

# *Study on TPACK Development of Novice Teachers in Rural Primary Schools*

Siyu Chen<sup>1</sup>, Yuantao Jiang<sup>2,\*</sup>

<sup>1</sup>Faculty of Education, Yunnan Normal University, Kunming, Yunnan, 650500, China

<sup>2</sup>College of China School of Executive Education and Southwest Yunnan Association, Yunnan Normal University, Kunming, Yunnan, 650500, China

2677546387@qq.com

\*Corresponding author

**Keywords:** Novice Teacher, Village Teacher, TPACK, Professional Development

**Abstract:** Novice teachers' application ability of information technology in teaching reflects the development level of rural teachers in the new era. However, there are lots of difficulties in the development of TPACK for novice teachers in rural primary schools, such as the consciousness of information technology application is not enough, the ontology knowledge is vulnerable and outdated, unreasonable resources are disposed, the methods of teaching lack of effective technical guidance, therefore, to promote the TPACK development of the novice teacher's awareness, support rural teachers to update the professional and technical knowledge, optimize the resources distribution of education and teaching, establish an integrated technical guidance training mechanism of TPACK development strategy. This way, novice teachers' competence in information progress can be improved and teachers' professional development can be promoted.

## 1. Introduction

In June, 2015, The State Council issued *the Support Plan for Rural Teachers (2015-2020)*, proposing to improve the application ability of information technology comprehensively for rural teachers, and emphasizing to continue implementing of this plan recently[1]. In July, 2020, the Ministry of Education and other six departments jointly issued *the Opinion on Strengthening the Construction of Rural Teachers in the New Era*, which requires to strengthen the professional development of rural teachers in the new era, cultivates high-quality rural teachers in line with the requirements of the new era, and pays more attention to enrich knowledge about artificial intelligence and other new technologies [2]. The key to revitalizing rural education depends on the improvement of the quality of rural teachers. In the new era or with frequent replacement of new technologies, rural teachers need to improve their information technology ability of application to achieve their professional development. The research on TPACK will improve teachers' ability to master and use information technology. Teachers' TPACK ability is a necessary ability for future teachers.

## 2. TPACK Development Dilemma for Novice Teachers in Rural Primary Schools

The new concept TPACK of integrated educational technology is found in PCK, and this structure is shown in Figures 1,2,3,4[3]. The level of teachers in rural primary schools has a significant influence on students' development. When information technology comes into the field of rural education, the problems existing in the development of the subject teaching knowledge of integrated technology of rural primary school teachers are more obvious than those of urban teachers.

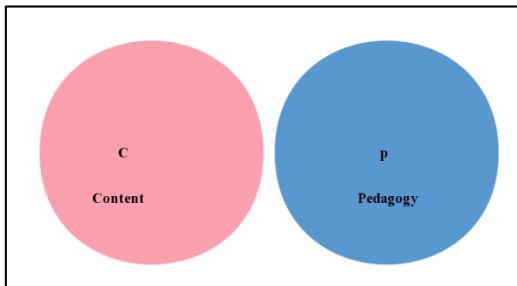


Figure 1: The Basi Content of “C” and “P”.

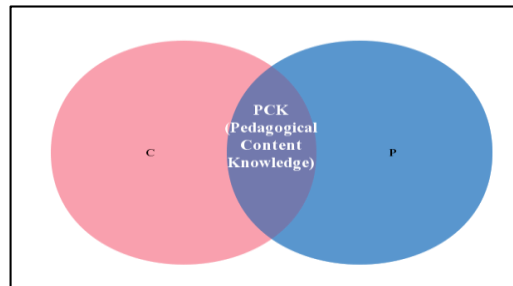


Figure 2: The Structure of PCK.

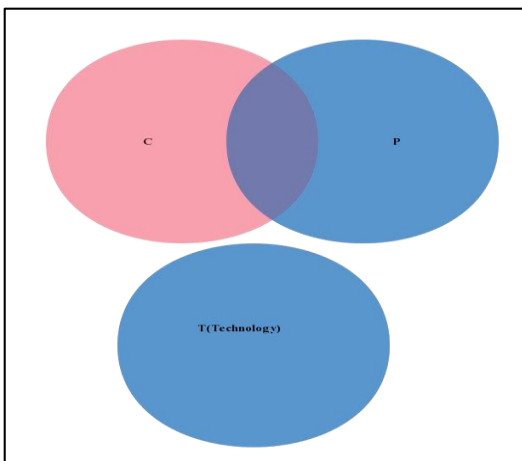


Figure 3: The Structure of “C” “P” “T”.

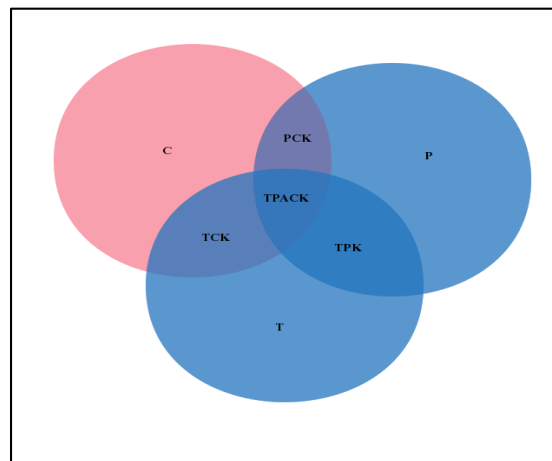


Figure 4: The Structure of TPACK.

### 2.1. Lack of Professional Awareness of Information Technology Application

Teachers' cognitive level and acceptance of information technology determines their attitude of using information technology to change teaching. Mishra P et al. believed that under the influence of rural economic, cultural development and educational cognition level, rural teachers have a weak sense of self-professional development, and their acceptance level of the integration of new technology and education level is often lower than that of urban teachers [4]. Xu Zhangtao believed that most teachers have not given full play to the deep integration of information technology in the teaching field and still maintain the traditional teaching model[5]. In reality, in most of the country, novice teachers in rural primary school teaching ability requests lowly, their own knowledge (PK, CK) and professional ability enough to cope with the demand of the teaching need, so in the preparation of teaching courseware, when teachers have no preparation courseware, choose to use convenient and easy teaching methods to operate the multimedia auxiliary teaching with traditional teaching ways without using information technology. Therefore, rural primary school teachers with negative awareness of using information technology to assist teaching will affect the development

of teachers' TPACK.

## **2.2. Pre-existing Knowledge of Novice Rural Teachers is weak and Outdated**

Novice rural teachers need to master the technical knowledge to suit for teaching and the ability to integrate the knowledge of technology, teaching methods and subject content. The premise is that the novice rural teachers should be able to update the ontology knowledge consciously and actively and form a systematic knowledge system. Willow sets (2021), and other people thought of rural teachers general teaching knowledge acquisition can only through the network, television and other media, with the actual situation of rural culture, and in terms of professional knowledge, the lack of modern intelligent education technology emerging disciplines such as knowledge, but also lack in practical education and scientific research by using the basic ability of smart technology [6]. Teachers' basic knowledge of using information technology in teaching is weak, their geographical location is remote, their information is blocked, and they are disconnected from their educational field, which is another factor affecting the development of TPACK for novice teachers in rural areas.

## **2.3. Allocate About Education and Teaching Resources Unreasonably**

Educational resources refer to the resources possessed, used, and consumed in the process of education, which can be generally divided into human, financial, and material resources [7]. This paper mainly emphasizes material resources. The allocation of educational technology resources, which is an important factor affecting the development of rural teachers' TPACK ability. Hao Shuizhi (2020) pointed out that the unbalanced and inadequate allocation of educational resources is an important factor restricting the development of rural basic education[8]. At the stage of compulsory education development, in the process of promoting compulsory education balanced development, some rural elementary school classrooms equipped with multimedia devices but equipment in different levels of technology or damaged problems later, which leads to the teachers in class can't use. The teaching hardware resources will have an important influence to the promotion of teachers' information ability in the long term,

## **2.4. Lack Effective Technical Guidance in School**

There is no complete technical support mechanism at the school level to provide technical guidance timely for novice teachers. Yang Zhe (2021) believed that most teachers are using information technology for presenting teaching content without understanding the essence of the integration of information technology and teaching. The effect of using information technology to change the traditional teaching model and promote the transformation of teachers' teaching and students' learning methods is not good [9]. Due to the limited professional knowledge of rural novice teachers in information technology, most of the knowledge is in a static state, the school can not provide technical guidance or training to promote the dynamic development of the subject teaching knowledge integrated with technology, which will have an impact on the professional development of teachers.

## **3. Promote TPACK Development Strategies for Novice Teachers in Rural Primary Schools**

The development of TPACK for novice primary school teachers is influenced by many factors, which not only needs to stimulate internal motivation, but also needs to build an external collaborative support mechanisms, such as supporting teachers to update professional and technical

knowledge, optimizing the allocation of education and teaching resources, establishing and improving the information technology training mechanism, to jointly promote the improvement of teachers' informatization ability.

### **3.1. Promote the Awareness of TPACK Development of Novice Teachers**

#### **3.1.1. Develop a Self-Professional Development Plan**

Teacher's development planning of a career refers to the career development goals that teachers should achieve at a certain time after starting teaching and includes reasonable arrangements for each stage of career development in order to achieve the goals [10]. For new countryside, elementary school teachers it should not be determined by external factors such as environmental exclusion refusing to specialization. The teacher's TPACK development in the career development plan must be more clearly about their own professional goals, pay attention to the new era of informatization development change caused by teaching practice, train their consciousness of information technology gradually, take the initiative to accept new technology, and achieve the change of teaching competence enhancement. In addition, with the combination of educational theoretical knowledge and teaching practice, they will improve their own information literacy, constantly, transform this awareness into practical action, and finally, drive students' learning and growth at the level of teaching action. Therefore, to achieve TPACK development, novice teachers in rural primary schools need to learn from the new era of teacher quality in career development planning.

#### **3.1.2. Guide Teachers to View the Contradiction between Working and Learning Rationally**

The contradiction between working and learning is a prominent problem, which affects the development of teachers' TPACK. The main subject, novice teachers teach in a more rural elementary school, have a heavy teaching tasks, otherwise need to complete a large number of additional administrative affairs. In rural schools, novice teachers shall bear management work especially, which occupies more time, makes them without delving into extra time, also in the field of information technology learning, and even appear a job burnout phenomenon. School administrators should give teachers more emotional care through psychological and mental guidance to teachers, increase the interaction among managers, teachers, and students, to alleviate the contradiction between working and learning, which enable teachers to respond to information literacy challenges actively.

#### **3.1.3. Attach Importance to Create an Information-Based Teaching Atmosphere**

Schools are the main front for the country to promote the implementation of information technology reform in the field of education, and principals need to lead teachers in the professional development of knowledge, ability, and beliefs [11]. The Education Informatization 2.0 Plan also requires principals of all levels and all types of schools to coordinate and promote the planning and development of informatization comprehensively in their schools [12]. The document entrusts principals to a new role to lead the development of teacher informatization, especially in rural primary schools. On the one hand, offer teachers enough hardware resources, strengthen their knowledge of information technology at the same time, and understand the overall level of current school teachers' information technology. On the other hand, formulate relevant policies to encourage teachers in teaching integration technology, build the information-based teaching environment atmosphere, thus improve the overall level of informatization education school.

### 3.2. Support Rural Teachers to Update Their Professional and Technical Knowledge

Information technology in the new era has expanded the scope of time and space of education and the cognitive limitations of human beings, which not only enables the teaching of rural teachers, but also provides the necessary technical support for the professional development of rural teachers. Jiang Yin (2021) believed that teachers' professional knowledge is one of the main contents reflecting teachers' professional quality and ability, as well as the basic condition for teachers to ensure the effectiveness of teaching activities, which highlights the professional characteristics of teachers rather than other professionals [13]. At present, the knowledge of information technology has become the indispensable professional knowledge of the novice teacher and the key factor of whether the novice teacher can successfully realize the role transformation.

Meanwhile, novice teachers should strengthen the weak knowledge of subjects, teaching methods, and other knowledge learning, enhance the knowledge of intelligent information technology, and embrace their minds with new teaching concepts and methods, to use technical means to promote the growth of professional knowledge. In addition, by building a learning community for novice teachers' professional and technical knowledge, reshaping and updating of teachers' knowledge structure can be accelerated. To be sure, in the process of integrating information technology, teachers need to follow the principles of economy, society, education principle, the principle of catalyst and master skilled of integration technology subject teaching knowledge, eventually, cultivating the novice teachers' information technology teaching ability, to make this a better service for teaching and form a meaningful reflection.

### 3.3. Realize Rational Allocation of Education and Teaching Resources

#### 3.3.1. Optimize the Allocation of School Resources

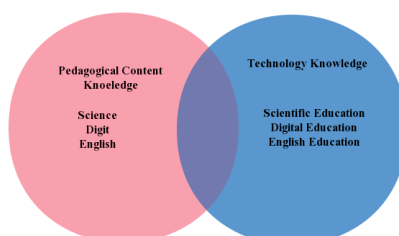


Figure 5: The Key TPACK Elements of Structure

Schools should consider two aspects to optimize resource allocation: one is to provide accurate teaching equipment resource supply; the other is to allocate teachers effectively. On the one hand, the precision of teaching equipment supply is the basis of the rural primary school novice teacher TPACK teaching conditions. To support the teacher improve teaching technical equipment, multimedia can teachers use under the environment of strips practice, the application of information technology, find their own advantages and disadvantages in the process of integration of technology; on the other hand, the effective allocation of teachers is an important guarantee for the development of TPACK and helps to solve the problem of structural shortage of teachers. Effective supply professional information technology teachers increasingly equipped with specialized information technology teachers can promote the teacher's effective teaching, equipment inspection and maintenance of a problem can be found timely. Provide additional information technology services, master information technology teachers, guarantee the equipment management and maintenance, and improve teachers' information technology teaching ability. It also enhances students' sense of

experience and gain. It can be seen that the rationality of school resource allocation has a large impact on teachers' professional development and students' ability improvement. So the key TPACK element structure of novice teachers as Figure 5.

### **3.3.2. Supply Overall Regional Resource**

Regional coordination requires the relevant administrative departments of the government to provide standard resource allocation for schools in need through unified deployment of existing resources, to meet the realistic needs of different schools. When the resources required for school development cannot meet the teaching demand, the local government should provide help timely and coordinate the supply of resources within the region, including both hardware facilities and "software resources", such as the quality of teachers and the source of students. When the quality of students cannot be selected, the government departments should allocate hardware resources rationally and increase the effective supply of information technology resources, which will not only promote the improvement of the quality of education informatization, make up for the weak places in education, but also maintain the fairness and justice of education further. Therefore, the supply of resources within the government area plays an important role in promoting the quality of education informatization.

## **3.4. Establish and Improve the TPACK Coordinated Development Guarantee Mechanism**

### **3.4.1. Carry out Technical Guidance on Campus Regularly**

Carrying out technical guidance in schools is an important link to train teachers' information literacy. The premise of technical guidance is that the school has the network facilities, equipment resources, and financial support required in reality. The school provides full-time technical guidance to teachers for each grade, organizes information technology guidance activities regularly, and provides technical services for teachers timely. Arrange teachers to take part in the guidance, mainly focusing on the content that can not be operated in classroom teaching, and classified problems in teaching. Technical guidance focuses more on solving the current technical problems to be solved by teachers, rather than systematic theoretical teaching, which also requires higher professional ability for technical guidance staff. Every novice teacher should cherish the learning opportunity in order to achieve their own information teaching level.

### **3.4.2. Carry out IT Training in the Region**

The training time, content, and frequency of information technology for rural teachers in the region should be targeted and flexible. Through optimizing the training, the novice teachers can improve the application ability of information technology. The following measures can be taken to carry out information technology training within the region: Firstly, teachers should be encouraged to try to build the knowledge map of information-based teaching. All teachers should understand and be familiar with information technology and true experience, the efficiency and convenience brought by the change of information technology; secondly, teachers can be organized to carry out equipment inspection and maintenance activities to develop teachers' information technology ability, which not only trains teachers' ability to solve technical problems in the work, but also enables new teachers to adapt to the needs of information work faster; Thirdly, improve teachers' awareness of information technology literacy. The conscious and active application of information technology awareness is regarded as a supportive tool to improve teaching quality; finally, we promote the innovation of information technology in education vigorously, through the training of content and methods, condensed into a distinctive teaching concept, and put into practice in the process of



teaching management. Teachers' awareness of information technology application and information literacy are improved, which provides development impetus for the development of TPACK.

### 3.4.3. Build Information Technology Precision Training Database

The construction of teacher information technology precision training database can meet the needs of teachers' intelligent services. Database construction can be divided into two levels: one is the theoretical level; the second is the practical level. The theoretical construction needs to pay attention to the training personnel, training duration, and training courses. The training objects include the training of all teachers as well as the training of principals, who are the key figures leading the professional development of teachers and the improvement of their information-based teaching ability plays an exemplary role in leading the new primary school teachers. The training time and frequency can be arranged flexibly. The training content should be practical in the actual field. The course should be combined with virtual and real, emphasizing pertinence and effectiveness, and striving to achieve "precise training". In practice, we should pay attention to "who will build", "who will use" and "who will manage", to form a systematic database. Therefore, an accurate training database for teachers is built to visualize the training information, facilitate the integration of data and information, and form a personalized TPACK assessment for teachers. It is convenient for teachers to know their own strengths and weaknesses in different categories of knowledge at any time, to play a certain role in future teaching, learning, and research. The Information Literacy of novice teachers in the new era is necessary, such as Figure 6.

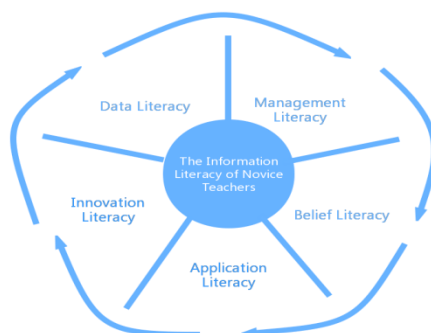


Figure 6: Information Literacy of Novice Teachers.

## 4. Conclusions

Through the village primary school teacher TPACK research, rural schools can accelerate the change of classroom teaching to adapt to the new era, to give students different emotional experience and improve rural informationization teaching competence, create new era and use information technology to teaching and management of teachers skillfully, avoid further artificial intelligence era. However, it is also necessary to realize that the problems and difficulties encountered by rural teachers in improving information literacy are large, relatively so more help and support from the outside world are needed.

## References

- [1] General Office of the State Council, *The Village Teacher Support Plan (2015-2020)* [EB/OL]. [2015-06-08]. [http://www.gov.cn/zhengce/zhengceku/2015-06/08/content\\_9833.htm](http://www.gov.cn/zhengce/zhengceku/2015-06/08/content_9833.htm).
- [2] Ministry of Education, and other six departments, *Opinions on Strengthening the Construction of Rural Teachers in the New Era* [EB/OL]. [2020-08-28]. [http://www.moe.gov.cn/srcsite/A10/s3735/202009/t20200903\\_484941.html](http://www.moe.gov.cn/srcsite/A10/s3735/202009/t20200903_484941.html).

- [3] Ke kang. *TPACK New Development in the Research of "Information Technology and Curriculum Integration" in the United States (II)*. *Electrochemical education research*, 2012.
- [4] Mishra P, Koehler M J. *Technological Pedagogical Content Knowledge: A Framework for Teacher Knowledge*. *Teachers College Record*, 2006(108).
- [5] Xu Zhangtao. *Policy Content, Evolution Logic and Possible Trend of Teachers' Information-based Teaching Ability*. *Modern Educational Technology*, 201, 31(05):44-51.
- [6] Liu Liyan, Zhang Huiqing, Yan Hanbing. *The dilemma, opportunity and Practice path of rural teachers' Professional Development in the Smart Era*. *China E-Education*, 2021(10):105-112.
- [7] Zhang Chuanping. *Research on the Allocation Standard of Compulsory Education Resources*. Wuhan: Wuhan University Press, 2013.32-33.
- [8] HAO S Z. *Research on the allocation of basic education resources under the background of rural revitalization strategy*. Anqing Normal University, 2020.
- [9] Yang Zhe. *Investigation and Research on the Deep Integration of Information Technology and Teaching in Primary and Secondary School Teachers*. *Teaching and Management*, 2015(30):26-29.
- [10] Li Haifen, Zhao Chunyu. *Teacher Career Planning and Design*. Chongqing: Chongqing University Press, 2014:7
- [11] Liu Xianrui, Jiang Yuantao. *Content and Path of Principal Leading Teacher Professional Development*. *China Adult Education*, 2020(23):86-88.
- [12] Ministry of Education. *Notice on Issuing Action Plan of Education Informatization 2.0*. China Education News Network, 2018.
- [13] JIANG Y. *Teacher Professional Knowledge: The cornerstone of preservice teachers' Practical Teaching*. *Educational Theory and Practice*, 2016, 41(26):35-39. (in Chinese).