

Research Article

Improving Pre-service English Teachers' TPACK in Teaching Contest

Fang Huang^{1*}, Wenxin Zhang², Kailiang Lv²

¹School of Education, Shanghai International Studies University, Shanghai, China

²School of Foreign Languages, Qingdao University, Qingdao, China
Email: huangfang@shisu.edu.com

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Abstract: The development of pre-service teachers' Technological Pedagogical Content Knowledge (TPACK) has attracted wide attention among scholars and teacher educators worldwide. However, few studies have explored pre-service teachers' TPACK in the context of teaching contest. To fill the research gap, this study interviewed three pre-service English teachers who participated in competitive teaching contest to uncover the influence of the teaching contest on their TPACK development. Findings suggested their TPACK was greatly developed through observations of role models, instructional design practice, peer collaboration, expert feedback, and self-reflection. Finding of the study enriched people's understanding of TPACK theory and provide valuable suggestions for pre-service teachers, university teacher training programs, and teacher educators to improve pre-service teachers' TPACK.

Keywords: pre-service teachers, TPACK, teaching contest

1. Introduction

The continuous advances in information and communication technologies (ICT) brings about new expectations to educational stakeholders to equip students with 21st century skills, such as collaboration, communication, ICT literacy, social and/or cultural skills, creativity, critical thinking and problem-solving. To achieve these educational goals, teachers are supposed to have sufficient technological, pedagogical and content knowledge (TPACK) and skills to integrate technology in their teaching (Huang, 2023; Schmidt et al., 2009). In the digital age, technological knowledge is the pre-condition of teachers' adoption of ICT and thus, is a critical knowledge for teachers (Fernández-Batanero et al., 2022; Valtonen et al., 2017). In addition, teachers who are equipped with technological knowledge are able to design teaching that caters to the needs of students' learning (Basham et al., 2016). If not, teachers' self-efficacy will be decreased, which further threatens their teaching quality.

Although pre-service teachers are taken for digital natives because they grow up with technology and are good at using diverse tools to perform tasks, most of their usage cater to learning needs. When they transform their roles from students to teachers, they are supposed to obtain TPACK to succeed in teaching (Su, 2023). The transforming process calls for time and energy commitment, as Roney et al. (2002) suggested that teachers generally need three to six years of practice to fully integrate ICT into the classroom teaching. Therefore, there is an urgent need to develop teachers' TPACK in their pre-service stage.

Consensus was achieved regarding the importance of teachers' knowledge and especially, technology integration

in teaching and learning (e.g., Huang et al., 2022; 2023), strategies were suggested to prepare pre-service teachers with sufficient technological pedagogical and content knowledge (TPACK) to be competent in future teaching (Wetzel et al., 2014; Tondeur et al., 2019). However, studies on teachers' professional development have not been saturated (Leask & Younie, 2013; Tseng et al., 2021). Existing studies on TPACK are predominately perception-oriented with surveys being the major tools to collect data (e.g., Baran et al., 2019; Cetin-Berber & Erdem, 2015; Huang et al., 2022; Kadioğlu-Akbulut et al., 2023; Koh & Divaharan, 2011), this way, understanding of TPACK are basically the macro-level perceptions, with insufficient insights of the inner mechanism, namely, how and/or why their TPACK developed. Furthermore, understanding of teachers' technology adoption and TPACK needs to be cultural, contextual, and content specific (Huang et al., 2023), given people's thinking and behavior differ (Angeli & Valanides, 2009; Huang et al., 2019; Rosenberg & Koehler, 2015).

To address the research gap, this study aims to generate an in-depth understanding of pre-service English teachers' TPACK development through semi-structured interviews by contextualizing the study in pre-service teachers' teaching contest. In China, teaching contests are organized by educational administrative department to evaluate teaching competence, it is also supposed to promote learning and professional development through competition. To achieve a good performance, competitors are expected to demonstrate teaching by using educational technology, answer questions that are raised to examine pedagogical, content knowledge and knowledge. Winners will be provided with good working opportunities in primary and secondary schools, so competitors do their best to polish teaching designs and demonstrate teaching abilities. In other words, teaching contest is an effective means to evaluate the competency level of teachers' TPACK. For pre-service teachers, due to the lack of opportunities for teaching practice, the teaching contest is an effective way to develop their TPACK knowledge. Findings of the study may provide references and suggestions for pre-service teachers and teacher educators. Two research questions are posed:

- (1) Do pre-service English teachers perceive teaching contest improves their TPACK?
- (2) In what way/how are their TPACK improved through the teaching contest?

2. Theoretical underpinning

2.1 Technological, pedagogical, and content knowledge (TPACK)

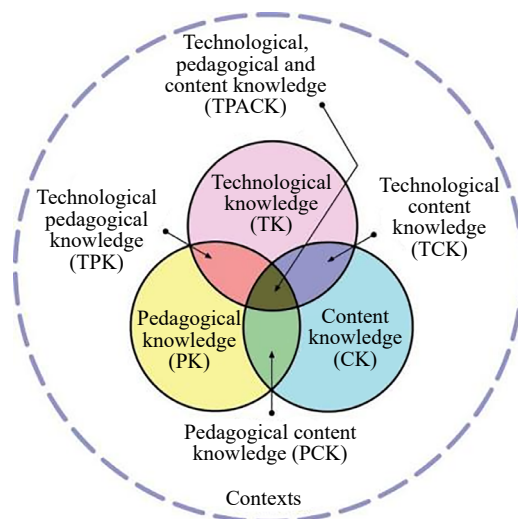
The TPACK framework is developed from the pedagogical and content knowledge (PCK) (Shulman, 1986). According to Shulman (1987), effective teaching is provided when teachers integrate content and pedagogical knowledge. Since its introduction, PCK has become the "common currency" to assess teachers' knowledge and skills in the teacher education field (Segall, 2004, p. 490).

With the increasing pervasiveness of ICT in education, researchers have realized the importance of using technology in teaching and argued for the necessity to combine technology with the PCK framework. Niess (2005) suggested technology usage, although indispensable, is challenging for teachers and teacher trainers, and thus, put forward a technology PCK (TPCK) model. Later, Mishra and Koehler (2006) proposed the technological, pedagogical and content knowledge (TPACK) framework which illustrated the connectedness and dynamic link among its dimensions (Figure 1).

The TPACK encompasses three main categories of knowledge: pedagogical knowledge (PK), indicating knowledge of teaching and learning approaches and techniques that teachers apply in the teaching practice; content knowledge (CK), which measures teachers' knowledge of the subject matter (e.g., English); technological knowledge (TK), describing teachers' knowledge of technology usage. PK, CK and TK are combined to form four new types of knowledge: pedagogical content knowledge (PCK), which refers to the appropriate combination of content knowledge and pedagogical knowledge to achieve effective teaching; technological pedagogical knowledge (TPK), illustrating teachers' ability to optimize teaching methods by utilizing technology; technological content knowledge (TCK), indicating teachers' use of technology to understand, create, represent, and analyze the content. Technological, pedagogical, content knowledge (TPCK) is the combination of all the knowledge in teaching (Cox & Graham, 2009; Mishra & Koehler, 2006).

The TPACK framework provided an insightful perspective for researchers and teacher educators to evaluate in-service and pre-service teachers' teaching competence. Koehler et al. (2012) suggested diverse ways to measure

TPACK, such as self-reported measurements, open questionnaire, performance evaluation and observations.



Available from <http://tpack.org> (accessed on 1st August 2022)

Figure 1. The framework of TPACK

2.2 Studies on TPACK

The TPACK framework has aroused scholars' interest and many scholars endeavored to examine teachers' and pre-teachers' TPACK. Schmidt et al. (2009) designed a questionnaire in Likert Scale based on the TPACK theoretical framework, and it was widely used by researchers. Archambault and Crippen (2009) examined the TPACK of a total of 596 K-12 teachers who conducted online teaching and result showed that they have less confidence in their technological knowledge than the pedagogical and content knowledge. Later, Ekrem and Recep (2014) investigated the relationship between English pre-service teachers' TPACK and their gender and academic achievement. Other researchers also assessed teachers' TPACK in diverse settings (e.g., Chai et al., 2010; Koh et al., 2010; Sahin, 2011) and suggested their knowledge varied in TPACK perspectives, to be specific, most teachers perceived themselves to be more knowledgeable in pedagogy and content, but less skilled in using technology (Huang et al., 2022; 2023). Some researchers conducted interviews to unpack teachers' technology integration (e.g., Harris & Hofer, 2011; Phillips, 2016) and suggested TPACK enactment is influenced by processes of identity development and practice.

The development of teachers' TPACK need to be considered in the specific context (Cox, 2008; Mishra & Koehler, 2006). Despite a burgeoning trend, TPACK research specific to language teachers' knowledge about language teaching with technology has been severely lacking (Tseng et al., 2021).

3. Method

The current study is a qualitative inquiry, and semi-structured interviews were conducted to collect data to understand if, and how teaching contest improves pre-service English teachers' TPACK. Semi-structured interviews were used since they have the potential to provide detailed and rich information related to interviewees' experiences, understandings, and perceptions of a particular topic (Turner & Hagstrom-Schmidt, 2022), and help to achieve reciprocity between the interviewer and the interviewees (Galletta, 2013).

3.1 Participants, context, and procedure

This study invited three pre-service English teachers who had participated in the English teaching contests at the

provincial level in 2022. They were all junior university students majoring in English education and won prizes in the teaching contest. Out of consideration for protecting the privacy of the interviewees, their names have been replaced by A, B and C.

The provincial level English teaching contest is one of the most important contests for pre-service English teachers, those who win the competition will be provided with good job opportunities by administrative educational departments. This, to a large degree, motivated pre-service teachers to achieve good performance and win the ideal prize. The contest consists of three parts. In the first part, participants are required to use educational technologies (e.g., PowerPoint slides, video, audios) to demonstrate teaching within fifteen minutes, and the teaching contents are provided several months before the contest. The ability to integrate technology properly to teach English contents is one of the most important criteria in this section. In the second part, they are asked to teach a randomly selected content within ten minutes, and in this section, they do not need to use technology, but blackboard design is asked to assist teaching. In the third part, participants are required to answer questions posed by several judges.

To prepare for the contest, the three participants were guided by their tutors, experienced in-service university English teachers, from July through November 2022. Workshops were organized to enhance their teaching skills. Pre-service teachers were encouraged to individually design technology-integrated lessons. During teaching demonstrations, their tutors provided detailed feedback and advice from diverse perspectives, including teaching methods, technology usage (such as PowerPoint slides, video, audio), English pronunciation and intonation, content understanding and delivery, drill and practice design, homework design, teacher talk, gesture, and blackboard design. Pre-service teachers were expected to reflect on this feedback and refine their teaching multiple times. Throughout this process, the three pre-service teachers collaborated to improve their teaching.

The authors interviewed them right after the teaching contest to obtain authentic understandings of their TPACK development. Timely stimulated recalls, and individual-based interviews (including follow-up interviews) were conducted by the researchers right after their teaching contest to obtain detailed and in-depth information about their perceptions of TPACK development. Recordings of teaching, teaching designs, and questions raised by examiners (provided by contest organizers) were used as stimuli to remind participants to recall their preparation and feelings of teaching performance. All the interviews were completed within a month. Follow-up interviews were conducted to add understandings, with two interviews being conducted in person and one online, given the distance between researchers and the interviewees. Each interview lasted about one hour. To achieve better understanding, all the interviews were conducted in their native language, Chinese. Based on their consent, interviews were recorded and later transcribed word for word for further data analysis.

3.2 Instrument

All interviews were conducted based on a series of interview questions that constitute an interview protocol. Based on the understanding of TPACK literature and the context of the teaching contest, the interview protocol was initially designed and modified after a pilot interview, with the help of one expert in educational technology. The interview outline centered on how pre-service teachers prepare for the contest and their perception of TPACK development in this process. Sample of interview questions is,

“How did you prepare for the contest? How did you perceive yourself as a candidate? Are there any difficulties and how did you cope with them? How do you use technology to demonstrate English teaching? In what way, and how did your tutor help you? Did your peers support you in teaching contest preparation, and how? Do you think your knowledge and skills have improved during the contest, and how is it? How did you understand your adoption of technology to teach English? Do you have some suggestions for pre-service teachers’ knowledge development?”

3.3 Data analysis

An inductive, thematic analysis method was adopted to analyze the data as it is proved to be a flexible tool to interpret the meaning of the data and extract data-driven themes (Charmaz & Thornberg, 2021). The process of analysis was guided by a six-step systematic framework developed by Braun and Clarke (2006). First, to understand

the participants' experiences and perceptions, the researchers independently coded the transcripts word by word and highlighted the potential codes and themes. To eliminate disagreement, two meetings were held to refine the themes until consensus was reached.

4. Findings

4.1 *The importance of role models to improve pre-service teachers' TPACK*

Interviewees suggested teaching design was one of the biggest difficulties that pre-service teachers encountered when they prepared for the teaching contest. Although they have obtained theoretical knowledge from course learning, it is challengeable for them to apply theoretical knowledge to teaching practice. Fortunately, they were inspired when observing teaching delivered by experienced teachers and regarded them as good role models.

At first, when I was preparing for the competition, I felt lost. I didn't know how to design a lesson. Later, I got inspiration from observing excellent teachers' teaching and some videos of the first prize winners in previous competitions. ...I got some ideas to design my teaching with PPT... (From A)

When I firstly stood on the teaching stage, I was so nervous that I didn't even know what to do. To overcome it, I found some excellent teachers' videos, imitated their teaching gestures, and thought about their teaching design. Through observation, I learned how to organize classroom activities. (From B)

Observation helped me to figure out the teaching steps. When I watched their lessons, I thought about teaching methods and techniques to present English knowledge... I began to design the blackboard writing, analyze the text, and make teaching plan by myself... (From C)

Observation is an effective way for pre-service teachers to improve their knowledge and specifically, how to combine technological knowledge, pedagogical knowledge, and content knowledge (Tondeur et al., 2019; Valtonen et al., 2015). Role models inspired them in the teaching design, ways to integrate technology, as well as teaching delivery. In many cases, pre-service teachers imitate experienced teachers and obtained teaching techniques.

4.2 *Intensive teaching practice improves their TPACK*

Although observation enhanced knowledge obtainment in teaching design and technology integration, intensive teaching practice is the most direct way to develop their TPACK. As Tondeur et al. (2012) suggested, pre-service teachers should develop their knowledge about educational technology in the real teaching situations and observing others' technology use could not substitute for action (Tearle & Golder, 2008). Similarly, Jang (2008) suggested theoretical knowledge should be combined with practice to improve peoples' understanding of the reasons behind why and how technology can be integrated in teaching. To be competitive in the teaching contest, pre-service teachers need to design and practice teaching, they try to adopt innovative teaching methods and technology tools, based on their understanding of the contents, to achieve the best teaching effect. This way, their understanding of TPACK were greatly improved.

At the beginning, when I used PPT slides to assist teaching, I only listed many words and pictures on PPT slides, without considering whether ways of present match the content of teaching. Through constant practice, I gradually realized I need to think about the purpose of using technology and how to connect technology with teaching content and pedagogy... I became better in it. (From C)

The intensive teaching practice enriched pre-service teachers' understandings of TPACK, although they have encountered with many difficulties. To overcome these difficulties, they proactively search for good materials from online sources, pick up innovative technological skills, and think hard to find the best way to integrate technology in

teaching.

The teaching theme for me is collection. To make teaching more vivid and enhance the interaction with students, in the lead-in section, I tried to create an imaginary gallery. I designed entrance tickets and invited them to visit my exhibition. I used Canvas (a software) to design tickets. I also learned to use editing software to make a video about the collection. (From B)

Since the topic of my text is related to football, I want to demonstrate a game context using PPT. With this idea in mind, I immediately searched for “game teaching” on the Internet and found many bloggers shared how to make animations, where to get resources, what tools I can use, and so on. So, I started to teach myself to design animations and games... I also asked help from some students majoring in education technology, and I invited friends of art majors to help me to design PPT. The most unforgettable thing for me is that I made a small animation within eight hours, I felt a great sense of accomplishment. (From C)

Although it took efforts and time for pre-service English teachers to find innovative materials and grasp new tools, their TPACK develops rapidly, which in turn improved their sense of accomplishment.

It is noticeable that although they had technology using experiences in their daily life and obtained some knowledge of using PowerPoint through courses, this knowledge was far from enough for them to be competitive in the teaching contest, knowledge and skill improvement needs practice (Angeli & Valandies, 2009; Polly et al., 2010). Due to the limited class time and big class size in the Chinese university teaching context, there are insufficient opportunities for pre-service teachers to practice teaching with technology. Teaching contest preparation provides them with intense practical opportunity to improve their abilities to integrate technology in English teaching.

4.3 Peer support and pressure facilitate TPACK development

Interviewees in this study suggested that they perceived support as well as pressure from their peers. Peer support is a system of giving and receiving help founded on key principles of respect, shared responsibility, and mutual agreement of what is helpful (Mead et al., 2001, p. 135), and it plays a significant role in teachers’ professional development (Angeli & Valandies, 2009).

I am grateful to my classmates in the whole preparation and practice process. It is inevitable that I felt anxious at some moments, we encouraged each other, discussed about instructional design, and shared useful sources. We were actually inspired by each other... (From A)

When we prepared for the second section of the contest, which requires us to prepare for 50 topics, my classmates and I chose to collaborate on the instructional design of these topics, we work as a team... This saves us a lot of time and improves our efficiency... Their teaching designs also provide some innovative ideas... To prepare for the question-and-answer section, which the third section of the contest, we take turns to propose questions and answer questions. Collaboration can help to relieve tension, at the same time, he or she points out problems for me to improve. (From B)

An interesting finding was that, in addition to peer support, peer pressure was also perceived by interviewees, which triggered their motivation to perfect teaching (Burns & Darling, 2002; Elliot et al., 2001; Ryan, 2000).

Although my classmates and I always encouraged each other, we had a competitive relationship during the contest. Sometimes I felt a big pressure when I realized their instructional designs are better than mine. But this pressure motivated me to continue to polish my instructional design. Without the comparison of my peers, I may not be able to design such a wonderful class. (From C)

In summary, peer support improved their TPACK. Peer cooperation provided opportunities for pre-service teachers to learn from each other. They realized their own shortcomings and gained useful information in the collaboration.

Peer pressure, despite its inevitability, is not necessarily bad. On the contrary, peer pressure stimulated the learning motivation of pre-service teachers, and their knowledge and skills were greatly enhanced.

4.4 Self-reflection and advisors' feedback improved TPACK

Reflection is indispensable for teachers to construct knowledge bases and improve the understanding of professional practice. It is a cognitive process (Moon, 2013) that allows reflectors to learn either from their own experience, or through observation and collaboration with others (Dewey, 1933). If pre-service teachers do not reflect on their teaching practice, it is difficult to achieve professional growth.

Reflection helps pre-service teachers to reconsider ways to integrate technology in English teaching to cater to teaching objectives as well as students' learning needs and features. It also helps pre-service teachers to gain insights into their attitudes and beliefs about technology-enhanced English teaching, as well as the difficulties they encountered in the teaching process. When asked if the teaching contest facilitated their TPACK development, all the three pre-service teachers had affirmative answers. They suggested that their technological knowledge has improved the most, followed by pedagogical knowledge, and then the content knowledge.

I think my ability to integrate information technology into teaching has improved to the greatest degree. It was the competition that gave me the chance to practice technology adoption in English teaching. (From A)

Before taking part in the competition, I lacked the awareness and motivation to learn technology skills. I think my existing knowledge of technology is enough to support teaching. But when I participated in the competition, I realized that I have a lot of things to learn. The competition forced me to take the initiative to pick up innovative technological skills, otherwise, my teaching will not be attractive and innovative. (From B)

My knowledge of English subject is quite sufficient... in this contest, I learned how to integrate technological and pedagogical, content knowledge into teaching. (From C)

Besides self-reflection, advisors' continuous feedback is an important source of their reflection that leads to the development of TPACK.

When I teach the theme of collection, my tutor suggested me to make a video of my family photos and used in the lead-in section, which easily aroused students' emotions because everyone has family photo... the use of pictures and videos has greatly stimulated students' learning interest, creativity, and imagination... My tutor gave me many useful advice, mainly in the design of teaching activities, the choice of technical tools, and the teaching style. These suggestions broadened my understanding of pedagogy, content and technology and gave me lots of inspirations. (From A)

Tutors were very helpful. They guided me how to analyze the text content, what kind of pedagogy to choose, how to make PPT design more vivid, what kind of pictures and videos to use in teaching and so on. (From B)

I was grateful to my tutor. He not only shared a lot of teaching resources with us, but also gave timely feedback during the practice process. For example, the teacher pointed out the lack of interaction with students, and suggested ways to cultivate students core competences (e.g., critical thinking, communication competence) in English learning. In addition, the teacher also gave me a lot of emotional support to help me overcome tension and anxiety. (From C)

Teacher educators played an important role in the development of pre-service teachers' TPACK during the contest. Experienced teacher educators helped pre-service teachers to better understand TPACK theories, provided practical suggestions for them to improve teaching. In addition to knowledge expansion, emotional support from teacher educators also stimulated their learning motivation and help them to establish positive attitudes and beliefs in teacher identity, which contributed to the enhancement of TPACK and their professional development (Borg, 2001; Blackwell et

al., 2016; Geijsel et al., 2009; Runhaar et al., 2010).

5. Discussion

This qualitative study inquired into pre-service English teachers' TPACK improvement in English teaching contest. After five months of preparation, one participant took the first place and two took the second place in the competition. Findings from interviews explicitly suggested their improvement in TPACK, and the improvement can be attributed to diverse reasons. Observations and emulations of how excellent teachers who won teaching competitions (role models) integrate technology in specific content teaching provide pre-service teachers with ideas and confidence to design teaching with technology (Kaufman, 2014; Tearle & Golder, 2008; Tondeur et al., 2019). Intensive teaching practice is also a practical approach to develop pre-service teachers' TPACK because it provides them with the opportunity to learn technology in instructional design (Lavonen et al., 2006). Collaboration facilitated pre-service teachers' TPACK, because it enables them to exchange opinions and generate innovative ideas to integrate technology in English teaching (Koh et al., 2010; Tondeur et al., 2016). Despite pre-service teachers felt peer pressure during the preparation process, it was proved to have a positive impact on their TPACK improvement. Self-reflection and advisors' valuable feedback are also important resources to improve pre-service teachers' knowledge and skills (Zhao & Huang, 2024). Self-reflection helps pre-service teachers develop a positive attitude towards technology integration education and realize the importance of technology integration in teaching (Baran et al., 2019; Ching et al., 2016). At the same time, pre-service teachers can benefit from feedback provided by advisors, such as teacher educators and experienced experts, who are able to help pre-service teachers acquire accessible resources and skills to implement technology in their teaching.

In short, this study suggested teaching contest is effective to improve pre-service teachers' TPACK. Based on these findings, some suggestions were provided for pre-service teachers as well as university teacher educators, hoping to enlighten ways to improve TPACK for pre-service teachers. Pre-service teachers are expected to take up innovative technologies and teaching methods. To achieve good teaching performance, pre-service teachers need to constantly enrich their knowledge and thus, lifelong learning is necessary (Day, 2002). Pre-service teachers are expected to have a wealth of subject and pedagogical knowledge to support their future teaching.

In the digital era, teachers are suggested to constantly update their technological knowledge and improve their ability to apply technology in teaching process. Teachers' beliefs on teaching and learning have an impact on their use of ICT (Teo et al., 2008). When teachers realize that technology is an effective mean of disseminating knowledge, they tend to use technology to supplement or extend existing teaching methods. Pre-service teachers should maintain a positive attitude towards TPACK and continuously improve their information and digital literacy. This requires pre-service teachers to establish the lifelong learning awareness and constantly absorb new teaching concepts and methods, to improve their teaching ability and professional development.

Despite courses provided in universities to develop pre-service teachers' technological literacy (e.g., computer science, educational technology), interview data suggested they still feel technology integration is challenging. Therefore, universities and teacher educators should develop more practical courses for pre-service teachers to practice using technology in language teaching and may invite excellent teachers to provide demonstration class.

In addition, it is urgent to transform the current assessment methods. Teacher educators are expected to adopt multiple ways to evaluate pre-service teachers' teaching competence. For example, besides curriculum exams, they can use portfolio assessment to build up understanding of pre-service teachers' teaching competence. Constant feedback from formative assessment can improve the effectiveness of pre-service teacher training. Meanwhile, pre-service teachers should be provided with advisors who can guide them to improve skills, overcome difficulties, and develop professional knowledge in their daily study. Pre-service teachers can learn from advisors who are experienced teachers and work together to promote their TPACK development.

Pre-service teachers should be provided with more opportunities to apply the learned knowledge to teaching practice. Practice can improve teachers' teaching skills, which further consolidated understandings of theories. Teacher educators should encourage pre-service teachers to actively participate in practical activities, strengthen teachers' belief in practice, and develop teaching ability.

6. Conclusion

TPACK is not only a theoretical framework, but also a standard to measure teachers' knowledge and ability to integrate technology in subject education. This study provides a comprehensive understanding of pre-service teachers' TPACK improvement through contextualizing the study in the university teaching contest setting. Findings of the study suggested, as a form of practice, the teaching contest provided pre-service teachers with the opportunity to learn and apply technology in their teaching. Teaching contest also encouraged pre-service teachers to actively learn how to combine subject knowledge, pedagogical knowledge, and technological knowledge in teaching. In preparing process, pre-service teachers have developed their TPACK fast in a limited time through observation and imitation of role models, cooperation and communication with peers, feedback from advisors, and self-reflection. This study provides a new perspective for pre-service teachers, universities, and teacher educators to explore ways to develop pre-service teachers' TPACK.

One of the limitations of this study is the small sample size. Future research could include educational stakeholders, such as teacher educators and policy makers to understand the development of pre-service teachers' TPACK. In addition, this study did not examine pre-service teachers' initial TPACK and thus, there is no way to conduct a succinct comparison. Further studies may remedy this limitation.

Through contextualizing the study in English teaching context, this study enriched people's understanding of TPACK improvement of preservice teachers during the teaching contest, especially reasons and factors influencing their TPACK improvement. Therefore, findings of the study provide suggestions for both pre-service teachers and teacher educators to adopt effective strategies to improve their TPACK.

Author contribution

The contributions of Fang Huang and Kailiang Lv are equal.

Conflict of interest

The authors declare no competing financial interest.

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