



# Research on the Relationship Between Teachers' Professional Competence and Students' Academic Achievements

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**Abstract.** In recent years, with the development of the world economy and the need for urbanization in some areas, society's need for educational development has gradually increased, and the demand for different talents has become increasingly prominent. The professional competence of teachers, as pioneers of talent development, is inextricably linked to the academic achievement of students and the educational level of society. Against this background, the paper analyzes the impact of teachers' professional competence on students' academic achievement from both a broad and narrow perspective. Ultimately, teacher professional competence is found to be positively related to student academic achievement. Also, in analyzing teacher professional competence in a narrow sense, the paper finds that there may be a special link between teachers' mastery of knowledge about the subject they teach, general education. The link is that content knowledge(CK) and general pedagogical knowledge (GPK) are basic elements that make up the professional competence of teachers, and the strengthening of mastery can contribute to the strengthening of PCK mastery. Based on the results of the research, the recommendations given in this paper include, but are not limited to, changing the content of the development and assessment of CK competence; refining the concept of GPK and the method of developing teachers' mastery of GPK; enriching the training program for teachers' PCK competence to achieve all-roundness, diversification, and individualization, and carrying out training programs and formulating the corresponding policies to achieve this goal.

**Keywords:** Teacher Professional Competence, Content Knowledge, Pedagogical Content Knowledge, General Pedagogical Knowledge.

## 1 Introduction

With education continuously evolving and new educational needs emerging, the overall capability of teachers is required to keep pace with the current situation in the twenty-first century. Challenges are emerging, such as adapting to technology, and providing a suitable learning environment for a diverse student population. As Caena

and several researchers argue, teachers' professional competencies must be improved to create chances for cultivating students in today's context <sup>[1]</sup>.

In the future, students need personalized teaching methods, given that heterogeneity is paid more and more attention and homogeneity is unacceptable. Meanwhile, several researches have shown that the overall quality of teachers in many areas of the world is low, although the rate between qualified teachers and unqualified teachers is not a serious problem <sup>[2]</sup>. Educational equality has not been achieved yet. These phenomena all imply a necessity for the improvement of teachers' professional competence. Only when students' personal needs are met can their academic achievements live up to both their and teachers' expectations. The paper mainly focuses on the analysis of key components of teachers' professional competence and exploring ways to improve teachers' professional competence.

The research firstly concentrates on identifying components of teachers' professional competence, which are going to be analyzed, then tries to figure out the impacts they have on students, not only their academic achievements but also some other possible elements concerning academic achievements.

The research is designed to develop ways educators can apply during the working process to improve their professional competence according to the relationships found in the research.

## **2 Definition of Teachers' Professional Competence**

Teacher professional competence is a rather vague concept. To dip into it, the paper supposes that definition should be settled in the first place. According to Shulman, teachers' professional competence can be divided into seven types, including general pedagogical knowledge, content knowledge, and so on <sup>[3]</sup>. The definition of teachers' professional competence remains unclear. Taking into account the characteristics and circumstances of the development of the times, this paper interprets the meaning of teachers' professional competence at both broad and narrow levels.

### **2.1 Teacher Professional Competence in a Broad Sense**

The paper suggests that a general analysis can be made from the literal meaning of the expression.

Several researchers have given their definitions through their study results. For example, Sarva points out that teacher professional competence includes different elements necessary for the efficient management of the education process <sup>[4]</sup>. It is seen as a concept including knowledge, capabilities, and traditional beliefs. Meanwhile, Olina suggests that competence firstly consists of not only professional skills but also matters <sup>[5]</sup>.

In this way, the paper suggests that the definition of teachers' professional competence in a broad sense may consist of two different concepts. One is related to the subject they teach, and another is the characteristics and skills they own.

## 2.2 Teacher Professional Competence in a Narrow Sense

Content knowledge might represent the concept that they teach. The latter two may stand for the characteristics and abilities they own.

Specific knowledge for teaching is a theory that describes the knowledge that teachers need to teach a particular subject matter. The requirements for mastery of this factor have evolved over the past century. In the early part of the 20th century, the focus of policy and assessment was on ensuring that teachers, as educated professionals, had a good command of general knowledge. From the 1980s onwards, the main focus has been on teachers knowing the subjects expected to teach <sup>[6]</sup>.

Pedagogical Content Knowledge, as Gitomer further points out, is mainly about how to teach the knowledge of a particular program in a particular way to students. It focuses exclusively on the teaching and learning of a subject or specific themes, even concerning classroom organization.

General pedagogical knowledge refers to some general education skills, such as the ability to communicate with diverse students, educational psychology, transpersonal thinking, the ability to analyze teaching and learning outcomes, etc. And Leijen suggests the definition covers several domains: student-relevant, instructional-relevant, and contextual features. However, in the empirical study, the scope of GPK was narrower, emphasizing the student-related and teaching-related dimensions <sup>[7]</sup>.

Above all, teachers' professional competence may be defined in two senses. In a broad sense, it might refer to their mastery of the content of the books they teach and their ability to solve the problems that arise during the teaching process. In a narrow sense meanwhile, the former concept is extended to content knowledge (CK), and the latter is subdivided into pedagogical content knowledge (PCK) and general pedagogical knowledge (GPK). It turns out that teacher professional competence is the synthesis of mastery of these three elements.

## 3 Impact of Teachers' Professional Competence

Education is indispensable to the individual, the community, and the State, and it is a fundamental right of citizenship. The professional competence of teachers is an important indicator of the improvement of the level of education, which is of great importance to society and the individual <sup>[8]</sup>. The professional competence of teachers is a direct correlate of the quality of education, and their impact on the academic achievement of students will have an indirect effect on the State and society.

### 3.1 Impact of Content Knowledge Mastery on Students' Academic Achievements

CK serves as an expression of the teacher's professional competence, as mentioned above, referring to the matters that are taught and learned in courses in classrooms <sup>[9]</sup>. Many researchers have come to a similar conclusion through different research methods, which is that teachers' mastery of subject content holds a significant relation with students' academic achievement. Recent studies have proved that.

CK is the most fundamental basis for teachers' pedagogical activities. Teachers need to know not only the "facts" of their subject but also the basic principles and structures of the subject, including processive components. A student's mastery of content knowledge is something that can be most visually demonstrated on a test. Test scores, which represent a student's mastery of content knowledge, make up a large portion of the components of student academic achievement. Students' access to content knowledge is, for the most part, only through the teacher's teaching. Student test scores are an important indication of a teacher's mastery of content knowledge. The worse the teacher's mastery is, the weaker the student's mastery of it is likely to be, which may ultimately lead to low academic achievement.

However, it is important to note that the relationship between the above is not a certain one. Teachers with good content knowledge are also likely to teach students with poor academic achievement. This may involve personal reasons on the part of the student.

### **3.2 Impact of Pedagogical Content Knowledge Mastery on Students' Academic Achievements**

It was mentioned above that teachers' mastery of content knowledge is largely a fundamental factor in students' academic achievement. PCK, as a relatively more structured and abstract concept, may be one of the reasons that finally leads to poor academic achievement for students, who are taught by teachers having a good command of CK.

Essentially, PCK is a kind of knowledge that enables teachers to act necessarily to teach a particular subject. It is not overly practiced about the specific subject content. It refers mainly to procedural measures, such as teaching programs, classroom management, differentiated instructions, and so on. It serves as another important tool for teachers to deliver instruction and also has a huge impact on student academic outcomes. PCK is a gauge for teachers to gain the yardstick about how to reach a balance between teaching approach and content, as a result, can bring out the best in the students<sup>[10]</sup>.

It has been verified by Gess-Newsome that PCK is one of the elements that influence students' learning and achievement. Filgona points out that good teachers should possess abundant pedagogical content knowledge. By being pedagogically knowledgeable, Timothy observed that teachers who can be friends with students and carry out a terrific educational atmosphere will do good for students<sup>[10]</sup>.

An implication springs to mind that PCK is concerned with how CK can be taught to students more effectively. This partly explains why teachers with a good content knowledge base sometimes teach students with poor academic achievement. If a teacher with a good stock of content knowledge doesn't know how to get students to digest that knowledge effectively, which represents their mastery of PCK, it shouldn't be surprising that students end up getting bad grades.

To further refine the study of the impact of PCK, the paper extends the abstract concept of PCK.

According to previous studies, it has been pointed out that PCK's impact on student's academic achievement needs to be mediated by several intermediary factors, such as teachers' motivation, belief, self-efficacy, and so on.

As it is testified by Tatsushi, teachers who have less motivation were less likely to spend time dipping into teaching methods expected useful, which probably led to worse mastery of knowledge of instruction. Teachers' belief is verified to have a strong relationship with the knowledge of learners <sup>[11]</sup>. Lack of both of these may result in content knowledge not being taught well to students.

Teacher self-efficacy is thought to be another possible mediating factor because Yang found out that teachers with high self-efficacy may coin an effective study atmosphere by setting quizzes to make students think hard, managing behaviors that are not allowed in class flexibly, and making knowledge more appealing. The paper also suggests that high self-efficacy among teachers has a positive effect on two-way interaction and improved capability to achieve wanted pedagogical results <sup>[12]</sup>. If teachers have good self-efficacy, then the classroom can function well and content knowledge can be more efficiently received by students. Better still, students may develop a strong interest in the subject, perhaps leading to greater academic achievement.

Just as Widodo argued, although teachers' knowledge may not be directly related to student learning, an increase in teachers' PCK may help teachers develop a deeper understanding of teaching and thus facilitate student learning <sup>[13]</sup>.

To sum up, there should be a passing grade for teachers' mastery of PCK. If the level of mastery is above the passing line, or even beyond it to a higher level, then students' academic achievement will be correspondingly better. The requirements for teacher mastery of PCK are not as stringent as those for CK mastery, but the impact of PCK on academic outcomes is equally important.

### **3.3 Impact of General Pedagogical Knowledge Mastery on Students' Academic Achievements**

Unlike the previous two concepts, relatively little research has been done on GPK <sup>[14]</sup>. The paper further explores the impact of GPK.

Referring to Rufino, GPK includes knowledge concerning what teachers will carry out in class; students' personalized characteristics, and the assessment system <sup>[15]</sup>.

Based on the above analyses, this paper argues that PCK and GPK have some similarities. But one thing that needs to be made clear here is that PCK and GPK are not the same thing. PCK is a pedagogical approach for a particular course and does not necessarily have compatibility. GPK, on the other hand, is much broader and can be applied to different courses. The paper argues that PCK is the result of GPK segmentation based on the degree of content knowledge mastery.

To enhance the professional competence of teachers, it is necessary to find appropriate and efficient methods.

After the analyses of CK, PCK, and GPK, this paper argues that these three, as important components of teachers' professional competence, have a special relationship within them and influence each other to change teachers' professional competence,

which ultimately affects students' academic achievement. Yang suggests that the combination of PCK and CK and their mutual improvement can lead to a significant increase in teachers' professional competence [12]. His idea might demonstrate the viability of the ideas in the paper.

CK is quite different from the latter two and represents the most basic professional competence of a teacher. Without good CK, teachers cannot teach their students. PCK is a specific extension of GPK in a particular discipline. With good CK and GPK, teachers can synthesize knowledge related to both to enhance their mastery of PCK and further promote students' academic achievement.

## **4 Problems with Teachers' Professional Competence and Recommendations**

As mentioned at the very beginning of the article, changes in the contemporary educational environment and higher demands for educational productivity have created some challenges for teachers' professional competence. The development of teacher professional competence is critical for the maintenance of education quality. This, coupled with the fact that previous research on vocational teachers has focused only on which professional competencies vocational teachers possess or should demonstrate, with little attention paid to the definition of competencies, has left gaps related to the perception and construction of the concept of professional competence. This paper broadly identifies the scope covered by the professional competence of teachers, based on which the professional competence of teachers can be targeted.

### **4.1 W Problems with Teachers' Professional Competence**

Problems exist with teacher professional competence, not just in China but in all parts of the world. Through his research, Sha found out that teaching design, reflection and development, multicultural education, and information technology application skills of rural primary school teachers in District Z in China are at a poor level. These issues center on the mastery of PCK and GPK [16]. This can be used as a proxy for the issue of professional competence of today's teachers. CK, the most basic professional competency for teachers, is not lacking in urban and some rural areas. However, as society develops, the need for heterogeneous education for students gradually increases. Advances in technology have also set higher standards for teachers to change their teaching methods and improve their teaching adaptability.

However, the issue of teachers' mastery of CK should not be overlooked. Teachers' knowledge of CK is also unsatisfactory, especially in disadvantaged areas. However, due to lacking in educational resources, educators are unable to improve their mastery of CK. It is even more difficult to improve PCK and GPK.

To sum up, the paper suggests that problems with teachers' professional competence may mainly center on the latter two factors mentioned above--PCK and GPK. In some specific areas, teachers' mastery of CK needs to be improved accordingly. As

time goes on, teachers' knowledge of CK should not be superficial but should be deepened to include more content knowledge than what is written in the text.

## 4.2 Recommendations

Based on the problems summarized above, this paper gives some recommendations accordingly. The recommendations can be divided into three aspects.

Firstly, the easiest aspect to start with is to make changes to the assessment content to address teachers' mastery of content knowledge. Teachers need to continually improve their mastery and depth of understanding of CK in response to changes in CK. The process of preparing pre-service teachers should focus on strengthening their mastery of content knowledge. The content of teacher qualification tests should also be adapted to develop a community of teachers with a deep understanding of content knowledge.

The second point is for GPK enhancement. As a more general concept that may be neglected, this aspect of education should be popularized and reinforced as appropriate in the teacher training process. For example, teachers should be instructed and assessed on classroom assessment, educational psychology, and so on. More research should be carried out to further refine the GPK and point the way towards enhancing teachers' professional competence.

Thirdly, for the improvement of PCK, training programs can be launched to promote teachers' acquisition of it. As Ma has pointed out, educational work is highly complex and involves the all-round development of students' thoughts, feelings, perceptions, and behaviors. Thus, the assessment and evaluation of teachers' work should also be multi-dimensional and three-dimensional, and the assessment of teachers' work should therefore be multi-dimensional, reflecting differences and hierarchies. This step should be an extension of the GPK and needs to be closely aligned with the content knowledge of each discipline <sup>[17]</sup>. For example, as it turns out that lack of concern about teaching guidance might affect the attainment of instructional knowledge, giving teachers chances to consider methods of explanation is a way to some extent <sup>[10]</sup>. The paper suggests policy policymakers also take some intermediate mediums, such as emotion management skills, and teaching burnout into account. The government should realize the essence of enhancing and testing teachers' skills in improving their self-efficacy and emotion management. Programs should be designed to enhance teachers' mental well-being and effectiveness. Also, to preserve teachers' mental well-being, adaptations should be established <sup>[12]</sup>.

Because of the special relationship between CK, PCK, and GPK, attention ought to be paid to rearrange the priority of improving the professional competence of teachers, to distinguish between the more important and the less important. The paper argues that teachers' CK and GPK should be consolidated first, before combining the two to strengthen their mastery of PCK.

## 5 Conclusion

Starting from the concept of teacher professional competence, this paper subsumes the impact of teacher professional competence on positive pedagogical outcomes in terms of both the literal meaning of the concept itself and the factors that make up the concept. The connection between the concepts of CK, PCK, and GPK is found, and based on this finding targeted recommendations are made for improving teacher professional competence, such as improvement of the concept of GPK and the methodology for developing teachers' mastery of GPK; enrichment of the PCK teaching program to achieve the all-round, diversified and personalized development of teachers' PCK competence, etc.

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