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SELF-EFFICACY OF TEACHER CANDIDATES IN DESIGNING CALL ACTIVITIES FOR ENGLISH LEARNERS WITHIN THE FRAMEWORK OF TECHNOLOGICAL PEDAGOGICAL AND CONTENT KNOWLEDGE (TPACK)

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ABSTRACT

Research shows that the number of English Learners (ELs) has been increasing significantly in K-12 classrooms around the world. This has led to an increase in the need for qualified second language teachers, which spurred a five-fold increase in the number of online teacher education programs in the United States since the 1990s and increasing numbers of online courses for teacher candidates (TCs). Therefore, teacher education programs need to offer effective technology-based courses to provide TCs with the best practices in language teaching.

The purpose of this study was to investigate the effectiveness of a Computer Assisted Language Learning (CALL) course in improving TC self-efficacy for integrating CALL activities for Non-Native English Speakers (NNES) in the classroom. In this study, 16 TCs in the U.S. designed a variety of CALL activities for 15 Chinese and 16 Turkish students. On the basis of a self-report survey and open-ended questions in the same survey as well as the student perception of instruction (SPI) survey, this non-experimental correlational design study revealed the relationships between different variables: the perception of TCs' pedagogical and content knowledge, CALL technology knowledge, confidence level in motivating students, and assessment and feedback awareness in teaching English in a distance learning environment.

Despite the small sample size, the regression procedure predicted 92% of the variation in the dependent criterion, and the qualitative data also supported this large effect size.

The results indicated that designing CALL activities as a hands-on experience increased TCs' self-efficacy in technological pedagogical and content knowledge (TPACK). The paper discusses the pedagogical implications for training TCs to teach EFL learners through CALL in the digital age.

Keywords: **CALL, TPACK, distance learning, self-efficacy, teacher education, teacher candidates**

INTRODUCTION

Research has shown that the range of technologies available for use in language learning and teaching is very diverse, and the ways that the technology is used in classrooms have become central to language practice (Motteram, 2013).

In parallel with this, there is a large agreement that it is the teachers making decisions regarding how to use Information Computer Technology (ICT) in teaching languages or any content area (Haydn & Barton, 2008; Liu & Kleinsasser, 2015; Sang, Valcke, Braak, & Tondeur, 2010); therefore, teachers act as technology integrating agents in classrooms.

Along with this, teacher candidates (TCs) are encouraged to be prepared for being the agents of the technology integration in teacher training programs at universities.

In addition, as the number of English learners (ELs) increase in K-12 classrooms and colleges, there has been an increase in the need for qualified second language (L2) teachers, which is one of the reasons in the increase of the number of online teacher education programs in relation with the increasing importance of technology (National Center for Education Statistics, 2009).

Hall and Knox (2009) reported that since the mid-1990s such programs have experienced a five-fold increase in number. However, there have been some studies reporting that online instruction may not be suitable for methodology courses commonly found in teacher certification programs (Alexander, Lignugaris-Kraft, & Forbush, 2007; Collopy & Arnold, 2009).

This suggested, "F2F courses was more important for teacher-candidates to feel competent with the content of the course" (Collopy & Arnold, 2009, p.96). However, considering the fact that teaching practices are becoming more online and less F2F, these TCs may need more online skills to design Computer Assisted Language Learning (CALL) activities, and, therefore, they may need more exposure to online materials. Teaching these skills to TCs can be accomplished through online teacher education programs. For example, this study includes TCs who designed CALL activities to practice their CALL skills.

Therefore, this study serves as a pilot study for further research in learning whether designing CALL activities as a practice promotes gaining more confidence and skills in reaching EL needs and in their fields.

In addition, even though there has been some research on the benefits of online instruction mentioned above, these results have not been confirmed from the student perspectives by most of the studies. For example, Kuo (2008) explored Taiwanese EFL TCs' perceptions on CALL activities and online resources in language learning and teaching; however, the study did not mention any of the learner perspectives. Unlike other studies, one of the aspects of this study was to learn whether CALL activities designed by TCs help learners to see the effectiveness of TCs' technology knowledge in CALL. In our study, language learners who interacted with TCs though the materials created by TCs provided feedback and their perspectives on the materials.

The main purpose of this study was to investigate the effectiveness of a CALL course in improving TC self-efficacy for integrating CALL activities for Non-Native English Speakers (NNES) in the classroom. Therefore, we examined the relationships between the perception of TCs' self-efficacy in pedagogical and content knowledge, their CALL technology knowledge and their assessment and feedback awareness level.

LITERATURE REVIEW

Teacher Education Programs in the US

With the turn of the 21st Century, the PK-12 student population in the United States has changed drastically, with the increasing number of ELs in classrooms throughout the U.S.

These demographic changes have transformed teaching practices at different educational levels in the United States because ELs in the U.S. constitute a growing percentage of the population. In 1990, one out of every twenty K-12 students was an EL; however, this percentage increased to one out of nine in 2008, and is expected to increase to one out of four in the next twenty years (Goldenberg, 2008 cited in Nutta, Mokhtari, & Strebel, 2012).

Therefore, teacher preparation programs have been developing their curriculum to train TCs to meet ELs' needs in their mainstream classrooms. Including ELs in the general curriculum and providing them with the opportunities and resources to reach their full potential alongside their native-speaking peers in their learning environments has been the main focus of this era in terms of teacher preparation programs (Nutta, Mokhtari, & Strebel, 2012). While the number of ELs is expected to increase exponentially by 2030, it is asserted that about 85% of novice teachers who join public schools have not had more than seven hours of training in regards to teaching ELs in their classrooms (Nutta et al., 2012). In addition, there continues to be an achievement gap between ELs and their native speaking peers in mainstream classrooms. Most ELs perform below their English-speaking peers on standardized tests such as the Florida Comprehensive Assessment Test (FCAT) and drop out of school. This gap is due to the difficulties with reading, writing, and learning in a new language (Nutta et al., 2012).

At the national level, federal legislation, such as the No Child Left Behind Act of 2001 (NCLB) and the 2008 reauthorization of Higher Education Opportunity Act, requires public schools, state departments, and higher education institutions to provide provisions for the education of ELs. In this regard, Lucas and Grinberg (2008 cited in Nutta et al., 2012) identified four structural strategies to prepare all teachers to teach ELs such as adding applied linguistics course to the program, modifying courses and field experiences, adding or modifying program prerequisites, and adding a minor or supplemental certificate program. The first two are related to ESOL (English-for-Speakers-of-Other-Languages) infused programs, and the last two are alternatives to the infusion (Nutta et al., 2012). EL infusion (*ESOL infusion* or *ESL infusion)* at the higher education level is an approach to prepare teacher candidates to teach and assess ELs in mainstream classrooms. This approach includes integrating EL-based content throughout the education curriculum that improves pre-service teacher understanding of EL reading, writing, listening, speaking, and assessment, not only adding or embedding content in core education courses.

The main purpose is to prepare teachers of all subjects and grade levels to support the achievement of ELs rather than to prepare specialists who focus on teaching ESL or bilingual education. This approach is supported through a model called the One Plus Model. The One Plus model mentioned in Nutta et al. (2012) includes all areas of teacher education programs including courses, field experiences, evaluation, and accreditations. One Plus indicates an accumulation of basic knowledge to obtaining qualifications for teaching ELs in all subject areas.

Considering the growing number of ELs in the classroom and the continuing achievement gap between ELs and native English speakers, the language teaching field needs more qualified teachers. In order to meet the demand for more qualified L2 teachers who are technologically-savvy for the 21st century, educational institutions offering mostly online classes and online teacher education programs need to provide more practice-based online courses which prepare TCs for the classroom of today.

L2 TCs need to have hands-on experience with designing CALL activities for their prospective students and have the self-confidence before starting their in-service duties.

Historical Background of CALL

In the 1960s when Computer Assisted Instruction (CAI) just started, education was comprised of behavioristic approaches and the computer activities for language learning mainly consisted of drill and practice, sequential learning, and self-pacing. Teachers used computers around this time to make teaching more efficient, rather than to make learning more effective.

However, in the 1970s, the CALL field started utilizing student-centered approaches throughout education, and around 1980s, the Communicative Approach in language learning impacted CALL. According to Canale and Swain (1980), ELs should know the grammar rules, produce meaningful communications, know sociocultural rules and negotiate meaning to be able to communicate with native speakers.

However, Savignon (1983) emphasized the difference between what learners know and what they can produce. In other words, knowing how to negotiate meaning is just as important as actually knowing meaning; therefore, it was suggested that the computer could do more than providing language learners with drill and practice; therefore, educators started using computers as a communicative language tool to help language learners acquire communicative language skills.

In the 1990s, the Internet and the increasingly sophisticated software field notably changed the way in which people communicated. The Internet is utilized in all aspects of education. Therefore, now, it is not only a matter of technology in the classroom; it is a matter of integrating the effective use of the Internet in classrooms along with other technological tools. These technological innovations have changed the way in which instruction in provided in schools. Currently, over 90% of two- and four-year degree-granting institutions in the U.S. are offering some type of online instruction (D'Orsie & Day, 2003; Martyn, 2003).

Considering this significant alteration in how education is disseminated and the percentage of institutions providing online instruction, there continues to be a shortage of qualified teachers who can teach online classes. Two populations affected by this shortage are language learners and the L2 teachers who instruct these learners. For instance, the Center for Applied Linguistics (CAL) reported that 25% of elementary schools and 30% of secondary schools were affected by a shortage of qualified foreign language teachers and that more than one quarter of elementary school foreign language teachers in the US are not certified (Rhodes & Pufahl, 2009).

In response to this need for more qualified L2 teachers in K-12 schools, colleges of education in the U.S. have started offering a growing number of online programs (National Center for Education Statistics, 2009).

Self-Efficacy of Teacher Candidates

Research shows that even though teacher education programs prepare TCs to teach online classes in terms of theory, they lack practical applications. For instance, in Collopy and Arnold's (2009) study, it was found that TCs who experienced some face-to-face instruction were more confident in their abilities to apply what they had learned.

Applying the theoretical information in face-to-face classrooms was easier for them because the teaching of Communicative Language Teaching strategies (Hoven, 2007) were thought to be better suited to face-to-face second language methodology classes where these strategies can be viewed and practiced by TCs in a realistic classroom setting.

In addition, Kissau (2012) investigated the extent to which TCs completing online language teaching methodology instruction perceived their own self-confidence compared to their counterparts who completed the same instruction in a face-to-face setting. The TCs completing face-to-face courses experienced a significantly greater increase in confidence to teach ELs than did their online peers in regard to all but three of the 16 survey items measuring teacher efficacy. O'Neal, Ringler and Rodriguez (2008) investigated teacher efficacy through the survey and interview techniques. Twenty-four subject area teachers participated in this study and it was found that 75% of the teachers did not feel prepared to teach ELs during their pre-service years; however, their confidence increased as they practiced their skills during the in-service years.

In addition, in two different Turkish studies conducted by Durgunoğlu and Hughes (2010) and Polat (2010), it was found that TCs had low confidence about teaching ELs in general. Polat (2010) found that TCs reported more self-confidence in terms of their socio-cultural awareness but lower self-confidence regarding their linguistic knowledge and educational readiness to boost ELs' literacy skills and to close the achievement gap compared to their in-service counterparts.

Durgunoglu and Hughes (2010) investigated the preparedness level of TCs and found that the TCs felt less confident and less effective in teaching ELs than the in-service teachers participating in this study. According to researchers' classroom observations and their interaction with students in discussions, a lack of preparedness and linguistic knowledge was obvious.

Furthermore, 85 TCs in EL-infused elementary education courses reported that they had low self-confidence about the sociocultural perspective of teaching, such as providing communicative activities for the learners, and they had more self-confidence in curriculum and classroom organization (Coady, Harper, & de Jong, 2011). The research clearly demonstrated that TCs, particularly those in online programs and classes, needed more applied experience to improve their knowledge and self-confidence in working with ELs in their future classrooms. TCs need to do more hands on tasks in designing CALL activities and test their skills with real students. In realizing this, a firm theoretical framework is necessary. The Technological Pedagogical and Content Knowledge (TPACK) framework (Mishra & Koehler, 2006) that builds on Shulman's (1987) Pedagogical Content Knowledge Theory is used for this study.

Framework

Teacher education programs promote applied professional experience in L2 courses, such as CALL courses (Hong, 2010; Kleinsasser, 2013). Since one class that focuses on the knowledge of language, culture, and technology for the 21st century pre-service L2 teachers is the CALL class, TPACK (Mishra & Koehler, 2006) is one of frameworks that is used in CALL methodologies. TPACK is a framework (See Figure 1) that displays the knowledge that teachers need in order to use technology in the classroom effectively.

The TPACK framework emphasizes the interconnectedness of three types of knowledge: Content Knowledge (CK), Pedagogy Knowledge (PK), and Technology Knowledge (TK), with the addition of a fourth kind of knowledge, the kind of knowledge that develops when the various knowledges intersect - Technological Pedagogical Content Knowledge (TPACK). Figure 1 illustrates that when technology is introduced into the language classroom, L2 learners develop integrated knowledge through this intersection of content (language), pedagogy (teaching of language), and technology (computers) that is unique to each situation.

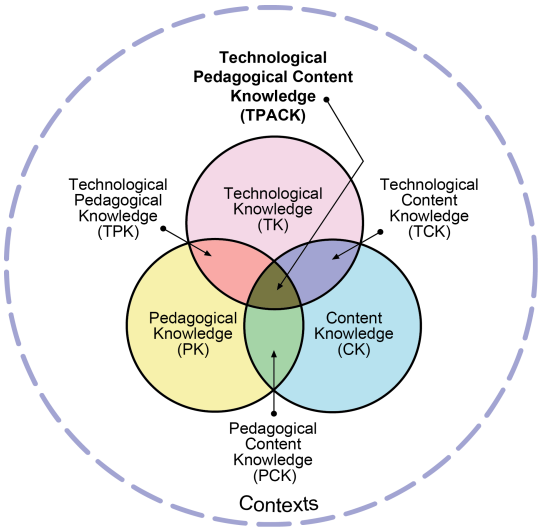

Figure 1.
TPACK Image reproduced by permission of the publisher,
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The purpose of TPACK is enhancing language learners' learning through meaningful strategies along with the integration of technology. It is a combination of content, pedagogy, and technology (Koehler, Mishra, & Yahya, 2007; Liu & Kleinsasser, 2015). Therefore, it is appropriate to include TPACK when discussing teacher candidates' self-efficacy level in integrating CALL into their language learning classes.

Research has shown that when TCs receive CALL professional development utilizing the constructs of TPACK, their self-efficacy in integrating content knowledge, pedagogical knowledge, and technology knowledge increases overall (Liu & Kleinsasser, 2015; Kavanoz, Yüksel, & Ozcan, 2015). Utilizing technology effectively in the L2 classroom can positively impact how content is taught to ELs.

However, research shows that teacher education programs do not provide TCs with the required best practices, such as designing online language activities (i.e., CALL activities), to be able to integrate technology into their curriculum during the pre-service years, and this creates a lack of confidence in TCs (Fishman & Davis, 2006; Maddux & Cummings, 2004).

However, if teacher education programs would integrate the TPACK framework along with the best practices for the use of technology in classrooms, TCs would be better prepared to integrate technology into real-life online classroom activities. Therefore, we investigated TC efficacy in designing CALL activities for ELs within the framework of TPACK.

METHODOLOGY

Research Question

Since TPACK, "components of which can be listed as content knowledge, pedagogical knowledge, pedagogical content knowledge, and technological pedagogical knowledge," refers to the integration of TCs' technology knowledge into their content and pedagogical knowledge, we operationalized field knowledge and technological knowledge as TPACK (Kavanoz, Yuksel, & Ozcan, 2015, p. 95).

In this study, we investigated the relationships between the perception of TCs' knowledge of English language teaching, knowledge and efficacy in designing CALL activities and the ability to assess their EFL students online in a distance learning environment to answer the following research question: Does the field knowledge and applied practice in creating CALL activities predict the self-efficacy of TCs in CALL?

Research Setting and Participants

A total of 16 TCs from a southern state university in the United States participated in this study. The participant TCs created interactive lessons and discussion activities to add to an online class for English as a Foreign Language (EFL) students in a web-based Canvas platform developed for a CALL class in Master of Art (M.A.) Teaching English to Speakers of Other Languages (TESOL) program. Creation of the activities such as Present Perfect Tense activities for a CALL class took place in a Sandbox course, as TCs were allowed to create their own activities and practice their skills in a pre-classroom setting within a CALL

class. They were allowed to choose to create a discussion activity based on Reading, Writing, Listening, Speaking, or Grammar skill development.

Tips and models about how to do this were provided by one of the researchers who taught the main CALL class to TCs. The TC participants understood how they could create a lesson or discussion activities and add it to the course. In addition, they learned how to navigate in the Canvas system and use the system are all features through an orientation completed by one of the researchers. Furthermore, a total of 15 intermediate English level students from Turkey and 16 from China participated in the activities that were designed by the TCs after they had designed the activities. All the discussions and course activities were completed by the Turkish and Chinese students online in the Sandbox course. The TCs had no face-to-face teaching experience with the international EFL learners who participated in those activities from their own countries.

To keep the English level variable constant, only intermediate level EFL learners were chosen to participate in this study. The levels of the students were determined based on the English Language Diagnosis and Assessment Certificate of Proficiency in English (ELDA COPE) exam.

TCs had four tasks to complete in the Sandbox course: an introductory video to introduce themselves and what the EFL learners are supposed to do, a discussion activity, a lesson page with practice activities, and a summative quiz. The activities prepared by TCs were based on Present Perfect Tense. To obtain consistency in terms of the content, a segment of a grammar textbook provided to the TCs so that they could use it to prepare their own activities. After the EFL students were entered into the course system, they were able to watch the introductory videos and participate in the discussions, the activities on the lesson pages, and quizzes the TCs had created.

The EFL students sent their feedback via the platform-email to TCs about all of these activities, so TCs could get real-time reviews for what they had created. The objective was to provide an opportunity for TCs to view Best Practice models for creating online language activities and apply those practices in a real-world setting with live EFL learners. This element was missing in most of the research studies mentioned in the literature review section of this paper. It is crucial for TCs to get feedback from the real-time reviews.

Data collection and Instrument

The data was collected through the survey (see Appendix) that was distributed to the TCs on Qualtrics website. The survey link that was protected by a password was provided to the TCs before they started creating the CALL activities, and their perceptions were measured before they started their hands-on experience in creating CALL activities. The same survey was distributed to the same TCs after the CALL course ended at the end of the semester to investigate if their perceptions regarding their self-confidence in TPACK changed.

The survey distributed to the TCs was created by one of the researchers and piloted with 7 international TCs who learned English as a Foreign Language and were in a doctoral program at a southern university. These participants had some kind of CALL class exposure in the past, and they provided feedback on the items after taking this survey.

This method was used to validate the survey before applying it in the real CALL class. Even though this technique is not one of the validation techniques that were used in the literature, we acknowledge the limitation that was caused by the research time limitations.

Since the CALL class is offered once per year, the researchers had to apply the survey after testing it on 7 TESOL TCs.

The survey is six-point Likert scale (Strongly agree, Agree, Neither Agree/Disagree, Disagree, Strongly Disagree, and Not Applicable) and it contains 40 items including sub-sections on *pedagogical and content knowledge, CALL technology knowledge, self-efficacy in motivating students,* and *assessment and feedback awareness*. For data analysis purposes, pedagogical and content knowledge and confidence level in student motivation subsections were combined in one main category as "the self-efficacy in pedagogical and content knowledge (SEPCK)" because the items in these two sections mainly focus on the English language teaching knowledge.

Therefore, it will be referred as SEPCK throughout the rest of the paper.

Data Analysis

The survey was administered to a total of 16 TCs; however, after excluding all the incomplete surveys and missing items both from the pre-test and post-test, only four surveys could be included to compute the analysis. In addition, one of the "SEPCK" items and one of the "assessment and feedback awareness" items were recoded for analysis purposes.

These items were "I am afraid to make mistakes in an online class because all students will see my mistakes" in SEPCK and "I am afraid giving individual feedback would take so much time in an online class" in the assessment and feedback awareness (AFA) section.

The data was also triangulated with the qualitative comments that were obtained from the section at the end of the survey asking the participants to provide their comments about their experiences.

In addition, the researchers included the Student Perception of Instruction (SPI) survey comments. SPIs are distributed to all the university students including the TCs at the end of each semester as a university required course survey.

The data was computed and analyzed in two strands: descriptive statistics and inferential statistics. The IBM Statistical Package for Social Sciences (SPSS) Statistics V22.0 was used to calculate both types of statistics. For the inferential statistics, regression was used.

RESULTS

The data in Table 1 indicate the correlations between variables. According to Table 1, there is a high correlation between SEPCK and Self-Efficacy in CALL knowledge (r=.94) and between AFA and Self-Efficacy in CALL knowledge (r=.80).

Table: 1
Correlations among the Self-Efficacy in CALL, SEPCK, and AFA

		Self-Efficacy in CALL knowledge	SEPCK	AFA
Pearson Correlation	Self-Efficacy in CALL	1.000	.943	.800
	SEPCK	.943	1.000	.728
	AFA	.800	.728	1.000
Sig. (1-tailed)	Self-Efficacy in CALL	.	.029	.100
	SEPCK	.029	.	.136
	AFA	.100	.136	.
N	Self-Efficacy in CALL	4	4	4
	SEPCK	4	4	4
	AFA	4	4	4

Overall, the linear composite of the independent variables such as SEPCK and AFA, entered into the regression procedure, predicted (or explained) 91.7% of the variation in the dependent criterion, self-efficacy in CALL technology knowledge, F (2, 1) =5.5, p = .28 (see Table 2). All of the confidence intervals around each of the b weights included zero as a probable value.

Table: 2
Analysis of Variance

R Square		R Square	df	Mean Square	F	Sig.
.917	Regression	22.000	2	11.000	5.500	.289[b]
	Residual	2.000	1	2.000		
	Total	24.000	3			

a. Dependent Variable: Self-Efficacy in CALL, b. Predictors: (Constant)

This suggests that the results for each of the independent variables are not precise enough to be retained. The finding of such a large effect size motivates the researchers to further investigate whether the results can be replicated with a substantially larger sample.

Although the R^2 may simply be a spurious result, the lack of a statistically significant result may also be attributable to an inadequate amount of power to detect the effect, given the small sample size. Because the R^2 was substantially large, an investigation with sufficient power to detect whether an effect does indeed exist may be obtained by utilizing a larger sample size.

As for the qualitative data, TCs enjoyed the class and felt that they were able to create CALL activities.

Two participants stated that they had lower computer anxiety and teaching anxiety after they started working on creating CALL materials. In addition, at the end of the semester, all the participants reported great improvement in building on their TPACK.

Among these participants, one of them also stated that having a chance to design her own CALL materials and having real students in an online setting fostered her knowledge in integrating technology into teaching the EL content.

Furthermore, besides the survey comments, one of the comments from the student SPI surveys were, "I loved the course and learned a lot on how to be specific and lead a more constructive interactive class!" In addition, another TC commented on SPI surveys and stated, "Thanks to both the professor and teacher assistant for their support and valuable feedback!!!" The TCs were grateful to have the opportunity to interact with their future learners and have an exposure to the feeling of creating CALL materials, which eventually boosted their self-efficacy in TPACK.

Besides the quantitative data, the qualitative data obtained from both the study survey and the SPI surveys indicated that creating CALL activities in a Sandbox setting can improve TCs' self-efficacy in CALL when they are provided with technological and pedagogical content knowledge, and they can apply their skills in a real-world setting with real-time students. This also indicated that TCs might strengthen their skills in online teaching when provided with well-developed CALL knowledge and competencies.

DISCUSSION

The study explored the TCs' self-efficacy in CALL technology, and the data analysis depicted how TCs perceived their development of knowledge in CALL and their competencies within the framework of TPACK. The large effect size suggested that self-efficacy in pedagogical and content knowledge and the assessment and feedback awareness in language teaching had an effect on CALL technology knowledge regardless of the knowledge of computer and Internet. TCs reported the their professional growth for creating CALL activities and were confident about improving their EFL students' learning motivation by means of Internet technology and TPACK.

Despite the convincing findings in favor of face-to-face L2 instruction in the literature, the qualitative results of this study suggested that well-designed online L2 CALL activities are effective at increasing TC self-efficacy in utilizing CALL knowledge in real classrooms filled with real-time EFL students. In addition, using this real-time online environment to practice their CALL skills in creating CALL activities was a big part of their transformation from TCs into in-service teachers. Therefore, the educational institutions that offer CALL courses should provide such opportunities to TCs. As Salomon (2000) and Oster-Levinz and Klieger (2010) mentioned, technology itself will not create a change, but it will help in the realization of a new pedagogy.

According to the results, providing TCs with the knowledge of TPACK (Mishra & Koehler, 2006) and providing real-time CALL practice opportunities will increase their self-efficacy in their fields and will help them access to the necessary information that is necessary for the interactive activities. This way, TCs will learn how to exploit the CALL opportunities to create their own activities and apply them in real-life situations as in the cases of EFL students.

Lastly, qualitative results indicated that designing CALL activities in an applied real-world setting such as Sandbox contributed to TCs' increased self-confidence to teach L2 learners. According to both quantitative and qualitative results, TCs have had a high level of TPACK self-efficacy and positive attitudes

towards designing CALL activities. As their self-efficacy in SEPCK and AFA increased, their self-efficacy in CALL also increased.

Therefore, it can be stated that TCs' knowledge increase in technology is supported and interconnected by other areas. Even though this interconnectedness cannot be causal, the relationship between the variables mentioned indicated that self-efficacy of TCs is increased especially in a real-time CALL class environment.

Since CALL is one of the most powerful and the fastest growing areas in teacher education field, TCs carry such an important role as future in-service teachers in any education system. They are the ones who can effectively use the ICT to create a communicative, engaging, and learner-centered environment in an online atmosphere. Therefore, the future research should focus more on the hands-on aspect of CALL within the TPACK framework. As emphasized by Kavanoz et al. (2015) and Lee and Tsai (2010), teacher education programs have a vital role in teachers' future use of ICT, and therefore, presenting conceptualizations of web, pedagogy, and content as interdependent dimensions of teachers' knowledge will help TCs to better understand teaching profession to be able to reach EL needs.

LIMITATIONS AND IMPLICATIONS

As with any research, this study has several potential limitations that constrain its interpretation and generalizability. First, it is important to indicate the fact that the nature of this study was exploratory considering the self-designed survey and validation techniques as well as trying out a new methodology that brings a real-time experience to TCs (i.e., designing CALL activities).

In addition, since the data collected through the survey mentioned above depended on the TCs' perceptions in which they rated their self-efficacy in TPACK and AFA, the self-reported answers to the survey might have affected the construct validity of this study. In other words, some relevant aspects of the variables may not have been fully captured by the measures, which indicate a limitation.

A further limitation of this study was the very small sample size. Even though 16 TCs worked on their CALL activities and completed the tasks, only some of them were willing to participate in the survey. In addition, since we applied a pre-test and post-test technique in this study, the participants who took the survey in pre-test were supposed to be the same participants taking the post-test; however, some of these participants didn't not participate in the post-test while some others participated in it.

Therefore, after all the attrition, only four TCs were able to fully complete the survey. In addition, the unique characteristics of the course, the instructor, and the teacher-candidates at the participating university prevent the results from being generalized to all methodology classes taught by all instructors at all institutions.

Therefore, we acknowledge this limitation. However, the large effect size despite this small sample size compensates this limitation along with the qualitative data coming from the TC comments.

Therefore, when replicating this study with larger groups of TCs, we recommend paying extra attention to interpreting the results and generalizing the findings for other TCs. Also, since the survey may inform the researchers only about the

Furthermore, for future studies, using qualitative methods such as interviews with TCs may constitute a more comprehensive picture of the TCs' perceived CALL technology self-efficacy. If conducted quantitatively, the survey may include other variables that can be analyzed through Structural Equation Modeling (SEM) to see the strength and weaknesses between different variables. Despite some limitations, this study is considered unique in terms of providing opportunities to TCs such as hands-on experience with creating CALL materials, testing them on real-time learners, and getting real student feedback on their work.

In other words, it mainly contributes to teacher education field and CALL in three aspects. First, the new design that we applied in this study transforms the CALL training into real-life online classroom setting where TCs may encounter one day as most teacher education programs are becoming more online and less face-to-face. Even though this aspect is understudied or less investigated in the literature (McNeil, 2013), this study was a small step in starting such methods in CALL classes or in teacher education programs. Furthermore, this study investigated TCs' professional improvement in one semester by examining both their TPACK and assessment and feedback awareness development through the pre-test and post-test method.

This can be considered as a very important aspect because as TCs develop their perception about their skills in the field, they change attitudes towards their profession and future students. Therefore, giving a chance to TCs to express their professional improvements or realize their potential in the field is very crucial in teacher training programs.More importantly, our investigation grants an opportunity to teacher educators to pay attention to evaluating and researching technological professional teacher development programs through different perspectives. Our study indicated that TCs' self-confidence in CALL and their TPACK development was not only determined by their own perceptions but it was mostly determined by having an opportunity to have an access to the real-life online classrooms. In such a design, TCs can practice their skills, boost their self-confidence through the feedback provided by real language learners. We recommend using this technique as a project in each CALL class to give such opportunities to TCs. In the end, this will scaffold TCs' CALL knowledge as they learn how to infuse technology into their own classrooms and as they learn how to handle some situations that may rise as they proceed.

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TPACK- Technological Pedagogical Content Knowledge: http://tpack.org

APPENDIX

SELF-EFFICACY IN CREATING CALL MATERIALS SURVEY (6-point Likert Scale)

Self-Efficacy in Pedagogical and Content Knowledge (SEPCK)

Pedagogical and Content Knowledge Section

1. **I believe I can use effective questioning strategies to activate ELLs' background knowledge.**
2. **I feel confident that I can create interactive online activities for ELLs**
3. **I am confident that my course focuses on ELLs' level of English.**
4. **I am confident that my activities are creative**
5. **I believe I can clearly explain instructions for each activity**
6. **I believe I can write good lesson plans**
7. **I am confident that I know how to write lesson plan objectives**
8. **I am confident I can help my students improve English proficiency**

9. Motivating Students Section

10. **I feel confident to motivate students with low interest.**
11. **I am confident that I can motivate students with my activities.**
12. **I am confident that I can motivate students to appreciate the benefits of language learning**
13. **I am aware of the factors that may affect my students' success in learning English**
14. **I am ready to implement a variety of different teaching strategies to meet the needs of my ELLs.**

15. CALL Technology Knowledge (TK)

16. **I know how to utilize computer technology in order to create an online classroom**
17. **I believe I know how to create an online curriculum for nonnative English speakers**
18. **I feel confident that I can easily include videos in my online course**
19. **I am sure I can create discussions for my online courses.**
20. **I believe I can create modules/unites for my online courses.**
21. **I believe creating quizzes for an online class is easy**
22. **I am sure I can create good online quizzes**
23. **I believe I can use technology to teach reading**
24. **I believe I can use technology to teach writing**
25. **I believe I can use technology to teach listening**
26. **I believe I can use technology to teach speaking**
27. **I believe I can use technology to teach grammar**
28. **I am sure I can teach vocabulary in an online classroom environment**
29. **I am confident that I can make online announcements for an online class**
30. **I am afraid to make mistakes in an online class because all students will see my mistakes.**
31. **I feel prepared to design online lesson plans effectively for ELLs.**
32. **I think I have to further learn how to integrate Internet resources into my future EFL classroom curricula.**
33. **I am sure that I can get ELLs to follow the online-class rules.**
34. **I believe the Internet is a useful tool for helping me achieve my future teaching purpose.**
35. **I would like to use CALL materials and activities in my future online classroom as much as possible.**

36. Assessment and Feedback Awareness (AFA)

37. **I feel confident to use a variety of assessment strategies in my teaching**
38. **I am sure that I can provide an alternative explanation or example when my students are confused.**
39. **I feel confident that I can give constructive feedback when I teach online**
40. **I am sure I can give individual feedback on my students' mistakes**
41. **I am afraid giving individual feedback would take so much time in an online class**
42. **I believe I know how to scaffold my students' language abilities.**
43. I am sure I can easily create authentic assessment materials