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**ASSESSING TPACK LEVEL OF UNIVERSITY LANGUAGE  
INSTRUCTORS IN CHINA**

He Sun (a), Noraini Said (b)\*, Nur Suhaidah Sukor  
\*Corresponding author

(a) Universiti Malaysia Sabah, Malaysia, 785401145@qq.com  
(b) Universiti Malaysia Sabah, Malaysia, noraini.said@ums.edu.my  
(c) Universiti Malaysia Sabah, Malaysia, nursuhaidahsukor@ums.edu.my

**Abstract**

The integration of technology in education has become increasingly crucial in recent years, particularly in enhancing the professional knowledge and skills of teachers. Technological Pedagogical Content Knowledge (TPACK) is a widely recognized framework for understanding the integration of technology in education, and it highlights the importance of balancing technology integration with subject content and teaching methodologies. In this study, the level of TPACK among 120 language instructors from four local colleges and universities was assessed through a TPACK survey. The results indicate that the overall level of TPACK among the instructors surveyed is above average. Furthermore, the results reveal a positive correlation among the key elements of TPACK. The study concludes by proposing countermeasures for TPACK development in order to improve the training of language instructors in China. Overall, the study sheds light on the importance of TPACK in improving the quality of language instruction and talent cultivation in China.

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## 1. Introduction

The COVID-19 pandemic has brought about significant changes in the field of university education, particularly with the shift from traditional offline education to online education. This shift has presented new challenges for university teachers, and the Ministry of Education, People's Republic of China responded with the issuance of the "Education Information 2.0 Action Plan" in 2018. The purpose of the plan was to promote comprehensive resource sharing, improve students' information technology literacy, and foster educational innovation and integrated development. As a result, it has become increasingly important for university teachers to develop their Technological Pedagogical Content Knowledge also known as TPACK capacities in order to meet these new challenges and demands.

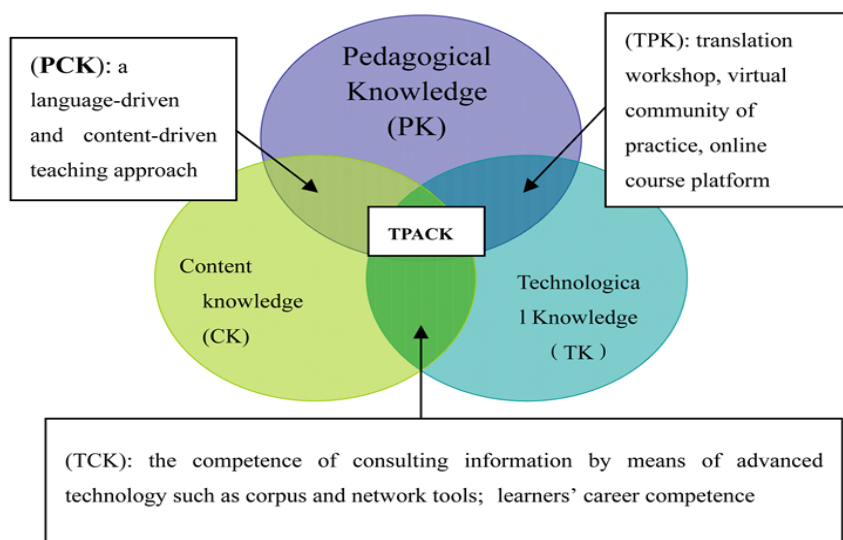
TPACK is an updated framework based on Shulman's (1986) theory of teacher knowledge, the discipline teaching knowledge theory known as Pedagogical Content Knowledge (PCK), which emphasized the integration of subject content and teaching method knowledge. With the continuous development of technology and its wide application in the field of education, people began to pay attention to the teaching effectiveness of technology and the role of teachers in the application of technology. Mishra and Koehler (2005) put forward the TPACK framework which consists of seven constructs, including single constructs such as Content Knowledge (CK), Pedagogical Knowledge (PK), and Technology Knowledge (TK), as well as compound constructs like Pedagogical Content Knowledge (PCK), Technological Pedagogical Knowledge (TPK), Technological Content Knowledge (TCK), and Technological Pedagogical Content Knowledge (TPACK).

In the People's Republic of China (PRC), TPACK research has recently gained significant attention as a growing field of study. The TPACK framework was first introduced in China by Chinese scholars Li Mei Feng and Li Yi in 2008 and since then, research on TPACK has become increasingly popular. With the progression of the Teacher Education Revolution in China, TPACK has become a critical topic in the academic community for teacher education and educational technology, leading to a growing body of research. Currently, domestic TPACK studies mainly focus on theoretical development (He, 2012), TPACK development in specific subjects, and TPACK development among primary and middle school teachers (Huang et al., 2013). However, there is limited research on TPACK development among language instructors (Xu et al., 2018), making a study on the current level of TPACK among language instructors in China particularly significant.

The TPACK theory explores the relationship between teacher's knowledge and the integration of information technology in education. It has gained significant attention in recent years and is considered a crucial topic in educational technology research. It has become one of the main frontier topics in the field of educational technology research, especially during the past 10 years. In general, TPACK research can be divided into four phases of development:

Phase 1: The period from 2005 to 2008. This is the initial stage of TPACK theoretical research. During this period, the research was mainly focused on concept discrimination and framework determination. Most of the important research achievements were done by American scholars Koehler and Mishra. Koehler and Mishra (2005) first raised the concept TPACK as a necessary way of improving teachers' use of technology for instruction. In 2013, they improved on Shulman's (1986) concept of teachers' content knowledge, proposed the conceptual framework of TPACK (Technological Pedagogical

Content Knowledge), and held that teachers' knowledge includes subject content knowledge, pedagogical knowledge, and technical knowledge (Koehler & Mishra, 2005). They formed complex relationships that were both relatively independent and superimposed on each other. In 2008, Koehler and Mishra first built the TPACK framework and made it clear that it contains seven constructs: TK, PK, CK, TPK, TCK, PCK, TPACK as illustrated in Figure 1. At the same year, TPACK framework was first introduced in China by Chinese scholar Li and Li (2008).



**Figure 1.** TPACK framework

Phase 2: The period from 2009 to 2012 is the first stage development of TPACK theory and measurement research. During this period, researchers constantly improved the framework. Scholars such as Angeli and Valanides (2009) develop the conceptual framework of TPACK, by proposing the ICT-TPCK model which emphasizes the role of information technology, content knowledge, ICT technology knowledge, pedagogical knowledge, learner knowledge and situational knowledge, and proposed the technology mapping method to develop teachers' ICT-TPCK. Their model provides process support for teachers to make connections between the tools, pedagogy and subject content provided. Lee and Tsai (2010) put forward TPCK-W framework, which was proposed to explain how teachers integrate network technology and teaching practices. In 2012, through study TPCK and PCK frame and its development, professor He Kekang made full elaboration of the TPACK framework, which became the turning point of TPACK research in China (He, 2012).

Apart from the framework, researchers also focused on developing instruments for TPACK measurement purposes for practical research. The measurement tool that was widely cited was the "Pre-service Teacher Teaching and Technical Knowledge Survey Scale" designed by Schmidt et al. (2009).

Phase 3: The period from 2013 to 2019 saw rapid development stage of TPACK applied research. Most research was mainly focused on TPACK application within specific subjects (Çam & Koç, 2019) and special groups (Huang et al., 2013). Through this research, researchers found that demographic variables such as educational background, title, age, major, can affect a teachers' TPACK ability (Huang et al., 2013). Ertmer (2010) demonstrates four variables of teacher change -- knowledge, self-efficacy,

teaching belief, subject, and school culture. He discusses the implications of four variables in pre-employment teacher education and in-service teacher professional development projects.

Phase 4: Year 2020 to 2023 was the thriving period of TPACK applied research. In these three years, exacerbated by the COVID-19 pandemic, the research was translated into exploration of TPACK application in online courses, teachers' TPACK capacity development and Intelligence TPACK (I-TPACK). For a start, Ali (2020) stressed the necessity of TPACK development in making online courses for remote learning in higher education institutions. Apart from that, teachers' effective integration of technology (Saubern et al., 2020), teaching methods, and content in their teaching practices were found to benefit both students' acquisition of knowledge and their improvement in TPACK knowledge (Tondeur et al., 2020). In addition, the utilization of artificial intelligence (AI) is emphasized. Celik (2023) insisted that having more knowledge about AI-based tools would enhance teachers' comprehension of the pedagogical benefits of AI. Moreover, teachers with technological knowledge (TK) could better evaluate AI decisions. However, solely possessing TK is inadequate for educational integration of AI-based tools. Therefore, technological pedagogical knowledge (TPK) combining both TK and pedagogical knowledge (PK) is necessary for teachers to proficiently use AI in education (Yang, 2022).

In conclusion, TPACK research has reached a peak stage, where both theoretical and practical research were sufficiently recorded. However, research on TPACK development of university language instructors in the China is still minimal. This research intends to investigate the current situation of language instructors' TPACK level in China, identify the existing problems, and clarify the actual demands of university language instructors in China, to provide some reference for further research.

## **2. Research Questions**

- i. What is the current TPACK level of language instructors in China?
- ii. What is the relationship among the seven constructs in TPACK?

## **3. Purpose of the Study**

The goal of this paper is to study the current TPACK level of language instructors in China and the relationship among the seven constructs of TPACK.

## **4. Research Methods**

Based on the questionnaire designed by Schmidt et al. (2009), this quantitative survey research revised and redeveloped the Schmidt et al. (2009) measurement scale based on the characteristics of the knowledge structure of language instructors. The final questionnaire is divided into two parts: one is the basic demographic information part which includes the participants' educational background, age, gender, teaching age, professional title and major. The other part consists of the items according to the TPACK constructs, employing five-point Likert scale: strongly disagree, disagree, not clear, agree, strongly agree.

The survey was conducted via SO JUMP, a professional online questionnaire/survey platform, equivalent to survey monkey or Google Form/Survey Monkey since the participants resided in various locations across the city and they are working at home because of the COVID-19. To guarantee

confidentiality, personal information such as names and contact details were not obtained. The participants were made aware of their voluntary involvement, and they were free to withdraw from the study whenever they desired.

The study sample consisted of 120 language instructors that came from 4 four different universities who were randomly selected. A total of 60 females and 60 males with age between 25 to 55 years old become the sample of these studies. The study was performed using the native language of the participants. The participants were kept anonymous, only disclosing their age, gender, educational background. A pilot study was conducted, the result was indicated in Table 1, the Cronbach alpha coefficient of each construct involved in TPACK were CK=0.82, TK=0.82, PK=0.91, PCK=0.92, TCK=0.87, TPK=0.85, TPACK=0.92. The above reliability scores are adequate as all scores range from 0.7 to 0.950 (Lance et al., 2006).

**Table 1.** Reliability value for the instrument

Construct	CK	TK	PK	PCK	TCK	TPK	TPACK
Cronbach alpha value	0.82	0.82	0.91	0.92	0.87	0.85	0.92

Data collected were calculated by adopting both descriptive and inferential statistics. Descriptive statistics were computed for each item on the constructs in TPACK. Next, the Pearson product-moment correlation coefficient ( $r$ ) was used to determine the correlation between the dependent and independent variables (Neuman, 2014). The analysis includes descriptive statistics such as mean values and One-Way ANOVA.

## 5. Findings

### 5.1. The current TPACK level of language instructors in China

According to the descriptive statistical analysis results, the average TPACK score of language instructors is  $m=3.65$  (the full score is 5). The means were computed through statistical analysis for TPACK levels revealed that the participants judged their TPACK level as moderately high (compared to the average level  $m=2.5$ ). Due to COVID-19 pandemic, language instructors had transitioned from conventional face-to-face learning to online and remote learning. This in turn has somewhat affect the language instructors to improve their TPACK (Ali, 2020). The mean score of each construct varies from  $m=3.17-4.01$ . Among the seven constructs, CK got the highest score  $m=4.01$ ,  $SD=0.82$ , which means most of the language instructors have a high level of subject knowledge. PK and PCK were at a relatively high level while TK got the lowest score  $m=3.17$ ,  $SD=0.77$ . That is because most of the universities have relatively low requirements on the information technology level of liberal arts students in China. Applied Linguistics and TESOL are considered as liberal arts in China. As for CK, because all of the language instructors worked in universities are experts in this field, thus they have faith in their CK level (Çam & Koç, 2019).

In addition, all the compound constructs related to technology (TCK  $m=3.36$ ,  $SD=0.83$ , TPK  $m=3.45$ ,  $SD=0.83$ , TPACK  $m=3.65$ ,  $SD=0.81$ ) were at a relatively low level compares to CK  $m=4.01$ ,  $SD=0.82$ , PK  $m=3.97$ ,  $SD=0.77$ , PCK  $m=3.94$ ,  $SD=0.74$ .

**Table 2.** Mean value of each construct of TPACK

Constructs	CK	TK	PK	PCK	TCK	TPK	TPACK
Mean Values	4.01	3.17	3.97	3.94	3.36	3.45	3.65
Standard Deviation	0.82	0.77	0.77	0.74	0.83	0.83	0.81

Past studies in China indicated that the overall TPACK level of language instructors in China are above average (Xu et al., 2018). This new findings in Table 2 suggests that the overall TPACK level of language instructors in China is at average level with TPACK  $m=3.65$ ,  $SD=0.81$ . Findings from this study suggest that language instructors should improve their skills related to information technology.

## 5.2. The relationship among the seven constructs in TPACK

Overall, there is a significant positive correlation among the key elements of TPACK. An analysis was conducted on the survey results to study the correlation among the key elements of TPACK, the results are shown in Table 4. There is a significant positive correlation between CK, TK, PK, PCK, TCK, TPK and TPACK (Voogt & McKenney, 2017) based on the interpretation value by Sugiyono (2012) in Table 3. The TPACK knowledge structure of university language instructors includes TK, CK, PK, TCK, TPK, PCK and TPACK in which they must be related (Ren & Ren, 2015).

**Table 3.** Statistics of correlation coefficients of each construct of TPACK

Interval Coefficient	Relationship Level
0.80-1.000	Very strong
0.60-0.799	Strong
0.40-0.599	Moderate
0.20-0.399	Weak
0.00-0.199	Very weak

**Table 4.** Statistics of correlation coefficients of each construct of TPACK

Construct	CK	TK	PK	PCK	TCK	TPK
CK	1	---	--	--	--	--
TK	0.430	1	--	--	--	--
PK	0.633**	0.504	1	--	--	--
PCK	0.601**	0.415	0.645**	1	--	--
TCK	0.431	0.868**	0.528	0.713**	1	--
TPK	0.349	0.496	0.550	0.610**	0.778**	1

\*\* refers to extremely significant at two tails.

For language instructors, their TK, PK, CK and PCK have no significant contribution to TPACK; But CK has PCK Significant predictive effect (Dong et al., 2015). According to Table 4, it is also can be

seen that CK has a strong correlation with PK ( $r=.633$ ,  $p<.05$ ), and PCK ( $r=.601$ ,  $p<.05$ ). CK has weak relationship with TPK ( $r=.349$ ,  $p<.05$ ). This finding supports a previous study done by Ren and Ren (2015) that CK has a weak relationship with TPK ( $r=.359$ ,  $p<.05$ ). It is also verified that the elements related to technology (TK) play an especially important role in improving language instructors TPACK level in nowadays because of the education digitization (Abduvakhidov et al., 2021). From Table 4 we can tell that TK has a very strong correlation with TCK ( $r=.868$ ,  $p<.05$ ) while a medium correlation with the other elements. In the information age, the acquisition of professional knowledge and industry frontier information cannot be separated from the application of information technology (Celik, 2023). PK has a relatively strong correlation with PCK ( $r=.645$ ,  $p<.05$ ) and a medium correlation with TCK ( $r=.528$ ,  $p<.05$ ), TPK( $r=.550$ ,  $p<.05$ ). PK and PCK are highly related items because teachers adopting their pedagogical methodologies to suit available ICT resources while conducting their instructions (Fahadi & Khan, 2022).

Among the double constructs, PCK has a strong correlation with TCK ( $r=.713$ ,  $p<.05$ ), TPK( $r=.610$ ,  $p<.05$ ); TCK has a strong correlation with TPK( $r=.778$ ,  $p<.05$ ). There are some studies advocate exposing teachers to the three double constructs, namely PCK, TCK, TPK. For example, In Hwang's (2021) study, teachers were asked to search for teaching topics (PCK) and implement (TPK) into it, and then help teachers understand how it can effectively improve their teaching.

## 6. Conclusion

The overall TPACK level of the present Chinese language promising trend. This is owing to the rapid development of information technology and the political support of Chinese government. In recent years, the educational department has issued a lot of documents to promote digital education. At present, although most of the universities have facilities with multimedia teaching machine and online teaching platforms, they still cannot afford the increasing requirement of digital technology (Saubern et al., 2020). To comply with the requirement, universities should set up intelligence teaching departments to build up and safeguard information teaching environment for all the teachers. The department also needs to carry out training related to teaching technology. TK plays an important role in TPACK development of Chinese language instructors. Thus, it is suggested that the university language instructors should be given more teaching technology knowledge training if they want to improve their TPACK integrated capacity.

This study also found that there is a significant positive correlation among the seven elements of TPACK. Compared with the other dimensions, TPACK has a highly strong correlation with TK, TCK and TPK, which reveals the importance of teaching technology knowledge in TPACK development. Thus, it is suggested that the university language instructors should ask for more teaching technology knowledge training if they want to improve their TPACK integrated capacity. There are still some shortcomings in this study. Due to the limitations of research conditions, the sample size is relatively small, so the research results cannot necessarily represent the TPACK level of all university language instructors in China.

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