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A PBL-based Professional Development Framework to Incorporating Vocational Teachers in Thailand: Perceptions and Guidelines from Training Workshop

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Abstract: Vocational education and training have become significant in developing the country in various aspects. Thailand has emphasized on improving the quality of vocational education with the promotion of ICT to support the teaching and learning. However, vocational teachers are limited with the knowledge, skills, and confidence in using technology in their classroom, making their students' learning unmotivated and unengaged to the learning. Therefore, this study proposes a novel framework to developing the vocational teaching with the use of ICT support. The framework aims to make the vocational teachers skillful with TPACK in serving 21st-century education. Thus, this framework is integrated into the training workshop basing on project-based learning strategy, starting from considering actual teaching context, planning and finding solutions to address the need-to-be-enhanced learning topics in particular situations, applying learning technologies to support and motivate teaching and learning, to creating instructional activities. Furthermore, an experiment to investigate the perceptions and feedbacks towards the proposed framework was conducted with the vocational teachers in a training workshop. The findings show that the framework could help increase the vocational teachers' perceptions on using ICT for teaching on confidence in using ICT for teaching and ease of use the ICT to assist teaching. Moreover, the teachers provide qualitative perspective in using ICT and suggestions for the institution. In addition, a proposal of practical guidelines and suggestions on vocational teachers' development in Thailand with ICT has been proposed.

Keywords: Technology-enhanced vocational learning, vocational education and training workshop, TPACK

1. Introduction

Information and communication technology (ICT) skills are essential for effective participation in today's world. Thailand's ICT education policies and explores some of the reason why despite significant investment. While OECD/UNESCO (2016) identified one of policy issues that may be holding Thailand that is teachers' confidence and capacity to use ICT in the classroom. The teachers have limited confidence in using technology to facilitate specific concepts or skills and to support creativity (Kafyulilo & Keengwe, 2014).

Moreover, Thai formal education system has included general education and vocational education to help move the country beyond; especially, Thailand government has focused on enhancing the vocational education. Presently, several countries have seen a significant return of interest in vocational education and training (VET) and an increasing policy focuses on qualification completions in VET education (McGrath, 2012; Van, Ritzen & Pieters, 2014; Fieger, 2015). Vocational education and training (VET) focus on specific practical skills which allow individuals to

engage in a specific professional activity (Agrawal, 2013). One of the mechanisms for enhancing the standard of VET is education system especially, the teachers in vocational education. Vocational teachers' work is based on teaching competence and competence related to a specific work-life vocational practice (Andersson & Köpsén, 2015). Previous research presented the teachers' competencies for teaching and learning process to support the learner achievement (Fritsch, et al., 2015). In addition, some studies reported that the teachers' beliefs that influence their behavior in the classroom could be improved student engagement in vocational education (Van, Ritzen & Pieters, 2014).

Vocational Education and Training (VET) in Thailand are offered at the secondary level in specific schools or institutions, or in a dual model based on agreements between schools and companies. After two years of coursework, students obtain a diploma, and they may continue to higher VET at tertiary institutions. Therefore, vocational teacher training plays a major role in the development of knowledge and skill of vocational teachers in Thailand vocational colleges. Thailand has numerous vocational teachers and various branches such as Home Economics, Fashion Design, Mechanic, Electronic, etc. However, the barriers to professional development are to employ technology and adapt for teaching that limits the impact of vocational competency. Therefore, if the confidence of using technology for vocational teachers has been improved, it could finally enhance the vocational competency and teaching performance.

Based on this perspective and the limited use of ICT in vocational teaching in Thailand, therefore, this study proposed a framework for vocational teachers' professional development in Thailand, hereinafter called TVET. In this framework, ICT and learning technologies play a crucial role to promote the teachers to have adequate teaching skills for 21st-century education based on Technological- Pedagogical- Content Knowledge (TPACK) strategy. Meanwhile, Project-Based Learning (PBL) strategy was used to develop meaningful instructional activities with the experience of technology and tools. Furthermore, the experiment was conducted with vocational teachers from various domains in a training workshop to seeking for the answers towards the following research questions:

1) Do the vocational teachers reveal higher perceptions on using ICT to support teaching with the TVET framework?
2) What are their feedbacks and suggestions on the proposed TVET framework?

This research study not only made an attempt to enhance the vocational teaching's quality in Thailand with the proposed framework, but also presented the guidelines and suggestions on vocational teachers' development in Thailand with ICT.

1. Related Studies

1.1. PBL in Professional Development

Project-Based Learning (PBL) is considered as a potential constructivist teaching and learning framework. The teachers need a wide range of supports to implement this strategy in their classrooms successfully. Moreover, PBL is presented as a way to think about innovative instruction by providing a possible means of enactment (Marx, et al., 1994). Previous research presented the continuous professional development model, to support teachers to enact Project-Based Learning in Science and Technology that engage in PBL develop skills of independent learning and learn to be more open minded, remember what they learn longer (Fallik, Eylon & Rosenfeld, 2008).

In this study, we applied the five steps of Project-Based Learning (PBL) by Krajcik & Blumenfeld (2006) in learning processes consisting of: (1) Start with diving a question (2) Explore the diving question in via planning (3) Find solution via research the information for design investigations (4) Learn to use technology for constructing products and (5) Share ideas via presentation process.

1.2. TPACK and Vocational Teaching

Mishra, & Koehler, (2006) presented Technological Pedagogical Content Knowledge (TPACK) framework that attempts to capture some of the essential qualities of knowledge required by teachers

for technology integration in their teaching while addressing the complex, multifaceted and situated nature of teacher knowledge. Therefore, teachers need a specialized form of professional knowledge termed as technological pedagogical content knowledge (TPACK) to support ICT integration for 21st-century learning (Koh, Chai & Lim, 2016). At the heart of the TPACK framework, is the complex interplay of three primary forms of knowledge consisting of Content (CK), Pedagogy (PK), and Technology (TK). Several research studies proposed the Technological Pedagogical Content Knowledge (TPACK) framework to use the conceptual tool in studies that consider technology integration into classrooms (Olofson, Swallow & Neumann, 2016). In addition, several studies investigated to develop teachers who have the TPACK capabilities to use technologies to support teaching and learning (Kadijevich, 2012; Srisawasdi, N,2014; Finger, et al., 2015; Yeh, et al., 2015; Tai, Pan & Lee, 2015). Khan, Bibi, & Hasan, (2016) proposed teachers' conceptions of technology integration teaching that have flexible teaching of the most significant conceptions of teaching within the context of vocational education. Therefore, vocational teachers need to acquire a technology to transfer the knowledge through pedagogies effectively.

2. TVET Development

In this study, we attempted to design an framework to support the professional development of vocational teachers, hereinafter called TVET. The goal of this framework is to help prepare the vocational teachers equipped with the TPACK strategy and ready for the 21st-century education.

As shown in Figure 1, the TVET framework runs in the training workshop and implementation with certain steps, in the meantime, the vocational teachers (trainees) are gaining the knowledge of TPACK with following strategies, including active learning, formative assessment, engaging learning environment, and learning motivation. The workshop training process runs in following steps.

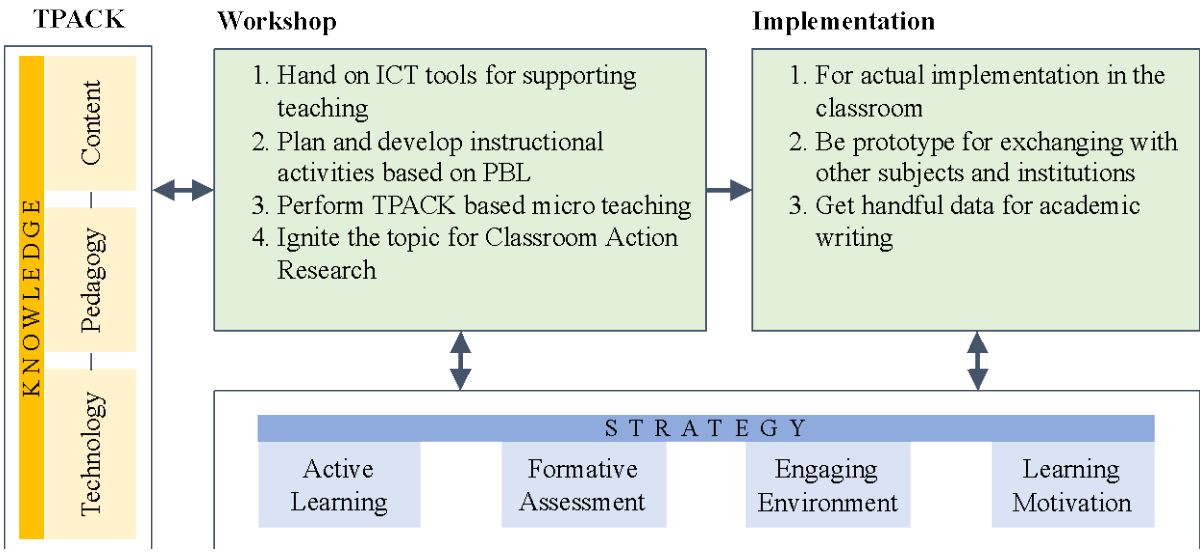

Figure 1. Overall Structure of the TVET Framework

1. The trainees firstly get introduced to ICT and learning technology tools, followed by the hands-on experience to their advantages and functionalities. This process enables the trainees to have an impression and engagement with such ICT tools to be implemented in their teaching topic.
2. Then, the trainees are told to create a plan and develop their instructional activities following the PBL process by adopting the learned ICT tools. To perform this important process effectively, the trainees are encouraged to work in this sequence:

- Diving a question: this helps the trainees to establish the topic needed to scaffold or to enhance as it may frequently find difficulties, misconception, low motivation, low participation/involvement by their students. At this point, the project has already been initiated.
- Planning: this step would create an operation plan to achieve the need-to-solve problems by considering their capacity, institutional infrastructure and facilitation, classroom environment, and availability of the computer/mobile devices. At this point, a plan is visualized.
- Find the solution: in considering the plan and actual environment, the trainees search and study for the possible solutions, e.g. using mobile devices in a group activity, using social media for the discussion and reflection, asking students to learn some basic knowledge before the scaffolding sessions in the classroom. The solution might incorporate multiple activities and tools upon the problem and situation.
- Use ICT technology to construct the product: at this point, the handed-on ICT tools can be applied to supplement the solutions. For example, the Internet Response System (IRS) might be used during the instruction to seek for students' ongoing understanding with their personal mobile devices. The online collaborative presentation making could be used for brainstorming, analyzing and creativity.
- Share ideas: this is inter-operational with the third step in the workshop.

3. Lastly, the trainees perform a TPACK-based micro-teaching with the developed instructional activities on the selected topic. The other trainees act as their students and give reflections on the received activities, while the trainers provide the feedbacks for further improvements.

However, after the training workshop process, the trainees have some time to make the improvements for the final instructional activities to address the exact problems in their situations. The implementation phase is expected in the follow-up study.

3. Methods

3.1. Participants

The participants of this study included 43 vocational teachers (male = 14, female = 29) aged between 20 and 60 years old from 11 teaching domains, including General Relations, Fashion, Textiles, Food, Nutrition, Home Economics, Hotel, Design, Arts, Screen Printing, and Communication Technology from a vocational college in Thailand. Each of them has teaching experience at least two years and have attended at least three workshops on training ICT earlier. They attended a vocational teacher training workshop run by our proposed framework for two days (16 hours).

3.2. Instruments and Validation

In this study, a questionnaire was developed to measure the vocational teachers' perceptions of the effectiveness of ICT competence training. The questionnaire was adapted from (Galanouli Murphy & Gardner, 2004), which consists of nine 5-Likert Scale items to measure the following dimensions: Confidence in using ICT for teaching (CFD), Importance of ICT to teachers (IPT), and Ease of Use the ICT to assist teaching (EOU). The adapted questionnaire was validated for the reliability with the Cronbach's alpha of 0.866, implying the internal consistency in the measuring items. Example items can be found in the Appendix.

Moreover, an open-ended questionnaire was developed to assess the vocational teacher's qualitative perspective on using ICT for teaching in the classroom (TCR), and suggestions for the improvement of using ICT in the vocational institution (SIM). The questionnaire was validated, with suggestions, by five experienced ICT technicians, infrastructure engineer and vocational teachers, for the accepted validity.

Both questionnaires were presented in the online version of Google Form to collect the research data during the training process.

3.3. Experimental Procedure

The experiment to measure the effectiveness of the TVET framework was conducted in the 2-day training workshop. Figure 2 shows the experimental procedures with the four following steps:

Step 1: Pre-questionnaire, the vocational teachers answered the online questionnaire with their mobile devices. This aims to collect their personal background and perceptions towards the using of ICT and learning technologies prior to the introduction of TVET framework for 30 mins, as shown in Figure 3 (top-left).

Step 2: Frameworking the TVET framework, they received a training on the technology and applications, e.g. Plickers, Socrative, as shown in Figure 3 (top-right). This step helps equalize the technology skills of the teachers and provides a practical guideline on using the ICT technology effectively. This lasted for seven hours.

Step 3: They were then separated into six groups upon their areas of study and the convenience of collaboration. As shown in Figure 3 (bottom-left), each group brainstorms and found the common problems to address; as a result, the developed instructional activities can be used with all members of a group. At this step, each group followed the PBL process presented in the TVET framework lasted for eight hours.

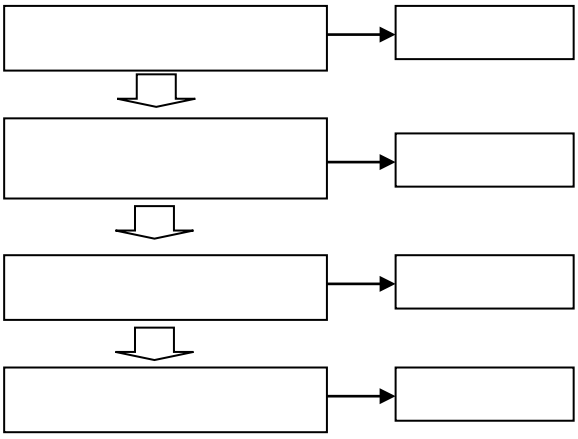

Figure 2. Experimental Procedure.

Step 4: Post-questionnaire, as shown in Figure 3 (bottom-left), individual teachers took an online post-questionnaire, which were in parallel with the pre-questionnaire for the data collection after experiencing the TVET framework. Moreover, an open-ended questionnaire was given to collect more perspectives toward such framework.

Figure 3. The Vocational Teachers' Professional Development Training Process.

4. Research Findings

4.1. Vocational Teachers' Perceptions towards the TVET Framework

Based on the data collected from the pre- and post- online questionnaires, both data were analyzed to examine the difference of their perceptions towards the TVET framework on three dimensions.

As shown in Table 1, it was found that the vocational teachers rated higher on all three dimensions; nonetheless, CFD and EOU were rated significantly higher. This result means that the TVET framework could shift their perceptions on the use of ICT in helping their students' learning problems, especially regarding confidence and ease of use.

Table 1: Results of pre- and post- questionnaire scores on the TVET framework perceptions.

Dimension	Pre-Training (n = 43)			Post Training (n = 43)			t
	M	SD	Interpretation	M	SD	Interpretation	
CFD	3.575	0.884	Moderate	4.331	1.413	High	2.974***
IPT	4.350	1.788	High	4.512	0.967	Very high	0.522
EOU	4.114	1.145	High	4.737	1.761	Very high	1.944*

*$p < 0.05$; ***$p < 0.001$; $df = 84$

Moreover, when taking gender difference (male and female) onto significant perception difference (CFD and EOU), it was found that female teachers (M = 4.63) could reveal higher perception than male teachers (M = 4.03) on CFD, in contrast to the beginning, while male teachers (M = 4.89) revealed higher perception than female teachers (M = 4.59) on EOU, after attending the training with the TVET framework, as shown in Figure 4. This implies that the TVET framework could provide a strong confidence in using ICT in teaching over the males.

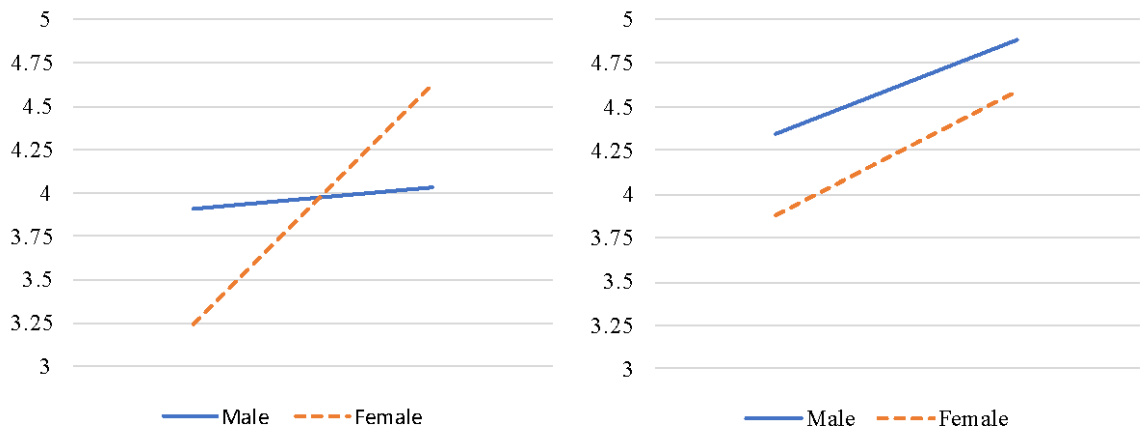

Figure 4. Gender Difference on CFD (left) and EOU (right).

4.2. Vocational Teachers' Qualitative Perspective and Suggestion towards the TVET Framework

Based on the feedbacks/responses on the open-ended questions, all the responses were analyzed from all 43 participants with a coding technique. The responses could be summarized and presented in Table 2.

It was found that the in-service vocational teachers provided positive feedbacks upon the using ICT for teaching in the classroom as it could increase the learning participation and bring more learning motivation with engaging environment. Moreover, the teachers feed backed several points to be addressed by the institutions for the improvement of using ICT. All teachers' feedbacks aimed to move the vocational education forwards by seeing the ICT as an essence to drive the learning environments effectively, ranging from the tiny students-teachers-classroom perspective, to the entire infrastructure-institution perspective.

Therefore, the authors have proposed a proposal of practical guidelines and suggestions on vocational teachers' development in Thailand with ICT. In addition, related studies have been reviewed in supporting this proposal.

Table 2: Results of qualitative feedback on using ICT for teaching in the classroom (TCR), and suggestions for the improvement of using ICT in the vocational institution (SIM).

Item	Feedback
TCR	
1. Participation/Involvement (Activeness)	- The training could make my classroom more active with willing participation. - I can't wait to see the happy noise in my classroom with the children.
2. Engagement	- Our developed activities could strongly engage the students in the bored topics for sure. - I felt if I finalize the developed plans, the student would get motivated and the most benefit for their better learning performance
SIM	
1. Technology/Infrastructure	- The college would provide better, stable Internet network for a great learning experience with ICT. - I love to see the high-speed Internet, then I can ask student to response me on their mobile without their data plan.
2. Workloads/Management	- The school should reduce the paper load, so that I can have more time to learn ICT and create better instruction. - As always, the timetable management does not support my creativity

	to enhance the teaching.
3. Incentive/Supports	- The school should consider our effort on taking ICT to enhance the students' learning outcomes, and offer some more incentive, at least as an encouragement. - Learning ICT and implementing in the actual course, this could be measured for the promotion.

5. Guidelines and Suggestions on Vocational Teachers' Development in Thailand with ICT

In the last decade, several research studies have been described the contribution to utilize of Information and Communication Technology (ICT) in an educational system that many countries agree that teachers should update their knowledge, skills, and competences. Some have even included professional development in their use ICT for teaching (Vanderlinde, Braak, & Tondeur, 2010; Wastiau, et al., 2013; Kabakci & Çoklar, 2014; Vrasidas, 2015). Many research on Information and Communication Technology (ICT) policy in education have revealed multiple methods concerning design and implementation of policies adopted by many researchers of developing countries especially, in vocational education (McGrath, 2012; Khan, Bibi & Hasan, 2016) that attempted to suggest the government each country in order to improve vocational education system.

In this study, we have found that the vocational teachers do not have methods for applying the technology for teaching and learning while they can use routine technology. In addition, they need to be supported with the facilities such as internet, tablet or device in order to use during the learning process. Vocational teachers need to prepare to integrate ICT in teaching. In the case of an ICT training, even more, concerns have to be considered. The results show that professional development for teachers is most effective if directed to the stage of ICT development reached by the college. We found that the attitude of vocational teachers was improved about using ICT. This can be considered as an important step towards the successful integration of ICT in vocational education.

6. Conclusions

This study presented a novel framework to vocational teachers' professional developments with ICT to address the shortages and flaws of present learning and teaching situations in Thailand vocational context. The TVET framework was proposed by taking ICT and learning technologies as a major tool to be applied in developing the instructional activities for the particular topics upon the teachers' context. With the TVET framework, the teachers are expected to have TPACK skill of practice through the training workshop process. Besides, PBL was adopted to serve as a concrete structure in developing such needed instructional activities.

Importantly, this research offers a significant contribution to enhancing the quality of vocational teaching and learning with ICT support; moreover, the provided framework could be a leap in advancing the community of technology-enhanced vocational education. As mentioned earlier, this initial version of the proposed TVET framework has just passed the experiment to seek for its effectiveness with only one group of participants. However, continuous improvements can be made upon the follow-up implementations of the ICT-facilitated instructional activities developed during the training workshop, and upon the improvement of the institution's network, infrastructure and managements. Moreover, the study with multiple groups of participants is required examine the difference among interesting variables and students' background.

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Appendix

Example of questionnaire items for measuring the teachers' perception towards the use of ICT in teaching.

1) I feel confident when teaching with ICT.
2) I am generally quite good with ICT.
3) I use ICT in many ways in my teaching.
4) I would generally feel OK trying something new teaching with ICT.
5) I believe I could do advanced ICT for teaching.
6) Figuring out computer problems appeals to me.
7) Learning about ICT is worthwhile.
8) I would like to know more about ICT.
9) All teachers should be able to use ICT in their teaching.