

Overview of TPACK theory under the perspective of Chinese education

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Abstract: Under the background of the new curriculum reform, Chinese education under the influence of the fundamental task of moral education is the fundamental guidance to explore the future of Chinese education. How to use the limited teaching resources to cultivate students with the core quality of Chinese discipline, which is a big problem on the way to explore. Especially in the process of rapid development of information technology, the rational use of technical resources and the integration of educators' own subject application knowledge are one of the key abilities affecting Chinese teaching. Technological Pedagogical Content Knowledge (TPACK) effectively delineates the knowledge framework of teachers, and the knowledge model constructed by TPACK can well reflect the ability of a teacher and the future trend of complementary development of teachers' abilities.

1. Introduction

With the rapid development of information technology, the field of education has ushered in unprecedented changes. As an important part of basic education, Chinese education is also faced with the opportunities and challenges brought by informatization and digitalization. In this context, how to effectively integrate technology and Chinese teaching and improve the quality of Chinese education has become a problem that every Chinese educator needs to think about deeply.

TPACK (subject teaching knowledge of integrated technology) theory, as a framework describing the interweaving and integration of teachers in technology, education and subject content knowledge, provides a strong theoretical support for this reform in the field of Chinese education. Since its introduction by Mishra and Koehler in 2006, TPACK theory has gradually become an important direction for research in the field of educational technology and has been widely applied in educational practice. In the field of Chinese education, TPACK theory also shows its unique value. It emphasizes the application of technology in teaching, and encourages teachers to use technical tools and resources to innovate teaching methods and improve the teaching effect.

However, although TPACK theory has wide application prospects in the field of Chinese education, how to effectively use TPACK theory to guide Chinese teaching and to realize the deep integration of technology and Chinese teaching is still an urgent problem to be solved. Therefore, this paper aims to summarize the TPACK theory from the perspective of Chinese education, comb the research status of TPACK theory in the field of Chinese education, analyze the problems and

challenges in its practical application, in order to provide effective guidance and support for Chinese teachers, and promote the informatization and digital process of Chinese education.

Firstly, this paper will introduce the basic concepts, components and theoretical basis of TPACK theory, and clarify the scope and focus of its application in Chinese education. Next, this paper will review the research achievements of TPACK theory in the field of Chinese education in recent years, and analyze the characteristics and trends of these studies, so as to provide reference for the subsequent in-depth research. On this basis, this paper will discuss the specific application and strategies of TPACK theory in guiding Chinese teaching and improving the teaching effect, in order to provide practical practical guidance for Chinese teachers. Finally, this paper will also prospect the future development direction of TPACK theory in the field of Chinese education, and provide theoretical support and direction guidance for the informatization and digitalization process of Chinese education.

2. Theoretical traceability and theoretical composition of TPACK

It is not difficult to see from each word that this is a knowledge structure framework containing three main elements, namely, subject content knowledge, teaching method knowledge and technical knowledge. The foothold of each element is Knowledge (knowledge), so TPACK is described by the teacher for effective teaching activities have the ability, covering the declarative knowledge, procedural knowledge and strategic knowledge multiple aspects, especially based on the development direction of future education into the information technology knowledge, such knowledge framework is considered to be the necessary ability of future teachers.

2.1. Theoretical traceability

In 1987, Schulman, an American teacher knowledge researcher, critically deconstructed the research of teacher knowledge structure from the perspective of epistemology and methodology, thus putting forward a new framework of teacher knowledge structure. In his opinion, the knowledge structure of teachers should mainly include subject content knowledge, general teaching method knowledge, course knowledge, subject teaching knowledge, student knowledge, educational environment knowledge, related educational purpose, purpose and other knowledge elements.^[1] It is the emergence of this view that lays the foundation of the theoretical framework of TPACK. After Schulman's idea of knowledge structure was proposed, many scholars deepened it on this basis. In 2001, Pearson proposed the TPCK, and in 2005, United States scholars Kohler and Mishra first incorporated technical knowledge into the framework, and Thompson and Mishra changed the TPCK to TPACK. At the same time, two meanings have been added: first, it emphasizes that the three types of knowledge, namely subject knowledge, pedagogical knowledge and technical knowledge, are indispensable for the integration of information technology and curriculum, that is, emphasize the connection between them; Second, it emphasizes the interaction of the three types of knowledge to form a whole, which means "Total PACK", so that the concept of TPACK has been completely proposed.

2.2. Theoretical composition and its characteristics

TPACK theory can be composed of three core elements, four composite elements and one context factor. The three core elements are the subject content knowledge (CK), teaching method knowledge (PK), and technical knowledge (TK). The four composite elements are subject teaching knowledge (PCK), subject content knowledge of integrated technology (TCK), teaching method knowledge of integrated technology (TPK), and subject teaching knowledge of integrated

technology (TPACK).

The context factor refers to the knowledge of the peripheral factors related to the teaching practice, such as the situational application ability. As for the context factors, Boras and Selinas also put forward the classification of macro, submacro and micro levels, with macro emphasizing social and political environment, secondary macro emphasizing school environment, and micro emphasizing classroom environment. The structure of three core elements finally achieves the theoretical factors of TPACK integration. Finally, with peripheral factors, it is integrated into a complete theoretical model of teacher ability, which acts on the analysis and evaluation of teachers' ability and finally acts in teaching practice. Actually teachers' teaching knowledge and ability problem as early as in education was widely discussed and explored, from the beginning of the knowledge center to the course center, activity center, each step brings the teachers' own ability demand innovation, as the engineer of the human soul, is also bear the huge development demand and the development of heavy conscious responsibility. TPACK theory is not difficult to understand, is popular in the middle of the 20th century on the basis of the new era of productivity innovation technology change development, but for the study of TPACK theory is not only put forward framework so simple, the key is to through the theory in practice. When TPACK is used as an evaluation tool, the measurement methods and measurement tools have also diversified, from focusing on qualitative analysis to quantitative analysis and blended analysis (qualitative analysis plus quantitative analysis), so as to explore teachers' development strategies and realize the combination of theory and practice.

While paying attention to the framework structure of the TPACK theory, we should also see the characteristics of the TPACK theory, namely complexity, interactivity and balance.^[2] Complexity is characterized by the complex structure and loose coupling of TPACK theory. Because the three core elements are independent of each other and act on the teaching activities of the same teacher at the same time, the integration process will bring about confusion in the logical relationship between knowledge and knowledge, thus showing the complexity of the theory. Interactivity is manifested as the two-way interaction between the core elements. If there is no communication between the core elements, the composite elements and the final TPACK theory cannot be produced, the basis of the TPACK theoretical framework is based on the overlapping interaction between the core elements. Equilibrium is manifested in dynamic reconstruction and maintenance of the balance between the elements, which means that when one of the core elements grows or changes, it will bring about changes between the other elements, and once the balance between the elements is imbalanced, it will not be expressed as the subject teaching knowledge of integrated technology. For example, even if a Chinese teacher is well-read and has a thorough understanding of ancient and modern Chinese and foreign literature, he does not have the knowledge of pedagogy, and it is difficult for him to transform his knowledge of subject content into teaching content knowledge and pass it on to students. If students can't learn something, then such teaching is bound to fail, so maintaining a balance between the core elements is the key to the establishment of the TPACK theory.

Since TPACK theory is put forward, the researchers in the definition of TPACK nature and structure always exist big differences, different teams are based on the empirical measurement of different views, the more mature research conclusion can be roughly divided into TPACK structure integration and transformation of two categories.

3. The reflection of TPACK in the Chinese language teachers

Because TPACK theory research technology tools applicable scope and has the accuracy of measurement itself, the study of TPACK theory structure usually involves more science and engineering, for the humanities research mostly stay in language teaching, and language is a

combination of language and literature, TPACK theory in Chinese class practice, also can bring the teaching results.

3.1. The formation process of TPACK structure in Chinese teachers

As khalid ents of humanities, shaping the students' intrinsic value attitude is more than pure declarative knowledge or procedural knowledge, from the perspective of 3 d goals, the cultivation of emotional attitude values in the Chinese teaching is not negligible focus, but that does not mean that knowledge and ability, process and method is not important, the cultivation of emotional attitude values is to shape on the basis of the two elements of learning. The new curriculum standards emphasize the centrality of core literacy Chinese, which not only comes from cultural self-confidence as the core political factor, but also relies heavily on culture to reflect a person's three views, and language is a discipline that plays an important role in this process. While the natural sciences emphasize practicality and instrumentality, the humanities must not forget the return of literature as anthropology, think about the meaning of human beings, and transcend the singularity of the individual. This kind of teaching process is a very long and difficult process to achieve, and if the Chinese teacher does not have such a thinking himself, the students will not be able to learn from the teacher. This kind of subject content knowledge is different from the so-called theoretical knowledge (CK) of ancient literature, comparative literature, literature and art, etc., but is an internalized personality, and the internalized personality is also established in the process of receiving theoretical edification by prospective teachers. Teacher's personality will act on the teaching behavior at the same time, the teachers choose what teaching mode, teaching method, use of teaching concept of teaching activities, at this point, the teacher was preliminary contact the teaching method knowledge, through another core elements of teaching method knowledge (PK) system learning, then presents two independent and connect the core areas of subject content knowledge and teaching knowledge, the middle communication area is composite elements subject teaching knowledge (PCK), this is the first step in the language teacher knowledge structure.

With the beginning of the third information technology revolution, people's life and production work have produced tremendous changes, and technology is essentially the combination of the material world and the ideological world. One manifestation of the externalization product of human ideas is technology. The story of technology is the interaction between evolution, thought and technology, where the idea is the product and result of evolution, how it produces and presents itself in technology so that it in turn drives evolution.^[3] The explosive application of technology in various fields, but also reflected in education and teaching, 2012 released the "Education Informatization decade Development Plan (2011-2020)" pointed out that " explore the law of the deep integration of information technology and education and teaching, in-depth study of the teaching mode under the information environment."^[4] Chinese teachers are inseparable from information-based teaching tools, especially in the teaching environment under the influence of global infectious diseases, online teaching is the norm in many regions, how to deal with the new challenges brought about by the changes in teaching scenarios, and how teachers can use information resources to create higher teaching value, are worth pondering. For example, how teachers' knowledge of subject teaching (PCK) can be effectively disseminated through new media is a thematic part of the integration of the three core elements. In the teaching process, the common integration of teaching method knowledge (TPK) uses multimedia teaching method. Such as the use of PPT teaching content, this presentation is (TCK), teaching activity is not a single, the design of multiple teaching link means that need multiple knowledge ability, also focus on the key integration technology of subject teaching knowledge (TPACK), in order to judge a professional teacher's teaching ability.

3.2. Research path of TPACK structure for Chinese teachers

The model of TPACK theoretical structure is mainly reflected in two aspects in the process of teacher development. One is used as a measure of teachers' professional ability after entry.^[5] The second is for the guiding function of pre-service teacher training. For the first aspect, the key is to develop the analytical survey standards and evaluation scales. Nowadays, the most common one is the seven-point Likert scale based on the quantitative analysis method. In the research process of professional teacher ability analysis, it is not enough to only adopt qualitative measurement and quantitative measurement, but also to inject mixed measurement method, which refers to the measurement of teacher TPACK structure through the combination of quantitative and qualitative method, which is a recently developed and mature TPACK measurement method. The University of Delaware research team has focused on combining quantitative and qualitative mixed measures of TPACK. In 2013, on the basis of the development of the original qualitative measurement tool, the research team of the University of Delaware began to work on the revision of the quantitative research tool TPACK measurement scale, and adopted the quantitative and qualitative TPACK measurement methods in the same study to improve the scientificity and accuracy of the research results through the triangular evidence between data. The research team of the University of Cyprus also adopted the course task and classroom observation as data collection tools, and the data analysis method combining quantitative text analysis and qualitative discourse analysis developed the mixed measurement method of TPACK under the translational perspective, and developed the measurement standards and specific operation methods.

At the same time, measurement tools with reliability and validity should be developed, such as video analysis tools, interview tools, etc. There is also a trend to develop new measurement tools that fit into the context of TPACK research. For the second aspect, need to focus on the problem of development strategy, which is about the problem of teacher education, education managers should focus on colleges and universities for normal training program reform and try out, broaden the research ideas of higher education education, guarantee orientation no deviation at the same time, also should pay attention to the incentive function of teachers training, clear teacher itself is a long way and respected profession, higher education on education workers or education workers should be based on the research of the education teaching production concept, rather than a simple copy and paste employment orientation of teaching guidance. Although the object of higher education has strong self-study ability, but also should pay attention to the teaching process of personalized training path, because of the development of education workers of independent thinking and the ability to solve the problem of teaching in the practice, to develop the object of follow up type of experimental research, and timely reform adjustment, show "learn high teacher, body is for fan" normal spirit.

4. Development trend of TPACK theory research

The high citability rate of literature essentially reflects the high attention of researchers to the research content of literature, so the high citations rate of research literature in a specific field reflects the main concerns of researchers in this field, and the combing of the research content in such literature can reflect the change of research trends in this field.

According to the content analysis of the research results that have attracted high attention in each stage, it can be seen that the research perspective of TPACK scholars shows certain change rules with time. Based on this study, we propose that the trend of future research in this field is as follows:

4.1. More accurate measurement and training of the knowledge structure of information teachers

The study on the structure and nature of TPACK shows a development trend from exploring the constituent elements of TPACK structure, the existence of elements and the relationship between elements gradually change to the determination of the path relationship and quantitative relationship between elements. Early scholars focused on the types and forms of TPACK component elements, and drew two conclusions about the integration and transformation of TPACK. With the development of TPACK measurement tools, people began to try to explore the composition of TPACK framework by measuring the structure of teacher knowledge, which not only defined the constituent elements of the framework but also obtained the structural and quantitative relations between the elements. In 2013, researchers in Singapore and Taiwan, China developed the teacher TPACK structural equation model, which clearly gave the TPACK component elements, as well as the path relationship and quantitative relationship between the elements. It can be seen that the research on the structure and essence of TPACK shows a research trend from the existence and structural rationality of each element in the early structure to a qualitative exploration of the nature and elements of TPACK structure, and then to a precise exploration of the relationship between structure and quantity among the elements. Although, some studies have obtained a structural equation model of teacher TPACK, this model only describes the precise relationship among some elements. Therefore, this study believes that the construction of a more complete teacher TPACK structural equation model will be one of the future research hotspots. At the same time, the accurate measurement and modeling of teachers' TPACK structure also make the cultivation of teachers' knowledge structure change from qualitative inquiry to quantitative measurement. The construction of TPACK structural equation model provides a clear structure and quantitative relationship between all kinds of knowledge in the knowledge structure of information teachers. Based on this, the measurement and training of pre-service and in-service teacher knowledge structure will become an important practical application field of TPACK theory in the future.

4.2. Explore teachers' professional development in more specific fields

Through the systematic analysis of the research problems of the highly cited literature, it can be seen that the research on the theoretical framework and practical application of TPACK shows a gradual concrete trend. The early research on TPACK framework defined the constituent elements significantly, and only defined them as technical knowledge, teaching knowledge and subject knowledge. Although the research conclusion is universal, its practical value is not good. With the deepening of research, researchers prefer to study the TPACK framework within a specific field. For example, the technical knowledge of TPACK framework is embodied into interactive electronic whiteboard, electronic books and network technology, the teaching knowledge is embodied into problem-based teaching and meaningful learning, and the subject knowledge is specifically limited to mathematics, science and language.

4.3. Development path of teacher education technology based on mixed empirical research

Through the analysis of the use of research methods in the literature, it can be seen that the research in the field of TPACK has been constructed by the early theory of research orientation gradually changed into the research orientation of theoretical test, based on the number of empirical research gradually increased, and the measurement method from a certain amount of research or qualitative research into a combination of quantitative and qualitative research. Early research in the TPACK field was mainly in theory. The existence of its constituent elements and the value of the

theory are studied and reflected on. In recent years, the quantitative and mixed empirical research in this field has gradually increased, and the exploration of its theoretical framework has changed from based on deduction to based on measurement. In terms of data acquisition, with the increasing number of research on the design and development of measurement tools, the available types and accuracy of research data have been improved. In terms of data analysis, the analysis methods used are gradually enriched, gradually changing from the early single regression analysis, correlation analysis and cluster analysis to path analysis and structural equations.

4.4. The path of TPACK to help the quality of Chinese education

TPACK (subject teaching knowledge of integrated technology) plays a key role in improving the quality of Chinese education. The following are the specific methods and ways to improve the quality of Chinese education through TPACK:

4.4.1. Integrate technical resources and enrich the teaching content:

The TPACK framework encourages teachers to integrate technical tools and resources into their teaching and enrich the teaching content. This can not only stimulate students' interest in learning, but also broaden students' knowledge horizon.

For example, the multimedia display of literary works and the use of network resources for classroom interaction can make Chinese teaching more vivid and interesting.

4.4.2. Innovate the teaching methods to improve the teaching effect:

Under the TPACK framework, teachers can use technical means to innovate teaching methods, such as online collaborative learning and flipped classroom, so as to improve students' participation and promote students' independent learning.

These teaching methods can stimulate students' interest in learning and improve students' thinking ability and innovation ability.

4.4.3. Strengthen the integration of information technology and Chinese teaching:

TPACK emphasizes the integration of information technology and subject teaching. In Chinese teaching, teachers should pay attention to the integration of information technology with teaching content and teaching methods, so as to improve the information level of Chinese teaching.

For example, teachers can use information technology means to conduct classroom evaluation, homework management, learning resource sharing, etc., to make teaching more convenient and efficient.

4.4.4. Improve teachers' application ability of information technology:

The TPACK framework requires teachers to have high information technology application ability. Teachers can improve their ability to apply information technology by participating in training and independent learning, so as to make better use of technical tools and resources for teaching.

For example, teachers can improve their teaching effects by learning skills such as the design and development of digital teaching resources and the use of online education platforms.

4.4.5. Pay attention to students' needs and promote personalized learning:

Under the framework of TPACK, teachers should pay attention to the personalized needs of students, and use technical means to provide students with personalized learning resources and

guidance.

For example, teachers can analyze students' learning data and understand students' learning style and progress, and provide students with customized learning plans and resources.

To sum up, TPACK has effectively improved the quality of Chinese education by integrating technical resources, innovating teaching methods, strengthening the integration of information technology and Chinese teaching, improving teachers' application ability to apply information technology and paying attention to students' needs. These methods and approaches are of great significance for improving students' interest in learning, cultivating students' thinking ability and innovation ability, and promoting students' all-round development.

5. Conclusions

Since its inception, TPACK theory has been widely concerned by researchers in different countries and in various related fields, and has achieved rich research results. Among them, the research conclusion on the nature of the knowledge structure of information teachers and the relationship among the constituent factors is an important breakthrough in the theoretical research of educational technology. However, the research conclusions of TPACK measurement method and the development strategy of TPACK for teachers based on measurement research have high guiding value for the training practice of information teachers. However, due to the complexity, development and inferiority of teachers' knowledge structure itself, the existing research on the TPACK structure model has the generality of specific subject teaching situation remains to be proved, and due to the combination of quantitative and qualitative TPACK measurement system has not been established, so based on the accuracy of empirical research higher teachers' TPACK development strategy remains to be improved. Therefore, this study believes that future researchers can study the teacher TPACK structure in specific disciplines, and constantly improve the TPACK measurement tools, so as to derive a more operable teacher TPACK development program.

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