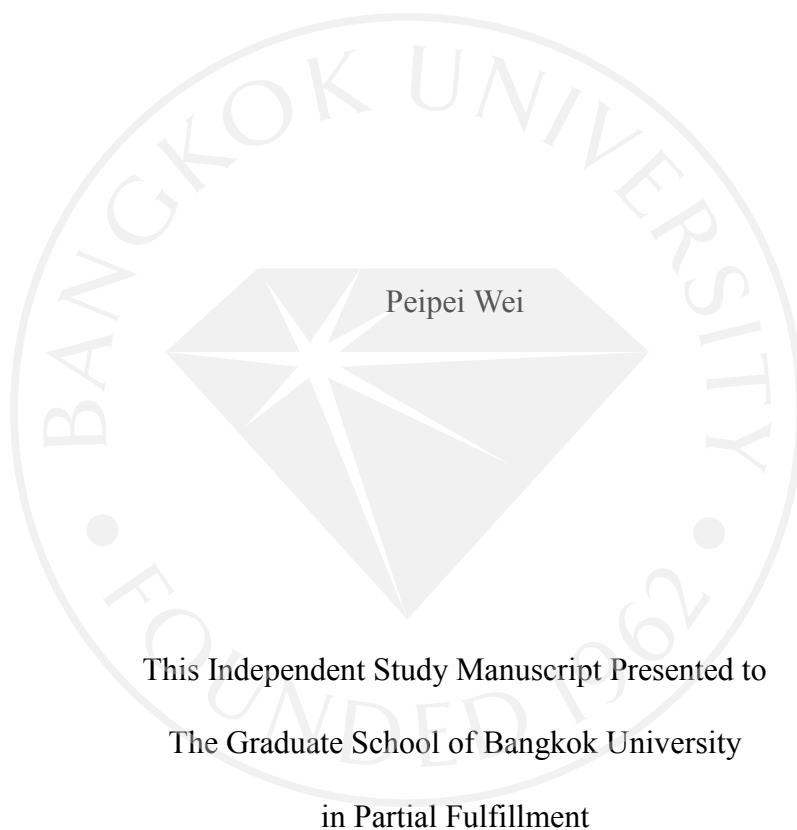**EXAMINING AND IDENTIFYING EFFECTIVE TEACHING METHODS**

FOR PRIMARY SCHOOL EDUCATIONAL PROGRAM STDENTS OF

BAISE UNIVERSITY

EXAMINING AND IDENTIFYING EFFECTIVE TEACHING METHODS FOR

PRIMARY SCHOOL EDUCATIONAL PROGRAM STDENTS OF

BAISE UNIVERSITY

Peipei Wei

This Independent Study Manuscript Presented to

The Graduate School of Bangkok University

in Partial Fulfillment

of the Requirements for the Degree

Master of Business Innovation

2020

This manuscript has been approved by

the Graduate school

Bangkok University

Title: Examining and Identifying Effective Teaching Methods for Primary School

Educational Program Students of Baise University

Author: Ms. Peipei Wei

Independent Study Committee:

Advisor:

(Dr. Xavier Parisot)

(Dr. Johan Van Rooyen)

Field Specialist:

(Assoc. Prof. Dr. Vincent Ribiere)

(Mr. Virat Rattakorn)

Dean, Graduate School

November 10, 2020

Wei, P. M.M. (Business Innovation), November 2020, Graduate School,

Bangkok University.

<u>Examining and Identifying Effective Teaching Methods for Primary School</u>

<u>Educational Program Students of Baise University</u> (124 pp.)

Advisor: Xavier Parisot, Ph.D and Johan Van Rooyen, Ph.D.

Co-advisor: Luo Qiuxue, Ph.D.

ABSTRACT

Teachers are not only the implementers of education programs, but also the subjects of the teaching technology to affect the effectiveness of the education system directly. The major of Primary Education plays an important role in the current development of primary education in China. The training of primary education professionals plays an important role in the improvement of the faculty force for the development of the Chinese primary education. The foundation of the Chinese talent training can become more solid and the problem of shortage of teachers at the stage of basic education can be solved continuously only when high-level excellent teachers enter the stage of basic education gradually. It is firmly believed by the Chinese Ministry of Education that the high-quality teachers to enter the primary education system are taken as the fundamental foundation of the national education. The exploration on the concrete, operational and targeted mode of the basic standards of talent training is also the key to the current education and teaching reform in Chinese universities. The primary goal of the teaching reform is to change the ideas of teachers and promote the active participation, independent exploration, practical ability,

problem-solving skills and teamwork of students. It is aimed to promote the overall development of the teaching "process and method" and teach students the required emotions, attitudes and values. With the continuous innovation of the educational paradigm, the rapid development of the information technology and the renewal of the teaching content, the method about the effective application of the effective model teaching theory based on the information technology in teaching has been adopted by more and more teaching researchers. TPACK theory is a comprehensive embodiment of the ability to integrate the information technology into the Chinese curriculum teaching. It is widely applied to the application and measurement of the effective teaching method. TPACK teaching is focused on the integration of TK, PK, CK, PCK, TCK, TPK and TPACK. The effective teaching method based on TPACK is focused on the cultivation of students in line with the need of the educational reform and development. It is endowed with the modern educational concept, the solid basic educational theory and the innovative consciousness and ability. It can be qualified for the teaching work of curriculum teaching technology, method, concept, knowledge, discipline and other aspects. However, the TPACK framework is integrated into the assessment of Primary Education teachers on the knowledge about subjects, content, pedagogy and innovative technology in the Chinese primary education. Eighty teachers of the Primary Education Department of Baise University are taken as the research object in the paper. Literature analysis, questionnaire survey, interview survey and other research methods are adopted. On the basis of the interview results, TPACK theory is adopted to explore the mode of promoting the scientific development of general education teachers. It is aimed to provide some reference for the promotion on the scientific development of Primary Education.

The main research content of the paper is as follows. Firstly, the research on the development status of theory and teaching practice as well as related problems is understood by looking up the relevant research literature based on TPACK theory. The questions, purposes and scope of the research are put forward. Next, the literature review of Primary Education and effective teaching methods is carried out. Then, the TPACK questionnaire and the measurement scale are adopted to design interview questions and interview questionnaires. Three teachers are interviewed and eighty questionnaires are collected. Afterwards, the data analysis is carried out through SPSS 20.0. According to data results: 1. TK: Teachers have a poor understanding of the traditional knowledge, but the respondents are endowed with a positive learning attitude in general. 2. CK: Teachers can adopt different methods and strategies generally to improve their professional knowledge about primary school teaching. However, the polarization is serious for whether there are enough professional knowledge and thinking modes of primary school teaching about self-assessment.3: PK: The interviewed teachers have a relatively full understanding of teaching methods. They can make adjustment according to the teaching situation and the feedback of students. 4: PCK: Teachers have the same and superior subjective cognitive level on the application of different teaching methods to inspire the thinking ability of students. However, there is great difference in the selection of effective teaching methods and the action ability is slightly lower than the subjective cognitive level.5. TCK: Teachers' TCK knowledge level is higher than the average level and the knowledge level of some teachers is backward. 6. TPK: Teachers have a good understanding of TPK knowledge, which is above the average level. 7. TPACK: Teachers' knowledge level of TPACK is higher than the normal level. However, the

knowledge level of some teachers is lower. It is necessary to pay attention to and carry out the targeted training and improvement activities. Finally, the application status of TPACK among the teachers of the Primary Education Department of Baise University is discussed as well as the advantages and disadvantages of TPACK integration. The key elements to help Primary Education teachers carry out effective teaching and learning activities are put forward. It is ultimately conducive to the overall learning satisfaction and achievement of students. The incentive mechanism of TPACK is helpful to promoting the action of teachers in TPACK teaching. It is aimed to achieve the goal of effective teaching.

ACKNOWLEDGEMENT

This thesis was completed under the guidance of Dr. Johan. From the beginning to the completion of this paper, each step is completed under the tutor's careful guidance, into a large amount of tutor painstaking efforts. Here, I would like to express my high respect and heartfelt thanks to my tutor! In the process of writing the paper, I met a lot of problems, which were all solved under the patient guidance of the teacher. So here, again to the teacher way 1: teacher, thank you!

I would like to thank the faculty of the graduate school for their education and training. They not only guide my study carefully, but also encourage and help me when I am depressed. Here, I would like to express my heartfelt thanks to all the teachers. In particular, Dr. Xavier is always eager to solve many problems in my study and life.

I would like to thank my second mentor, Miss Luo Qiuxue. She patiently assisted Dr. Johan in helping me with my thesis.

I would like to thank my interviewees, Mr. Li, Mr. Dong fang and Mr. Zhi, for their help and support. They spent a lot of time answering my interview questions.

During my study in Bangkok University, I got help from my respected teachers, classmates and friends. They are my role models. Thank you!

Peipei Wei

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

LIST OF TABLES

LIST OF TABLES (Continued)

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

1.1 Introduction

Teaching is a profession that determines the educational needs of students and makes various decisions on issues such as assessing learners' performance and enhancing the quality of teaching" (Gözütok, 2004). Teachers not only implement education programs but also delivery various teaching techniques which directly affect the effectiveness of the education system (Unal, 2011). Primary education teachers training plays an important role in complementing the current development of primary education development in China. Many early research perceived the teachers as the person who relayed information to the learners. However, in recent years, this profession has been seen as education engineer, artist and expert (Güneş, 2016). These traits are brought into focus in teacher education, and thus open up new discussions.

In line with this new trend in focus, the Chinese Ministry of Education also strongly believe that to have high qualified and well trained teachers entering the primary schooling system is the basic learning foundation for the country. As such with China's pedagogical reform since 2001, many initiatives have been rolled out across all primary and secondary (junior and senior) schools in China that cover school management system, curriculum content, pedagogy, assessment, teacher training etc. (Tan & Chua, 2015). The overriding objective of the pedagogical reform is to "shift from an over-emphasis on passive learning, rote-memorization and mechanical training to one that promotes students' active participation, independent

inquiry, practical ability, problem-solving skills and teamwork" (Ministry of Education of the People's Republic of China, 2011). Teachers are expected to go beyond knowledge transmission ('knowledge and skills') to ensure that their 'process and methods' used in teaching promote holistic development, and that their students are instilled with the desired 'sentiments, attitudes and values'.

Currently, advancement in communication technology has accelerated the process of e-education as well as set off an upsurge of reforms in the area of education in China (Liu, Zhang, Zhong & Jiang, 2012). Nevertheless, the Chinese government does not fully define the pedagogical training process in these programs and as such teacher training institutions differ in this aspect (Baris & Hasan, 2019). Although, the current practical teaching processes, institutions of higher learning have attached more importance to technological introduction, there is still a lack on how to exert technological functions (Huang, Shang, Lan & Wang, 2014). The effective use of information technology in teaching has therefore become a new challenge for teachers with the continuous innovation of educational paradigms, rapid development of information technology, and update in teaching content (Tao, Neng-feng, Ji-yu & Xiao-chun, 2017).

With the extensive use of information technology in in school education, the Technological Pedagogical Content Knowledge (TPACK) theoretical framework has also been adopted by a growing number of researchers to study, assess and advance teachers' ability to integrate IT into course teaching in China (Su, Huang, Zhou & Chang, 2017). TPACK has been introduced by Koehler and Mishra as a way of thinking about the knowledge teachers need to understand to integrate technology effectively in their classrooms (Mishra & Koehler, 2006). TPACK is regarded as a

useful tool in teachers' professional development (Niess, Ronau, Shafer, Driskell, Harper, Johnston & Kersaint, 2009). Although TPACK framework has been studied in many domains, there is little research and investigation conducted with Chinese primary school education teachers.

To address this gap, this independent study therefore seeks to assess knowledge of discipline, content, pedagogy, and innovative technology and how they are combined among the teaching staffs at the Primary School Teacher's Training department of Baise University.

1.2 Research Objectives

Using the TPACK questionnaire and measuring scale designed Mishra & Koehler (2006) which is considered as one of the most useful frameworks for describing the types of knowledge that teachers should master in integrating technologies effectively in their teaching, the research objectives are as follow:

1.2.1 Demonstrate the current situation of primary school teachers' training program instructors' proficiency of using technology in teaching.

1.2.2 Assess the readiness of the teachers in the adoption of TPACK

1.2.3 Highlight the strength and lacking in the integration of technological, pedagogical and content knowledge for effective teaching and learning

1.3 Research Question

1.3.1 How proficient are the teachers in the use of technology in teaching?

1.3.2 To what extend are the teachers ready in the integration of TPACK in their teaching?

1.3.3 In which aspects of the TPACK where teachers regard as inefficient?

1.4 Research Method and Analysis

This IS adopts a quantitative research method and all data from the closed-ended survey are analyzed with the Statistical Package for the Social Sciences (SPSS).

1.5 Significant of the Study

Many studies on the integration of innovative technologies into education systems usually report that the primary causes of failure or success lie mainly in the teachers' knowledge and attitudes toward the change (Giles & Hargreaves, 2006; Hattie, 2009). The findings of this study will help teachers in the primary school teacher training department at Baise University to assess their readiness in the adoption of TPACK. The results will indicate the strength and weaknesses in the integration for effective teaching and learning. The greater understanding will enable teachers to adapt and adjust to teaching mechanism. The improved teaching mechanism will facilitate better teaching which ultimately benefit the overall learning satisfaction and performance of the students.

1.6 Limitations of the Study

While this study provides valuable insights for the improvement of the TPACK framework, it has some limitations. First, the sample of this study is relative small comprising of about 50 respondents. The findings are based on self-reported data of teachers' perceptions of their TPACK knowledge domains. In view of the

current Covid 19 pandemic, the researcher is unable to conduct in-depth focus group and the study has been carried out by using quantitative research methodology. Even though such quantitative data is considered valuable to draw some inferences, it is also seen crucial to collect some qualitative data in order to better understand the reasons underlying those results. To overall this restriction, the researcher will incorporate open-ended questions for insightful feedbacks from the respondents. Supporting studies based on quantitative data with qualitative data is considered to be very useful to understand the reality of the results acquired in a study. Therefore, the researcher suggests further studies to use mixed-methods approaches to better understand the social reality underlying the results in the study.

1.7 Research Framework

   The research framework of this paper is presented in Figure 1.1 as shown on the following page.

Literature review

Selected topic and Significance of the research

Research

Theories

| Teaching Mode | Professional training | Curriculum setup |

| TPAK | Primary Education | Effective Teaching | Teaching Management |

Effective Teaching based on TPACK Theory

| TPACK Theory system | The present situation of Teaching in Baise University |

Teaching theory

| TPACK theory | Teaching Method | Teaching Resources |

| Different integration dimensions | The Best Application path of TPACK Theory |

Carry out teaching reform

Conclusion and countermeasure

Summary and prospect

Figure 1.1: Research Framework of the IS

CHAPTER 2

LITERATURE RVIEW

2.1 TPACK Teaching Model in China

Classroom teaching is the foundation of university education and the main channel for normal students to receive higher education in China. From the measurement of classroom and teaching management, many Chinese and international researchers have attempted to investigate factors influencing effectiveness of teaching to improve the teaching performance and improvement in teachers' training. In recent years, the application of the TPACK model has become an important tool helping teachers to promote students' independence, initiative and creativity in learning. TPACK model optimize enables innovative teaching and enhance education, improve the teaching effect of primary education and promote the all-round development of students.

The effective teaching method based on TPACK company theory is also of great significance for the scientific construction of a curriculum system that supports "multi-ability" and "one specialty", and the establishment of curriculum objectives and curriculum contents that serve the objectives and specifications of personnel training. The followings section comprises of the literature review of Chinese scholars on the effective teaching methods of primary education and the application of TPACK theory in the field of teaching.

The structure of this chapter consists 5 main parts. These are as follows:

1) Introduction to the Primary Education Specialty and current research in this field

2) Research on classroom effective Teaching methods

3) Introduction to TPACK Theory

4) Research into the application of TPACK model

5) Conclusion

2.2 Primary Education Specialty

The teacher training for primary education major has many implications and benefits. It meets the needs for educational reform and development, develops students morally, intellectually, physically and aesthetically. It also implies modern educational concepts, good professional ethics and professional emotions. It broadens basic knowledge, builds solid educational theory, produces skillful teachers, innovative consciousness and ability, competent for the teaching of various subjects in primary schools, Advanced applied educational talents engaged in educational scientific research, educational administration and other management as well as similar professional fields.

In addition, mastering the basic principles of Marxism and the theory of socialism with Chinese characteristics, establishes a better world outlook in terms of life and values. Other benefits include abiding the law, loving the cause of education and loving children, talents majoring in primary education need to have a full understanding of the theoretical frontiers of educational disciplines, the actual situation and development trend of educational reform, in addition to the basic quality requirements such as good social morality and teachers' professional ethics. This requires them to have advanced educational ideas, to master systematic and solid theoretical knowledge of educational science, to have solid basic knowledge of

humanities and social sciences, natural sciences and aesthetic literacy, and to master a foreign language and computer and information technology. reach the level set by the state.

2.3 Research on the Major of Primary Education

National requirements for the training of professionals in primary education In 2019, the state put forward new requirements for the training of talents in primary education. Zhao & Cheng (2019) considered the change in the requirements for professionals in primary education, the teaching of primary education should reform classroom teaching, guide teachers to change the traditional way of classroom learning, encourage teachers to teach TPACK, and carry out theme discussions. Discuss teaching, on-the-spot teaching and so on. Li (2019) the goal and specification of talent training should be established from the following four aspects: national requirements, teacher qualifications, teacher recruitment and examination, and job requirements. Li (2019) to establish a well-directed talent training goal and specification "multi-ability and one specialty" training model should take into account the national requirements, teacher qualifications, teacher recruitment and examination, and job requirements. Finally, it achieves the talent training goal and specification of "meeting the standard (national standard), getting (teacher qualification), passing the examination (teacher establishment), and teaching well (to meet the needs of primary school posts)". The employment direction of graduates majoring in primary education.

Zhou & Wu (2019) further added that besides teaching at primary school, he might work in educational administrative departments, educational consulting

institutions and similar professional fields of education. Zhou & Wu (2019, pp. 40-44) also pursued master's and doctoral degrees in pedagogy and psychology, such as pedagogy principles, development and pedagogy, curriculum and teaching theory, subject teaching theory, and so on. Therefore, in its training, attention to the formation of its theoretical knowledge literacy system and reduce unnecessary preaching. Zhao & Cheng (2019, p. 2) cited that the training unit needed to construct an overall evaluation system of talent training from the entrance, process to export, and make an objective and scientific evaluation of the training of professionals. In the entrance, we need to control the quality of the source of students, and be able to select students who really love primary education, have the feelings of primary education, have the spirit of dedication and meet the requirements of professional training in the new era.

Generally speaking, the construction of primary education major in Yan (2019, pp. 49-50) must further improve the mode of personnel training scientifically, clearly train comprehensive senior applied primary school general subject teachers in the professional orientation, and fully realize the synchronous training of subject professional education and teacher education on the basis of giving prominence to general education in the setting of curriculum. In the construction of qualified teachers, we should be closer to the practice of primary education and the needs of local education, and really provide high-quality talent guarantee for primary education under the background of the new curriculum reform.

2.3.1 Curriculum design and curriculum construction

In recent years, many scholars have studied the curriculum setting and curriculum construction of primary education majors. Some scholars believe that the

undergraduate colleges of primary education should implement the curriculum model of dividing liberal arts and science subjects, follow the requirements of national normal students' professional development in the curriculum system, standardize the total credit and the proportion of credits, especially implement targeted curriculum settings for liberal arts and science majors. There should be both prominence and integration. Liu (2019) noted that doing a good job in the construction of practical curriculum in primary education is the key to ensure the effect of primary education. Teachers should pay more attention to the construction of practical courses by implementing practical courses with the combination of decentralization and concentration, introducing diversified teaching, paying attention to the construction of educational practice bases, changing the single way of curriculum evaluation, and so on. Better build practical courses and ensure teaching quality.

Taking the primary education major of Guangxi normal University of Science and Technology as an example. Zhang (2019, pp. 26-30) explored the curriculum system of teacher education with the integration of theory and practice. It is considered that the teacher education curriculum with the integration of theory and practice should also be an interactive curriculum constructed in a real or simulated teaching situation. In the curriculum, students achieve their own development and role shaping through dialogue and communication, reflection, revision, comprehension and other ways.

In addition, there are some schools that integrate science in liberal arts and liberal arts in science, give consideration to disciplines and strive for soft development under the premise of highlighting the direction of arts and science. For example, the direction of liberal arts is "primary school mathematics teaching

design", and the direction of science is "primary school Chinese teaching design". In this way, we can focus on the thinking structure from knowledge content to logical theory, establish the concept of "big education", and make students adapt to the curriculum teaching arrangement of basic education schools.

Therefore, from the perspective of general subject teacher training by Li (2019, pp. 40-44), the optimization of the curriculum system of primary education major needs to be based on a clear training goal and based on the orientation of professional value. Optimize and adjust the current curriculum configuration of primary education majors, the choice of curriculum types, the improvement of curriculum content and so on. This requires the cooperation of liberal arts and science professors and pedagogy experts to design a more perfect curriculum training system for students of this major.

2.3.2 Teaching and Education Management Model

Yang (2019, pp. 202-203) cited that when controlling the quality of education, when educational administrators are formulating and managing different types of systems, all teaching links should be incorporated into the management of primary education. In the process of primary education management, we should gradually focus on the quality control of the whole teaching process. This can not only promote the coordination and cooperation between various disciplines, but also effectively improve the quality of students' homework. Joyce, Roberta, Jonathan, David & Dong (2019, p. 14) mentioned that through the study of the educational management model of Chinese educational circles, the teaching management model of primary education major in China should be based on the understanding of the goal of teaching value and the pursuit of enlightenment to students' wisdom. In the

organization and implementation of education and teaching, we should creatively interpret the text grasp the game between presupposition and generation, and adaptability. In terms of teaching management, Cai (2019, pp. 62-63) reckoned that to establish an Omni-directional cooperative education mechanism, it is necessary to establish the concept of mutual integration and win-win cooperation between schools and places, and to regard teacher training as the common responsibility of universities and employers; the second is to establish a regular communication mechanism, build a carrier of cooperation and exchange, and implement the content of cooperation. For example, Qin (2019, pp. 73-75) pointed out that primary School may employ university teachers to participate in teaching reform and scientific research activities, or arrange students to serve as assistant head teachers and teaching assistants. This is not only conducive to the arrangement of school practice teaching activities, promote the improvement of teachers and students' teaching practice ability, and establish a long-term cooperation mechanism In short, Yu (2019) suggested that "people-oriented" management model should not only change the management system, but also change teaching objectives and update teaching ideas. The goal is to cultivate students' comprehensive ability, rather than the traditional examination-oriented education. Normal school must adhere to the innovative concept of teaching evaluation, combined with the existing teaching evaluation system and the actual situation of the school; effectively promote the development and progress of teaching quality.

2.4 Classroom Effective Teaching Method

2.4.1 Defining of effective classroom teaching method

In the traditional sense, classroom is used for teaching activities. Teaching, on the other hand, refers to the activities of teachers' in teaching and students' learning. The "effectiveness" in this study evolves the investigation into "class teaching". It is a kind of organizational form of teaching. Popularly speaking, it means that in a relatively fixed teaching environment, teachers treat a relatively fixed group of students. And a series of teaching activities completed in a relatively fixed and effective time. Throughout the definition of effective classroom teaching at home and abroad, mainly from the perspective of economics, refers to efficient teaching. It is mainly to use the relationship between input and output in economics to determine whether a teacher's teaching in the classroom is efficient or not. It not only comes from practice, but also can rise to the theory, and finally to better guide the practice. Since it can be defined, such a large concept should be decomposed into sub-concepts, which can be explored deeply and evolved into different meticulous research directions, and the final research results are bound to greatly promote modern classroom teaching.

2.4.2 Research on effective teaching method

In classroom most of the research on effective teaching method in classroom is based on the applied research of primary education, and the effectiveness is verified by carrying out teaching practice activities to verify the effectiveness of teaching methods, teaching models and so on, and get the corresponding results, in recent years, there are mainly the following representative.

Through the investigation and analysis of the training precedents of "general

primary school teachers' in 34 normal universities in China, Li (2019) remarked that although the example of general subject education in higher normal education is more successful, however, in the current situation of "general primary school teachers" training expectations, the effectiveness of its normal student education is difficult to meet the requirements of the Internet era. Therefore, we should change the way according to the reality of our own school to meet the current requirements of training students majoring in primary education.

Zhou & Wu (2019, p. 108) stated that through the investigation and analysis of the reform of primary education major in 28 local colleges and universities, pointed out that teaching management should be vigorously promoted in university classroom reform and also focus on the concept of university classroom reform and carry out eight transformational ideas. Attention should be paid to organizing teachers in the teaching and research offices of primary education to attend seminars and collective discussions after listening, including college leaders, professional responsible persons, the team of directors of the teaching and research departments, and young teachers to listen to classes of high-level talents.

From the perspective of the professional construction of primary education in schools, Chen (2019, pp. 90-92) further examined the professional construction of primary education in 21 emerging normal universities, and believed that a comprehensive, objective and reasonable diversified assessment system should be established to promote teaching with evaluation, build the style of study with evaluation, and improve quality of teaching with evaluation.

From the perspective of teaching management and based on an empirical study of primary education majors in 24 normal schools along the southeast coast,

Zhao & Cheng (2019) stated that teachers should gradually extend their power to students, respect students' individual differences, and let students give full play to their subjective initiatively. Realize the self-management of education. In the teaching management, the school should carry out theme activities regularly and irregularly to spread the correct teaching concept to the teachers and students of the school.

For teaching methods, Xie (2020, pp. 48-50) conducted an empirical analysis and research on the teaching effectiveness of primary education majors in 126 colleges and universities. He found that in the major of primary education, the principle of combining online teaching with offline teaching, fully combined with online resource learning curriculum theory, and offline teaching practice, including case analysis, task-driven, centralized discussion, social practice and other ways, can effectively improve students' curriculum application ability from the current situation of angry money classroom teaching, Gu (2019, pp. 99-100) made an investigation and analysis on the effectiveness of classroom teaching of primary education majors in Hezhou College, fully understood the current situation of classroom teaching through classroom observation, student questionnaires and teacher interviews, and analyzed the attribution of the problems existing in classroom teaching from three aspects: schools, teachers and students. She also improves the effectiveness of current college classroom teaching by improving the education and teaching level of teachers, improving the methods and strategies of college students' classroom learning and reforming the school teaching and management system.

In short, in order to improve the effectiveness of primary education and teaching, Wang (2019, pp. 205-206) concluded after an empirical study of 12 normal universities majoring in primary education: in terms of communication and

cooperation, it is necessary to stimulate the pleasant experience of the common growth of teachers and students; pay attention to the comprehensive and individual development of students in motivation and evaluation; and pay attention to self-growth and life-long development in terms of reflection and development. What is more, we should not let the training of undergraduate professionals in primary education in normal colleges and universities bear too much pressure.

2.5 TPACK Theory

2.5.1 TPACK Theory Introduces

TPACK is the abbreviation of Technological Pedagogical Content Knowledge, that is, the subject teaching knowledge of integrated technology. The TPACK model by Mishra & Koehler (2006) is an ongoing internal integration and potential tapping activity that involves an in-depth understanding of the complex network of relationships between content, pedagogy and technology and their environment. The framework of TPACK arises from the concept that technological integration in a specific educational context benefits from the careful combination of content, pedagogy and technical strength, which requires teachers who use technology in teaching practice to have a certain level of application in these three fields. TPACK is interpreted as the integration of tool knowledge and its provision, pedagogy, content and learners.

In TPACK theory, the framework of its integration is synchronized with the educational background. TPACK is of high value to some problems in the field of pedagogy, or to some specific topics that are troublesome to learners and difficult for teachers to express clearly. Moreover, TPACK embodies its unique value and plays a

unique role in how to transform and carry out teaching more effectively through technology. At the core of the TPACK framework are multiple interactions of three main forms of knowledge: content (CK), pedagogy (competition), and technical knowledge (TK). The design of TPACK goes beyond the understanding of the separation of these three knowledge bases. The TPACK framework further emphasizes three key concepts of teaching content knowledge (PCK), technology content knowledge (TCK), technology teaching knowledge (TPK) and technology teaching content knowledge (TPACK).
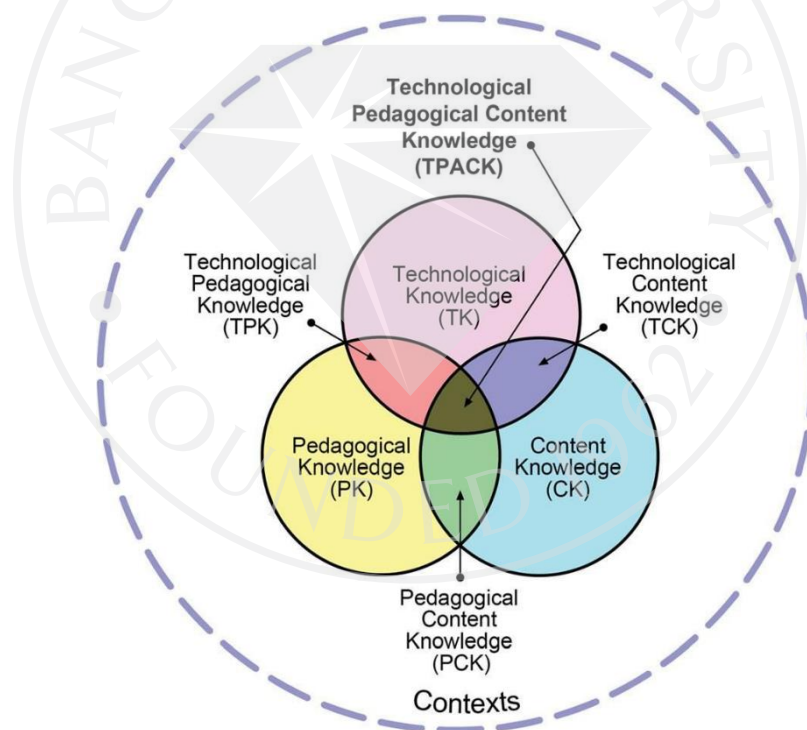

Figure 2.1: Theoretical Framework Diagram of TPACK

The integration of TPACK has many dimensions, such as integrated technology subject teaching knowledge (TPCK), technology teaching knowledge

(TPK) and so on. At present, scholars in academic circles have studied the major of primary education from many perspectives and these studies were of great help to the construction of primary education in our country. Therefore, in the general subject teacher training, the application of TPACK theory to promote the scientific training of general subject teachers can further clarify the current situation of general subject teacher training and promote the scientific development of primary education.

TPACK helps to make in-service teachers face the real teaching environment. In the process of training normal students, we can increase the communication between normal students and in-service teachers and enrich the form and connotation of the curriculum by inviting front-line teachers to give lectures or lectures, and for normal students and front-line teachers to form a learning community. Through active communication with front-line teachers who carry out TPACK teaching reform activities, we can update teaching ideas and optimize the knowledge structure of normal school students.

2.5.2 Research on the application of TPACK theory

Li (2019, pp. 46-48) emphasized that TPACK is individual and situational and that in-service teachers work involved real teaching environment. In the process of training normal students, teachers can increase the communication between normal students and in-service teachers and enrich the form and connotation of the curriculum by inviting front-line teachers to give lectures and for normal students and front-line teachers to form learning community. Through active communication with front-line teachers, not only can teachers update normal students' teaching ideas, but optimizes their knowledge structure and improve their TPACK.

In the training of talents in primary education, Zhu (2019, pp. 76-78) the idea of building a "3 + 4" applied talent training model based on TPACK as a new achievement in the reform of normal school students' educational management. Under the requirements of the reform of TPACK teaching theory, primary education major is not only an important part of normal school students' educational reform, but also an inevitable way to make up for educational deficiencies in the new era. Co-ordinate the different integration ways of TPACK theory, change the influencing factors of teaching quality evaluation of primary education major in normal school students, and grasp the teaching needs and evaluation elements. This is an important way to promote the sustainable development of primary education major in normal school students.

In the process of training, Joyce, Roberta, Jonathan, David & Dong (2019, pp. 13-14) cited that can adopt all kinds of effective methods and means, such as TPACK theory system, through the combination of TP, competition and CK to reform the curriculum system, such as professional examination and examination, the evaluation and evaluation of students' comprehensive quality, the examination of students' practical teaching ability and so on. Relying on the combination of TPK, TCK and PCK, we can provide timely feedback on the training effect of innovative talents in primary education, and make timely and effective improvements according to the feedback results, so as to make the professionals trained in primary education more in line with the requirements of the current and future development of primary education in our country.

In the teaching mode, Jiang (2019) promoted the comprehensive teaching evaluation model through the subject research, adopted advanced evaluation, and aimed at cultivating students' professional quality. Synthesizing the TPACK theory, the model of TK and CK theory is a more modern education model, not only to enhance the theoretical knowledge of students, but also to improve the core literacy of students, and cultivate students' innovative ability and practical ability. At the same time, Zhu (2019, pp. 162-165) pointed out that strengthening students' sense of subjective participation and cultivating students' independence, initiative and creativity in the process of teaching were important concepts to optimize the function of teaching and education, improve the teaching effect of primary education and promote the all-round development of students. While TPACK theory pays attention to respecting students and cultivating students' learning motivation in the teaching process, the TPK combination integrates teaching behaviors such as heuristic explanation and demonstration, learning method guidance, timely evaluation, practical innovation and so on. It is an effective model of classroom teaching behavior in primary school education in cultivating students' subjectivity, and it is worth using for reference.

At present, there are many problems in the teaching practice ability of students majoring in higher vocational primary education in terms of teachers' basic skills and teaching ability. Luo (2019, pp. 43-45) reckoned that teachers should improve the training mode and inherit the characteristics of primary education. Based on the integration principle of TPACK theory, the use of information-based teaching to increase the proportion of practical teaching in the course of teaching methods; reform the teaching methods based on TCK combination to establish an exemplary

role.

Ding (2019, pp. 29-130) stated that from the "problem-oriented" direction of classroom teaching reform of theoretical courses, Ding tried to use TPACK and other theoretical systems to construct a new classroom teaching model of "Primary School Pedagogy" in normal universities. As one of the products of the development in the field of modern education, the major of primary education under the background of core literacy is of great value in cultivating students' comprehensive ability and literacy.

Therefore, in terms of teaching methods, Zhou & Wu (2019, pp. 104-108) said that according to the different combination dimensions of TPACK theory, such as TPK, PCK, etc., rely on teaching activities such as observation classes, high-quality demonstration classes, teaching competitions, etc., reform classroom teaching, guide teachers to change the traditional way of classroom learning, encourage teachers to explore case teaching, topic discussion, discussion teaching, on-the-spot teaching, etc. to improve students' ability to analyze and solve problems as well as research and innovation.

In the field of online learning, Chen (2019, pp.48-50) used the TPACK model, collected students' apps online learning and evaluate the used of platforms and software during the Covid 2019 pandemic. The findings based on the relevant integration process, revealed students' learning habits, learning interests and knowledge, and improve the way of online courses and face-to-face teaching. This is an important application direction of technology integration of TPACK in teaching.

Based on the TPACK system, Tang (2019, pp. 89-92) recommended that teachers must adhere to the evaluation concept of education-oriented, student-

centered and in-depth study of the characteristics of normal students in primary school normal school education. Tang (2019, p. 145) further suggested teachers to let TPACK teaching theory promote the evaluation system of comprehensive personality development of teaching methods and models, promote PCK combination model and pay attention to students' growth in an all-round way, as well as promoting teaching model to keep pace with the times. Liu (2019, pp.169-170) research also indicated that scientifically construct a curriculum system would support "multi-ability" and "one specialty", and establish curriculum objectives and curriculum contents that serve the objectives and specifications of personnel training. Under the framework of TPACK system, teaching should strengthen particularly on the training of teachers' basic skills to integrate them into daily classroom teaching, and improve the practice mode to cultivate practical abilities.

2.6 Conclusion

This literature Review clarifies and explains what is the major in primary education, and what is effective teaching method in the classroom, as well as in depth understanding of the TPACK model in teaching. It also introduces how academics and front-line teachers in education can carry out their work in order to realize the deep integration of theory and practice of educational curriculum and to train qualified primary and secondary school teachers in the future teaching mode, teaching management and curriculum design.

From the above literature review, we can see that at present, scholars in academic circles have studied the major of primary education from many angles, and these studies are of great help to the construction of primary education major in

China. However, at present, there are few literatures about the effective teaching methods of primary education based on TPACK theory in the academic circles, such as teaching methods, teaching mode research, educational talent training path, curriculum setting and curriculum construction, teaching and educational management mode and so on.

In other words, there is little research on the teaching method and teaching mode based on TPACK theory, the training path of TPACK education talents, the curriculum setting and curriculum construction path of effective teaching, the teaching and educational management mode matching TPACK theory, and so on. Moreover, the color of most of the teaching practice is heavy and the theory is relatively weak, especially the lack of targeted model construction research. Primary education majors are required not only to have basic theoretical knowledge, but also to have the basic abilities of teaching and curriculum development, educational management, educational and scientific research in primary schools.

Moreover, considering the increasing competitiveness and sustainable development ability of educational professional posts or related fields, some teaching methods and theoretical systems based on the effective combination of TPACK have been paid more and more attention. Therefore, students majoring in primary education should be trained to acquire knowledge, ask questions and solve problems independently, so that they can meet the needs of theory-based primary education and teaching, educational management, education and scientific research and similar professional fields. Therefore, each university has its own talent training orientation under the background of different geographical location, different level of economic development, different society and custom culture. Therefore, this study chooses the

primary education major of Baise University as the research object to study its teaching effectiveness, which can not only play the role of combining theory with practice, but also play a complementary role to the former research. enrich the relevant literature reference.

CHAPTER 3

METHODLOGY

3.1 Introduction

This chapter gives an outline of research methods that were followed in the study of the use of TPACK teaching method in primary education major at Baise University. The researcher describes the research design that was chosen for the purpose of this study and the reasons for this choice. The instrument that was used for data collection is also described and the procedures that were followed to carry out this study are included. It also provides information on the participants, that is, the criteria for inclusion in the study, who the participants were and how they were sampled. The researcher also discusses the methods used to analyze the data. Lastly, the ethical issues that were followed in the process are also discussed. Since this paper mainly studies the teaching method of primary school education teachers in Baise University, China, the selected samples are all the teachers who teach primary school education in Baise University.

3.2 Research Design

A research design describes the procedures for conducting the study, including when, from whom, and under what conditions the data will be obtained and analysed for required information. This helps to increase the validity of the questionnaire and gain more responses. This study employed the mixed method design which is the combination of qualitative and quantitative approach to collect and analyze data (Creswell & Plano Clark, 2007). A Qualitative approach refers to

the in-depth investigation and is more descriptive than numerical (Saunders, Lewis &

Thornhil, 2007). Qualitative approach, on the other hand involved the interpretation

of phenomena without depending on numerical measurements or statistical methods.

It is more concerned with observing, listening and interpretation of phenomena. The

use of both qualitative and quantitative data approaches reinforces each other (Kombo

& Tromp, 2009) In recent years, integrating qualitative and quantitative methods

becomes common in research (Bryman, 2006) because mixed method design can

provide detailed and comprehensive data in order to achieve the research objectives

and answer the research questions. This study employed the exploratory model on the

basis that little is known about this area. The qualitative research contained 3 in-depth

interviews followed by 50 quantitative data collection. Exploratory studies are a

valuable means of understanding what is happening; to seek new insights; to ask

questions and to assess phenomenon in a new light (Yin, 1994). This study was

conducted in two phases. The following Table 3.1 shows the steps taken for the two

phases.

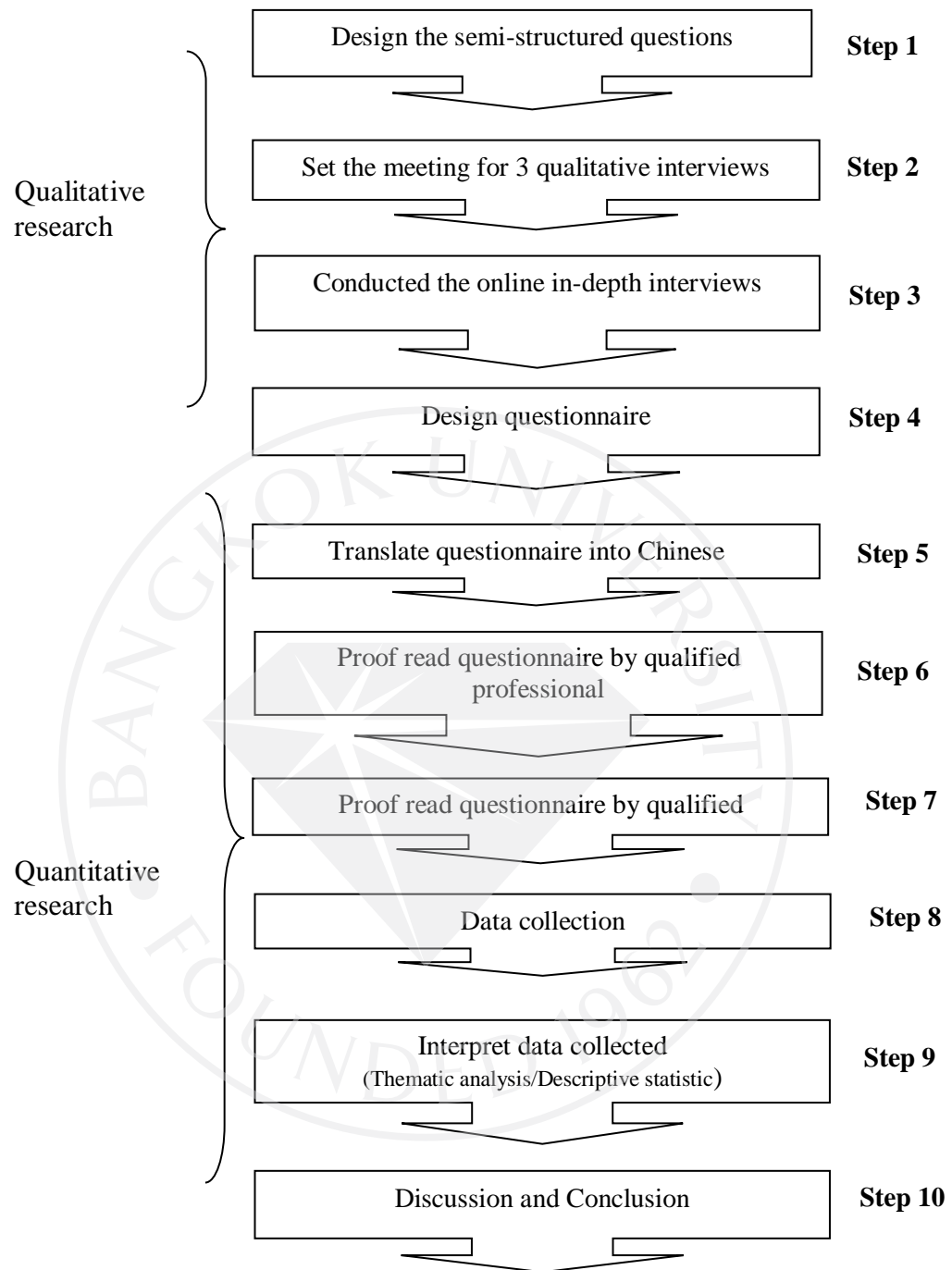| | Design the semi-structured questions | **Step 1** |
	Set the meeting for 3 qualitative interviews	**Step 2**
Qualitative research	Conducted the online in-depth interviews	**Step 3**
	Design questionnaire	**Step 4**
	Translate questionnaire into Chinese	**Step 5**
	Proof read questionnaire by qualified professional	**Step 6**
	Proof read questionnaire by qualified	**Step 7**
Quantitative research	Data collection	**Step 8**
	Interpret data collected (Thematic analysis/Descriptive statistic)	**Step 9**
	Discussion and Conclusion	**Step 10**

Figure 3.1: The Flowchart of the Research Process

3.3 Sampling Method

In this research, the researcher uses purposeful sampling in both studies. Mugenda & Mugenda (1999, p. 50) observe that purposive sampling is a technique that allows a researcher to use cases that have the required information with respect to the objectives of his or her study. It is also a commonly used technique for qualitative research to identify and select information rich cases for the moat effective use of limited resources (Patton, 2002). For the qualitative research, 3 instructors have been selected for in-depth interviews. Due to their direct involvement in the teaching process, these participants are especially knowledgeable and have experienced with a phenomenon of interest (Cresswell & Plano Clark, 2011).

In addition to knowledge and experience, the availability, willingness to participate, the ability to communicate experiences and express opinions in an articulate and reflective manner is crucial (Bernard, 2002; Spradley, 1979). The sampling methods in both quantitative and qualitative are intended to maximize efficiency and validity (Morse & Niehaus, 2009).

The initial method used in this study was qualitative. Understanding that the sample selected might be too small and lack randomization, a quantitative research questionnaire was implemented after that.

3.3.1 Selection of sample for interviews

The in-depth interviews were carried out online on video conference. In so doing, the researcher was able to see the interviewees and the discussion was carried out individually for a time period of about 30 minutes. The participants comprised of teachers of different ages ranging from late 20s to mid 40s. Teacher A was a male instructor with 18 years of teaching experience. He specialized in Teaching

Methodology. He was in his late 40s. The second participant had 5 years teaching

experience and specialized in General Education. He was in his early 30s. The last

participant, taught Primary School Education. She was the youngest among the three

interviewed and had three years of teaching experience. These participants were

asked about their opinions and perspective of the 7 dimensions of TPACK. They were

able to provide insightful information. The interviews were carried out on 3 different

days. For participant A, the interview was conducted on 17th April 2020, Participant

B was on 22nd April 2020 and Participant C was on 28th April 2020. A summary table

of the in-depth interviewees are presented in Table 3.2 as shown below.

Table 3.1: Details of participants in the interviews

Participants	Teaching field	Age	Years of experience	Date of interview	Duration of interview
Participant A	Teaching Methodology	Mid 40s	18	17/4/2020	30 minutes
Participant B	General Education	Early 30s	5	22/4/2020	30 minutes
Participant C	Primary School Education	Late 20s	3	28/4/2020	25 minutes

3.3.2 Selection of Sample for survey questionnaire

The survey questionnaire was distributed to 100 teaching staff members of the Baise University by the official working QQ chat group. The survey questionnaire was posted on 8th May 2020 and 80 teachers responded and the last day of collection was on the 11th May 2020. The address of the group chat was 282344969qq. The teachers were requested to enter a link to complete the survey. The link is https://www.wjx.cn/jq/75195941.asp. This is an active QQ chat group and it is the official communication channel for all the teaching staffs **at** Baise University. A caption of the chat group is presented on Figure 3.1 and the page with the link is on Figure 3.2 on the Following Page

Figure 3.2: The QQ chat group of the Primary School Education teaching staff

Figure 3.3: Online survey questionnaire link for the Primary School Education

teaching staffs

3.3.3 Interview questions and data analysis

To analyze the data, the researcher used thematic analysis, categories and

patterns for the interpretation of data. The data were first analysed using coding

system whereby a number is allocated according to themes and then further

categorize according to the 7 dimensions in the TPACK model. The list of questions

based on the given dimensions are presented in the Table 3.3 as presented on the

following page.

Table 3.2: In-depth Interview Questions

1	Technological Knowledge (TK)	What kind of pedagogy do you think students can accept? What do you think are the disadvantages of participatory teaching methods for students? How did you design your teaching goals?
2	Content Knowledge (CK)	What do you think of your teaching goals? What kind of teaching goals do you think are accurate? How did students complete in accordance with the teaching objectives?
3	Pedagogical Knowledge (PK)	How do you usually design your teaching process? On specific situation, what kind of teaching method did you use in the teaching process? How did students complete in accordance with the teaching objectives?
4	Pedagogical Content Knowledge (PCK)	How do you usually design your teaching process? On specific situation, what kind of teaching method did you use in the teaching process? How would you rate the cooperative inquiry of students in your class?
5	Technological Content Knowledge (TCK)	What are the characteristics of the students in your class during class? What kind of teaching goals do you think are accurate?

Table 3.2 (Continued): In-depth Interview Questions

6	Technological Pedagogical Knowledge (TPK)	How do you adjust your teaching methods based on the students' response to the class? What content do you mainly refer to complete your teaching goal design?
7	Technological Pedagogical Content Knowledge (TPACK)	What are the more complete learning mechanisms in your TPACK class?

范畴	编码样例
TK（技术知识）	A12讲授式，针对学生依赖性习惯；B老师 A68理论联系实际；A老师 A117培养计划，面向本专业的未来职业答疑；B老师 A79参与式教学方法：教师控场能力。A老师 A178建立固定的知识点，自我认知与感受。A老师 A25情景教学法，讨论法，案例教学法；C老师 A66讨论式：比较活跃，喜欢发表自己的看法；B老师 A102参与式教学：兴趣因素，取决于学生的回答；B老师 A23课后征集学生兴趣点和疑问点，作为下次答疑点；B老师

Figure 3.4: The thematic analysis of the interviews are presented (Chinese screenshots)

Table 3.3: Interview Questionnaire Analysis

Scope	Code sample
TK	A12 Lecturing, targeted at students' dependent habit; B teacher
	A68 Combine theory with practice; A teacher
	A117 Training program, answer questions for the future profession; B teacher
	A79 Participatory teaching: teachers' class control capability. A teacher
	A178 Set fixed knowledge points, self-cognition and perception. A teacher
	A25 Situational teaching, discussion, case studies; C teacher
	A66 Discussion mode: more active, prefer to express their views; B teacher
	A102 Participatory teaching: factors of interest, depending on students' answer; B teacher
	A23 Collect students' interest points and questions after class as the next explanation points; B teacher
	A62 Low class efficiency, not suitable for all levels of students; C teachers
	A31 Social demands, talent training programs, students' physical and mental development characteristics. C teacher

(Continued)

Table 3.3 (Continued): Interview Questionnaire Analysis

Scope	Code sample
CK	A16 Care about students' growth, take students' future development as the starting point; B teachers
	A41 Notice before class; leave time for questions after class; B teacher
	A31 Set reasonable goals, to promote student development; C teacher
	A83 Teachers produce outlines, lecturing program, course ware. A teacher
	A125 Cause antipathy being judged plagiarism in homework and exams; A teacher.
	A9 Opposite to the instrumentalization of education, respect for the choice and fate of students; A teacher
	A72 Personality development, synchronized rational thinking and knowledge construction; A teacher
	A98 Expand thinking through classroom teaching and extracurricular activities. C teacher

Table 3.3 (Continued): Interview Questionnaire Analysis

Scope	Code sample
PK	A68 Set theoretical position of the curriculum according to the requirements of given goals; B teacher
	A46 Integrate knowledge points, oriented from students' interests and doubts; B teacher
	A78 Practical guidance, passing knowledge while answering questions. A teacher
	A48 Dispute resolution mechanism for work assignment based on students' study habits; B teacher
	A43 Set three-dimensional goals in line with the goals of the student's proximate development area; C teacher
	A53 Emphasize the cultivation of independent observation and analysis ability, attach importance to cooperative inquiry. B teacher
PCK	A58 Assign a series of in-class and after-class tests; A teacher
	A91 Extracurricular reading and post-reading writing; A teacher
	A112 Certain field practical observation and analysis reports as assessment; A teacher
	A153 Strict teaching plan and schedule design. B teacher
	A44 Assessment program is officially reviewed and backed up by the college and the teaching and research office; A teacher

Table 3.3 (Continued): Interview Questionnaire Analysis

Scope	Code sample
PCK	A76 Complete the tasks and assignments assigned by the teachers, exhausted; A teacher A104 Students ability and self-cognition can't reach; C teacher A96 Form hot and cold zones and gradually reinforce. A teacher
TCK	A18 Inform the course objectives before class, assign homework for evaluation after class; B the teacher A40 Adopt appropriate organization and implementation methods according to teaching objectives; C teacher A312 Complete group assignments, and carry out mutual evaluation in group. C teacher A65 Generally divide into introduction, expansion and ending; C teacher A56 Break down the knowledge points according to the selected teaching materials; A teacher A99 Refer to other teacher materials who have taught this course for guarantee; A teacher A88 Combine different courses and apply new teaching techniques. B teacher

(Continued)

Table 3.3 (Continued): Interview Questionnaire Analysis

Scope	Code sample
TPK	A105 Students must develop plans for self-learning; B teacher
	A77 Change teaching methods or assign plans and personal tasks; A teacher
	A92 Dynamic adjustment according to teaching evaluation results; C teacher
	A114 Improve the program with more after-school interaction, online and offline communication. B teacher
TPACK	A34 National overall educational thinking and style; A teacher
	A71 Teaching arrangements for education authorities, schools and colleges; A teacher
	A82 The quality of student source, bachelor, master and doctor level. A teacher
	A48 Carry out teaching according to specific conditions B teacher
	A92 Assign homework and class notes; C teacher
	A128 Concretize and quantify evaluation criteria; C teachers
	A93 Reinforce the effect through QQ, WeChat and direct communication. C teacher

3.3.4 Survey questionnaire and data analysis

The research adapted and used the TPACK survey questionnaire designed by Schmidt, Baran, Thompson, Koehler, Mishra, & Shin (2009). For the current study, the researcher translated the survey questionnaire into Chinese with the guidance of a qualified linguistic profession, Dr. Luo Qiu Xue from the Baise University. China adaptation were made further to the questionnaire for appropriate application to the context of the study. The 72 questions had been adjusted to 24 questions to answer the research questions. The adaptation had been carefully studied for suitability and appropriateness to the research scope. The survey questionnaire is presented on the Table 3.4.

Table 3.4: Survey Questionnaire (Chinese version)

项目	非常不同意	不同意	一般	同意	非常同意
TK (Technology Knowledge)	1	2	3	4	5
1. 我知道如何解决自己遇到的技术问题。					
2. 我可以很轻松学会相关技术并运用于教学。					

(Continued)

Table 3.4 (Continued): Survey Questionnaire (Chinese version)

项目	非常不同意	不同意	一般	同意	非常同意
TK (Technology Knowledge)	1	2	3	4	5
3. 我可以适应重要的新技术。					
4. 我拥有使用技术所需的技能。					
CK（学科内容知识）	1	2	3	4	5
5. 我有充分的小学教学专业知识。					
6. 我可以用小学教学专业的思维进行思考。					
7. 我有不同的方法和策略来提升自己对小学教学专业知识的认知。					

Table 3.4 (Continued): Survey Questionnaire (Chinese version)

项目	非常不同意	不同意	一般	同意	非常同意
PK（教学法知识）	1	2	3	4	5
8. 我知道如何评估学生的课堂表现，并运用多种方法进行评估					
9. 我可以根据学生目前对问题的理解程度来调整我的教学内容.。					
PK（教学法知识）	1	2	3	4	5
10. 我可以针对不同的学生调整我的教学风格。					
11. 我可以在课堂上使用各种教学方法。					

Table 3.4 (Continued): Survey Questionnaire (Chinese version)

项目	非常不同意	不同意	一般	同意	非常同意
12. (我非常熟悉一般学生的领悟力和误区，知道如何组织和维护课堂管理。					
PCK（学科教学知识）	1	2	3	4	5
13. 我知道如何选择有效的教学方法指导学生进行小学教育专业里相关课程的思考与学习。					
14. 我知道使用不同的教学方法以通过课堂教学和课外作业提高学生的思维能力。					

(Continued)

Table 3.4 (Continued): Survey Questionnaire (Chinese version)

项目	非常不同意	不同意	一般	同意	非常同意
PK（教学法知识）	1	2	3	4	5
TCK （整合技术的学科内容知识）	1	2	3	4	5
15. 我了解可以用于理解和进行 小学教育专业所教课程教学 的技术。					
16. 我知道如何针对不同的课程 应用适合于教学的新技术。					
TPK（整合技术的教学法知识）	1	2	3	4	5
17. 我知道如何选择用于增强课 程教学方法的技术。					

Table 3.4 (Continued): Survey Questionnaire (Chinese version)

项目	非常不同意	不同意	一般	同意	非常同意
18. 我知道如何选择用于提高学生课程学习能力的技术。					
19. . 我将运用批判性思维来思考如何在课堂上使用技术。					
PK（教学法知识）	1	2	3	4	5
20. 我知道如何针对不同的教学活动调整使用我所学习的技术。					
21. 我知道如何选择在课堂上使用的技术以完善我所教授的内容、教学方法以及学生所学习的内容。					

(Continued)

Table 3.4 (Continued): Survey Questionnaire (Chinese version)

项目	非常不同意	不同意	一般	同意	非常同意
22. 我知道如何在课堂上使用结合了我在课程作业中所学内容、技术和教学方法的教学策略。					
TPACK（整合技术的学科教学知识）	1	2	3	4	5
23. 我能教授适当结合小学教育专业课程、技术和教学方法的课程。					

(Continued)

Table 3.4 (Continued): Survey Questionnaire (Chinese version)

项目	非常不同意	不同意	一般	同意	非常同意
TPACK（整合技术的学科教学知识）	1	2	3	4	5
24. 我在教学过程中适当地采用学科教学内容、技术和教学方法相结合的模式。					

Table 3.5: Survey Questionnaire (English Version)

Item	Very disagree	Disagree	Normal	Agree	Very agree
TK	1	2	3	4	5
1. I know how to solve the technical problems I have encountered					

(Continued)

Table 3.5 (Continued): Survey Questionnaire (English Version)

Item	Very disagree	Disagree	Normal	Agree	Very agree
TK	1	2	3	4	5
2. I can easily learn the relevant technology and apply it to teaching					
3. I can adapt to significant new technologies.					
4. I have the required skills to apply the technology					
CK	1	2	3	4	5
5. I have sufficient professional knowledge for primary school teaching.					
6. I have the thinking mode of primary school teaching					
7. I have different methods and strategies to improve my professional knowledge of primary school teaching					

(Continued)

Table 3.5 (Continued): Survey Questionnaire (English Version)

Item	Very disagree	Disagree	Normal	Agree	Very agree
PK	1	2	3	4	5
8.I know how to evaluate students' classroom performance and employ various evaluation methods					
9.I can adjust my teaching content according to the students' current understanding					
10.I can adjust my teaching style for different students.					
11.I can apply various teaching methods in class					
12.I am quite familiar with the general students' understanding and misunderstanding, and know how to organize and maintain classroom management					

Table 3.5 (Continued): Survey Questionnaire (English Version)

Item	Very disagree	Disagree	Normal	Agree	Very agree
PCK	1	2	3	4	5
13.I know how to choose effective teaching methods to guide students to think and study relevant courses in primary education					
14.I know how to apply different teaching methods to improve students' thinking ability through classroom teaching and homework					
TCK	1	2	3	4	5
15.I master the techniques that can be used to understand and carry out the teaching courses in primary education					
16.I know how to apply new technologies for teaching different courses					

(Continued)

Table 3.5 (Continued): Survey Questionnaire (English Version)

Item	Very disagree	Disagree	Normal	Agree	Very agree
TPK	1	2	3	4	5
17. I know how to choose the techniques to enhance the teaching methods of the course.					
18. I know how to choose the technology to improve students' learning ability in courses.					
19. I will apply critical thinking to think about how to use technology in class.					
20. I know how to adjust the technology I have learned for different teaching activities.					

(Continued)

Table 3.5 (Continued): Survey Questionnaire (English Version)

Item	Very disagree	Disagree	Normal	Agree	Very agree
TPK	1	2	3	4	5
21. I know how to choose the techniques used in class to perfect teaching content, teaching methods and learning content.					
22. I know how to apply a teaching strategy in class that combines what I have learned in course assignments, techniques and teaching methods					
TPACK	1	2	3	4	5
23. I can teach courses that appropriately combine primary education professional courses, techniques and teaching methods					

Table 3.5 (Continued): Survey Questionnaire (English Version)

Item	Very disagree	Disagree	Normal	Agree	Very agree
TPACK	1	2	3	4	5
24.I appropriately adopt the mode of combining subject teaching content, technology and teaching methods in the teaching process					

        The data collection of the two research were conducted at roughly the same time; assessing information using parallel constructs for both types of data; separately analyzing both types of data; and comparing results through procedures such as a side-by-side comparison in a discussion, transforming the qualitative data set into quantitative scores, or jointly displaying both forms of data.

        This study uses the Statistical Package for Social Studies (SPSS) to analysis the data. The researcher first screened and cleaned to identify any significant outliers or missing values. SPSS In the preliminary 37 analyses, analysis, normality test, descriptive analyses, validity test, reliability test, inferential analyses and mediator test were conducted. The reliability test of this study was examined through Cronbach's Alpha Coefficient.

3.4 Conclusion

This chapter extensively discussed the research methodology used in this study. The discussion included research design, sample selection, instrument of measurement, data collection, and data analysis techniques. The findings of these analyses are exhibited in Chapter 4.

CHAPTER 4

RESEARCH RESULTS

The research findings which derived from data analysis of 150 questionnaire sets were presented in this chapter.

4.1 Summary of Demographic Data

A total of 150 questionnaires were randomly distributed to teachers in Baise University, with 80 valid questionnaires in withdrawal. Of the interviewed teachers, 35 are male and 45 are female, accounting for 43.75% and 56.25% respectively. The age distribution of the respondents ranges from 25 years old and below to over 45 years old. The aged groups ranked by number are 26-35 years old, 36-45 years old, 46 years old and over as well as 25 years old and below, for 51, 14, 12, 3. The number of respondents in the 36-45 age groups was notably higher than that in other age groups.
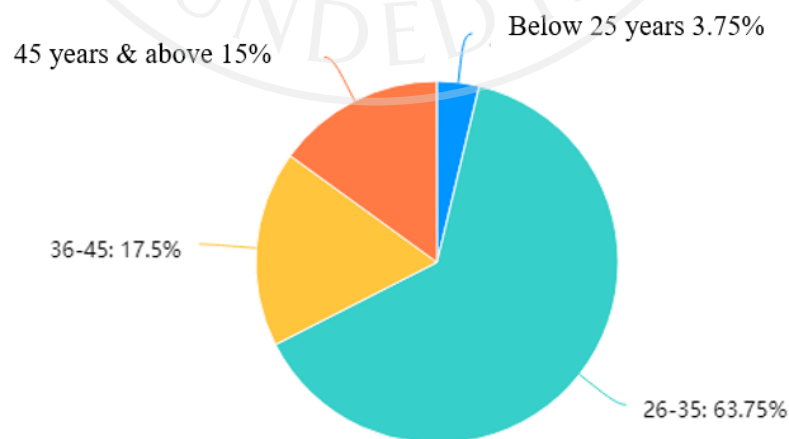

Figure 4.1: Respondents Age Distribution

The respondents belong to pre-school education, primary education and other fields, with the largest proportion in other fields with 45 persons, making up 56.25%, followed by primary education, accounting for 31.25% with 25 respondents of the total, and respondents in pre-school takes up the least fraction with 10 persons. A further survey was conducted on the main courses taught by the respondents. Given the wide range of the courses, among the listed ones in the questionnaire, the major courses of participants mainly include social science courses, fine arts, science foundation, special education and preschool education, mathematics and music. The courses are for students in all grades, especially in freshman and sophomore year, with 27 and 30 students, accounting for 33.75% and 37.5% respectively. The number of courses for third-year and fourth-year students is smaller in 14 and 9. As to whether they had studied computer education or modern educational technology, approximately 75% gave affirmative answer.
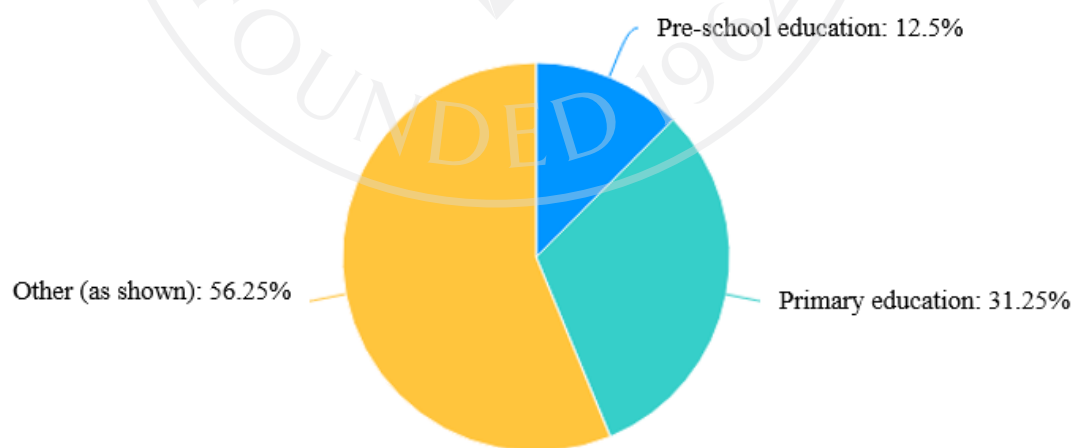
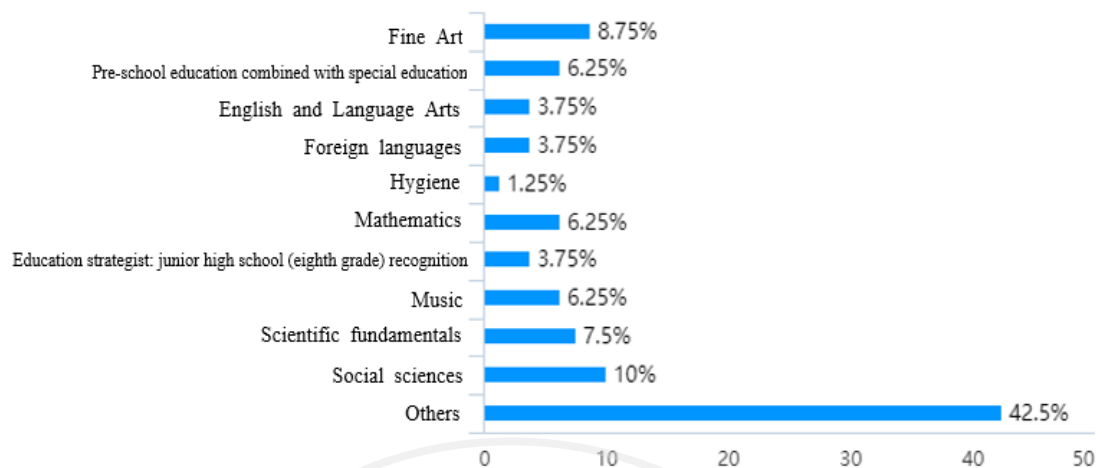Figure 4.2: Distribution of respondents' majors
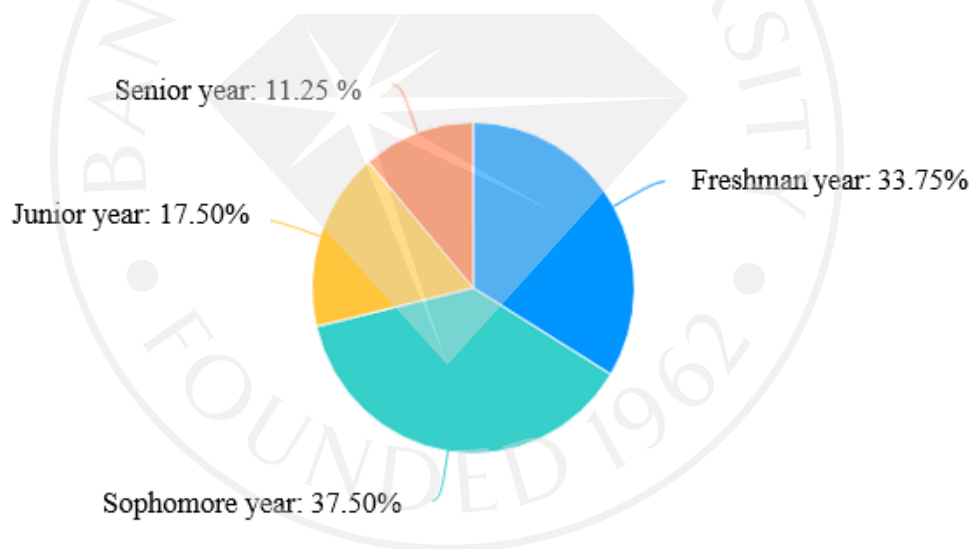
Figure 4.3: Distribution of teaching courses

Figure 4.4: Teaching grade of respondents

4.2 Scale Reliability and Validity Test

4.2.1 Reliability test

Reliability refers to the stability and consistency of the results measured by the test or scale tool. The greater the reliability of the scale, the smaller the standard

error. This measurement is not relevant to the test or the scale itself, thus reliability is targeted at the results obtained by the evaluation tool rather than the tool itself. At present, the Cronbach αcoefficient is widely applied as the index of reliability measurement, which belongs to the internal consistency reliability, and is most commonly used in Likert scale. When each respondent's data in the item is converted to standardized Z score, the new average for each item is 0 and the standard deviation is 1, then the reliability of the scale is calculated again, which is called standardized Cronbach reliability, or Cronbach's alpha. Based on the general standards, the reliability value less than 0.5 indicates that the scale requires redesign being inconsistent and unstable. The value is between 0.5 and 0.7 shall be judged according to the scale, if it is a dimension scale, it is acceptable greater than 0.5, while for the entire scale, it can only be reluctantly accepted greater than 0.6, the reliability value greater than 0.7 means high reliability, each dimension and total scale are acceptable.

This questionnaire contains 7 scales, namely, TK, CK, PK, PCK, TCK, TPK and TPACK. At first, the above 7 scales was performed by Cronbach α reliability test, then conducted reliability test of the total scale composed of 7 sub-scales. As shown in the results, the reliability test values of the other sub-scales were greater than 0.8, which indicated excellent reliability performance of the scale. Hence, in general, the scale of this study bears high consistency and stability, which can support further research and analysis.

Table 4.1: Scale reliability analysis results

Dimensions	Cronbach's Alpha	Cronbach's Alpha Cronbach's Alpha based on standardized items	Question number
TK	0.850	0.852	4
CK	0.894	0.894	3
PK	0.926	0.927	5
PCK	0.861	0.865	2
TCK	0.788	0.789	2
TPK	0.933	0.934	6
TPACK	0.758	0.756	2
Total scale	0.945	0.943	24

4.2.1 Validity test

To perform Bartlett chi-square test and KMO tests on the teacher's TPACK level scale with SPSS, so as to verify its structural validity. The analysis results show that the 24 items of the 7 sub-scales Bartlett spherical test χ^2 value is 1865.463 (sig=0.000), and the information reflected by the 24 items is certain overlapping, which is necessary for factor analysis. KMO test is aimed at investigating the partial correlation between variables, the value is between 0-1, the closer the KMO statistic is close to 1, the stronger the partial correlation between variables and the better the factor analysis effect. The KMO value of the scale is 0.907, indicating that it is more suitable for factor analysis.

Table 4.2: KMO and Bartlett tests

Item		Value
KMO KMO sampling adequacy		0.907
Bartlett chi-square test	Approximate chi-square	1865.463
	Freedom	276
	significance	0.000

When carrying out factor analysis Principal component analysis was

employed to extract 7 common factor analysis for items according to the structural

assumptions of 7 dimensions in the scale. The results indicated that the cumulative

explained variance of the scale was 84.149%, which was in accordance with the

standard of explained value above 60%. In order to further clarify the structure of

each common factor, the index orthogonal rotation was carried out through the

maximum variance method. In terms of common factor load distribution, it can be

seen that common factor 1 represents TK scale, common factor 2 for PK, common

factor 3 for CK, common factor 4 for TCK, common factor 5 for PCK, common

factor 6 for PK in integrated technology, and common factor 7 for subject knowledge

in integrated technology. From the factor load of 24 items included in the extracted 7

factors, except for a few items, the load of the other items is above 0.6, which

basically reached the critical level suggested by the relevant research, manifesting

that the questionnaire scale had higher structural validity, which verified that the

TPACK level measure scale adopted in this study had higher structural validity and

satisfied the research requirements.

Table 4.3: Composition Matrix of TPACK Level Measure Scale after Rotation

Dimensions	Item	Factor load						
		factor 1	factor 2	factor 3	factor 4	factor 5	factor 6	factor 7
TK	7	**0.612**	0.522	-0.069	0.185	-0.238	0.130	0.217
	8	**0.631**	0.438	-0.283	-0.098	0.218	-0.298	0.017
	9	**0.561**	0.644	-0.065	-0.017	-0.045	0.347	0.108
	10	**0.639**	0.587	-0.021	0.055	0.105	-0.173	-0.179
CK	11	0.203	0.113	**0.507**	0.130	0.157	-0.050	-0.089
	12	0.139	-0.060	**0.531**	0.173	0.035	0.025	-0.016
	13	0.073	-0.083	**0.612**	0.019	0.040	0.113	-0.221
PK	14	0.040	**0.811**	0.075	-0.315	0.216	0.016	-0.054
	15	-0.039	**0.860**	-0.001	-0.294	0.188	0.134	-0.054
	16	-0.095	**0.728**	0.080	-0.420	0.087	0.177	0.335
	17	-0.224	**0.808**	-0.066	-0.289	-0.101	0.043	-0.070
	18	0.069	**0.792**	0.050	-0.351	0.019	-0.041	-0.117
PCK	19	-0.288	-0.073	0.196	-0.231	**0.816**	-0.135	-0.035
	20	-0.254	-0.264	-0.026	-0.166	**0.808**	-0.084	0.208
TCK	21	0.152	0.115	0.236	**0.790**	-0.210	-0.294	0.102
	22	0.093	-0.052	-0.232	**0.869**	-0.018	-0.088	0.022

Table 4.3 (Continued): Composition Matrix of TPACK Level Measure Scale after

Rotation

Dimensions	Item	Factor load						
		factor 1	factor 2	factor 3	factor 4	factor 5	factor 6	factor 7
TPK	23	-0.096	-0.028	-0.291	0.029	-0.161	**0.844**	-0.034
	24	-0.089	-0.105	-0.226	0.097	0.011	**0.863**	-0.090
	25	0.147	-0.109	-0.150	0.112	-0.386	**0.768**	-0.098
	26	0.049	-0.188	-0.238	0.223	-0.072	**0.809**	-0.216
	27	0.370	-0.083	-0.180	0.259	0.093	**0.757**	-0.169
	28	0.109	-0.242	-0.285	0.136	0.341	**0.761**	0.161
TPACK	29	0.269	-0.141	0.289	0.428	0.095	0.033	**0.711**
	30	0.111	-0.240	-0.174	0.206	0.225	-0.263	**0.757**

4.3 Statistical Results of Teachers' TPACK Levels

The teacher TPACK level measure scale adopted in this study contains 7 sub-factors such as TK. TK refers to the general term of technology used by teachers to optimize teaching process and improve teaching efficiency, including general technology of education and specialized TK of respondents to which teachers belong. CK refers to the basic knowledge of the subject taught by teachers, which is the basis of teachers' tutoring and the fundamental content of students' learning. PK usually bears the universality of the respondents, which revolves about the knowledge related to the process, practice or method of teaching and learning. PCK is a combination of CK and PK. TCK refers to a compound element that integrates CK and TK. Similarly,

TPK and TPK are the combined elements of PK and TK, as well as PCK and TK respectively. The question number and items included in the questionnaire designed by the Institute are shown in the table below.

Table 4.4: Questions in Scale Dimensions

Dimensions	Item Range
TK	7-10
CK	11-13
PK	14-18
PCK	19-20
TCK	21-22
TPK	23-28
TPACK	29-30

4.3.1 Descriptive statistics of teacher TPACK level in dimensions

4.3.1.1 TK analysis and results

In the measurement of teachers' TK, this study included four questions. The results were that 42.5% of teachers' answer to the first question is normal, "I know how to solve the technical problems I have encountered," and 55% of teachers agree with the statement and above, indicating that teachers' ability to solve technical problems encountered in teaching is not high. For "I can easily learn the relevant technology and apply it to teaching" The proportion of teachers who agree and very agree is 51.25%, slightly over half, and the proportion of teachers who disagree is as

high as 7.5%, indicating that teachers have great difficulties in mastering new teaching techniques. For "I' m constantly learning significant new technologies," who agreed and strongly agreed took up 66.25%, remarkably higher than other TK measurement statements, indicating that teachers are proactive in learning new teaching techniques. For "I have the required skills to apply the technology", the highly agreed number is 8.75% and the agree number is 43.75%, the proportion is slightly greater than 50%. According to the scoring method of Likert scale, this paper calculated the evaluation scores and standard deviation of the respondents in each item. The third question is 3.81 as highest score, the second question and the fourth question obtained the lower score of 3.58, the difference of the scoring standard deviation of each question is negligible, and the subjective cognition of the respondents among the items in the dimension is relatively consistent. The above results showed that although the teachers' actual mastery of TK is not at a high level, the respondents generally presented a positive attitude towards learning.

Table 4.5: TK statistical results

Questions/ options	Very disagree	Disagree	Normal	Agree	Very agree	Mean value	Standard deviation
I know how to solve the technical problems I have encountered	0 0%	2 2.5%	34 42.5%	32 40%	12 15%	3.68	0.76
I can easily learn the relevant technology and apply it to teaching	0 0%	6 7.5%	33 41.25 %	30 37.5 %	11 13.75 %	3.58	0.82
I' m constantly learning significant new technologies	0 0%	2 2.5%	25 31.25 %	39 48.75 %	14 17.5%	3.81	0.75

Table 4.5 (Continued): TK statistical results

Questions/ options	Very disagree	Disagree	Normal	Agree	Very agree	Mean value	Standard deviation
I have the required skills to apply the technology	0 0%	3 3.75%	35 43.75%	35 43.75%	7 8.75%	3.58	0.71

4.3.1.2 CK analysis and results

In terms of CK measurement, there were three questions. According to the survey, in the first question of "I have sufficient professional knowledge for primary school teaching", 40% of teachers deem the statement as normal and 46.25% agree with or strongly agree, while 13.75% disagree or very disagree. For "I have the thinking mode of primary school teaching", the number of teachers with normal recognition is 33.75%, and the number with very disagree and disagree is 11.25%, all of them have declined, the percentage of those who agree or very agree was 45%. As to the third question, the number who very disagree and disagree with "I have different methods and strategies to improve my professional knowledge of primary school teaching" is 7.5%, teachers think as normal is 25%, and the number who agree and very agree is 67.5%, which is much higher than the first two questions. Based on scoring method of Liker scale, the evaluation scores and standard deviation of the respondents in each item were calculated. The highest score of the third question was 3.71, the score of the first question and the second question was 3.44 and 3.55. The

difference of scoring standard deviation of each question is negligible, which is higher

than TK dimension, indicating that the subjective cognition of the respondents among

the items in the dimension is consistent, but the fluctuation range is higher than TK.

The above results showed that teachers can generally adopt different methods and

strategies to improve their professional knowledge for primary school teaching, yet

the polarization is serious about whether the self-assessment has sufficient

professional knowledge and thinking mode of primary school teaching.

Table 4.6: CK Statistics Statistical Results

Questions/ options	Very disagree	Disagree	Normal	Agree	Very agree	Mean value	Standard deviation
I have sufficient professional knowledge for primary school teaching.	2 2.5%	9 11.25%	32 40%	26 32.5 %	11 13.75 %	3.44	0.95
I have the thinking mode of primary school teaching	1 1.25%	8 10%	27 33.75 %	34 42.5 %	10 12.5%	3.55	0.88

(Continued)

Table 4.6 (Continued): CK Statistics Statistical Results

Questions/ options	Very disagree	Disagree	Normal	Agree	Very agree	Mean value	Standard deviation
I have different methods and strategies to improve my professional knowledge of primary school teaching	2 2.5%	4 5%	20 25%	43 53.75 %	11 13.75 %	3.71	0.86

4.3.1.3 PK analysis and results

As for PK measurement, it included 5 questions. In addition to "I know how to evaluate students' classroom performance and employ various evaluation methods" and "I have a variety of ways and strategies to develop my own to understand my subject." A small quantity of respondents disagreed with the description, and the respondents at least generally agreed with the other three sentences description of the teaching knowledge. The number of respondents who indicated that they were in accordance with the description ranged from 67.5% to 72.5%, and the difference was negligible. According to the scoring method of the Likert scale, this paper calculated the evaluation scores and standard deviation of the respondents in each item. The average score of the five questions in this dimension is more than 3.8. The second question "I can adjust my teaching content according to the

students' current understanding", gained the highest score of 3.90, the third question
and the fifth question had the lowest score, yet up to 3.81. The difference between the
scores of each question is small. Meanwhile, it is found that the difference of standard
deviation of each subject is similar, which is lower than the knowledge dimension of
subject content, indicating that the subjective cognition of the respondents among the
items in the dimension is consistent, and the distribution of options is stable. The
above results showed that the teachers who were interviewed had relatively sufficient
knowledge of teaching methods and could make adjustments in line with teaching
situation and students' feedback.

Table 4.7: PK statistical results

Questions/ options	Very disagree	Disagree	Normal	Agree	Very agree	Mean value	Standard deviation
I know how to evaluate students' classroom performance and employ various evaluation methods	0 0%	1 1.25%	21 26.25%	46 57.5%	12 15%	3.86	0.67

(Continued)

Table 4.7 (Continued): PK statistical results

Questions/ options	Very disagree	Disagree	Normal	Agree	Very agree	Mean value	Standard deviation
I can adjust my teaching content according to the students' current understanding	0 0%	0 0%	22 27.5%	44 55%	14 17.5%	3.90	0.67
I have a variety of approaches and strategies to better understand my discipline	0 0%	2 2.5%	22 27.5%	45 56.25%	11 13.75%	3.81	0.70
I can apply various teaching methods in class	0 0%	0 0%	23 28.75%	47 58.75%	10 12.5%	3.84	0.63

(Continued)

Table 4.7 (Continued): PK statistical results

Questions/ options	Very disagree	Disagree	Normal	Agree	Very agree	Mean value	Standard deviation
I am quite familiar with the general students' understanding and misunderstanding, and know how to organize and maintain classroom management	0 0%	0 0%	26 32.5%	43 53.75 %	11 13.75 %	3.81	0.66

4.3.1.4 PCK analysis and results

In the measurement of PCK dimension, this study had 2 questions. The survey found that "I know how to choose effective teaching methods to guide students to think and study relevant courses in primary education." 5% of respondents said they disagreed with it, 31.25% regarded it as normal, and 63.75% agreed. As for "I know how to apply different teaching methods to improve students' thinking ability through classroom teaching and homework", the number of respondents who were very inconsistent or not in conformity with the situation was zero, and the percentage of respondents who were in conformity with and very consistent with the situation reached 68.75%. Applying scoring method of Likert scale, the evaluation scores and

standard deviation of the respondents in each item were calculated. The mean value of the first question was 3.71, the mean value of the second question was 3.80, and the standard deviation of the second question was 0.62, which was less than 0.75 of the standard deviation of the first question. The results show that the teachers boast a consistent and superior level of subjective cognition about applying different teaching methods to enlighten students' thinking ability, but there is a great difference between them on how to choose effective teaching methods, and the action ability is slightly lower than that of subjective cognition.

Table 4.8: PCK statistical results

Questions/ options	Very disagree	Disagree	Normal	Agree	Very agree	Mean value	Standard deviation
I know how to choose effective teaching methods to guide students to think and study relevant courses in primary education	0 (0%)	4 (5%)	25 (31.25 %)	41 (51.2 5%)	10 (12.5 %)	3.71	0.75

(Continued)

Table 4.8 (Continued): PCK statistical results

Questions/ options	Very disagree	Disagree	Normal	Agree	Very agree	Mean value	Standard deviation
I know how to apply different teaching methods to improve students' thinking ability through classroom teaching and homework	0 0%	0 0%	25 31.25%	46 57.5%	9 11.25%	3.80	0.62

4.3.1.5 TCK analysis and results

As to TCK measurement, there were 2 questions. The survey showed that "I master the techniques that can be used to understand and carry out the teaching courses in primary education." 6.25% of respondents responded they disagreed, 37.5% said they were normal in this regard, and 56.25% agreed. For "I know how to apply new technologies for teaching different courses," the proportion of respondents who disagree was only 1.25%, and the proportion of those who agree and very agree was 58.75%. With the scoring method of the Likert scale, the evaluation scores and standard deviations of the respondents in each item were calculated. The mean value of the first question and the second question were 3.60 and 3.71, the standard deviations of the two questions were 0.76 and 0.72, respectively. The results manifested that the knowledge level of TCK is above-average, while some teachers is

lag behind.

Table 4.9: TCK statistical results

Questions/options	Very disagree	Disagree	Normal	Agree	Very agree	Mean value	Standard deviation
I master the techniques that can be used to understand and carry out the teaching courses in primary education	0 0%	5 6.25%	30 37.5%	37 46.25%	8 10%	3.60	0.76
I know how to apply new technologies for teaching different courses	0 0%	1 1.25%	32 40%	36 45%	11 13.75 %	3.71	0.72

4.3.1.6 TPK analysis and results

When measuring TPK dimension, this study consisted of 6 questions. The results were concluded that, except for a small number of respondents in the first, third, fourth and fifth questions who did not conform to the description, the respondents were at least normal in the six statements. In the knowledge level of the 6 questions, the proportion of respondents agree and very agree with the description

ranged from 57.5% to 72.5%, and the difference between them was great. According to the scoring method of Likert scale, this paper calculated the evaluation scores and standard deviation of the respondents in each item. The average score of the five questions in this dimension was more than 3.7. The second question, "I can adjust my teaching content according to the students' current understanding", has a minimum score of 3.71. The fifth question, "I know how to employs a teaching strategy in class that combines the content, techniques and teaching methods I have learned in my course assignments." The highest score was 3.88. The difference of scoring standard deviation of each question is slight, which indicated that the subjective cognition of the respondents in the dimension was consistent, and the distribution of options was stable. As a whole, the teachers' knowledge of TPK is good above the average level.

Table 4.10: TPK statistical results

Questions/ options	Very disagree	Disagree	Normal	Agree	Very agree	Mean value	Standard deviation
I know how to choose the techniques to enhance the teaching methods of the course.	0 0%	1 1.25%	30 37.5%	39 48.75 %	10 12.5 %	3.73	0.69

(Continued)

Table 4.10 (Continued): TPK statistical results

Questions/ options	Very disagree	Disagree	Normal	Agree	Very agree	Mean value	Standard deviation
I know how to choose the technology to improve students' learning ability in courses.	0 0%	0 0%	34 42.5%	35 43.75 %	11 13.75 %	3.71	0.70
I will apply critical thinking to think about how to use technology in class.	0 0%	1 1.25%	28 35%	41 51.25 %	10 12.5 %	3.75	0.68
I know how to adjust the technology I have learned for different teaching activities.	0 0%	1 1.25%	27 33.75%	42 52.5 %	10 12.5 %	3.76	0.68

Table 4.10 (Continued): TPK statistical results

Questions/ options	Very disagree	Disagree	Normal	Agree	Very agree	Mean value	Standard deviation
I know how to choose the techniques used in class to perfect teaching content, teaching methods and learning content.	0 0%	1 1.25%	23 28.75%	43 53.75%	13 16.25%	3.85	0.70

4.3.1.7 TPACK analysis and results

With regard to TPACK measurement, this study had 2 questions. The survey results showed that for "I can teach courses that appropriately combine primary education professional courses, techniques and teaching methods." 7.5% of respondents indicated disagree or very disagree, 30% indicated normal conformity and 62.5% indicated agree or very agree. Besides, for "I appropriately adopt the mode of combining subject teaching content, technology and teaching methods in the teaching process." The proportion of respondents who disagree the situation was 6.25%, and the proportion of respondents who agree and were very agree was 62.5%. According to the scoring method of Likert scale, the evaluation scores and standard deviation of the respondents in each item were calculated. The mean value of the first question was 3.64, the mean value of the second question was 3.70, and the standard

deviation of the two questions was 0.80 and 0.79, respectively, in which the difference was slight. As shown in the results, the teachers' knowledge of TPACK is higher than normal level, whereas some teachers' knowledge level is lower, which requires attention and targeted training and improvement.

Table 4.11: TPACK statistical results

Questions/ options	Very disagree	Disagree	Normal	Agree	Very agree	Mean value	Standard deviation
I can teach courses that appropriately combine primary education professional courses, techniques and teaching methods	1 1.25%	5 6.25%	24 30%	42 52.5 %	8 10%	3.64	0.80
I appropriately adopt the mode of combining subject teaching content, technology and teaching methods in the teaching process	0 0%	5 6.25%	25 31.25 %	39 48.75 %	11 13.75 %	3.70	0.79

4.3.2 Scale mean value of each dimension

In order to convert the comprehensive score scale of each dimension into the 1-5 scoring method adopted by the scale to facilitate the comparison, the mean value of each dimension was taken in this study. This paper applied a 5-point Likert scale measuring tool, all the questions are positive questions, thus the higher the mean score of each dimension, the higher the score or evaluation of the respondents in this dimension. The mean score and standard deviation of each dimension are as follows. The ranking dimensions according to the evaluation score were TK, CK, PK, PCK, TCK, TPK and TPACK. As a whole, the teachers of the respondents showed a moderate bias in the performance of each dimension of the TPACK level, a little higher in the PK, the integrated technology teaching knowledge and the PCK, while CK, TK, the integrated technology CK and the integrated technology PCK were slightly worse. As a result, the teachers present certain shortcomings in the basic knowledge of subject content and TK, which calls for recognition and improvement.

Table 4.12: Descriptive statistics of scale dimensions

Dimensions	Number	Minimum	Maximum	Mean value	Standard deviation
TK	80	2.50	5.00	3.66	0.63
CK	80	1.00	5.00	3.57	0.82
PK	80	2.80	5.00	3.85	0.58
PCK	80	2.50	5.00	3.76	0.65

(Continued)

Table 4.12 (Continued): Descriptive statistics of scale dimensions

Dimensions	Number	Minimum	Maximum	Mean value	Standard deviation
TCK	80	2.00	5.00	3.66	0.67
TPK	80	2.67	5.00	3.78	0.59
TPACK	80	2.00	5.00	3.67	0.71
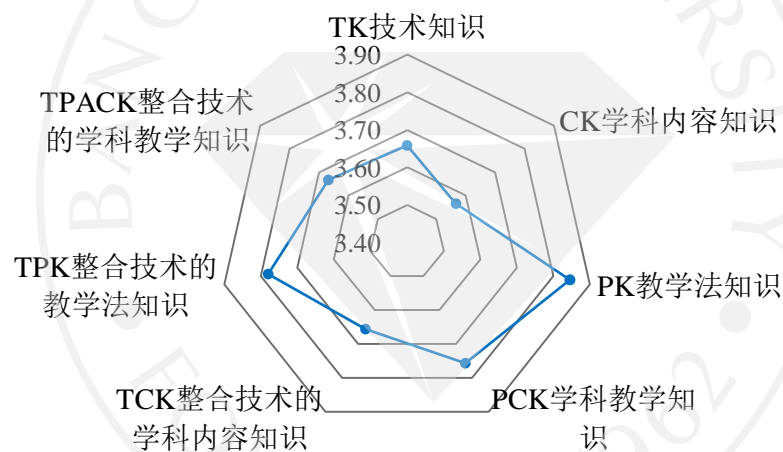
Figure 4.5: Teacher TPACK Level Radar Chart

4.3.3 Correlation Analysis of Teachers TPACK Level

This paper conducted a pairwise Pearson correlation analysis on the self-assessment scores of the respondents in terms of TK, CK, PK, PCK, TCK, TPK and TPACK. The results showed that the two groups of factors presenting linear correlation at significant level. The correlation coefficients of all two groups were all positive, which indicated that these factors were synergistic of mutual gain. In other

words, the higher the evaluation or score of one factor, the higher the evaluation on the other. Among them, the correlation coefficient between PK self-assessment score and PCK self-assessment score, PCK self-assessment score and TCK self-assessment score, TCK self-assessment score and TPK self-assessment score were higher than 0.8, meaning that they were of high correlation.

Table 4.13: Correlation matrix

	TK	CK	PK	PCK	TCK	TPK	TPACK
TK	1	.522**	.614**	.507**	.682**	.618**	.485**
CK	.522**	1	.714**	.684**	.728**	.641**	.715**
PK	.614**	.714**	1	.825**	.751**	.775**	.644**
PCK	.507**	.684**	.825**	1	.800**	.755**	.648**
TCK	.682**	.728**	.751**	.800**	1	.831**	.776**
TPK	.618**	.641**	.775**	.755**	.831**	1	.777**
TPACK	.485**	.715**	.644**	.648**	.776**	.777**	1

*P < 0.01, **P < 0.01

4.4 Difference Analysis

On the basis of the data obtained from the survey, this study further analyzed the differences in the self-evaluation scores of teachers' groups (gender, age) with different demographic characteristics in each sub-dimension of teachers' TPACK

level- TK, CK, PK, PCK, TCK, TPK and TPACK with scientific guidance and reference for optimizing teachers' teaching effect and improving teaching quality in the new era.

4.4.1 TPACK analysis among teachers by gender

This study assumed that there might be significant differences in the TPACK level in teachers of different genders, hence, an independent sample t test was employed to compare the mean value of self-assessment scores of teachers in terms of genders. Descriptive statistics based on the survey data showed that male teachers scored higher than female teachers in seven TPACK measurement dimensions, such as TK. Subsequently, meticulous statistical test of these differences found that in addition to the PK and TPACK, the mean score of male teachers was significantly higher than that of female teachers in five dimensions, such as TK (the P value was less than 0.1).

Table 4.14: Difference analysis in TPACK Levels among Teachers of Different Genders

Dimensions	Gender	Number	Mean value	Standard deviation	t value	P value	Differences comparison
TK	Male	35	3.80	0.65	1.780	0.079	1>2*
	Female	45	3.55	0.60			

(Continued)

Table 4.14 (Continued): Difference analysis in TPACK Levels among Teachers of

Different Genders

Dimensions	Gender	Number	Mean value	Standard deviation	t value	P value	Differences comparison
CK	Male	35	3.78	0.81	2.113	0.038	1>2**
	Female	45	3.40	0.79			
PK	Male	35	3.96	0.60	1.570	0.121	No significant difference
	Female	45	3.76	0.56			
PCK	Male	35	3.90	0.65	1.778	0.079	1>2*
	Female	45	3.64	0.63			
TCK	Male	35	3.80	0.67	1.717	0.090	1>2*
	Female	45	3.54	0.66			
TPK	Male	35	3.91	0.56	1.763	0.082	1>2*
	Female	45	3.68	0.60			
TPACK	Male	35	3.79	0.76	1.303	0.196	No significant difference
	Female	45	3.58	0.67			

*P <0.1,** P <0.05,*** P <0.01

As shown in the above table, the Figure 1 and 2 indicate the top-down group

categories for which the differences were compared, 1 for males and 2 for females.

4.4.2 TPACK analysis among teachers by age

Different age groups may differ at TPACK levels, on this basis, this study assumed that teachers of different ages may present significant differences in TPACK level evaluation. Therefore, single factor variance test is applied to compare the mean value of self-assessment scores of each dimension of teachers of different ages. Descriptive statistics based on the survey data showed that teachers aged 45 and over scored higher in seven TPACK measurement dimensions, such as TK. Further rigorous statistical hypothesis testing found that apart from TK dimension and TPACK, teachers aged 45 and above scored significantly higher than teachers aged 36-45($P<0.1$) in the other five dimensions. 36-45 teachers had less knowledge of advanced and popular educational techniques and methods than younger groups of teachers, and there was also a gap in teaching experience between older teachers and older teachers, which was one possible explanation for the findings of the survey. According to the statistical results, it can be suggested to optimize and improve teachers' teaching efficiency and effect component, that is, the education authorities should put more resources to optimize and improve the TPACK level of middle-age teachers than younger teachers and elder teachers with more teaching experience.

Table 4.15: Difference Analysis in TPACK Levels among Teachers of Different Ages

Dimensions	Ages	Number	Mean value	Standard deviation	F value	P value	Differences comparison
TK	25 years and below	3	3.75	0.25	1.869	0.142	No significant difference
	26-35	51	3.69	0.66			
	36-45	14	3.34	0.45			
	45 years and above	12	3.90	0.67			
CK	25 years and below	3	3.67	0.58	2.376	0.077	4>3*
	26-35	51	3.57	0.79			
	36-45	14	3.17	0.80			
	45 years and above	12	4.00	0.86			
PK	25 years and below	3	3.87	0.23	3.160	0.029	4>3**
	26-35	51	3.83	0.58			
	36-45	14	3.56	0.58			
	45 years and above	12	4.23	0.50			

(Continued)

Table 4.15 (Continued): Difference Analysis in TPACK Levels among Teachers of

Different Ages

Dimensions	Ages	Number	Mean value	Standard deviation	F value	P value	Differences comparison
PCK	25 years and below	3	3.67	0.58	2.32 6	0.08 1	4>3*
	26-35	51	3.73	0.62			
	36-45	14	3.54	0.72			
	45 years and above	12	4.17	0.58			
TCK	25 years and below	3	3.67	0.29	3.45 3	0.02 1	2/4>3**
	26-35	51	3.70	0.68			
	36-45	14	3.21	0.51			
	45 years and above	12	4.00	0.64			
TPK	25 years and below	3	3.50	0.50	2.93 4	0.03 9	4>3**
	26-35	51	3.80	0.56			
	36-45	14	3.48	0.58			
	45 years and above	12	4.11	0.60			

(Continued)

Table 4.15 (Continued): Difference Analysis in TPACK Levels among Teachers of

Different Ages

Dimensions	Ages	Number	Mean value	Standard deviation	F value	P value	Differences comparison
TPACK	25 years and below	3	3.67	0.58	1.699	0.174	No significant difference
	26-35	51	3.75	0.70			
	36-45	14	3.29	0.54			
	45 years and above	12	3.75	0.87			

 * P <0.1, ** P <0.05, *** P <0.01;

As shown in the above table, the figures 1, 2, 3, etc. represent the top-down

group categories for differences, such as 1 for under 25, 2 for 26-35, and so on.

CHAPTER 5

DISUSSION AND CONCLUSIONS

This research conducted various analysis based on the SPSS results of the survey findings. Besides the reliability and validity testing, descriptive analysis was also used to examine the 7 dimensions of the TPACK. The outcomes highlighted the enabler as well as barriers or potential problem areas towards effective TPACK teaching among Baise University teachers. The first section of this chapter summarizes the results of the data analysis. After making a discussion on the results, the research contribution, the theoretical and practical significance of the results were analyzed. A section on the limitation of the study was also included. To end the chapter, the researcher provided some indication to possible future research into TPACK practices in the higher educational institution. The sections in the discussion and conclusions chapter are as follows:

5.1 Conclusions

The purpose of this research is to explore the perception, attitude, learning, motivation and emotional factors that affect teachers' TPACK teaching behaviors; the external influencing factors on teachers' TPACK teaching effectiveness; the concept and teaching mode that affect teaching; and the specific processes of TPACK teaching technology and implementation at Baise University.

5.1.1 The TPACK survey questionnaire by Mishra & Koehler (2006) has been considered as a highly valid tool for the measurement of effectiveness in teaching. Through targeted questionnaire analysis and data processing, the following

seven levels of conclusions are obtained from the above seven dimensions:

5.1.2 In terms of Technological Knowledge (TK), although the teachers' actual mastery of technical knowledge, they did not possess high level of IT knowledge for teaching. However, the respondents generally had shown proactive attitudes towards learning.

5.1.3 For Content Knowledge (CK), the interviewed teachers could basically adopt various methods and strategies to improve their professional knowledge of primary school teaching, while it was highly polarized in whether they had sufficient primary school teaching professional knowledge and thinking mode in self-evaluation.

5.1.4 As for Pedagogical Knowledge (PK), the interviewed teachers demonstrated relatively sound mastery of the teaching methods. They could make adjustments in line with their teaching situation and reflect on the students' feedback.

5.1.5 Concerning Pedagogical Content Knowledge (PCK), the interviewed teachers shown consistency and superiority in subjective cognition when applying different teaching methods to enlighten students' thinking capability. In fact, they were capable to while there are remarkable divergences between the teachers on how to select effective teaching methods and the ability of action is slightly lower than that of their subjective cognition.

5.1.6 With regard to Technological Content Knowledge (TCK), the interviewed teachers grasp an above-average level of knowledge about integrated technology, whereas some teachers master fewer knowledge.

With reference to Technological Pedagogical Knowledge (TPK), the teachers' ability to incorporate technology with their teaching methods was relatively

good. They attained an above-average level.

5.17 For TPACK, the interviewed teachers have a an above-average mastery of the subject teaching knowledge and the integration of technology in their teaching. However, there are some teachers that had shown lower mastery level, which required more attention and as such, they are idea targets for further training and improvement.

The results of the descriptive statistics on the scale dimensions are presented on Table 5.1 on the following page. Clearly indicated, there were greater impact from the external factors on the behaviors of the teachers from the Primary Education program at Baise University. As for internal factors such as Content Knowledge (CK) and TPACK, the impacts were much stronger in influencing teaching effectiveness and teaching behaviors of the teachers. Besides, the dimension of the slight accuracy difference will generally affect the behavior of teachers in Baise University. In the decision-making process, every step will have an impact on the teachers' behavior.

The results also indicated the radar chart statistics of studied teaching level in Figure 5.2 as presented below Table 5.1.

Table 5.1: Descriptive statistics of scale dimensions

Dimensions	Number	Minimum	Maximum	Mean value	Standard deviation
TK	80	2.50	5.00	3.66	0.63
CK	80	1.00	5.00	3.57	0.82

(Continued)

Table 5.1 (Continued): Descriptive statistics of scale dimensions

Dimensions	Number	Minimum	Maximum	Mean value	Standard deviation
PK	80	2.80	5.00	3.85	0.58
PCK	80	2.50	5.00	3.76	0.65
TCK	80	2.00	5.00	3.66	0.67
TPK	80	2.67	5.00	3.78	0.59
TPACK	80	2.00	5.00	3.67	0.71
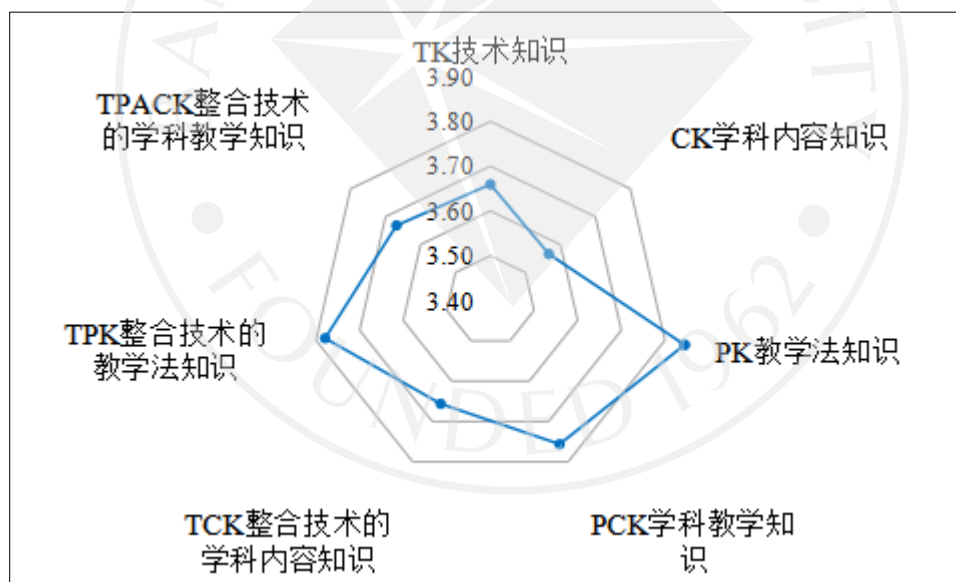
Figure 5.1: Teacher TPACK Level Radar Chart **2**

5.2 Discussion

Apart from the need to master the information about students' learning habits, learning interests and knowledge mastery, it is more important to know about the teachers integrate and incorporate these 7 dimensions into their practical teaching work. The results as presented below are based on the influence of research objectives, internal and external factors, teaching resources and teaching patterns with regards to effective TPACK teaching behaviors.

5.2.1 Based on the questionnaire survey, this study investigated 100 teachers through a TPACK survey questionnaire and three interviews with teachers at the Primary Education Faculty at Baise University. At present, the TPACK knowledge structure and competency requirements for primary education in Baise University include: TK, PK, CK, PCK, TCK, TPK, TPACK.

5.2.2 Under present rapid technology advancement, what is the teachers' attitude and awareness in using TPACK in their teaching? The findings indicated that teachers raised three majors problems concerning the application of TPACK to their teaching methods. The queries are as followings:

1) Integrating theory with practice to construct teacher education curriculum

2) Encouraging interactive and integrated curriculum in real or virtual teaching situation

3) Realizing students' role in self-development through dialogue and communication, reflection, revision, comprehension, etc.

It has also been noted that teachers are eager to find solutions to these problems. As such, it is clear that the teaching staffs are keen and active to overcome

problems to ensure effectiveness in using TPACK teaching methods. They were calling for solutions to improve teaching and curriculum design to optimize the usefulness of TPACK learning and teaching techniques.

Generally speaking, teachers who adopted TPACK teaching held positive attitudes towards the teaching method and perceived the TPACK teaching strategies as of great value. Teaching involves changes in individual behaviors that can be generated by motivating, stimulating, suggestive, responsive, and reinforcing interactions. Besides good attitudes and consciousness of teachers, motivation is also an influencing factor that affects the behaviors of teachers in Baise University. Hence, TPACK incentive mechanism not only facilitates but also motivate teachers to take actions under the TPACK teaching model. Ultimately, these teachers seek to achieve the effective teaching objective.

5.2.3 What is the readiness of the teachers in adopting TPACK in their teaching? What are current learning contents under the TPACK learning at the Primary Education major in Baise University?

There are various types of teacher's practices and application in TPACK teaching that depend on the information obtained in the teaching process and its sources. The sources of teaching information, including personal sources (friends, family, colleagues), school resources (teaching platforms, teaching resources, school-enterprise cooperation), public sources (social support, TPACK teaching organizations) and experience sources (review and employ teaching tools, experiences). Among these four elements, individual, commercial, and public sources are the more crucial factors related to the change in TPACK teaching approaches.

Moreover, the problem identification and information search of individual teachers are the continuous process of teachers' TPACK teaching technical process. After recognizing the demand, searching for information and evaluating different choices, teachers' TPACK teaching often apply decision-making rules to determine attributes in order of importance among different teaching models and thinking choices. As a result, in the whole process of teachers' TPACK teaching technology, each step will pose an impact on the next one. The add-on impact further contribute to effective teaching at the Primary Education major in Baise University.

5.2.4 What are the suggestion make by the teaching and related professions on TPACK? How Baise University can satisfy the requirements of the present education transformation for the integration of TPACK education? These are questions that require answers. During the research, the influence of teaching culture, government education sector, teaching competitions and external implications groups on teachers' TPACK teaching behavior in Baise University of Guangxi, China, has been revealed to varying extents. Meanwhile, the internal factors of the teachers in TPACK teaching behavior such as perception, attitude, learning, motivation and emotion have substantial impact on teachers' behaviors in the University. The teachers' personal attitude simplifies the TPACK teaching decision and offers individuals with an approach to evaluate alternatives based on his or her understanding of the attributes and benefits provided by each person.

The changes in teaching methods are inconsistent with previous results, and the value of various attributes to TPACK teaching will transform. From the process of teachers in TPACK teaching technology, notable differences can be found between the current situation of teachers' TPACK teaching as well as the desired ideal state.

Teachers in TPACK teaching constantly recognize the needs and problems. Thus, they search for internal and external information to address the problems.

5.3 Findings

Over the years, the "problem-oriented" theory curriculum is the direction of primary education teaching reform. This study attempts to construct innovative classroom teaching based on TPACK theory. Many teaching and training activities such as establishing TPACK model class, having TPACK demonstration and workshop sessions, class observation, on-site teaching, teaching training discussion and workshops and so on have facilitated the transformation of classroom teaching. Teachers receives more guidance to shift traditional classroom learning to innovative learning. Teaching staffs are also motivated to carry out TPACK teaching, There are also interesting initiatives implemented such as thematic discussion, discuss teaching, on-site teaching and so forth. As a consequence, teachers master students' learning habits, learning interest and knowledge mastery. Therefore, it is necessary to recognize teachers' effort to adopt TPACK teaching and accepting the 7 combined dimensions TK, PK, CK, PCK, TCK, TPK and TPACK, in their well as practical teaching experience and lessons.

As a whole, the interviewees presented an above-average level in each dimension of the TPACK. There are clear indication of better performance in PK, TPK and PCK, while the CK, TK, TCK和TPACK are lower than expected. This demonstrated that teachers were little weak in the basic knowledge of CK and TK. To a certain extent, there is a need for university administration to understand the potential problems and face the problem to make progress.

This paper further analyzes the differences of teachers' groups (by gender and age) with various demographic characteristics in each sub-dimension -TK, CK, PK, PCK, TCK, TPK of teachers' TPACK level and TPACK knowledge self-assessment scores Based on the data obtained from the survey. According to the analysis results of chapter IV, except for PK and TPACK knowledge, the average scores of male teachers were significantly higher than their female counterparts in five dimensions, such as TK. Furthermore, the teachers' mastery of advanced and popular educational techniques and methods were not as skillful as that of the younger group of teachers.

In addition, there was also a gap in teaching experiences between and newer and older teachers. To narrow this discrepancy, the education authorities should invest more resources to optimize and improve the TPACK level of middle-aged teachers. This is important because in doing so, it can provide better scientific guidance and reference to optimize teaching impact and effects. This in turns improves teaching quality in the technological educational era.

5.4 Limitations

This section expounds the limitations of the study on effective teaching approaches in the Primary Education faculty at Baise University. Under this background, it focuses on the limitations of the key research problems, the participants, tools, pathway design and implementation concept of this study still show some imperfects.

First of all, in order to identify the path and tools of effective teaching method research, it is necessary to carry out relevant research similar to that for

teachers. This allows further recognition of the basis of effective teaching from the audience perspective, the probable obstacles and the students' ideas and suggestions.

Furthermore, the research is on the basis of literature on teaching reform in TPACK theory, which requires the understanding of the frontier knowledge from the previous research. Nevertheless, the relevant research literature in this current study is still insufficient. Other limitations include the small sampling size of the participating teachers, the interview object itself, the lack of theoretical support in investigated problems, whether the proposed recommendations can confirm the concrete TPACK effective teaching development effect are still questionable. As such there is a need to further verify the findings.

Finally, the 80 teachers who participated in this study and 3 interviewees could represent only the group with higher professional demands and those were willing to improve their teaching capability. There are also a group of untrained teachers and some new entrants. The findings might be different if they are included in the survey. Hence, there are some uncertainties about whether the results of this independent study can be used to assess TPACK effective teaching levels of all teachers.

5.5 Recommendation for Future Study

To elevate the TPACK practices into the Primary Education major in Basie University, 4 major recommendations to establish knowledge sharing community, co-creation of content among teacher and students, generate greater academic research in the study of TPACK and up skill for teachers to manage TPACK teaching methods

are proposed. The further elaboration of the recommendations are provided as follows:

5.5.1 To establish a knowledge sharing (KS) platform whereby the teachers can easily share and exchange their TPACK teaching experiences. This platform should comprises of community of practitioners within the faculty as well as other departments in the university. Ideally, the KS platform can increase communication among teachers and the experts in the specific field who can share their know-how to support and accelerate TPACK teaching strategy. Take for instance, teachers in the computer science department can assist and advice teachers in terms of communication tools and applications for effective integration of technology to learning.

5.5.2 To overcome the barriers in the teachers' content knowledge, teachers can collaborate with their students to co-create interesting and student-generated content. The idea of students as partners, change agents, producers, and co-creators of their own learning has been the subject of increasing interest in recent years (Bovill, Cook-Sather, Felten, Millard & Moore-Cherry, 2016). Emerging research have shown that students are a valuable yet untapped resource in higher education (Gardebo & Wiggberg 2012). Nygaard, Brand, Bartholomew & Millard (2013) suggested that instructors and learners could establish significant benefits from working together and collaboratively on teaching and learning. There are many advantages to this co-creation of learning content. Some of the advantages suggested by Cook-Sather, Bovill & Felten (2014) enhanced engagement, motivation and learning; greater meta-cognitive awareness and stronger sense of identity, enrich

teaching and classroom experiences; strengthening student-staff relationships and development of a range of graduate attributes.

Through co-creation in learning, teachers adopt new roles as consultant, co-researcher and pedagogical co-designer. As consultants, teachers can share and discuss valuable perspectives on learning and teaching. Adopting a co-researcher role, teachers can collaborate meaningfully on teaching and learning research or subject-based research with students. Being a pedagogical co-designer, they can share responsibility for designing learning, teaching and assessment. Although there will be challenges in the new teaching method but to build and manage content knowledge, co-creation in learning is a sensible approach for the teachers in the Primary Education major at Baise University.

5.5.3 To narrow the understanding gap between theory and actual practices in classroom learning, it is vital to encourage teachers to engage in more academic research into the application of TPACK model in the university. In doing research, it allows teachers to reflect and focus into specific areas and find solutions to alleviate the problems encountered adopting the TPACK model.

5.5.4 At the university level, there is still a greater need for more initiatives to promote technology in education and encourage the use of electron devices and the access to internet for learning. Training to up skills teachers in terms of technical knowledge to operate new technologies in education will boost the confidence of the teachers and at the same expanses the learning boundaries of the teachers as well. In so doing, it will the overall TPACK performances of the teachers.

The implementation of the recommendations will be useful and effective to promote a new learning and sharing culture within the Primary Education faculty as

well as the university as a whole. When teachers and students active engage in the teaching and learning activities, it will enhance the learning experiences. This ultimately will increase classroom teaching experiences and teachers will be feel satisfied with their own teaching performance. Conducting research among teaching staff enable greater understanding and allow better adjustment to teaching methods for improvement. And finally, when Basie University is able to emphasis and patronize innovative learning as an important agenda, it will set a new benchmark for the Chinese educational system.
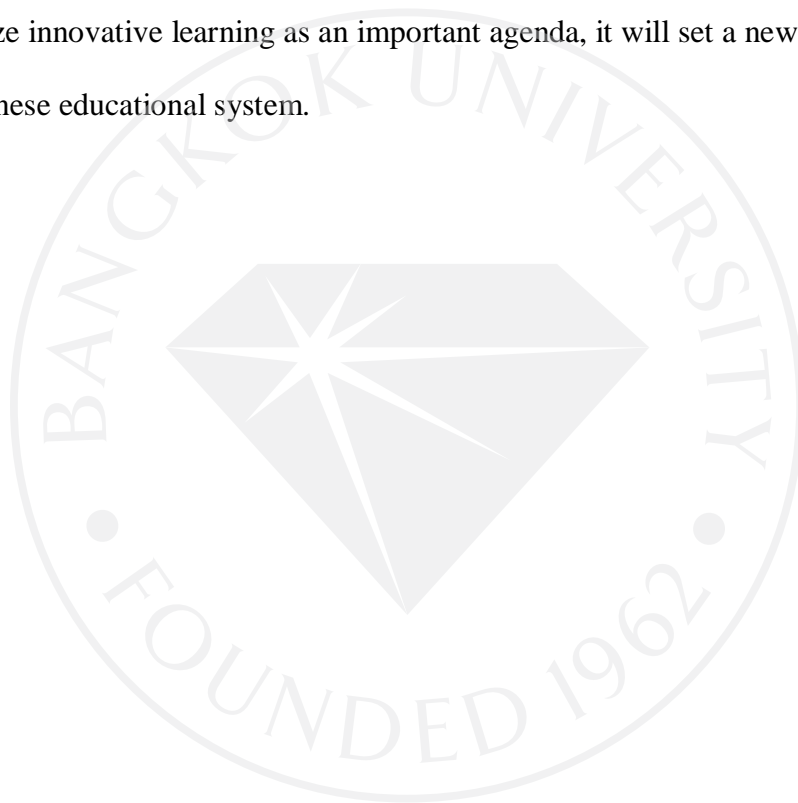
BIBLIOGRAPHY

Baris, Y., & Hasan, A. (2019). Teacher education in China, Japan and Turkey. *Educational Research and Reviews*, *14*(2), 51-55.

Bernard, H. R. (2002). *Research methods in anthropology: Qualitative and quantitative methods* (3rd ed.). Walnut Creek, CA: Alta Mira.

Bovill, C., Cook-Sather, A., Felten, P., Millard, L., & Moore-Cherry, N. (2016). Addressing potential challenges in co-creating learning and teaching: Overcoming resistance, navigating institutional norms and ensuring inclusivity in student–staff partnerships. *Higher Education*, *71*(2), 195-208.

Bryman, A. (2006). Integrating quantitative and qualitative research: How is it done? *Qualitative Research*, *6*, 97-113.

Cai, X. (2019). Thinking and exploration on improving the training quality of primary education professionals in local colleges and universities in the new era. *Shaanxi Education (Higher Education)*, *12*, 62-63.

Chen, X. (2019). A brief discussion on the reform of educational curriculum model in the process of changing from teachers to teachers-- A preliminary study on the construction of primary education specialty in emerging normal universities. *Modernization of Education*, *6*(A2), 90-92.

Cook-Sather, A., Bovill, C., & Felten, P. (2014). *Engaging students as partners in learning and teaching: A guide for faculty*. San Francisco: Jossey-Bass.

Creswell, J. W., Plano Clark, V. L. (2011). *Designing and conducting mixed method research* (2nd ed.). Thousand Oaks, CA: Sage.

Ding, R. (2019). The construction of the classroom teaching mode of "problem-oriented" theory course for primary education majors in higher vocational colleges-- taking the reform of the teaching mode of primary school pedagogy as an example. *Guide to Science and Education*, *10*, 129-130.

Gardebo, J., & Wiggberg, M. (2012). *Students, the university's unspent resource: revolutionising higher education through active student participation*. Uppsala, Sweden, Uppsala University.

Giles, C., & Hargreaves, A. (2006). The sustainability of innovative schools as learning organizations and professional learning communities during standardized reform. *Educational Administration Quarterly*, *42*, 124–156.

Gözütok, F. D. (2004). *I am developing my teaching*. Ankara: Siyasal Bookstore.

Gu, W. (2019). The construction and implementation of the trinity practical teaching system of "curriculum + practice + skills" in primary education major. *A Comparative study of Cultural Innovation*, *3*(16), 99-100.

Güneş, F. (2016). Teacher training approaches and models, University of Ahi Evran, *The Journal Kırşehir Education Faculty (KEFAD)*, *17*(3), 413-435

Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. New York: Routledge.

Huang, L., Shang, L., Lan, S., & Wang, Y. (2014). Exploration of integrated simulation platform on economy and management. *Experimental Technology & Management*, *31*(11), 191-194.

Jiang, X. (2019). The problems and improvement strategies of primary education major under the background of core literacy. *Journal of Jiamusi Vocational College*, *11*, 240-242.

Joyce, P. J, Roberta, E. R, Jonathan, B, David, H. B., & Dong, X.–Y. (2019). Research on the effectiveness of classroom teaching in teaching research University. *Feminist Education*. *3*, 12-14.

Kombo, D. K., & Tromp, D. L. A. (2009). *Proposal and thesis writing: An introduction*. Nairobi: Pauline.

Li, C., & Cao, Y. (2019). Research on the present situation and Promotion Strategy of TPACK of normal students majoring in Primary Education. *Office Automation*. *24*(19), 46-48.

Li, W. (2019). A probe into the talent training mode of "multi-ability and one specialty" in primary education major-- based on the perspective of excellent primary school teacher training. *Adult Education in China*. *13*, 91-93.

Liu, H. (2019). Research on the integrated general subject teacher training mode of primary education specialty based on TPACK. *Western quality Education*, *5*(23), 169-170.

Liu, X. (2019). Analysis on the strategy of practical curriculum construction of primary education specialty in normal universities. *Exchange of Science and Education*, *11*, 110-111.

Liu, X., Zhang, W., Zhong, H., & Jiang, L. (2014). Chinese EFL Teachers' application of E-educology of foreign languages: An investigation based on TRACK framework. *Teaching English with Technology*, *14*(1), 49-75.

Luo, H. (2019). On the cultivation of teaching practice ability of students majoring in higher vocational primary education. *Journal of Liaoning Teachers College (Social Science Edition)*, *4*, 43-45.

Ministry of Education of the People's Republic of China. (2011). *Teachers law of the People's Republic of China*. Retrieved from http://old.moe.gov.cn//publicfiles/business/htmlfiles/moe/moe_2803/200907/49852.html.

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for integrating technology in teacher knowledge. *Teachers College Record*, *108*(6), 1017-1054.

Morse, J. M., & Niehaus, L. (2009). *Mixed method design: Principles and procedures*. Walnut Creek, CA: Left Coast.

Mugenda, G. A., & Mugenda, M. O. (1999). *Research methods: Quantitative and qualitative approaches*. Nairobi: Act.

Niess, M. L., Ronau, R. N., Shafer, K. G., Driskell, S. O., Harper, S. R., Johnston, C., Browning, C., Özgün-Koca, S. A., & Kersaint, G. (2009). Mathematics teacher TPACK standards and development model. *Contemporary Issues in Technology & Teacher Education*, *9*(1), 4–24.

Nygaard, C., Brand, S., Bartholomew, P., & Millard, L. (2013). *Student engagement: Identity, motivation and community*. Faringdon: Libri.

Patton, M. Q. (2002). *Qualitative research and evaluation methods* (3rd ed.). Thousand Oaks, CA: Sage.

Qin, F. (2019). Curriculum design of primary education specialty in local normal universities: A probe into the formation of predicament. *Educational Watch*, *8*(35), 73-75.

Saunders, M., Lewis, P., & Thornhil, A. (2007). *Research methods for business students* (5th ed.). Chelmsford, United Kingdom. Pearson Education.

Schmidt, D. A., Baran, E., Thompson A. D., Koehler, M. J., Mishra, P., & Shin, T.

    (2009). Technological pedagogical content knowledge (TPACK): The

    development and validation of an assessment instrument for preservice

    teachers. *Journal of Research on Technology in Education*, *42*(2), 123-149.

Spradley, J. (1979). *The ethnographic interview*. New York: Holt Rinehart &

    Winston.

Su, X., Huang, X., Zhou, C., & Chang, M. (2017). A technological pedagogical

    content knowledge (TPACK) scale for geography teachers in senior high

    school. *Education and Science*, *42*(190), 325-341.

Tan, C., & Chua, C. S. K. (2015). Education policy borrowing in China: Has the

    west wind overpowered the east wind?. *Compare: A Journal of Comparative*

    and International Education, *45*(5), 686-704.

Tang, G. (2019). A dialectical analysis of the training cases of "general primary

    school teachers" in normal universities. *Modern Educational Science*, *6*, 89-

    92.

Tao, T., Neng-feng, Z., Ji-yu, J., & Xiao-chun, X. (2017). Application of practical

    curriculum for college specialty of economic management under TPACK

    framework – taking "enterprise operation and decision simulation system"

    curriculum as an example. *International Journal of Emerging Technologies*

    in Learning, *12*(7), 124-135.

Ünal, L. (2011). *A political analysis of economics for teacher instructiveness and*

    teacher training. In S. A. Kilimci (Ed.), Teacher training in Turkey (pp. 3-

    23). Ankara: Pegem.

Wang, Y. (2019). The practical teaching of primary education specialty in the view

    of double high. *Cultural and Educational Materials*, *20*, 205-206.

Xie, F. (2020). Empowering comprehensive quality: The annual concern of primary

    school principals in China. *Primary and Secondary School Management*, *1*,

    48-50.

Yan, D. (2019). A probe into the talent training mode of general subject teachers at

    the undergraduate level of primary education major. *Modernization of*

    Education, *6*(86), 49-50.

Yang, W. (2019). Research on primary school education management under the

    concept of new curriculum reform. *Curriculum Education Research*, *47*,

    202-203.

Yin, R. K. (1994). *Case study research: Design and methods* (2nd ed.). Newbury

    Park, CA: Sage.

Yu, C. (2019). On the teaching management mode of primary education based on the

    concept of "people-oriented". *Curriculum Education Research*, *36*, 157-158.

Zhang, T. (2019). A probe into the curriculum system of teacher education based on

    the integration of theory and practice-- taking the primary education specialty

    of Guangxi normal University of Science and Technology as an example.

    Journal of Chengdu normal University, *8*, 26 – 30.

Zhao, J., & Cheng, Q. (2019). Exploration on the present situation of cultivating

    innovative talents and the reform of training mode for undergraduate majors

    in primary education. *Modernization of Education*, *6*(A2), 1 - 2.

Zhou, Y., & Wu, C. (2019). A probe into the training path of "practice-oriented"

talents of primary education specialty in local colleges and universities.

Journal of Changji University. *4*, 104 -108.

Zhu, Y. (2019). Research on the evaluation system of teaching quality in the

secondary vocational stage of "3-4" applied talents training-- taking the major

of primary education as an example. *Journal of Heze University*, *41*(06), 76-

78.

APPENDIX
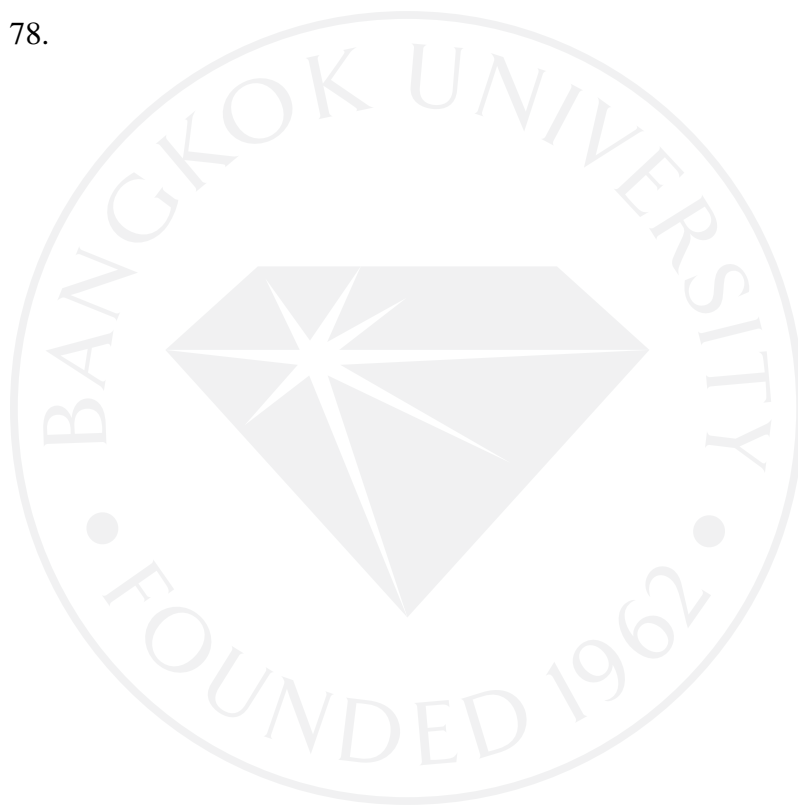
Interview Outline

The interview questions are part of Penny's independent research and exploratory analysis of effective pedagogy: teaching effective pedagogy to primary school students for teachers at Baise university.Each question is composed of three parts: teaching method, teaching content and teaching design.

Name: Dongfang   Gender: female   Age: 40

Date (DD/MM/YYYY): 17.04.2020

Interview record of teacher A:

Question1: What kind of pedagogy do you think students can accept? What do you think are the disadvantages of participatory teaching methods for students? How did you design your teaching goals?

最常见的教学法，大概是"理论联系实际"。参与式教学方法对于教师的控场能力要求比较高，而各方面均有限制的条件下，学生很容易形成热区和冷区，同时这种分区在几次课程后会逐步固化。从我个人而言，主要考虑能够使学生建立固定的知识点与其自我认知与感受之间的联系。(The most common teaching

method is probably "theory with practice". The participatory teaching method has high requirements on teachers' ability to control the field. Under the condition that there are restrictions in all aspects, students can easily form hot and cold zones, which will be gradually solidified after several courses. From my personal point of view, the main consideration is to enable students to establish the connection between the fixed knowledge points and their self-cognition and feelings)

Question 2: What do you think of your teaching goals? What kind of teaching goals do you think are accurate? How did students complete in accordance with the teaching objectives?

我反对教育的工具化倾向，同时尊重每一个学生自己的选择与命运。人格发展，理性思维与知识建构同步进行。不知道，也许在听了我的课程以后有些学生会有一些好的改变。但也有不少学生会在因为在作业和考核中抄袭被判定需要补考而非常讨厌憎恨我。不过我上学期两门课，总共400左右学生给的评分是八十多分和九十多分，百分制。(I oppose the instrumentalization tendency of education, and respect each student's own choice and destiny at the same time. Personality development, rational thinking and knowledge construction proceed simultaneously. I don't know. Maybe some students will have some good changes after my class. However, many students hate me because they are judged to have plagiarized in the homework and examination. However, in my two courses last semester, a total of about 400 students gave me scores in the eighties and nineties, on a hundred-point scale.)

Question 3: How do you usually design your teaching process? On specific situation, what kind of teaching method did you use in the teaching process? How did students complete in accordance with the teaching objectives?

通过布置了一系列相互关联的课堂和课后测试作业，以及课外阅读和读后感写作，并采用了相当数量的现场实践性观察分析报告作为考核。学生按要求进行，基本上是能完成学期教学目标的。学院在每学期开学前对于所有课程均有严格的教案和教学进度设计，教师都需要撰写提纲，授课教案，课件，所有的内容都需要提交给学院和教研室官方审核及备份存档。(By assigning a series of interrelated classroom and after-class test assignments, as well as extracurricular reading and post-reading writing, and adopting a considerable number of on-site practical observation and analysis reports as the assessment. Students are required to carry out, is basically able to complete the semester teaching objectives. Before the beginning of each semester, the school has a strict teaching plan and teaching schedule design for all courses. Teachers are required to write Outlines, teach plans, courseware, and submit all contents to the school and the teaching and research office for official review and backup).

Question 4: How do you usually design your teaching process? On specific situation, what kind of teaching method did you use in the teaching process? How would you rate the cooperative inquiry of students in your class?

几乎没有，至少我所在的学校本科教育的课程太满，学生光是完成各科老师布置的任务和作业，已经疲惫不堪，有限的自由时间还要用于吃喝玩乐，谈不上什么自我指导学习。学生的能力水平和自我认知也达不到。我允许同学在课堂

上直接提问或对话的，部分同学也能够主动在课堂和课后提出问题和讨论。

(Almost no, at least the undergraduate education courses in my school are too full. Students are exhausted from completing tasks and assignments assigned by the teachers of various subjects. The limited free time is also used for eating, drinking and playing. Students' ability level and self-cognition are also not up to it. I allow students to directly ask questions or have conversations in class, and some students can take the initiative to raise questions and discuss in class and after class).

Question 5: What are the characteristics of the students in your class during class? What kind of teaching goals do you think are accurate?

我的准备工作一般是根据选定的教材分课时分解知识点进行的，如果之前有其他教师教授过本课程，我会参考查阅所能找到的以前的所有材料，以求稳妥，并基本保持一致。同学在课堂上直接提问或对话的，部分同学也能够主动在课堂和课后提出问题和讨论。(My preparation work is generally carried out according to the selected teaching materials by breaking down the knowledge points. If there are other teachers who have taught this course before, I will refer to all the previous materials I can find for safety and consistency. If students directly ask questions or have dialogues in class, some students can also take the initiative to raise questions and discuss in class and after class).

Question 6: How do you adjust your teaching methods based on the students' response to the class? What content do you mainly refer to complete your teaching goal design?

我会根据学生在课堂上的表现改变，学生上课都不说话，我就改变，或者是表现不积极。目前担任的课程强调的是培养独立的观察和分析的能力。

(I will change according to the students' performance in class. If the students don't talk in class, I will change or not be active. Current courses emphasize the development of independent observation and analysis).

Question 7: What are the more complete learning mechanisms in your TPACK class?

这与学校，甚至整个国家整体的教育思路和风格有关，与教学安排有关，与生源质量有关，并非单独的课程就能够有效改善的。也只能因地制宜因材施教。

(It has to do with the way schools and even the whole country think and style of education, with the arrangement of teaching, with the quality of students, and not a single curriculum can be effectively improved. We can only teach students in accordance with local conditions).

The interview questions are part of Penny's independent research and exploratory analysis of effective pedagogy: teaching effective pedagogy to primary school students for teachers at Baise University. Each question is composed of three parts: teaching method, teaching content and teaching design.

Name: Li Yulong   Gender: male   Age: 32

Date (DD/MM/YYYY): 22.04.2020

Interview record of teacher B:

Question1: What kind of pedagogy do you think students can accept? What do you think are the disadvantages of participatory teaching methods for students? How did you design your teaching goals?

龙：讲授式和讨论式。很多同学形成了依赖性习惯，由于一些传统教学方法的影响，所以几乎近一半的同学喜欢不用自己思考，接受老师讲解的方式，但也有一半的同学他们比较活跃不太喜欢听取老师的观点，更喜欢发表自己的看法，就倾向于接受讨论式的方法。参与式教学对于学生来讲，很多时候取决于教学内容的因素同其兴趣的一致程度，很多时候大部分老师站在教师的角度认为参与式教学对于学生是有利的，但实际是否有利应该取决于学生的回答。教学目标的设置我基本考虑两大要求，第一是根据经过调研和讨论确立下来的学

校正式颁布的培养计划中对于学生学习的要求来设定。

(Long: lecture and discussion. Many students formed a dependency habit, due to the influence of some traditional teaching methods, so almost like without thinking about their own nearly half of the students, to accept the teacher on the way, but also have half of the students they are active don't like to listen to the teacher's point of view, more like her comments, tend to accept discussion-based method. For students, participatory teaching often depends on the consistency between the factors of the teaching content and their interests. In many cases, most teachers believe that participatory teaching is beneficial to students from the perspective of teachers, but whether it is beneficial in practice depends on students' answers. I basically consider two requirements for the setting of teaching objectives. The first is to set the requirements for students' learning in the formal training plan issued by the school after investigation and discussion).

Question 2: What do you think of your teaching goals? What kind of teaching goals do you think are accurate? How did students complete in accordance with the teaching objectives?

龙：关心学生成长，始终以学生未来发展和专业知识学习为考虑出发点。讨论法。比较满意，我会留出时间询问学生对于本目标的内容教学是否让自己了解了一些新的东西，同时也会为下次课堂，征集学生感兴趣的或者有疑问的一些线索，作为下次课教学目标的东西，所以学生对于每次课的教学目标接受情况较好。

(Long: I care about the growth of students and always take the future development of

students and the study of professional knowledge as the starting point. Discussion

method. Satisfied, I will set aside time to ask for whether the target teaching content

to let his students learned some new things, at the same time, it will be for the next

class, or have questions for students interested in some of the clues, as the next class

the teaching goal, so students for each class the teaching goal to accept situation is

better).

Question 3: How do you usually design your teaching process? On specific

situation, what kind of teaching method did you use in the teaching process? How did

students complete in accordance with the teaching objectives?

龙：按照要求完成，每次在目标的设定计划中，我就已经对于学生完成本目标

提出了一些要求，针对学生学习情况和特点设定要求，比如课堂上或者课后

的，学生基本能够按照要求完成。整合知识点，从学生的兴趣和疑惑中找问题

找知识点，以便一边传递知识一边答疑解惑。不太好，因学生学习习惯而定，

通常在我的课堂上学生小组学习存在做工分配的争议问题。

(Long: according to the requirements, each time in the goal setting plan, I have put

forward some requirements for the students to complete the goal, according to the

students' learning situation and characteristics, such as in class or after class, the

students can basically complete according to the requirements. Integrate knowledge

points, from the students' interests and questions to find the knowledge points, so as

to transfer knowledge and answer questions at the same time. B: not so good. It

depends on the study habits of the students. Usually in my class, there is a dispute

about the allocation of work in the group study).

Question 4: How do you usually design your teaching process? On specific situation, what kind of teaching method did you use in the teaching process? How would you rate the cooperative inquiry of students in your class?

龙：学生自我学习一定必须有计划，更换教学方法或者指定计划和个人任务。

从学生给我的教学评价结果来看，基本上是比较满意，从学生课后的互动来看，课后不论是线上还是线下交流次数比较多。

(Long: students must have a plan for self-study, change teaching methods or assign plans and personal tasks. According to the teaching evaluation results from the students, I am generally satisfied with them. According to the interaction between the students after class, there are more times of online and offline communication after class.)

Question 5: What are the characteristics of the students in your class during class? What kind of teaching goals do you think are accurate?

龙：一半的同学喜欢不用自己思考，接受老师讲解的方式，但也有一半的同学他们比较活跃不太喜欢听取老师的观点。调研和讨论确立下来的学校正式颁布的培养计划中对于学生学习的要求教学目标。

(Long: half of the students like to listen to the teacher without thinking on their own, but half of the students are more active and don't like to listen to the teacher's point of view. Investigate and discuss the requirements and teaching objectives for students in the formal training plan issued by the school).

Question 6: How do you adjust your teaching methods based on the students' response to the class? What content do you mainly refer to complete your teaching goal design?

龙：我基本在课堂前都会告知学生本次课堂的学习目标，让学生主动学习。我会根据线上线下，就是课上和课后，看学生表现调整。

(Long: I usually inform students of the learning objectives of the class before class, so that students can take the initiative to learn. I will adjust the students' performance according to online and offline, that is, in class and after class)

Question 7: What are the more complete learning mechanisms in your TPACK class?

龙：结合当前小学教育专业面向的未来职业对于学生提出来的新的要求和挑战，来完善目标。

(Long: to perfect the goal by combining the new requirements and challenges for students in the future career of the current primary education major).

The interview questions are part of Penny's independent research and exploratory analysis of effective pedagogy: teaching effective pedagogy to primary school students for teachers at Baise University. Each question is composed of three parts: teaching method, teaching content and teaching design.

Name: Zhu Zhihui   Gender: female   Age: 28

Date (DD/MM/YYYY): 28.04.2020

Interview record of teacher C:

Question 1: What kind of pedagogy do you think students can accept? What do you think are the disadvantages of participatory teaching methods for students? How did you design your teaching goals?

慧：情景教学法，讨论法，案例教学法。因为我发现这些教学法，学生在课堂接受能力比较好，比较有兴趣。课堂效率较低，对学生素质要求较高，并非所有层次学生都可开展。社会的需要；考虑到他们就业问题。现在对小学教育的老师要求非常严格。人才培养方案（百色大学制定的）；学生的身心发展特点，关爱每一个学生，注意差异问题。

(Hui: situational teaching method, discussion method, case teaching method. Because I find these teaching methods, students are more receptive and interested in the classroom. The classroom efficiency is low, the request to the student quality is high,

not all levels of students can be carried out. The needs of society; Consider their employment. Teachers of primary education are now very strict. Talent training program (formulated by Baise University); Students' physical and mental development characteristics, care for each student, pay attention to the differences).

Question 2: What do you think of your teaching goals? What kind of teaching goals do you think are accurate? How did students complete in accordance with the teaching objectives ?

慧：制定比较合理，促进学生发展。三维目标，符合学生最近发展区的目标。通过课堂教学以及课外活动。

(Hui: make more reasonable, promote the development of students. Three dimensional goals, in line with the goals of the student's most recent development zone. Through classroom teaching and extracurricular activities).

Question 3: How do you usually design your teaching process? On specific situation, what kind of teaching method did you use in the teaching process? How did students complete in accordance with the teaching objectives?

慧：课前告知课程目标，课后布置作业进行评价。根据教学目标，采用适宜的组织与实施方法，一般分为导入、展开和结束。通过完成小组作业，以及组内相互评价。

(Hui: inform the course objectives before class and assign homework for evaluation after class. According to the teaching objectives, appropriate organization and implementation methods are adopted, which are generally divided into introduction,

expansion and conclusion. By completing group assignments, as well as inter-group

evaluations)

Question 4: How do you usually design your teaching process? On specific

situation, what kind of teaching method did you use in the teaching process? How

would you rate the cooperative inquiry of students in your class?

慧：布置作业以及课堂笔记**根据三维目标**，通过将评价标准具体化，并将其量

化。一般。有部门学生积极。

(Hui: assign assignments and lecture notes based on three-dimensional goals by

concretizing and quantifying evaluation criteria. In general there are departments

where students are active)

Question 5: What are the characteristics of the students in your class during

class? What kind of teaching goals do you think are accurate?

慧：学生接受能力比较缓慢，可能我教的是五年制小学教育专科，学生年纪

小，感知能力弱。符合学生身心发展的目标。

(Hui: Students' ability to accept is relatively slow. Maybe I teach a five-year primary

school education college. The students are young and weak in perception. In line with

the goals of students' physical and mental development)

Question 6: How do you adjust your teaching methods based on the students'

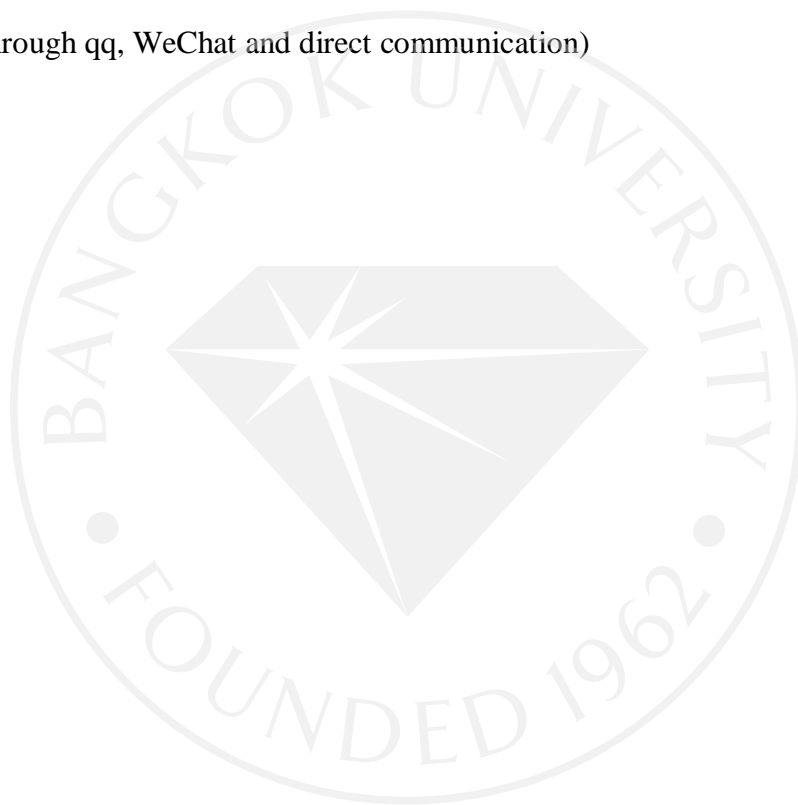response to the class? What content do you mainly refer to complete your teaching

goal design?

慧：课上的上课状态和课后的评价。学生制定自己的教学计划。

(Hui: the state of the class and the evaluation after class. Students make their own teaching plans)

Question 7: What are the more complete learning mechanisms in your TPACK class?

慧：通过qq、微信以及直接沟通

(Hui: through qq, WeChat and direct communication)

BIODATA

Name: Peipei Wei

Permanent Address: No. 26, Zhuzhou Avenue, Youjiang District, Baise City, Guangxi Province, China

Email: 513232830@qq.com/wei.peip@bumail.net

Education Background:

September 2009 to June 2012   I studied at Shiyan high school in Guangxi province Yizhou city;

September 2010 to June 2015   I got my bachelor degree at Law College of Baise University in Guangxi province Baise city.

Bangkok University
License Agreement of Dissertation/Thesis/ Report of Senior Project

Day __3__ Month___December___ Year __2020__

Mr./ Mrs./ Ms __Pei Pei Wei_____ now living at _____

Soi_____ Street __Zhuzhou Avenue_____

Sub-district __Long Jing_____ District __Youjiang, Baise_____

Province__Guangxi, China_____ Postal Code __533000_____ being a Bangkok

University student, student ID __7620202395_____

Degree level ☐ Bachelor ☒ Master ☐ Doctorate

Program__MBI_____ Department __IKI-SEA____ School __Graduate School__

hereafter referred to as "the licensor"

Bangkok University 119 Rama 4 Road, Klong-Toey, Bangkok 10110 hereafter referred to as "the licensee"

Both parties have agreed on the following terms and conditions:

1. The licensor certifies that he/she is the author and possesses the exclusive rights of dissertation/thesis/report of senior project entitled

EXAMINING AND IDENTIFYING EFFECTIVE TEACHING METHODS FOR

PRIMARY SCHOOL EDUCATIONAL PROGRAM STUDENTS OF BAISE UNIVERSITY

_____

submitted in partial fulfillment of the requirement for_the Degree Master of Management
                                                       (Business Innovation)
of Bangkok University (hereafter referred to as "dissertation/thesis/ report of senior project").

2. The licensor grants to the licensee an indefinite and royalty free license of his/her dissertation/thesis/report of senior project to reproduce, adapt, distribute, rent out the original or copy of the manuscript.

3. In case of any dispute in the copyright of the dissertation/thesis/report of senior project between the licensor and others, or between the licensee and others, or any other inconveniences in regard to the copyright that prevent the licensee from reproducing, adapting or distributing the manuscript, the licensor agrees to indemnify the licensee against any damage incurred.

This agreement is prepared in duplicate identical wording for two copies. Both parties have read and fully understand its contents and agree to comply with the above terms and conditions. Each party shall retain one signed copy of the agreement.

_____   _____ Licensor
(   )

_____   _____ Licensee
(Dr. Attipa Julpisit   )
Director, Library

_____   _____ Witness
(Mr. Virat Rattakorn   )
Dean, Graduate School

_____   _____ Witness
(   )