Fostering TPACK for Pre-service Teachers about Learning Management Competency into Professional Experiences

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Abstract

Technological, pedagogical, and content knowledge (TPACK) is now calling for professional teacher education. Technology can be integrated into the proportion of pedagogical and content knowledge by different classroom contexts. This research aims to foster TPACK for pre-service teachers about learning management competency into professional experiences. The participants consisted of 18 pre-service teachers during the teaching practicum in local schools. The tools used for data collection were questionnaires, tests, and assessment forms. The results showed that TPACK professional experiences program gain pre-service teachers' competency in learning management, they had post-test scores of competencies in learning management higher than pre-test score at .05 level of statistical significance. Professional experiences program indicated that pre-service teachers had level of satisfaction towards TPACK and learning management was at the highest level with all aspects.

Keywords: competency, pre-service teacher, professional development, teacher education, TPACK

1. Introduction

Programs for teacher production are one of the probable solutions that might deal with the current educational issues that affect both instructors and students. Society needs learning outcomes from educational process in flexible way (Edling & Simmie, 2020; Carter Andrew et.al., 2021; Arslan et.al., 2022). Students can learn and do according to modern world, live with others, competence to work and have life-long learning. In the 21st century, curriculum and learning management focused on developing students' ability to apply knowledge, skills, attitudes, and attributes holistically in their performance (Allen et al., 2020; Prachagool & Nuangchalerm, 2021). However, competency-based curriculum should align learning materials with real-life utilization. It emphasizes integrating information from pertinent sciences and equipping students with the skills and qualities needed to thrive in a world that is changing rapidly.

Teacher preparation program is an essential part of cultivating new talents and smart teachers. Many educators understand the importance of this concept and seek the program which suitable for novice teachers (Evens et.al., 2018; Chaipidech et al., 2021). Teacher development refers to the continuous improvement of teachers' skills and knowledge (Suebsing & Nuangchalerm, 2021). Generally speaking, this includes things like training materials, courses and mentorships. A pack designates a group of educators who plan and deliver these trainings. Some packs also include a mentoring component where a mentor teaches the trainings to another educator. Ultimately, teacher development can help every educator in the country improve their skills and teach effectively (Chaipidech et al., 2022; Kulachit & Nuangchalerm, 2022).

In Thailand, technology plays an instrumental role in improving education. However, pedagogy and contents in both general and specific are really needed to design in different classroom. That is, educational institutions have adopted a massive plan to introduce educational technology and its integration between pedagogical concepts and necessary contents into teacher production (Chansanam et al., 2021; Chaipidech et al., 2022). Additionally, the government is

also implementing Apps for education to assist with lesson planning and organization. These apps allow teachers to create and edit their own lesson plans, which vastly simplifies the process of teaching new subjects (Cheah et al., 2019). For example, an educator could easily plan a geography curriculum using Google Maps and other similar tools. This will allow him or her to cover all state geography standards while reducing the time required for each lesson.

In addition to technological improvements, teachers are also coming up with innovative uses for new technology in the educational sphere. Some educators use YouTube videos to help their students understand challenging concepts. They also use computerized programs to grade multiple essays at once and identify students with specific learning disabilities. Teachers have even used robots in the classroom to engage their students more effectively. As exciting as these developments are, there is a dark side to using technology in education (Juhji & Nuangchalerm, 2020; Jita & Sintema, 2022). Many young people rely on smartphones and social media as primary sources of information and entertainment.

Teacher development is a major focus of many educational programs thanks to the difficult role educators play in educating others effectively (Grossman, 2021; Janpleng & Ruangmontri, 2021). Innovative uses of technology have great potential to revolutionize how we train new teachers in the future (Saiyachit, 2022). On the other hand, young people relying on smartphone curriculum risks destroying future generations of educated citizens. It's important that educators work together and address this problem so everyone can benefit from how technology improves education in Thailand and other countries around the world (Kwok, 2021; Lachner et al., 2021).

The TPACK framework evolved from Shulman's (1986), which defines PCK as a type of knowledge that is specific and is knowledge that goes beyond content knowledge. This knowledge is the integration of various dimensions of knowledge to enhance the potential of teaching in that content. Mishra & Koehler (2006) proposed the concept of TPACK as a concept for integrating technology into the pedagogy process with additional content and knowledge to enable learners to learn well around the field. These are just a few suggestions to help develop new teachers and manage trainings effectively (Wang et al., 2018; Juhji & Nuangchalerm, 2020; Nuangchalerm, 2020; Nithitakkharanon & Nuangchalerm, 2022). Additionally, learning management systems make it easy to manage trainings and mentorship programs effectively. The ideas presented here are just a start in developing effective educational practices for teacher development (Roussinos & Jimoyiannis, 2019; Nuangchalerm et al., 2020; Prachagool et al., 2022).

An important process to encourage students to become professional teachers is to practice teacher professional experience. Practicing teacher professional experience is also at the heart of teacher professional students. Because it's a process that will help strengthen students, professional teachers. It's a necessary element that makes pre-service teachers more prepared to behave about what they should be and should do. Practicing teacher professional experience that can enhance the quality of teacher students to have desirable competencies (Srisawasdi, et al., 2018; Schaefer & Clandinin, 2019). This is a practice facility that is a model for students to learn from real-world situations along with theoretical learning from the university. There are real classrooms for students to apply the theory of knowledge and skills learned in real-world situations, so it is necessary to be serious about practicing teacher professional experience (Tanak, 2020; Subramaniam, 2022). In order to manage learning, there must be a variety of teaching and learning methods to develop the production potential of teachers with similar potential or on par with the leading teacher-producing institutions of the country.

Effective teachers will be able to use a variety of methods to manage classes for different types of learners. While inefficient teachers use the same approach to all types of learners (Hardin, 2008), teachers create agreements that allow learners to participate in classes. The importance of class management is widely recognized (Evertson & Weinstein, 2013; Vieira, 2020) which suggests that effectively managing learner behavior and learning of teachers is essential to achieving positive educational outcomes. Teachers can approach to class management has a significant effect on learners' intentions and self-learning (Broadbent et al., 2021), where effective classroom management coupled with teaching and maintaining a learning atmosphere leads to successful instruction. Building teacher-learner relationships and collaborating with students (Evertson & Weinstein, 2013). Teachers' ability to effectively manage classes demonstrates being a teacher who cares about students and hopes for social education and overall success (Prachagool et al., 2016).

Teachers need to adapt themselves in many ways, whether it's teaching and learning or performing tasks that require the knowledge and ability to apply technology and innovation in education, as well as developing new innovations to be used for transfer to students or gathering appropriate resources (Kim et al., 2021; Rufaida, 2021). Teachers must be professional teachers with knowledge of the subjects taught, the sciences of teaching based on various kinds of

methods and strategies. They have ability to practice teaching, transfer knowledge to students well, and be able to use suitable educational technology. That relies on a variety of learning tools, including the Internet, social media or the use of communication technology to create effective exchanges of learning. Teachers should therefore develop themselves by focusing on being able to design learning and acts as professional.

The instructional design concept of learning, which is characterized by a process that prepares the environment as well as other contexts. Learning that are consistent with students' characteristics and changing world circumstances, as well as apply technologies that combine technological aspects with learning psychology concepts. In the personal learning space, as well as teachers have to design and develop their own knowledge through a variety of technologies. The researchers are therefore interested in developing a learning management competency enhancement program for pre-service teachers during professional experiences. When the TPACK conceptual framework is used, both students and teachers can bring their comprehensive learning management competencies into practice. That is, it can motivate them to learn based on competencies and desirable behaviors. Also, the program provides opportunities pre-service teachers to use their knowledge and abilities to train as teachers, develop into professional teachers that result in the 21st century learning.

2. Method

This research and development, the professional experiences program was developed by employing empirical data and document analysis related the competency-based professional experiences through TPACK concept. Program for pre-service teacher development in learning management competency through TPACK framework is developed through the previous study by Nithitakkharanon & Nuangchalerm (2022). The program promotes learning management of pre-service teachers' competency as well as professional teachers should have TPACK framework in classroom strategies (Table 1). The requirements of strategies to foster learning management competency of pre-service teachers can be shown in 4 strategies.

Table 1. Learning Strategies in Requirement of Pre-Service Teachers

Strategy requirement	n	%
Professional Learning Community (PLC)	276	71.69
Workshop	218	56.62
Self-study method	196	50.91
Field trip	90	23.38

Pre-service teachers are expected to improve their learning managerial skills through a professional learning community (PLC), followed by workshops, self-study, and field trips, in that order (71.69%, 56.62%, 50.91%, and 23.38% respectively). By examining programs for teacher preparation and TPACK lesson design, the TPACK framework may assist them in developing learning management competency. Additionally, a pre-service teacher offered the suggestions below for improving learning management competency, which should be honed throughout the break between semesters. They are extremely handy to participate in competency-building activities since they have no academic goal, and they may be held accountable for any work that results from doing the activities as directed.

The study made the point that learning tactics should be varied to account for various learning situations and learning cultures. Pre-service instructors must to have certain learning abilities that go beyond the conventional classroom and advance it to new lesson design by fusing technology, pedagogy, and essential materials for 21st century learners. The procedures and approaches demanded appear appropriate for the nature and culture of the modern classroom. The notion of cooperation should be understood by pre-service teachers, and they should get the proper preparation.

Then, researchers employed focus group discussion to find out consensus about program for pre-service teacher development in learning management competency through TPACK framework. An informant group was 10 participants who concerned learning management competency through TPACK framework. They expressed idea and concept to teacher development program. Program outline and its manual strengthens were developed. Moreover, a group of data evaluators are qualified 9 scholars evaluated appropriateness, usefulness, and suitability before taking a pilot study and implement program to program of study during phase of school practicum. Pilot study was conducted with 30 pre-service teachers, improving and preparing program for teacher development. Then revise manual guide in semester 2, academic year 2021 at one school.

2.1 Participants

The participants in the implementation professional development program were pre-service teachers who conducted their professional experiences at on Demonstration School of A University. A total of 18 pre-service teachers who taught in primary and secondary levels were participated. They have to study 4 modules based on technology, pedagogy, and necessary contents in specific levels.

Module 1 Subject knowledge, ability to design learning in classroom

Module 2 Subject learning management based on student-centered approach

Module 3 Subject use and development of learning media, learning innovation, and technology for learning management

Module 4 Subject measuring and evaluating in learning outcomes

2.2 Procedure

2.2.1 Step 1: Pre-development assessment

Registration pre-service teachers to participate in this program, then orientation to clarify the details of participating in the learning management competency program. Testing learning management knowledge based on the TPACK framework, which a learning management knowledge test created by the researchers

2.2.2 Step 2: Development learning management competency

Four methods were used for developing learning management competency which reported and developed by Nithitakkharanon & Nuangchalerm (2022).

1. Self-study method, it is intended to allow preservice-teachers to study the learning materials and related reviews on their own disciplines before joining the program.

2. Field trips were intended to provide pre-service teachers with professional experience as teachers. It had increased knowledge, skills, and experiences by considering schools that places of study: 1) schools where teachers have a competency-based learning arrangement, 2) schools with outstanding performance are recognized.

3. Workshop aimed at enhancing the learning management competency, TPACK framework emphasized to their professional experience. In each module of training. They had a task assigned to review the content to integrate their knowledge and understanding of learning management competency through TPACK framework.

4. Professional Learning Community (PLC) was intended to enable pre-service teachers to practice their professional experiences with mentors and university. According to the expected understanding and course of action, they could enhance learning management competency through TPACK framework.

2.2.3 Step 3 Integration

Pre-service Teachers have professional experience, provide important information to the classroom, and use effective pedagogy that is in line with the way that students learn. The teachings given by the professional experiences at school are linked with the experience obtained by taking part in the program.

2.2.4 Step 4 Post-development assessment

The follow-up phase was manipulated after the workshop of the teacher's professional experience training students. Testing their understanding about learning management knowledge based on the TPACK framework. The assessment of the learning management competency was recorded and analyzed by school mentors. Then, the satisfaction towards professional development program was assessed.

2.3 Data Collection

Program allowed participants take the TPACK knowledge and understanding test. Using the TPAC conceptual framework, it is a multiple-choice knowledge test with 5 choices, which compares the scores before participating in the enrichment program. Participants were assessed their learning management competency by using the learn management competency assessment with 5-level rating scale. In the assigned course, mentors from university and school attended classroom, observe teaching and learning activities, assess learning management, and reflect on learning management practices. Then, the participants completed a satisfaction questionnaire for participating in the enhancement program.

2.4 Data Analysis

Researchers gathered data from a various kind of methods and analyze the data using mean and standard deviation to compare the pre-program score with the post-program score. Descriptive statistics used for providing details of development, dependent t-test was used for testing it significantly differences between pre and post scores. The criteria for analysis can be concluded by mean score ranges 4.51-5.00 refers to the competency of learning management was at highest level, 3.51-4.50 refers to the competency of learning management was at high level, 2.51-3.50 refers to the competency of learning management was at moderate level, 1.51-2.50 refers to the competency of learning management was at low level, and 1.00-1.50 refers to the competency of learning management was at lowest level.

3. Results

Professional development program was created which derives basic information from learning management competency studies and focus group discussions. The researchers used data from the creation of a learning management competency program outline for pre-service teachers, details of the content and activities are divided into 4 sections. The researchers led a learning management competency by enhancement program, TPACK framework, created a guide to the learning management competency. The validity of teacher development program which evaluated by expert consensus which described in terms of highest level of all aspects i.e., usefulness, suitability, feasibility, and appropriateness.

The experimental design was employed for testing pre and post scores, knowledge and understanding about learning management competency was studied and reported in Table 2. It revealed that they had post-test score higher than pre-test score at .05 level of statistical significance.

Table 2. Knowledge and Understanding about Learning Management Competency of Pre-Service Teachers Between before and after Implementation

Test	n	$\bar{X}$	S.D.	$\sum D$	$(\sum D)^2$	$\sum_D 2$	t
Pre	18	10.83	1.20	104	10816	634	17.56*
Post	18	16.61	0.70				

* significantly differences at .05 level of statistics

The level of learning management competency was investigated and found that they had all of component at highest level of competence. The pre-test of mean score was 10.83, but post-test mean score was 16.61. It can be clamimed that pre-service teacher had a positive achievement. The details can be shown in Table 3.

Table 3. Level of Learning Management Competency

Component	Before implement			After implement		
	$\bar{X}$	S.D.	Competency level	$\bar{X}$	S.D.	Competency level
Knowledge and understanding to learning design	3.17	0.10	Moderate	4.70	0.10	Highest
Learning management based on concept of learner-centered approach	3.28	0.27	Moderate	4.69	0.08	Highest
Media use and development, technology innovation for learning management	2.97	0.16	Moderate	4.79	0.15	Highest
Learning measurement and evaluation	3.02	0.18	Moderate	4.62	0.06	Highest
Overall	3.12	0.18	Moderate	4.69	0.11	Highest

Learning management competency, it can be concluded that before program implemented pre-service teachers had level of competency at moderate level. When considering all components in descending order, namely, learning management based on concept learner-centered approach; knowledge and understanding to learning design; learning measurement and evaluation, and media use and development; technology innovation for learning management. The

post-development segment as a whole was found to be at the highest level in descending order, namely, media use and development, technology innovation for learning management; knowledge and understanding to learning design; learning management based on concept learner-centered approach; and learning measurement and evaluation, and media use and development in respectively. To investigate satisfaction of pre-service teachers towards program, it found that they had level of satisfaction at the highest level of all items (Table 4).

Table 4. Learning Satisfaction Towards Teacher Development Program

Item	$\overline{X}$	S.D.	Level of satisfaction
1. The content is covered according to the goals of the program	4.44	0.62	High
2. The content is consistent with the need to enhance the learning management competency	4.39	0.78	High
3. The duration of training according to the program is appropriate to the content	4.33	0.59	High
4. Handbooks and capacity building documentation complete and up-to-date content	4.78	0.55	Highest
5. Documents can be applied in learning management practices	4.56	0.51	Highest
6. Knowledge, ability and experience in content are suitable	4.56	0.62	Highest
7. Personality is appropriate	4.67	0.59	Highest
8. There are techniques for organizing learning activities in accordance with the content	4.78	0.43	Highest
9. Provide opportunities to participate in learning exchanges	4.72	0.46	Highest
10. The timing of the educational session is appropriate for the subject matter	4.67	0.59	Highest
11. Self-study	4.61	0.50	Highest
12. Field trip	4.56	0.51	Highest
13. Workshop	4.78	0.43	Highest
14. Professional learning community	4.83	0.38	Highest
15. Module 1 Knowledge, ability to design learning	4.72	0.46	Highest
16. Module 2 Learning management based on learner-centered approach	4.83	0.38	Highest
17. Module 3 Use and development of media, innovation, technology	4.78	0.43	Highest
18. Module 4 Measuring and evaluating learning outcomes for learner development	4.67	0.49	Highest
19. The training materials and documentation are consistent with the activity	4.83	0.38	Highest
20. The place of the workshop is suitable	4.78	0.43	Highest
21. Gain new knowledge, skills and experiences by participating development program	4.89	0.32	Highest
22. Able to apply the knowledge, skills and experience gained from development program	4.94	0.24	Highest
Overall	4.71	0.12	Highest

When considering the list of items. The 19 items were at highest levels of satisfaction and the most 3 highest mean score can be sorted by descending: knowledge, skills and experience gained from development; gaining knowledge, new skills and experiences from participating in development; and gaining knowledge and experience from participating in development through professional learning community. However, the program should be continuosly conducted to perform TPACK into their professional experiences. The can promote pedagogical strategies as well the content and technology integration.

4. Discussion

The study reported that to improve pre-service teachers' learning managerial skills when they are gaining teaching experience. These include workshops, self-study techniques, field visits, and community engagement in professional learning. Additionally, there are several methods for developing i.e. training, teaching communication, seminars, operational meetings, job visits, and further education and remote learning. Koh & Divaharan (2011) found that reflecting on learning outcomes and sharing experiences with other teacher professional experience practitioners improves knowledge and use of technology in teaching and learning, as well as various competencies related to TPACK. They developed the technology integration expertise of teacher professional experience training students through the TPACK teaching model (Srisawasdi et al., 2018; Roussinos & Jimoyiannis, 2019; Nuangchalerm, 2020; Tanak, 2020; Lachner et al., 2021). Being a part of the professional learning community has a significant impact on

the higher degree of professional experience that students want to get. Teaching preparation for learning management design, as all three are equally crucial to overseeing student learning in a classroom.

In addition, Kagle (2014) studied professional learning communities for students practicing teacher professional experience. It has been found that using professional learning communities for students to practice teacher professional experience is an effective tool. It can help promote students' skills, practice the teacher professional experience by adapting it to the suitability and needs of the students. It also instills a culture of professional learning community for students to practice teacher professional experience to apply to quality teaching skills. The implementation of development program, teacher production agencies of various institutions can be deployed to promote the cognitive competence and ability to teach specific subjects of students.

The test results revealed that they had knowledge of learning management competence and gained more performance is at the highest level. The outcomes of the program's execution increase the learning management competency of teacher students by applying the TPACK framework. Through utilizing the TPACK framework, the participants' satisfaction well with development program is at the best degree possible. TPACK framework help teachers gain knowledge about lesson design to fit their classroom context (Gold & Holodynski, 2017; Nuangchalerm, 2020). It also motivates students to participate in classroom activities based on active learning (Schiefele, 2017). On the other hand, teacher motivation is a predictor of the importance of interest in each subject and the learning goals of students, both at the student level and in class. The motivation of the teacher shows indirect significance in relation to the motivation of the student obtained from the teacher's teaching Wolff et al., 2021).

Tseng et al. (2019) used TPACK when teaching through web conferencing. The findings indicated that there was found to be content and pedagogical knowledge. Teacher development is an integral part of improving education standards. For that reason, many educational institutions have programs to help teachers learn new skills and strategies. Technology is a major part of these programs, as it provides training platforms that help educators improve their jobs (Baran et al., 2011; Graham et al., 2012; Gur, 2015). Educators then use the skills they've learned to train their colleagues. This process has the potential to dramatically improve curriculum and teaching methods for all students.

There is a learning process that allows learners to learn how to learn, how to think and apply knowledge, skills and attitudes in practice as well. It enables students to learn from the context around them by using the principles of research. It also helps to hone the various competencies that have been learned to become mastery. Based on child development principles and the use of reverse data for the improvement and development of learners' learning. Reduce judgmental or competitive assessments should be done with prudence. Students have equal access to quality of learning resources, to reduce educational inequality, and develop instructional kits. This includes developing the skills of the 21st century and the new role of teachers in the new era, as well as supporting educational institutions to organize and develop teachers to become a truly professional teacher (Darling-Hammond, 2021; El Islami et al., 2022).

To be a good teacher requires the knowledge, ideas, skills and virtues of a teacher. In my opinion, there are both positive and negative sides. Therefore, teachers should develop their mindset and use their ideas as skills combined with skills (Kham, 2022). It is important factors for teachers to be able to provide children or learners with desirable attributes in accordance with the goals or intentions of education. Learning will be enhanced if teachers are aware of how to teach theme topics while integrating pedagogical and content knowledge. It comprises of the teacher's expertise, comprehension, and commitment to the material being taught.

Knowing the aims and objectives, studying the subject, and understanding potential of student’s context, teaching and learning strategies, including techniques giving students opportunities to seek information and use resources and technology for learning. The science of combining content with teaching methods is supported by research that can help pre-service teachers learn better to design appropriate lesson sand more than using conventional pedagogical knowledge alone. The content combines one of the most taught methods, namely technology, which is a combination of technological knowledge, pedagogical knowledge, and content knowledge.

5. Conclusion

The development programs to enhance learning management competency of pre-service teachers by using TPACK framework consisted of 5 components: the principles of the program, the aims of the program, the content and activities of the program, the formats and activities used in the program, and measurement and evaluation. Program evaluation results by qualified experts. Aspects of the usefulness, feasibility, accuracy, and appropriateness of the

learning management competency development program is appropriate at the highest level. The results of the implementation of the learning management competency program reported that pre-service teachers had post-test score higher than pre-test score. The level of learning management competency by using TPACK framework enhance their performance and learning satisfaction at the highest level.

However, the research project should take it into account the use of appropriate technology in the educational system, as well as technological literacy and pedagogical competencies. We think the current study has scientific and empirical significance for teacher education, notwithstanding its limitations. Teachers are now faced with new obstacles as a result of modern technologies, and they frequently struggle to integrate suitable technology into their lessons as a result of poor self-control. The results show that while creating courses with technology integration, pre-service teachers may feel emotionally difficult about its integration. Education professionals must take care to prevent instructors from becoming overwhelmed by unfavorable feelings while they study and use cutting-edge technologies for education.

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