditions for promoting teacher reflection and development (Wen, 2021). If students' English foundation is weak and their learning enthusiasm is not strong, it will have a negative impact on the development of PCK for medical English teachers, which is not conducive to the improvement of teaching quality for medical English teachers. From the conversation with Teacher Y, it can be observed that medical English teachers have certain awareness of self-development, but their teaching enthusiasm is affected by the low interest in learning among the students they teach. For the factors that constrain the development of PCK among medical English teachers, although external factors cannot be ignored, the internal self-development ability also needs to be emphasized and enhanced. From interviews with three in-service medical English teachers, it was also found that they have insufficient professional knowledge, and their pursuit of career ideals conflicts with reality, making them prone to falling into a state of tension and anxiety. So, they did not have a clear long-term development plan for PCK, and they were all thinking in their spare time or leisure time. Over time, their passion for self-development gradually weakened. Sometimes, there is even a sense of job burnout for them, which is not beneficial for the development and improvement of their PCK.

Some Strategies

Medical English teachers' PCK is built over time through continuous practice and reflection in their teaching practice. Only by enhancing the awareness of self-directed learning, self-reflection and self-growth can medical English teachers promote their own PCK development.

To Enrich Knowledge of Students

The teaching process is a two-way interactive process led by teachers centering students (Tang, 2019). If medical English teachers can fully understand students, they can better teach

according to students' needs in the process of educational practice, making the process of educational practice smooth. They can also better teach students according to their aptitude and improve the teaching quality. Although Chinese learners accept relevant educational psychology, psychology and other courses in school, the findings showed that medical English teachers only have superficial understanding of their students' personality characteristics, learning characteristics and so on. They use the general knowledge they have learned in school or books to treat their students as a whole, which leads to certain misalignment, resulting in the inability to accurately understand students and develop more targeted teaching designs. Therefore, in the training of medical English teachers, it is recommended to invite experts and professors from relevant fields who are very familiar with the physical and mental development status of college students to impart relevant knowledge and experience to medical English teachers, thereby enriching medical English teachers' knowledge about learners' characteristics.

To enrich knowledge of teaching contexts and objectives based on the classroom environment

This study found that among the components of PCK of medical English teachers, the score of knowledge of teaching contexts and objectives is the lowest and the weakest. This is not only related to pre-service training for medical English teachers, but also closely related to in-service training (Zhang, 2019). If the in-service training for medical English teachers makes up for some of the regrets in pre-service education practice, it may be more conducive to the rapid growth and development of their own PCK. Therefore, it is extremely important to fully utilize "research and studies". Medical English teachers can take real issues encountered in educational practice as research objects and jointly carry out teaching and research activities with their college peers. In the analysis of typical cases, what they are facing is a real medical English classroom environment. Under the leadership of excellent experienced teachers, brainstorming and discussing together can better immerse medical English teachers in the teaching context. They face special groups and classroom situations, creating teaching contexts that are suitable for their own class combined with the teaching objectives, rather than blindly believing that students have poor foundations and are not suitable for full English teaching, or simply using ready-made courseware to implement medical English teaching step by step.

To optimize knowledge of teaching strategies for students

Most college students only consider medical English as a subject to learn, rather than as a communicative tool, which deviates from the original intention of language learning. This misconception makes students only focus on finding ways to improve their medical English exam scores, rather than the essence of medical English learning itself (Hui, 2020). The classroom organizational and evaluative strategies of medical English teachers still remain traditional in the past, which has led to medical English gradually becoming a time-consuming and less effective subject. In response to the current level of students and medical English teachers' inability to combine theory with practical teaching, medical English teachers can adopt a "split classroom" approach in terms of organizational strategies, with half of the time for teacher's teaching and half for student's discussing during the classroom period, which can solve the shortcomings of traditional classroom teaching. In terms of questioning strategies, medical English teachers can progress layer by layer based on the actual situation of students. In terms of evaluative strategies, it is recommended that medical English teachers

use multiple evaluative methods, such as combining student evaluation with teacher assessment, mutual evaluation between students, and scale evaluative strategies, and not only consider grades or scores as the only means.

To establish an incentive and evaluative mechanism for teacher training

This study found that the lack of motivation among medical English teachers is also an important factor affecting the quality of training, whether it is teaching and research training or in-service training in universities. In this regard, this study suggests that effective achievements from other brother universities can be referenced. For example, connect training with the professional title, performance, and assessment of medical English teachers to motivate their enthusiasm. However, in the process of drawing on effective achievements, attention should be paid to preventing training from becoming mere formality (Han, 2011). If medical English teachers only participate in the training step by step for the sake of relevant interests, which is not related to the actual purpose of the training, then it is contrary to the training purpose. On the other hand, it is important not to increase the pressure on medical English teachers due to excessive and heavy training, which may lead to job burnout. Furthermore, in response to the traditional check-in mode of training in the past, if a standardized evaluation method or tool system can be established, it will have an icing on the cake effect.

To develop good habits of teaching reflection

Teaching reflection is the process in which individual teachers consciously or unconsciously reflect on sudden educational and teaching issues in the process of education and teaching (Liu & Luo, 2019). This study found that medical English teachers only consider teaching reflection as a teaching task to complete and do not consider it as an indispensable step in daily teaching, resulting in a weak awareness of teaching reflection. Most medical English teachers neglect teaching reflection on the grounds of having more affairs in their work. There are certain flaws in the contents and methods of teaching reflection, which need to be corrected and improved. Otherwise, it will affect the reflective effect of medical English teachers. In view of this, this study puts forward the following two pieces of strategies.

To Expand Reflection Content

The purpose of teaching reflection is to present unexpected situations or problems that teachers encounter in the process of educational practice and provide corresponding solutions (Ye, 2019). However, teaching reflection is not limited to this. On the one hand, teaching reflection is a solution to sudden issues in education and teaching. On the other hand, it is a summarization of teaching experience. Medical English teachers should enrich their reflection content and get rid of the practice of only reflecting on problems. It is not only that teaching reflection is carried out when difficult problems are encountered during the teaching process. It is worthwhile for medical English teachers to learn and reflect throughout the teaching process. Traditional teaching reflection is all about reflecting on one's own teaching. It is recommended that medical English teachers not only reflect on their own teaching design, teaching objects, etc., but also listen to other teachers' lessons, reflect and summarize their teaching concepts, teaching themes, teaching strategies, and the like. If any unreasonable links are found, they should improve them and form a new PCK to promote the development of their own PCK.

To Strengthen Reflection Process

A complete teaching reflection process is divided into pre-class reflection, in-class reflection, and post-class reflection (Ren et al., 2020). However, traditional teaching reflection is usually placed after a class. This study found that medical English teachers do not incorporate reflection throughout a class. Most medical English teachers tend to focus on reflection after a class. Reflection after action, also known as fragmented or incomplete reflection, is not conducive to medical English teachers' understanding of the entire teaching practice process. Reflection before action should pay attention to employing the experience of previous reflection, and make appropriate adjustments to the classroom and students based on the accumulated PCK, which can help improve the teaching quality of the class (Wen, 2021). Reflection in action reflects the teaching wit of teachers, which requires them to have a keen observation ability, be able to promptly recognize problems that arise in the process of teaching practice, make timely corrections to problems in teaching practice, and flexibly use PCK to handle classroom problems (Wang, 2020). However, reflection in action can be challenging. Medical English teachers need to be able to observe students' reactions and changes in the classroom teaching process in a timely manner. If medical English teachers want to improve their reflective ability in action, it is recommended for them to accumulate more relevant educational and teaching experience and diverse teaching scenarios, and timely make a summary. The reflection after action also needs to open up a new perspective, requiring medical English teachers to promptly examine the reflection before and in action and ensure consistency with the reflection after action, which is conducive to promoting the development of medical English teachers' PCK.

To Improve Teachers' Self-Development Ability

This study found that medical English teachers have a solid foundation in English professional knowledge in medical English practical teaching. However, in the actual process of education and teaching, there is little infiltration of knowledge related to cross-cultural communication. On the other hand, medical English teachers usually read fewer books and journals related to medicine and are unable to timely understand the corresponding dynamic changes in medical English teaching, resulting in a relative lack of medical professional knowledge (Li et al, 2018). Both of these issues reflect that medical English teachers can't fully utilize their subjective initiative to enhance their self-development ability and improve their professional level and teaching ability continuously. In short, to become an excellent and qualified medical English teacher, medical English teachers must actively learn in order to comply with the trend of the education era, update educational knowledge in a timely manner, and improve the quality of classroom teaching. The era of information and technology has created opportunities and provided a broader stage for medical English teachers to improve themselves. Medical English teachers can watch videos by excellent teachers, read professional books, discuss educational hot topics in educational forums, and also raise their own teaching confusion on the internet to enrich their PCK. Only through unremitting efforts in learning can they ensure that their knowledge system is quickly established and achieve the goal of professional self-growth. Medical English teachers should tailor their teaching to students' learning characteristics and create suitable medical English learning contexts for them. All of these require medical English teachers to actively learn and apply their accumulated experience to medical English teaching practice to promote the generation and development of their PCK.

Conclusion

In conclusion, this study divided the components of PCK of medical English teachers into the follow five components: i) knowledge of content and language integration, ii) knowledge of teaching contexts and objectives, iii) knowledge of teachers and students, iv) knowledge of teaching strategies. Through questionnaire and interview, this study intended to find out the problems of PCK of medical English teachers from the perspective of each component of PCK of medical English teachers. The problems of PCK of medical English teachers are as follows: i) deviation of knowledge of content and language integration, ii) unfamiliarity of knowledge of teachers and students, iii) lack of knowledge of teaching contexts and objectives, iv) insufficiency of knowledge of teaching strategies. On the basis of understanding the problems, this study respectively analyzed the causes and proposed some strategies from training, teacher reflection, teacher evaluation, etc. This study could provide reference and suggest a valuable perspective for the study of professional development of medical English teachers. This study can provide theoretical references for the professional development of medical English teachers and empirical references for teacher educators and policy makers to better support and promote the professional development of medical English teachers.

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