EXPLORING EFL TEACHERS' CALL KNOWLEDGE AND COMPETENCIES: IN-SERVICE PROGRAM PERSPECTIVES

Mei-Hui Liu, Tunghai University

Robert C. Kleinsasser, Arizona State University

This article describes quantitative and qualitative data providing perspectives on how six English as a Foreign Language (EFL) vocational high school teachers perceived CALL knowledge and competencies in a yearlong technology-enriched professional development program. The teachers' developing technological pedagogical content knowledge (TPACK) and perceived computer self-efficacy are examined from their use of technology while participating in online project-based EFL instruction. Data analysis reveals these participants' TPACK and self-efficacy of using computer technology development, their application and infusion of technology in English instruction, and factors that facilitated or hampered their (technology) professional development. Such understandings are briefly buttressed with additional perspectives from three university professionals and these teachers' vocational high school students. The multiple perspectives and perceptions render meaning-making potential for professionals promoting and developing technology integration into EFL classrooms.

INTRODUCTION

There is wide agreement that it is often the teachers who make decisions as to whether and how to use Information Computer Technology (ICT) in their teaching (Haydn & Barton, 2008; Sang, Valcke, Braak, & Tondeur, 2010), and that when they do, they can act as change agents for technology integration. Scholars and researchers have argued to transform teacher education to better prepare tomorrow's teachers to understand how technology impacts student learning (e.g., Ertmer, 2005; Polly, Mims, Shepherd, & Inan, 2010; Sang et al., 2010). Second language teacher educators have similarly urged for the preparation and education of pre- and in-service language teachers to develop computer-assisted language learning (CALL) in the 21st Century (e.g., Hong, 2010; Hubbard, 2008; Hubbard & Levy, 2006). To this end, we examined English as a Foreign Language (EFL) in-service teachers' year-long CALL professional development seeking to prepare teachers for technology-enriched language education and explored EFL teachers' learning to integrate technology into classroom instruction.

THEORETICAL FRAMEWORK

TPACK and Computer Self-Efficacy

Teacher professional development receives attention and promotes improvement in general and second language education (e.g., Avalos, 2011; Kleinsasser, 2013), including professional development in CALL (e.g., Hong, 2010). The technological pedagogical content knowledge (TPACK) framework (Mishra &

Koehler, 2006) that builds on Shulman's (1987) *Pedagogical Content Knowledge* is of particular interest in this study of online EFL teacher professional development. Mishra and Koehler (2006) emphasized teachers need to integrate technology with content in meaningful ways to enhance student learning. The TPACK core consists of dynamic relationships between content, pedagogy, and technology for teachers to develop (Koehler, Mishra, & Yahya, 2007; Mishra & Koehler, 2006). Hughes and Scharber (2008) further highlighted that all language teachers need to become more meta-cognitively aware of their knowledge base in terms of technological content knowledge (TCK), technological pedagogical knowledge (TPK), and TPACK (which may assist teachers to exploit different technology applications and tools as a source for ICT conceptualization, development, and assessment). Heeding Hughes and Scharber's advice, this study focuses on the following three constructs:

- TCK: knowing about selecting appropriate CALL tools to present English learning materials.
- TPK: knowing about implementing teaching methods and project-based pedagogy with appropriate CALL tools.
- TPACK: knowing about integrating appropriate pedagogy and CALL technology into presenting English learning materials and project-based content.

Additionally, the construct of self-efficacy plays a role with TCK, TPK, and TPACK. Compeau and Higgins (1995) described computer self-efficacy specifically as one's perceived ability to accomplish a task with computers (citing Bandura's [1986] social cognitive theory); individuals with higher computer self-efficacy beliefs see themselves as computer technology users. Performance accomplishments and vicarious learning experiences are generally considered major sources of increasing one's self-efficacy (Wang, Ertmer, & Newby, 2004). In other words, viewing others' successful task accomplishments may increase individual's perceptions of others' efficacy as well as one's own efficacy when performing similar tasks. Having briefly sketched the four theoretical constructs of our study, we turn now to empirical work that further clarifies these ideas, concepts, and insights.

LITERATURE REVIEW

Some researchers contended that many teachers do not infuse ICT into their instruction even in high-tech schools (e.g., Lin & Lu, 2010; Teo, 2009; Wang et al., 2004). Still other researchers found teachers' TPACK and computer self-efficacy increased with instruction in technology integration, pedagogy, and content (Mishra & Koehler, 2006; Thompson & Mishra, 2008) and some specific teachers' competencies were further developed using technology with instructional practices (Ertmer, 2005; Ropp, 1999). A majority of studies focusing on technology professional development has relied on quantitative surveys describing the effects of TPACK and various teacher competencies on developing teachers' TPACK (e.g., Doering, Veletsianos, Scharber, & Miller, 2009; Jang, 2010) or enhancing their perceived computer self-efficacy (e.g., Koh & Frick, 2009; Overbaugh & Lu, 2008). One example is Lee and Tsai (2010), who investigated elementary and high school teachers' self-efficacy for TPACK in Taiwanese schools utilizing surveys. However, Polly et al. (2010) highlighted the need for multiple data sources and various stakeholders' perspectives to provide "a more robust view" of how teachers learn to teach with technology. Nonetheless, few researchers have examined both issues (i.e., TPACK and computer self-efficacy) in one investigation as done in the current study.

Technological Pedagogical Content Knowledge (TPACK)

Using various scales, researchers have investigated pre-service teachers' TPACK development during semester-long courses in educational technology, mathematics, or science (e.g., Chai, Koh, Tsai, & Tan, 2011; Sahin, 2011; Schmidt, Baran, Thompson, Mishra, Koehler, & Shin, 2009; So & Kim, 2009). In these studies, pre-service teachers designed teaching projects after receiving instructional modules related to technology professional development. Some studies examined the development of teacher candidates' TPACK subcomponents by solely administering pre- and post- surveys, and others further analyzed the

project tasks designed by pre-service teachers. These investigators tended to find pre-service teachers' TPACK limited by a lack of pedagogical, technological, and/or content knowledge.

Researchers have further documented the static nature of in-service practitioners' TPACK (e.g., Archambault & Barnett, 2010; Benson & Ward, 2013; Jang & Tsai, 2012; Lin, Tsai, Chai, & Lee, 2013). Findings included high levels of technology knowledge that did not necessarily ensure TPACK, more experienced teachers perceived having more TPACK, and a significant negative correlation between age and TPACK domains. In two professional training contexts, Doering et al. (2009) and Jang (2010) found that it was a challenge for in-service teachers to develop and employ appropriate teaching content and pedagogical approaches while TCK and TPK were not sufficiently developed for real classroom instruction. However, few researchers have examined the nature of in-service teachers' technology infusion in classroom practice compared to pre-service teacher preparation as in the study presented here.

Computer Self-Efficacy

Extensive research has investigated pre-service teachers' intention or confidence integrating technology in future instructional practices in terms of computer self-efficacy (e.g., Celik & Yesilyurt, 2013; Demiralay & Karadeniz, 2010; Sang et al., 2010). A few studies considered in-service teachers' points of view. For instance, researchers found that teachers' perceived self-efficacy had significant correlations with their effort and commitment to using technology in classroom instruction (Lin & Liu, 2010). Teachers with more access to the Web for instructional purposes had higher levels of self-efficacy (Lee & Tsai, 2010), and EFL teachers with better computer access had lower computer anxiety and more computer self-efficacy (Chen, 2012). Yet, studies that tap into in-service teachers' perspectives and actions are rare; both interest and need to further study in-service TPACK and computer self-efficacy remain. This is no less true in second language education, which we take up next.

Language Teacher Preparation in CALL

The lack of adequate teacher preparation restricts technology-enhanced instruction in language classrooms (Egbert, Paulus, & Nakamichi, 2002; Kessler, 2006; Oxford & Jung, 2007). Aydin (2013) noted that the research depicting the process of language teachers' learning to teach with technology receives even less attention. There persists a dearth of related empirical studies on how (foreign) language teachers learn to integrate technology into their instructional practice (McNeil, 2013; Olphen, 2008).

Most researchers have tended to promote CALL teacher preparation by having pre-service teachers use technological tools or media (e.g., blogs, podcasting, e-portfolios, online learning communities) in technology or [Teaching English as a Second Language (TESL)] methodology courses (e.g., Debski, 2006; Desjardins & Peters, 2007; Egbert et al., 2002; Kim, 2011; Meskill, Anthony, Hilliker-VanStrander, Tseng, & You, 2006; Sun, 2010). These researchers found that pre-service teachers developed technological competences but were not at ease applying CALL in future classes. Meskill et al. (2006) documented that both in-service and pre-service language teachers in an online learning community appreciated expert-novice interactions and increased their positive attitudes toward CALL and confidence in CALL integration, whereas Kim (2011) and Sun (2010) showed that pre-service teachers held positive attitudes toward podcasting and/or blogging to support their professional development. These last three studies did not offer evidence as to how TESL professionals were capable of transforming these learning experiences and attitudes in real instructional settings.

Most recently, McNeil (2013) suggested that CALL professional development include situated learning activities. A few studies have already provided some initial insights that such opportunities encouraged participants to apply CALL theories into practices as well as to scaffold students' language learning (Chao, 2006; Debski, 2006). McNeil (2013) specifically explored Korean in-service teachers' learning experiences and contended that a situated learning training course had a positive effect on teachers' CALL skills. Nonetheless, McNeil acknowledged that the participating teachers' computer literacy

neither necessarily assisted nor reflected technology use in language education.

PROBLEM STATEMENT AND RESEARCH QUESTIONS

As illustrated above, there is limited research regarding in-service language teachers' CALL professional development and the process(es) of how practitioners implement technology in actual classroom settings. The extant literature shows that few researchers rely specifically on theories and utilize multiple stakeholders' perspectives to assess language teachers' CALL knowledge and competencies in situated learning contexts. We investigate EFL teachers' learning to teach with technology during a yearlong technology-enriched in-service program that used the theoretical lenses of TPACK and computer self-efficacy to understand and address the following research questions.

1. How do in-service EFL teachers perceive their development of CALL knowledge and competencies; how do university professionals and these EFL teachers' students perceive the teachers' professional development?

2. What benefits do in-service EFL teachers perceive when participating in online professional development?

3. What factors facilitate or hamper these EFL teachers' professional learning and classroom implementation of technology?

METHODOLOGY

Settings

This study was conducted at two private vocational schools located in a city in central Taiwan. The schools from which potential participants were recruited shared similarities in terms of historical reputation, curriculum design, and initiatives to create online learning environments. The major specialized subjects offered at both schools were Applied English, Cosmetology, Tourism, Nursing, Information Science, Business Administration, and International Trade. These two schools (School A=2,700 students; School B=3,400 students) were both ranked as "Top-rated Private Vocational School[s]" receiving extra finances from the Ministry of Education (MOE) in Taiwan during the 2009 and 2010 school years; one requested mission was to pioneer integrating technology into all instruction. Both schools promoted the use of school-based *Moodle* platforms and personal weblogs by organizing short-term technology workshops for teachers who volunteered to participate. Online learning was mainly used for class announcements or posting learning materials.

Participants

The main participants were six full-time EFL teachers (four in School A and two in School B). These female teachers were recruited based on their availability and willingness to join this technology professional development program (see Table 1 for demographic information). Amy, Bella, Cindy, and Dora were expected by the Director of Teaching Affairs to break new ground for technology-based English education (School A). Emily and Flora did not receive any pressure from their administrator (School B), yet they both had strong motivation to make changes to their current teaching practices. These teachers taught a general English course to students majoring in Applied English, Information Science, Nursing, or Cosmetology in order to improve their English language proficiency. Before taking part in the year-long professional development program, Amy, Bella, and Dora attended short-term technology workshops offered by their schools, while Cindy, Emily, and Flora learned how to use instructional technology from friends or colleagues. Their previous technology application covered PPT, emails, YouTube, and online resources. None were familiar with integrating online learning platforms or project-based instruction with their English curriculum.

Additionally, three university professionals and students in one class taught by each teacher (grade 10 or 11) offered additional perspectives on these English teachers' development with technology. These female professionals had taught 7–18 years at two private universities before their involvement in this research project. Two of them had expertise in English language education and the other in computer-assisted learning and project-based instruction. In total, 238 students consented to participate in the six English teachers' online language instruction. These six classes of 16–18 year-old students majored in different subject areas (Applied English [n=47, 49, and 42], Information Science [n =37], Cosmetology [n =45], or Nursing [n =18]). According to school exam scores, these students had either intermediate-low or intermediate levels of English proficiency. As shown in the student profile surveys, most of these students reported not being familiar with technology-enhanced language learning because less than 10% reported ever accessing online learning platforms, and none had engaged in project-based language learning before this study.

Table 1. *Demographic Information of the Participating Teachers*

Name	Age	Degree	Years Teaching	Class		Previous Technology Application	Previous Technology Professional Development
Amy	35	M.A. (TEFL)	6	A	Applied English	PPT, Email, YouTube, Online resources [a]	Short-term workshops [b]
Bella	28	B.A. (English)	2	B	Applied English	PPT, YouTube, Online resources	Short-term workshops
Cindy	47	B.A. (English)	17	C	Information Science	PPT Online resources	N/A [c]
Dora	45	B.A. (Economics)	20	D	Nursing	PPT, YouTube, Online resources	Short-term workshops
Emily	30	M.A. (Linguistics)	2	E	Applied English	PPT, Online resources	N/A
Flora	50	B.A. (Commerce)	15	F	Cosmetology	PPT, Online resources	N/A

Notes. All teachers' names are pseudonyms. [a] Online resources include pictures, short essay, travel information, or simplified news report. [b] Short-term workshops include two-hour, half a day, or one-day professional trainings. [c] N/A= not available from information received

The Technology-Enriched In-service Program

The main objectives of this in-service program were to enhance teachers' digital literacy and to promote the integration of online (project-based) instruction into English education. Table 2 summarizes the timelines of four learning components. First, six 90-minute training sessions were scheduled to help the six participating teachers learn how to design and manage course interfaces on *Moodle*. This open-source platform was employed due to its free access in this yearlong professional training. Also included were trainings of using Internet tools or media (e.g., *Icon Gallery* and *Video Converter*) and the *Hot Potatoes* program to design online multiple-choice or fill-in-blank test items. Specifically, the *WebQuest* program was selected and embedded on the platform to meet the pedagogy objective of project-based instruction investigated in this study. Five elements are included in each inquiry-based project: 1) introduction, 2) task, 3) process, 4) evaluation, and 5) conclusion, which aimed to help these teachers scaffold and create an online "meaningful and contextualized language experience" (Chao, 2006, p. 221) for students. Second, two face-to-face half-day workshops mainly based on transmission-oriented pedagogy were

offered by three university professionals to train these teachers on how to apply CALL. The teachers received lectures and joined hands-on activities pertaining to *WebQuest* project design, instruction, and evaluation rubrics. They were also encouraged to share and discuss possible solutions to difficulties they may encounter in the project implementation. Third, the teachers designed two *WebQuest* projects by referring to their textbook content. The first project was implemented in individual classes with varying topics such as "*Why Einstein is a Genius*" and "*New Year Celebrations in Different Countries.*" The second project was a collaborative task designed by the six teachers who selected their project team members based on the attributes of students' majors across classes or schools. The three classes of Applied English completed a project "*Showing Off Yourself in the Readers' Theater*" as the students had more motivation to perform in English. The others with a major in Information Science, Nursing, or Cosmetology completed the project "*Daily English Advertisement Around You*" due to their need to learn how to promote services (or products) via advertisements in the future. Fourth, both the teachers and university professionals joined online discussion forums where they shared, discussed, and reflected on the process of learning to teach project-based English with technology.

Table 2. *The Timelines of Learning Components in the Professional Development Program*

Components	Teacher Activities	Timeline
Moodle platform training	Design course interfaces for individual classes	September ~ October 2011
	Learn major functions and the *WebQuest* interface embedded on the *Moodle* platform	Mid October ~ late November 2011
	Learn the Internet tools or media related to the management of *Moodle*	
Face-to-face workshops	Learn theory and design of online project-based instruction	Early December 2011
	Discuss the implementation of online projects, rubrics of evaluating students' project performance, and difficulties encountered	Early May 2012
Design and implementation of *WebQuest* projects	Introduce project-based learning and the *Moodle* platform to students and create accounts for students	Late November ~ Mid December 2011
	Instruct students to complete the first project and offer suggestions/comments at each class	February ~ April 2012
	Instruct students to complete the second project and offer suggestions/comments across classes or schools	July ~ August 2012
Online discussion forums	Join online discussions with participating English teachers and university professionals	December 2011 ~ August 2012

Data Collection and Analysis

Data collection lasted from September 2011 to August 2012 (see Table 3). The English teachers completed pre- and post-surveys and three individual interviews. A *Teacher Technology Integration* (*TTI*) *Survey* was employed to assess the English teachers' CALL knowledge and competencies (see Appendix for sample items). This five-point Likert-type survey was adapted from previous studies regarding teachers' TPACK knowledge and computer self-efficacy when engaged in web-based instructional practices (Archambault & Barnett, 2010; Lee & Tsai, 2010; Sang et al., 2010). This research instrument underwent expert review and two rounds of piloting with four English teachers at a senior high school to establish construct validity and internal reliability. Some difficult wordings and unclear statements were revised after the first pilot. The revised instrument improved the Cronbach α value from .58 to .76 in the

second pilot (an acceptable index of internal consistency; see George & Mallery, 2003). This survey was administered at the beginning and at the end of this study to investigate the differences between these teachers' perceived knowledge development (including TPK, TCK, and TPACK) and computer self-efficacy. Also, the teachers were interviewed at the beginning, middle, and end of this study to depict the process of infusing technology into instructional practices. The university professionals were interviewed at the middle and at the end of this study to portray how they saw the teachers' learning to teach with technology. Individual face-to-face semi-structured interviews (Doering et al. 2009; Jang, 2010; Koh & Frick, 2009; Overbaugh & Lu, 2008) were conducted in Chinese to elicit the data without the interference of language performance. The teachers and university professionals in online discussions used the language (Chinese or English) with which they felt most comfortable. Additionally, the recruited students completed a *Student Profile Survey* and two feedback sheets to reflect on the instruction they received from the English teachers. Each feedback sheet contained two rating items in addition to written reflections, which revealed students' involvement in and satisfaction with these English teachers' CALL instruction. Any data collected in Chinese were translated by the first author and reviewed by a native English speaker.

Table 3. *Data Collection Procedures*

Timeline	English Teachers	Students	University Professionals
September 2011	Pre-*TTI* survey Interview (1)		
December ~ January 2011	[Design Project 1]	Profile survey	
January 2012			Interview (1)
(Winter Vacation)		[Complete Project 1]	
February 2012	Interview (2)	Feedback sheet (1)	
May ~ June 2012	[Design Project 2]		
July 2012	Post-*TTI* survey	[Complete Project 2] Feedback sheet (2)	
August 2012	Interview (3)		Interview (2)

Note: Online discussion messages posted by English teachers and university professionals were collected from December 2011 to August 2012.

Data were analyzed and compared continuously until theories or patterns emerged (Glaser & Strauss, 1967; Silverman, 2006). First, descriptive analysis was performed on the data collected from the pre- and post-*Teacher Technology Integration Surveys* completed by the six teachers. It revealed individual teacher's TPACK and self-efficacy for technology integration before and after taking this professional development program (α =.97 and .75 respectively). Also included was an analysis of 238 students' rating scores from the feedback sheet items describing their CALL learning experiences. Kolmogorov-Smirnova and Shapiro-Wilk's test revealed that students' responses to the feedback sheets were not normally distributed as a whole nor in each class (p=0.00 <0.05). We accordingly used a non-parametric method (i.e., Wilcoxon signed-rank test) to investigate whether there was a significant difference between these students' involvement in and satisfaction with teachers' online instruction after completing the first and the second projects. Second, the data described in the *Student Profile Survey* outlined an overview of the participating students' English learning experience(s) and learning expectation(s). Third, the qualitative data collected from interviews, written reflections on feedback sheets, and online posted messages were analyzed using Nvivo 8.0 and open/axial coding techniques (Corbin & Strauss, 2008) that helped to

organize groups of data within particular themes or issues being investigated. The inclusion criteria of the themes emerging from students' written reflections were based on more than 50% of participants' opinions or comments in each class. Finally, all data were triangulated to document the participating EFL teachers' professional development at two participating schools.

FINDINGS

Teachers' Development of CALL Knowledge and Competencies

Data analysis revealed that all the EFL teachers increased their self-efficacy for technology integration step by step. As shown in Table 4, the mean scores of the first survey scale range from 2.33 to 3.60 and the second from 3.73 to 4.20 (highest possible score= 5.00). When interviewed near the end of this study, almost all teachers reported high increases in the computer self-efficacy question. As Flora commented, "I now could rate myself at least 4 out of 5 scores in self-efficacy, while I only had 2 or at most 3 at the beginning of this study."

Table 4. *Teacher Technology Professional Development*

Teacher	Survey	TCK	TPK	TPACK	Self-Efficacy
Amy	1st	4.00	4.00	3.80	3.60
	2nd	4.40	4.00	3.80	3.87
Bella	1st	3.40	3.20	3.80	3.33
	2nd	4.60	3.80	4.40	4.00
Cindy	1st	1.80	1.80	1.40	2.33
	2nd	3.00	3.60	3.60	3.73
Dora	1st	2.00	2.00	2.20	3.00
	2nd	4.00	4.00	4.00	4.20
Emily	1st	1.20	1.80	1.40	3.13
	2nd	4.20	4.00	3.40	3.87
Flora	1st	1.60	1.40	1.40	2.13
	2nd	3.80	4.00	4.40	3.93
Average Gain Scores		1.67	1.54	1.60	1.01

Note. Likert Scale (1= strongly disagree, 2= disagree, 3= neutral, 4= agree, 5= strongly agree)

The findings derived from various data sources show that all teachers except for Amy reported great improvement in building their TPACK as a whole after attending this yearlong program. This is shown in the gain scores of three survey scales (TCK= 1.67, TPK= 1.54, TPACK= 1.60; see Table 4). The following sections extend these quantitative findings and depict individual teachers' CALL development and the challenges, if any, they encountered when using newly acquired knowledge in their language classrooms.

As a third-year teacher, Bella had been familiar with applying online resources into English instruction (first survey report mean = 3.40, 3.20, and 3.80 in the TPACK elements). She felt this professional development program fostered how to integrate technology into teaching content and classroom pedagogy (Mean = 4.60, 3.80, and 4.40 in survey categories). When invited to join the professional development

program, she looked forward to learning more about online instructional tools to improve her reading and writing instruction. After participating in the training for one semester, Bella felt excited to "become familiar with all the useful websites recommended by professors in the workshop. It helped a lot in my project design." When the first *WebQuest* project was completed, the largest percentage of Bella's discussion forum posts projected her confidence in teaching language—these were different from her previous instructional experiences: "the second [website] is authentic pronunciation by foreigners which helps students imitate them." When discussing with peers how to design the second project on the online forums, Bella displayed CALL knowledge integrating pedagogy, content, and technology:

> We could have students practice their speaking by the puppet show. Students have to refer to the script we offered online and videotape their 3-5 minute show…. They could…convert files by the *Format Factory* software, and then upload assignments to our *Moodle.*

At the end of this study, Bella explained how she had changed students' language learning via technology infusion. "I created a project for students to join a peer discussion and collectively complete the assignment on a platform outside the class sessions." Comparing her two implemented projects, she noted that, "It's amazing to evaluate student learning outcomes totally online. This is what I didn't accomplish in the first project."

By contrast, Cindy, Dora, Emily, and Flora seemed uncertain about whether they had enough technology knowledge to implement the requested online teaching project at the beginning of this study. For example, Flora confessed that, "mostly, I am only using the teaching DVD offered by textbook publishers. I am not quite sure whether I could have students learn English on the Internet." Dora echoed that uncertainty by saying "I don't know what *WebQuest* is and how such technology could be used in my teaching. So, I don't know what I expect myself to achieve." This may explain why most of them rated themselves with very limited TCK, TPK, and TPACK (the mean scores ranging from 1.20 to 2.20) at this stage. When interviewed after completing the first project, only Emily expressed an improvement in technology infusion because she could use the *Hot Potatoes* and *Video Converter* software "to give students several online interactive quizzes outside class" or "to teach students how to convert videotaped files for the *WebQuest* project in classroom." The other three teachers were concerned with falling behind on implementing what was promoted in the in-service program. Cindy reported her challenges, "I am overwhelmed by the new technology stuff suddenly instilled into my brain… I need more time to match the use of technology to students' language levels." She revealed feeling the pressure of completing the project-based instruction in a posted message, stressing, "Due to the tight course schedule, I really don't have the brainpower to think about the second project." Similarly, Dora admitted, "I have learned a lot but still don't know how to apply the techniques to my own teaching. I don't think I could finish the first project without following the professors' advice step by step." She frequently showed her reliance on the university professionals' instruction in posted messages such as, "Prof. Lee's previous suggestions did help me relieve my worries of using Internet resources." Yet, Dora acknowledged her professional growth in the second interview, "Definitely, I have enhanced my self-efficacy up to the percentage of 30 or even 50, compared to what I had before." As to Flora, her struggle with completing the first project was evident by stating "I was pushed by you and the other professors to complete the project. Though I know how to set up the *WebQuest* on the platform, I am still not familiar with how to design the project by myself." On the discussion forum, Flora addressed her challenges in designing the second project as she had to figure out "appropriate lesson units, related Internet resources or multimedia teaching materials, students' learning schedules, students' application of information technology, and the effects of applying information technology on teaching and learning in lesson units."

Near the end of this study, however, these teachers increased their CALL knowledge, as all reported improvement in terms of TCK, TPK, and overall TPACK (the mean scores ranging from 3.00 to 4.40). For instance, Cindy said, "I now grasp the essence of project-based instruction and apply those useful

online resources and techniques taught by Prof. Lee." Compared to the first project, Flora described that, "It sounded scary when I first learned a lot from the program. Now, after more practice, it's much easier than what I thought before." Cindy, Dora and Flora revealed their collaborative potential in developing their overall TPACK in the second *WebQuest* project. They instructed students to 1) search for the online English advertisements they liked most; 2) use the *Screen Capture* software to record target advertisements; 3) research the origin, meaning, and related slogan of these advertisements on websites; and 4) submit a group report about the impact of selected advertisements on general customers to the *Moodle* platform.

Yet, as reported by the four teachers, more effort was still needed to enhance pedagogical knowledge in relation to technology integration (i.e., TPK) in their language classrooms. Emily's sentiment was typical among the others' perspectives, "I am still learning how to make students closely follow me in this kind of online teaching and project-based pedagogy because sometimes they still got lost; especially, some language usages are beyond low-level students' comprehension." Similar online pedagogical concerns were reported by Cindy and Flora in their third interviews, which implies a lack of well-developed TPK in their CALL competencies: "The most challenging part was to create a cooperative learning online environment for my students"; "It's not easy to evaluate students' technology performance because I am still a novice in technology application."

Amy, on the other hand, described herself as part of the "young hi-tech generation" who always applied Internet technology (e.g., Facebook and YouTube) into classroom instruction. Accordingly, she regarded herself in the pre-survey as a teacher equipped with the TCK, TPK, and TPACK (mean = 4.00, 4.00, and 3.80) before receiving any professional training. When first interviewed, Amy expected this professional training program might help her with "teaching in a more efficient and easier way." During the study, she was puzzled at her own technology knowledge growth because she had not figured out how to make the platform the best language-learning environment. "We need more exact examples to follow, such as what has been going on in a project or how student learning outcomes are evaluated online." In the end, however, Amy appeared not to perceive improvement in these knowledge domains (mean = 4.40, 4.00, and 3.80). She shared her puzzlement, "I haven't applied a lot from what I learned into my practice, especially about how to design online tests."

Teachers' Benefits of CALL Knowledge and Competencies

These six EFL teachers overall perceived professional growth after participating in most components of this CALL training program. They stressed the significance of improving various technological skills, such as designing the course interface, uploading teaching materials, and employing the *Hot Potatoes* online tests. This promoted their in-class teaching to online learning activities, which continued to help students improve their vocabulary, reading, or writing outside classrooms. They found that students could practice online activities or quizzes in a repetitive or self-contained way, different from traditional paper-and-and pencil worksheets or tests completed during limited classroom time. In the face-to-face workshops, most teachers learned to design *WebQuest* projects, to set up project evaluation rubrics, and to search for related website information. They highlighted their achievement in raising students' learning motivation when implementing online project-based instruction. For instance, Bella reported in the third interview, "Students are more willing to speak English when involved in the online *Readers' Theater* activity while they were too shy to open their mouths on the classroom podium before." However, these teachers tended not to favor participation in online discussion forums themselves and seldom visited the forums unless there was a need to refer to the project design examples or evaluation rubrics. Accordingly, four out of the six teachers suggested that more workshops or informal face-to-face meetings be organized.

The teachers appeared to increase TPACK and to improve computer self-efficacy because of their professional development, while acknowledging a need to further enhance their TPK with future

technology infusion; they perceived both growth and benefits. In the following sections, we seek to explore further these teachers' readiness and performance in CALL instruction through other stakeholders' perspectives.

Additional Perspectives on Teachers' Professional Development

University Professionals' Observations

The university professionals found it quite praiseworthy how these English teachers integrated technology into instructional content and pedagogy during this yearlong CALL training process. For instance, Prof. Su complimented, "This professional development program makes it a reform for these teachers to teach online project-based English in old and traditional schools where exam-oriented teaching was prevalent among most teachers." As Prof. Ma maintained during this study, "[These teachers] definitely did improve technology knowledge, compared to their really unfamiliar application at the beginning of this professional development program." Near the end of this study, Prof. Lee remarked, "More or less these teachers have used each element of TPACK in their teaching despite that they are not so familiar with integrating all the elements together."

These three university professionals commented that all the teachers improved their technology literacy but not enough of their TCK. Though they were highly impressed by the class projects, there was concern that students should not just recite the same content but use their own imagination and creativity when involved in the *Readers' Theatre* project or explore the underlying meaning of advertisements (i.e., not just record and explain advertisement vocabulary). The university professionals also observed that four of these teachers implemented online platform instruction or the *WebQuest* projects without solid TPK, mainly due to unclear ideas about how to involve students in collaboratively completing assignments. There were also concerns about clear assessment rubrics, attainment of questionable language skills, and the lack of guiding peer interactions and promoting critical peer comments. Prof. Ma explained that, "As green-horn teachers using online platforms or the *WebQuest*, their design was still confined by traditional teaching methods."

Students' Online Learning Experiences

The development of these participating teachers' CALL knowledge and competencies could be further understood from students' CALL learning experiences. Table 5 shows that these six teachers, as a whole, significantly improved all of the 238 recruited students' involvement in the second online learning project, compared to the implementation of the first *WebQuest* ($z = -2.650$, $p = .008$). Yet, there is no significant difference in terms of students' satisfaction throughout the study ($z = -1.394$, $p = .163$).

When further investigated, individual teachers' technology professional development had a different impact on their students' language learning. Above all, Cindy's CALL instruction significantly made her students become both more involved in and satisfied with online learning after completing the second project ($z = -3.380$, $p = .001$; $z = -3.322$, $p = .001$). As noted by 84% of the students on the second feedback sheet, Cindy clearly explained to them all the steps involved in how to complete the cross-class *WebQuest* project.

Bella and Emily significantly increased Class B and E students' learning involvement ($z = -2.003$, $p = .045$; $z = -2.491$, $p = .013$). On average the former class was slightly satisfied with Bella's instruction in both projects (mean = 3.41 and 3.43), while the latter showed great satisfaction with Emily's teaching practices (mean = 3.62 and 3.88). Near the end of this study, 65% of the Class B and 83% of the Class E students reported they became more involved in the cross-school project because Bella and Emily had introduced more useful technology tools and showed them how to discuss project performance on the platform. By contrast, Class D was much more satisfied with Dora's online instructional practice in the second project ($z = -2.309$, $p = .021$), but had similar involvement in both learning projects (mean = 3.39 and 3.33). Interestingly, Dora satisfied 78% of the students in the second project by referring the design to

daily topics, yet Dora's online teaching materials, similar to what she usually covered in classroom instruction, appeared to make 67% of these learners less involved in online learning near the end of this study.

Table 5. *Average Rating Scores from Feedback Sheets and Wilcoxon Signed-Rank Test Results*

			Learning Involvement						Learning Satisfaction					
			1st [a]		2nd		Wilcoxon-test		1st		2nd		Wilcoxon-test	
Class	Teacher	N	M	SD	M	SD	z-value	p-value [c]	M	SD	M	SD	z-value	p-value
A	Amy	47	3.18 [b]	0.82	3.17	0.89	-0.166	0.868	3.28	1.06	3.02	0.92	-1.137	0.255
B	Bella	49	2.79	0.91	3.18	0.97	-2.003	0.045*	3.41	0.84	3.43	1	-0.016	0.873
C	Cindy	37	2.38	1.06	3.22	0.79	-3.38	0.001**	2.32	1.13	3.22	0.79	-3.322	0.001**
D	Dora	18	3.39	0.78	3.33	0.77	-0.277	0.782	3.06	0.72	3.5	0.71	-2.309	0.021*
E	Emily	42	3.38	0.91	3.86	0.78	-2.491	0.013*	3.62	0.88	3.88	0.77	-1.434	0.152
F	Flora	45	2.56	0.99	2.27	1.07	-1.681	0.093	2.4	0.89	2.16	1.11	-1.386	0.166
All		238	2.91	0.99	3.14	1.02	-2.65	0.008**	3.03	1.06	3.16	1.07	-1.394	0.163

Notes. [a] The 1st and 2nd feedback sheets were completed at the end of their first and second online project-based learning.
[b] Scores rated from 1= never/strongly unsatisfactory to 5 = always/strongly satisfactory. [c] * $p < .05$; ** $p < .01$

The other two teachers (Amy and Flora) appeared not to significantly foster students' online learning experiences, despite Flora's self-reported professional growth in technology integration. Amy involved her students in Class A quite evenly in the two projects (mean = 3.18 and 3.17) and slightly decreased their satisfaction with the second project (mean = 3.28 and 3.02). According to 74% and 63% of the students' reflection in the two feedback sheets, Amy's delivery of online project-based instruction was too fast to be followed. As to Flora's CALL instruction, 82% and 66% of the students complained that Flora seldom explained to them how to complete the first and second projects with clear instruction.

Teachers' and University Professionals' Perspectives on Other Factors in Teacher Technology Professional Development

Government and school administration support positively triggered these EFL teachers' intent to pursue professional growth. As Cindy elaborated, "Our school was promoted by the Ministry of Education (MOE) sponsorship to create an online learning environment for students. That's why we are in great need to improve our technology competence." The university professionals, such as Prof. Lee, also proposed that, "the direct push from the MOE is always useful for teachers to move forward." Additionally, partnerships between secondary schools and universities fostered these English teachers' learning to teach. Emily stressed that, "with university professionals' guidance and instruction, we spent less time sorting out the clues of technology use in English classes." Furthermore, peer collaboration across classes and schools brought both "pressure and pleasure" to these teachers. For instance, when others' project instruction was better prepared than hers, Bella felt stressed but reiterated that, "it's a great pleasure to work together with colleagues either inside or outside my school." Prof. Su commented that such peer pressure among the teachers could serve as motivators "to reflect on their own teaching."

By contrast, several perceived concerns appeared to hinder these English teachers' technology integration during this study. First, keeping pace with the tight curriculum schedule and the pressure of improving students' test scores resulted in limited time for these teachers to practice CALL application in class. Amy mentioned that, "My technology instruction was influenced by my colleagues who kept asking me whether I could catch up with the teaching schedules and improve my students' test scores via online learning." Additionally, these teachers worried about online safety and ethical issues when assigning

students to complete language assignments on the learning platform. Flora questioned if her students "were playing online games or surfing unhealthy websites when requested to complete online assignments." Dora lamented a challenge of online plagiarism, "We are really not prepared to prevent students from copying the content of similar project examples they could find online."

DISCUSSION

The data analysis depicted how EFL teachers perceived their development of CALL knowledge and competencies in light of the theoretical lenses of TPACK and computer self-efficacy. Five of the six teachers increased their ratings of TPK, TCK, TPACK, and computer self-efficacy items in the survey after receiving CALL training courses. In the interviews and posted messages, all the teachers reported the benefits and their professional growth for joining this in-service program and were confident about improving students' learning motivation by means of Internet technology. Yet, at the same time, four teachers acknowledged challenges with their TPK development when implementing online language instruction and 1) matching students' language levels; 2) evaluating students' project performance; or 3) creating an online cooperative learning environment among students.

The qualitative data analysis further revealed these teachers' perceived computer self-efficacy as mainly relevant to their technological knowledge development rather than TPACK as a whole. Kessler and Plakans (2008) already noted that teachers' high CALL confidence does not necessarily equal innovative and integrated technology and subject matter use. In line with existing literature, teachers who improve their technology literacy do not necessarily enhance TPK or TCK unless simultaneously revisiting their pedagogical knowledge or subject matter content knowledge (Benson & Ward, 2013; Doering et al., 2009; Jang, 2010).

Further evidence shows that age might not necessarily be a confounding factor. Amy (who was younger) did not improve her TCK, TPK, or TPACK during this teacher-training program while Cindy and Dora (who were older) did benefit a great deal in professional growth and evolution. Accordingly, such a finding may echo a significance of teaching experience, which is more positively related to TPACK development (Jang & Tsai, 2012). The multiple perspectives from this investigation reveal that age is not detrimental to CALL knowledge development and technology infusion, especially in comparison with Lin et al. (2013) who only relied on surveys. As for Amy's professional growth, in-service professional development might consider the ceiling effect constraining this young hi-tech's generation in enhancing overall CALL competencies. Perhaps by contextualizing Amy's technological skills in daily classroom instruction via offering scaffolding and building partnerships with experts in language learning technology (Kariuki, Franklin, & Duran, 2001), she would have more chances in crossing the barrier(s) of her TPACK development.

The additional stakeholders' perspectives further enlighten (if not confound) the participating EFL teachers' professional development. The university professionals' perspectives complimented these teachers' improvement in technology knowledge and acknowledged a promising start to infuse technology into online language instruction. They reflected, however, that these teachers' project-based instruction was still confined by traditional teaching methods as well as a focus on how to evaluate student performance due to the influence of exam-driven curriculum. They noted a necessity for all these teachers to continue developing and reinforcing pedagogical and content knowledge aligned with technology instruction (i.e., TPK, TCK, and TPACK). In general, all six teachers significantly improved their students' involvement in online projects; nonetheless, students as a whole still lacked total satisfaction with such learning experiences. These students appeared uncertain about accessing their online learning environments and learning from their teachers in completing technology-enriched projects. On the one hand, this may be attributed to the influence of traditional transmission of teaching modes on students' language learning habits (Wang, 2009; Zhang, Peng, & Hung, 2009). On the other hand, these English teachers with developing TPC or TCK might need to redefine language learning

outcomes with technology and develop learners' understandings simultaneously. Researchers caution that language teachers without well developed CALL knowledge and competencies may have difficulties making a difference with the infusion of technology in language classrooms (Hong, 2010; Hubbard & Levy, 2006).

We hence recommend that "individual TPACK profiles" promoting reflective processes (Benson & Ward, 2013) be used as professional training tools to help teachers who struggle to implement CALL and new pedagogy simultaneously. Teachers might keep track of the degree and manner "in which their individual knowledge areas overlap and integrate" (p. 170) via individual profiles when coming across different processes of developing TPK or TCK among peers in an in-service program. Moreover, teacher educators could highlight the positive experiences teachers have in the process of transition to new modes of teaching with technology (Wong & Benson, 2006), which may assist teachers to re-conceptualize their instructional beliefs and fine-tune their design of future technology-enhanced learning practices (Rienties, Brouwer, & Lygo-Baker, 2013).

Furthermore, attention to factors facilitating or hampering these EFL teachers' professional learning and classroom technology implementation was filtered throughout the findings. Echoing Richard, Blin, and Appel (2006), our teachers and professors recognized the empowerment of administration support, partnerships with universities, and the role of peer collaboration in these EFL teachers' learning to teach with technology. Yet, the teachers' awareness and concern of limited time deriving from tight curriculum scheduling and exam pressures cautioned how such things may hinder teacher professional technology growth (see also Mumtaz, 2000). These practitioners were aware of the concerns of online safety and ethical issues, reminding the profession of the importance of cyberwellness knowledge for teacher training programs (Chai, Koh, Ho, & Tsai, 2012). These teachers also tended to disregard online asynchronous discussion forums, instead preferring to get more involved in face-to-face workshops (see also Chao, 2006). This finding suggests teacher educators might use real-time interaction tools (e.g., instant messaging or Skype) for "building relationship[s] and seeking one-on-one support" (Trust, 2012, p. 134), in case teachers and university professionals are not available for frequent face-to-face meetings.

Our findings encourage further examination of additional questions related to teacher technology professional development. For example, how would these teachers develop their CALL knowledge and competencies in a longer teacher-training program or in a school context where curriculum is less driven by exams? How would the students' feedback stimulate these teachers' reflection on their technology infusion? How would the university professionals foster these teachers' professional growth by means of more face-to-face workshops or online discussion? How would the school administration support these teachers with more available time to practice integrating technology into classroom instruction? How would continuing in-service training enhance teachers' willingness to apply CALL in classroom instruction? These inquiries would provide additional foci into future research on CALL teacher development.

CONCLUSION

The limitations of this study recommend the following directions for future research. First, this investigation involved a small number of multiple stakeholders in in-service teachers' CALL professional development. We relied on self-report data and the perceptions of teachers, university professionals, and students to investigate the quality of the technology tasks implemented by EFL teachers to TPACK. Future researchers may recruit a larger sample of participants to offer additional perspectives. In addition to self-assessment, EFL teachers might conduct peer assessment on each other's TPACK development. Second, the current investigation reported EFL teachers' CALL knowledge and competence solely at two vocational high schools in Taiwan. We encourage related studies conducted in various educational contexts and echo Hofer and Grandgenett's (2012) suggestion to encourage and support studies of various knowledge development and technology integration. Third, paramount to improving CALL preparation is

keeping track of the process depicting teachers' performance in technology integration at different stages of their careers (Wong & Benson, 2006). Finally, a follow-up inquiry may be conducted to document in-service language teachers' continuing process of technology professional growth after they preliminarily apply formal CALL training into short-term classroom instruction.

This study contributes to the field of teacher training and CALL in three major aspects. Our designed in-service program and data collection covered the transfer of CALL training to real classroom instruction, which remains less investigated in the literature (McNeil, 2013). Additionally, this study investigated EFL teachers' professional growth by examining both their TPACK and computer self-efficacy development, which is a pioneering exploration in the CALL field. Specifically, the current investigation offers teacher educators to be aware of researching and evaluating teacher (technology) professional development programs through various perspectives. Our findings provide discerning evidence that teachers' CALL knowledge and competence development is not solely determined by teachers' own perceptions. The whole observation becomes more complex viewed through the additional lenses of university professionals and students. What additionally matters is student learning experiences and outcomes as teachers infuse technology into language education; this requires additional data sources and future mixed methods research projects.

APPENDIX. SAMPLE SURVEY ITEMS

1. TPACK Scale Items

   *** I know how to…

   1. Select proper content for Web resources for teaching. (TCK)
   2. Use Web technology to predict students' skill/understanding of a particular learning topic. (TCK)
   3. Apply teaching modules on the Web into practices. (TPK)
   4. Encourage the interactivity among students in a Web-based learning environment. (TPK)
   5. Guide students to use Web resources to study certain learning units. (TPACK)
   6. Apply Web technology to using multiple teaching strategies on a particular teaching unit. (TPACK)

2. Computer Self-Efficacy Scale Items

   ** I feel confident that…

   1. I can successfully teach relevant subject content with appropriate use of Web-technology.
   2. I can motivate my students to participate in technology-based projects on the Web.

   ** I believe that…

   3. Web-related resources can enrich teaching and learning content.
   4. Web-based teaching is a future trend in English education.

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ABOUT THE AUTHORS

Mei-Hui Liu is an associate professor in the Department of Foreign Languages and Literature at Tunghai University, Taiwan. Her research interests include EFL teacher professional development, technology-enhanced language learning, and online learning community.

E-mail: mliu@thu.edu.tw

Robert Kleinsasser's research and teaching interests include the social organization of (second language) teaching and learning and second language teacher professional development. He is currently interested in narrative inquiry, mixed-methods research, and teacher educators dealing with evolving and/or changing landscapes of accountability, testing, and evaluation.

E-mail: Robert.Kleinsasser@asu.edu

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EFL teacher competencies in this perspective can be developed through appropriately designed EFL teacher education programs, both pre-service and inservice. EFL teacher competencies with a reform perspective have certainly been formulated before, as has been cited by Madya (1987) and efforts to help in service teachers to acquire them have been made. However, as observed by Madya (2001), very little change has resulted from such efforts. This might be related to the fact that the process of educating EFL teachers has not been as conducive as desired to the development of the intended competenc... Teaching competences are focused on the role of the teacher in the classroom, directly linked with the 'craft' of teaching â€" with professional knowledge and skills mobilized for action [4]. Teacher competences imply a wider, systemic view of teacher professionalism, on multiple levels â€" the individual, the school, the local community, professional networks.Â Learning to act as teachers entails integrating thoughts, knowledge and dispositions in practices that are informed by consistent principles. Effective teaching revolves around these variables: curriculum dimension, classroom management, teaching strategies, climate and evaluation/ feedback.Â OECD, EFL, ICT, IIEP, PCK, UNESCO. The role of internet technologies in the modern training concept of In-service program perspectives.Â Liu, MH & Kleinsasser, R 2015, 'Exploring efl teachers' call knowledge and competencies: In-service program perspectives', Language Learning and Technology, vol. 19, no. 1, pp. 119-138. Liu MH, Kleinsasser R. Exploring efl teachers' call knowledge and competencies: In-service program perspectives. Language Learning and Technology. 2015;19(1):119-138. Liu, Mei Hui ; Kleinsasser, Robert. / Exploring efl teachers' call knowledge and competencies : In-service program perspectives. In: Language Learning and Technology. 2015 ; Vol. 19, No. 1. pp. 119-138. @article{13d2f9