

A Qualitative Study on CALL Knowledge and Materials Design: Insights From Pre-Service EFL Teachers

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ABSTRACT

The present study investigates how academic coursework and formal learning of instructional technology and materials design help pre-service English language teachers' development of critical knowledge of CALL materials. The participants are 111 pre-service English language teachers enrolled in a TEFL programme at a Turkish University. Throughout a 14-week semester, these participants learn to design a variety of CALL materials including online teaching tools and a set of Web 2.0 tools. The article explores the skills and knowledge of pre-service teachers on the design and development of audio-visual web-based activities, through qualitative content analysis of their written reflections. The analyses of reflections on practice have revealed that these teachers demonstrate strong and critical understanding of CALL in enriching authenticity, enhancing motivation, facilitating language learning, and providing multimodal resources. They also display great awareness of instructional knowledge, in particular, in the design and interface of technology to facilitate learning.

KEYWORDS

CALL Knowledge, EFL, Qualitative, Reflection, Teacher Education

1. INTRODUCTION

Integrating technology, from the perspective of blended learning, has become an agenda in learning English since 2000 (Chapelle, 2003; Li, 2014) and as a result, language teachers all over the world are expected to use technology in teaching (Li & Walsh, 2011). However, integrating technology in language classrooms has faced many obstacles and one of the major issues is that there is evidence of language teachers' graduating with little or no knowledge of the use of technology in language teaching (Hubbard, 2008). As pointed out by Kessler (2006), a common approach to Computer Assisted Language Learning (CALL) in current language teacher education programmes is to concentrate on digital literacy and as such, graduates of TESOL programmes expressed general dissatisfaction with their formal CALL preparation (Li, 2017). It is clear that teacher knowledge about CALL is a core issue and how we develop teachers' knowledge about CALL rather than digital literacy is more important for effective technology use. Recent research in teacher education in CALL focuses on the development of teachers' understanding and knowledge, rather than technological competence (see e.g., the Special Issue on Teacher Education and CALL, Language Learning and Technology,

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2015). However, there is insufficient understanding of teacher knowledge about CALL, especially how pre-service teachers construct their own knowledge in learning to use CALL in teaching.

Against this background, this paper investigates the development of CALL knowledge of language teacher candidates based on data collected during a 14-week undergraduate course in a 4-year English Language Teacher programme at a Turkish University, with a particular focus on the design and development of audio-visual web-based activities. Since developing such knowledge does require learning based on practice as well as theoretical input, the data was collected as a part of a course entitled *Instructional Technology and Materials Design*, which is offered to students in their third year at the Department of Foreign Languages, Division of English Language Teaching. The data comes from written reflections of the pre-service teachers, submitted to the lecturer at the end of the semester. It should be noted here that the reflections have not been used by the lecturer as part of the course assessment. These reflections include students' evaluation of and reflection on the instructional CALL materials they produced throughout the semester. It is believed that with the reflective writing practices, we will be able to understand how pre-service teachers understand and construct their own knowledge in using technology for language teaching, which might further influence the teacher education and development in CALL.

The aim of this paper is two-fold. First, it aims to shed light on the development of student teachers' knowledge about CALL - and in particular about the design and development of audio-visual web-based language practice materials- with a data-driven, practice oriented approach. Second, we hope to contribute to the literature of teacher education in integrating technology. Such insights and knowledge is important for the field of CALL since teacher training and development is a core element of effective CALL integration (Li, 2008). In the following section, we will present a review of literature and the theoretical basis of teacher knowledge about CALL. This will be followed by the method section, which will include information on participants, context, teaching materials, and analytic procedures. Following the findings, a discussion will be presented, including pedagogical implications and future research directions.

2. TEACHER KNOWLEDGE ABOUT CALL

It is widely acknowledged that teachers are decision-makers in material choices and activities design in classrooms (Borg, 2006; Li, 2013). In terms of integrating technology in teaching, it is important to focus on developing teacher knowledge about CALL because teachers act as change agents and there is ample evidence to urge for the preparation and education of pre- and in-service language teachers to develop computer-assisted language learning in the 21st Century (e.g., Liu & Kleinsasser, 2015; Hong, 2010; Hubbard, 2008; Hubbard & Levy, 2006). At a very broad level, the term teacher knowledge is used as an umbrella term to cover teachers' theoretical and practical knowledge. This might overlap with beliefs, dispositions, values and propositions (Li, 2017) and it can be investigated through different approaches (Tsui, 2003). Shulman (1987) proposed that expertise in teaching is based on the development of three knowledge bases: subject matter knowledge, pedagogical content knowledge and general pedagogical knowledge, and emphasised the 'intersection of content and pedagogy'. Building on Shulman's (1987) Pedagogical Content Knowledge framework, Mishra & Koehler (2006) proposed the technological pedagogical content knowledge (TPACK), emphasizing (1) the dynamic relationships between content, pedagogy, and technology for teachers, and (2) successful integration of technology in teaching and in developing their own knowledge and competence in the technology integration (Koehler, Mishra, & Yahya, 2007; Mishra & Koehler, 2006). The core part of TPACK, therefore, is to know about integrating appropriate pedagogy and CALL technology into English learning materials and teaching.

On the other hand, teacher knowledge can be viewed as personal practical knowledge (Clandinin and Connelly, 1987), which is the knowledge teachers hold and refer to in their professional life that is constructed and reconstructed through their stories and process of reflection. Recent work

in teacher knowledge by and large focuses on the construction of personal practical knowledge by both pre-service and in-service teachers (e.g., Morton & Gray, 2010; Tsui, 2007), and this line of research sees teacher knowledge as personal, practical and tacit and it is developed from teachers' experiential practice when they respond to the context. In this paper, personal practical knowledge is the focus as the student teachers go through an experiential learning process in which they interact with colleagues, and in which they acquire a new understanding of teaching situated in that context (Kolb, 1984). However, as Ruohotie-Lyhty (2011) points out, this process of learning or knowledge building is not straightforward, as individuals' agency or the capacity to act (Ahearn, 2001) influences the process. Individuals are different and have different ways to interact with the environment they are in and they have different capacity to act in practice.

There are two important elements in personal practical knowledge development: reflection-on-practice and personal understanding. Reflection-on-practice is the opportunity that student teachers interpret and adapt information they receive from training based on the situation they are in. In this process, student teachers draw on the knowledgebase of theoretical work to develop their own understanding of the knowledge for the context. This is a personal contextual and reflective process. Personal understanding is closely linked to this reflection procession. For student teachers, it is an individual particular way of reconstructing the past and intentions for the future (Tsui, 2007; Connelly & Clandinin, 1988) and it is first-hand experience of students' learning styles, interest levels, needs and difficulties (Elbaz, 1981). This said, personal practical knowledge does not mean that student teachers do not consider content knowledge. In contrast, content knowledge is shaped and reconstructed in the interaction with the environment – it is the student teachers' perception of the context that influences how they deal with the content and make pedagogical decisions.

Acknowledging the importance of contextual and personal aspect of knowledge development, Kumaravadivelu (2012) reviewed these different concepts of teacher knowledge and proposed that for teacher preparation, we should aim for a set of manageable and meaning types of knowledge. Adopting this approach, Li (2017) presents three types of knowledge that student teachers develop most in learning to teach that rests on data of student teacher teaching; (1) disciplinary content knowledge, (2) pedagogical knowledge and (3) contextual knowledge. This framework has clear distinction of content/ discipline focus, pedagogy focus and context focus, although the interrelatedness of these different types of knowledge base is acknowledged. This framework is useful for this study as these knowledge domains are valid for the development of CALL knowledge as well.

Teacher knowledge and skills regarding CALL has been under-researched until recently, yet there is no agreed framework or models that can be applied to develop pre- and in- service teachers' ability and expertise in integrating technology in teaching. Hampel and Stickler (2005) focused on the knowledge and skills teachers need for online teaching, whereas Healey et al. (2011) proposed a list of skills and standards that teachers should acquire in order to teach with technology. A number of studies have been carried out on the intersection of teacher knowledge and CALL with a diverse set of methodological tools. In their study with pre-service language teachers, Rilling et al. (2005) showed that connecting CALL theory with actual practices contributes to the teacher development in a significant way, and student teachers come into realisation that they "could apply what they had learned directly in their classrooms with confidence and self-assurance" (p. 230). Questionnaire based studies have also dominated what novice and experienced teachers know about ICT and how CALL knowledge develops over time. Based on findings from a survey applied to 94 teachers, Fakeye (2010) reported that rare use of information and communication technologies is an important factor for understanding teachers' development of CALL knowledge.

Following the framework of Mishra and Koehler (2006), Kocoglu (2009) worked with 27 pre-service English language teachers in Turkey in order to understand the development of their knowledge domains during a CALL course with a grounded interpretative approach. She claimed that for the teacher candidates, Technological Pedagogical Content Knowledge meant "understanding what it means to teach English language with technology; knowledge of instructional strategies; knowledge

of students' learning; and knowledge of materials that integrate technology in language teaching" (Kocoglu 2009: 2737). Based on the previous research, this study aims to reveal the insights into the CALL knowledge construction through student teachers' reflections and experience, to contribute to the understanding of TPACK and reveal how such knowledge is personal and practical. The significance of this study is to identify the core CALL knowledge from the participants' perspectives and experiences. This design to some extent mirrored the 4 E approach of teacher development in CALL environment, which encourages teachers as learners to explore, engage, evaluate and enhance (Son, et al., 2015).

3. THE STUDY

The study centres around the following research question:

How do teacher candidates reveal and display their knowledge of the design and development of audio-visual web-based activities through their reflections on the materials they produced throughout the semester?

This research question evaluates the knowledge of self and is a process-oriented reflective practice. The research question and the data related to it will be approached with a qualitative emergent paradigm using a grounded approach and content analysis. Before we provide more information on our methodological stance, we will first present information on participants and context.

3.1. Participants and Research Site

The participants of this study consist of 111 undergraduate English as a foreign language teacher candidates (distributed into 3 sections, 37 students each) enrolled into a four-year teacher training programme and taking their *Instructional Technology and Materials Design* class, which is compulsory in their third year. In Turkey, most of the teacher candidates go through vocational education in *Anatolian Teacher Training High Schools* and then undergo a four-year undergraduate language teacher education programme to become English teachers at public schools, universities and the private sector. The curriculum of these teacher-training programmes is to a great extent determined by the Turkish Council of Higher Education, although lecturers in different universities are flexible for choosing the contents of their syllabuses based on their expertise. In this particular course, entitled *Instructional Technology and Materials Design*, the syllabus¹ has been designed by the course lecturer to familiarise the students with theoretical and practical understanding of how technology can be integrated into language teaching, and how teachers can make use of contemporary developments in instructional technology. As is stated in the course syllabus "Informed by theoretical underpinnings, the course explains the ways Web 2.0 applications, corpus analysis software, CALL applications, and digital media can be implemented to support teaching and learning experiences in classrooms and beyond".

Apart from many other technological tools, two kinds of software and practical and theoretical knowledge about them are given particular emphasis during the course: (1) a corpus analysis software called AntConc (Anthony, 2010) to help the teacher candidates analyze foreign language patterns and produce materials based on these patterns, and (2) a java software that teachers can use to produce online audio-visual materials (Hot Potatoes²). In this paper, the focus will be on the use of the second software, Hot Potatoes, which helps teachers to develop cloze tests, multiple choice and open-ended question exercises, matching exercises, and crossword activities that can further be enhanced with image, audio and video files, and can be made available online for their students³.

The students develop these materials both by using the computers that are available in the class with the assistance of the lecturer, and after becoming more competent in the software, by performing out-of-class work in pairs and in groups.

The data comes from the written reflections of the students (an average of 1500-2000 words per group of students who worked together on the materials) on their learning process throughout the semester, as well as on how they think these technological tools could be used in their future teaching. These reflections constitute the data to be analysed for this paper, and consents have been granted from all students for the use of their reflections as data. The students, after they finalise their HotPotatoes projects, post the online teaching materials to the course blog by also providing some brief information on the target level and topic. Each student is asked to comment on at least five different materials on the blog on voluntary basis, creating the Coop-TECH (the Corpus of Online Peer feedback in TEaCHing), analyses of which is reported in another study (Sert & Aşık, under review).

3.2. Methodology

This study employs qualitative content analysis for investigating the reflections of student teachers on their learning of CALL materials throughout a semester in a teacher education programme. In order to investigate the development of CALL knowledge, we used grounded theory (Croker 2009) and a qualitative content analysis of the written reflections to see the emerging themes from what the teacher candidates know. Our dataset is students' written reflections (mostly in pairs and groups, consisting of 45 reflective pieces in total with an average of around 2000 words each) based on their design of materials. A grounded approach has been employed for the analysis of the data through several stages. First, all written reflections were loaded in Nvivo 10 and one written feedback was used to build nodes. The goal of this stage was to code all the relevant information under different categories, and initially 39 nodes were developed containing 488 extracts. For example, the following extract is from one group's reflection:

...by using CALL and Web Assisted Language Learning (WALL) language teachers have great opportunities and access to unlimited recourses for preparing authentic materials. (DD_IK)

This extract was initially coded in the node as 'material selection'. In coding data, new nodes were developed when necessary. The next stage involved checking nodes and revisiting data. Each node was carefully checked and as a result some extracts were moved to a new node. For example, the above-mentioned extract was recoded under the node of 'resource'. While revising nodes and moving around extracts, some nodes collapsed with others and some nodes were deleted. For example, 'student age' and 'student level' were merged to become a new node 'student level' as both nodes describe how age and level of students influence the decision making of the design. As a result, 'student age' was removed from the node list. After this, all nodes were compared again to reduce the data by grouping the coded items into sub-themes. For example, the coded nodes 'activity type' and 'activity sequence' were further collapsed into a category 'developing an activity', which were considered as sub-themes. This stage left us with 25 sub-themes⁴. The last stage of data analysis was to go through all these sub-themes and group them under three substantive main themes, namely: disciplinary knowledge about CALL, instructional knowledge and contextual knowledge drawing upon the concepts in the literature review (e.g., Li, 2017) (see Table 1 for themes and subthemes). It should be noted here that these knowledge domains did not shape the analysis. The emerging themes were placed under them, which was a post-analytic treatment of the emerging themes, rather than a top-down one. In the data presentation in Table 1, the findings are reported based on these three knowledge domains.

Table 1. Themes developed from student group reflection (note: source means reflections and references means extracts)

Knowledge Domain	Themes	Number of Source / References
Disciplinary knowledge about CALL (benefits and drawbacks)	Enabling authenticity	31/61
	Increasing motivation	27/54
	Improving linguistic knowledge acquisition and skill development	20/31
	Providing rich and multimodal resources	9/15
	Making more exercises	8/8
	Providing a space for sharing	5/6
	Providing immediate feedback	5/6
	Having flexibility	5/6
	<i>Not good as a testing tool</i>	6/7
	<i>Suitable for independent learning</i>	3/4
	<i>Negative influence on learners</i>	1/1
Developing instructional knowledge	Activity	18/39
	Technical design of the material	18/38
	Technical problems encountered	14/25
	Material selection	13/17
	Giving instruction	8/11
	Learning content difficulty	4/4
Developing contextual knowledge	Student level	27/53
	Learner interest	9/11
	Technology availability	9/10

4. FINDINGS FROM THE WRITTEN REFLECTIONS OF THE STUDENTS: EMERGENCE AND DEVELOPMENT OF CALL KNOWLEDGE

During the course, three types of knowledge were developed and their development was evidenced in the student teachers' reflections. After covering a variety of topics related to instructional design, materials development and CALL and producing both corpus driven materials as well as online audio-visual language learning activities and exercises, the students' reflections were representative of their knowledge and knowledge development of CALL.

4.1. Disciplinary Knowledge About CALL

These pre-service teachers demonstrate their knowledge about the discipline, CALL in the form of recognising benefits of CALL and its drawbacks. Understanding CALL mainly concerns recognising its benefits in the following areas: a) enabling authenticity in language learning; b) increasing motivation; c) improving linguistic knowledge acquisition and language skills; d) providing rich and multimodal resources for language learning; e) enabling to make more exercises; f) providing a space for sharing; g) providing immediate feedback and h) bearing flexibility across subjects. Due to reasons of space, we only report three mostly cited benefits in the student teachers' reflections and some of their concerns.

In the reflections, the most dominant theme across the group is the advantage of CALL in enabling authenticity in language learning. Clearly, student teachers consider authenticity as an important element in language learning and CALL facilitates achieving authenticity.

“Firstly, as we use foreign TV series as materials, we can provide our students to be familiar with real life. So, the students can recognize the culture of the country. They get a real life input and they can learn to produce real life or authentic outputs”. <BM_OT>

The positive impact of CALL is also recognised as an important role that technology can play in language learning. In particular, student teachers emphasise that technology increases motivation and help students stay on task.

“We know that games and songs motivate students and they try to fill in the gaps just for fun, if they complete the gaps, they can sing the song”. <BM_OT>

“We tried to use lots of pictures and sound because they need to see and listen at that age. They can be bored and tired very easily. We need to attract visual and audial learner’s interests”. <CD_SD_GT>

Student teachers also think CALL helps in linguistic knowledge acquisition and language skills development.

“These materials especially develop student’s speaking and listening skills besides their vocabulary, reading and grammar skills”. <CD_SD_GT>

However, developing knowledge of the discipline does not mean students are blindly accepting the ideas and benefits of CALL, in their reflection, they demonstrate criticality, such as pointing out the drawbacks of a certain tool or the function of a type of technology. Hotpotatoes on the one hand offers students a tool to create exercises according to their target student profiles and on the other shows limitations as a tool for testing purposes.

“First of all, it (hot potatoes) does not give opportunity for students to interact with other students or teacher. They just do the task in front of computers on their own. Students are deprived of speaking skill because there is no chance to communicate”. <BB_HT>

“It is emphasized this program wasn’t created as a test-design package at first. So, there are no provisions to prevent the student from cheating, and no security measures are provided and this affects the success of the learner”. <SA_BA>

Apart from critically evaluating tools, student teachers also developed awareness of using technology for independent learning (in particular Hotpotatoes in this study).

“...hot potato materials could only be used as a self-learning or a self-assessment tool, however it couldn’t be used as a testing tool”. <DC_FD>

“Its usage in exams may cause some problems because this could be only suitable for students’ self study”. <EC_MD_MC>

4.2. Developing Instructional Knowledge

The second type of knowledge student teachers have developed as evidenced in their reflections is instructional knowledge. This type of knowledge includes knowledge of designing activities (activity type and sequence, learning difficulties), technological considerations in design of the materials (e.g., graphic design, medium and colour), and selection of appropriate materials.

Students display their knowledge about the technological considerations in designing materials, including graphic design, colour and instructions of exercises. Clearly, this knowledge is developed and catalysed after they engage in reflections.

“At first step, it was really difficult because it was a totally new experience for all of us. We couldn’t understand what we should do with these materials. That’s why; we have made some mistakes while preparing the activities”. <CM_SD_GT>

Student teachers particularly pay attention to the design of their materials in terms of colour and the pedagogical consideration behind this is predominantly for increasing motivation apart from the health issues. For example:

“Our background color is good for eyes. All these things affect students’ motivation. We added a next button to shift the activity easily but we forgot to add back button. It can be a problem if students want to go back check something. We set a time limit for crossword activity because it is a game but we didn’t set a time limit for the other activities because they try to apply new rules they learn and it can be challenging”. <BM_OT>

“Their background colors don’t strain eyes, special design for kids”. <HA_MB_HY>

“We try to use colorful picture intentionally to attract their attention also we choose colorful background to make the paper enjoyable and attractive for students”. <MY_SE>

Interestingly, instruction is also an issue that students realized after they designed the materials. For some students, there is lack of clarity in their instruction but for others, they simply forgot to include that in their materials.

“My mistake actually the thing that i forgot is there is no statement or explanation at the top of page about the questions. I forgot that” <SA_BG>

One of the possible reasons is the difference between the use of traditional materials and online materials as when teachers use traditional materials, they give instructions to students face-to-face whereas the online learning materials change the learning mode and students get instructions online. Instruction, however is not the only problem student teachers encountered, some of them experienced technical problems as well.

“At first step, it was really difficult because it was a totally new experience for all of us. We couldn’t understand what we should do with these materials. That’s why; we have made some mistakes while preparing the activities”. <CD_SD_GT>

“because it was our first-time attempt to make a computer based material. We had problems in publishing them on the internet”. <HA_MB_HY>

Despite the technical problems students encountered, they do show evidence that they have developed competence and confidence in dealing with technical side of the course.

“we have some difficulty at first while preparing the materials, we have produced an effective work for our learners at the end”. <EEK_EK_ZK>

4.3. Developing Contextual Knowledge

The importance of context knowledge in understanding pedagogy and activity is apparent and in the reflections, student teachers show their contextual knowledge, especially about the learners and technology environment.

Learners are viewed by the student teachers as one of the key elements of contextual knowledge and regarding developing such knowledge involves them think about student levels and interests in particular. As one group of students reflected,

“there are some certain points to pay attention such as the level, needs and interests of the students”. <BS_NK>

In preparing materials, student level is considered as an important influential factor.

“some names of the places such as laundromat, department store, and bakery are not familiar to my target level. Maybe, I can change their names or remove them” <AC>

With regards to student level, student teachers do not just focus on students’ linguistic levels but also the cultural values and norms.

“The subject cannot be appropriate for the level of the students. It can be above or below the target level. It cannot be suitable for their cultural values”. <DC_FD>

Learners exert as an influential factor for successful teaching and being able to recognising future students’ needs and characteristics is vital.

“I assume that if we teach in traditional ways I can say that we will not be successful because the future students are not like us. They have tablets in their hands, they communicate via internet, they are all aware of new technological facilities”. <BK>

Not only student characteristics are important, students' attitudes are considered to be important as well. This is a strong contextual characteristic which is influenced by local curriculum and testing system.

"It is necessary to remember that teachers need to take their students' attitudes into consideration. Accustomed to be taught in a traditional way, some learners may resist using technologies instead of books. Even if they accept using it, they have some feelings like "I don't feel like I'm learning something." Because especially in Turkey, where traditional methods like GTM are still on the stage, learners are used to be taught deductively. They tend to think that learning is memorizing rules. So it is difficult for them to adopt positive attitudes towards a language teaching including web based materials". <GD_MK>

In the reflections, technology environment also becomes part of the contextual knowledge. The availability of technology in their local schools and access to it is a strong factor influencing how they design their materials. The following extracts show the considerations of student teachers had in developing e-learning materials in relation to disadvantaging students.

"we cannot ignore that some children may not be exposed to computers and other technology because of socio-economic status. The way we will follow in our classes should be arranged according to our students' profiles and living conditions, otherwise, this puts these children at a disadvantage in learning technological functions". <BK_PD>

"The most important disadvantage is to access to the internet. For example; when the teacher gives homework to the students, they may not have access to internet in their homes. This situation will be a big problem for students. They will be discouraged from doing their assignments". <CD_SD_GT>

The critical view of technology availability also lies in recognising the impact of the use of CALL in different settings. For example, one group commented on home environment whereas the other one focus on school environment and how practical it is to adopt technology in assisting learning and teaching.

"all regions in Turkey are not in the same position in terms of economy. Some schools have computers, internet. However, some schools don't have even one computer. Thereby, in practice, applying web-based tools can be challenging for some". <GD_MT>

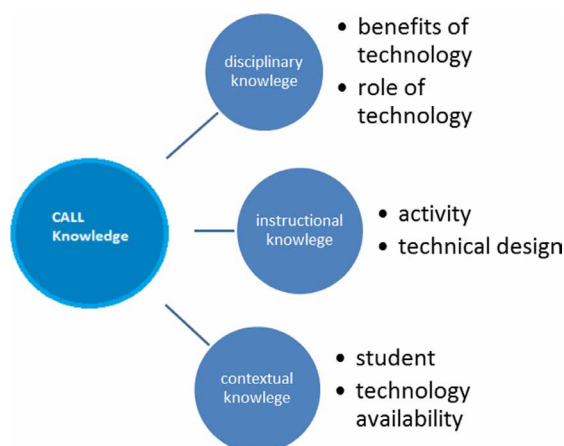
"All of the students may not have a computer and internet at their home". <MA_EY>

5. DISCUSSION AND IMPLICATIONS

From student teachers' reflections, we can see that student knowledge development includes different domains, such as disciplinary (CALL), instructional knowledge and contextual knowledge (see Figure 1). In each knowledge domain, there are different elements. Disciplinary knowledge in student teachers' CALL knowledge includes mainly benefits of technology and principles of using technology. Student teachers generally believe that technology benefits language learning in the aspects of enabling authenticity in language learning (e.g., see language use in real-life contexts), facilitating linguistic knowledge acquisition, increasing motivation, and providing rich language resources. Thus, the principles student teachers developed focus on these areas to maximize the benefits of technology in language teaching. In terms of roles of technology, student teachers consider technology as tools to address both their professional needs and students' learning needs (Ottensbreit-Lefwich, 2012). For example, to address their professional needs, student teachers use technology to search for authentic rich language materials, and to address the learners' needs, technological tools are used for enhancing linguistic knowledge and student motivation.

The second type of knowledge is instructional knowledge, which focuses on activity and technical design of materials. Activity lies at the heart of the instructional knowledge. The first aspect of activity regards types of activities, such as cloze, gap filling and crosswords, in relation to their pedagogical goals. The second aspect of activity concerns activity sequence which often happens after teaching. Clearly for student teachers, appropriate activities are not the sole criteria for effective CALL, the natural flow of the activities and developmental relationship between activities

Figure 1. CALL knowledge



is core to the effectiveness of the activity. In terms of design, student teachers mainly focus on the practicality of technology, such as font size, background colour and easy to use. This is an important aspect of CALL knowledge as Chapelle (2003) suggests, practicality is one of essential criteria for effective CALL. It is important that these student teachers demonstrate such knowledge at early stage as competence and confidence of working with technology is critical in integrating technology in teaching (Li, 2008). Design also concerns giving instruction due to the differences in learning mode. The issue of design was not only a concern voiced in students' reflections, it emerged as an important topic while the students were giving online peer feedback (Sert & Aşık, under review). This is not surprising considering the fact that the strength of CALL materials are in their audio-visual and multimodal nature, and such a strength can only be reflected appropriately with the right design. We have, however, concerns on the effectiveness of the teaching of appropriate design in CALL courses all over the world. One can argue that while learning to employ CALL, and while learning a new software, design is generally something that teacher candidates are not actively engaged since it is sorted out by software developers. However, this issue is significantly important, and it emerged as a key topic in written reflections. We can confidently state that the activities the teacher candidates carried out in this course triggered such understanding and development of knowledge, because Hotpotatoes software requires teachers to actively get involved with design and manipulation of technology (e.g., finding and integrating audio-visual materials).

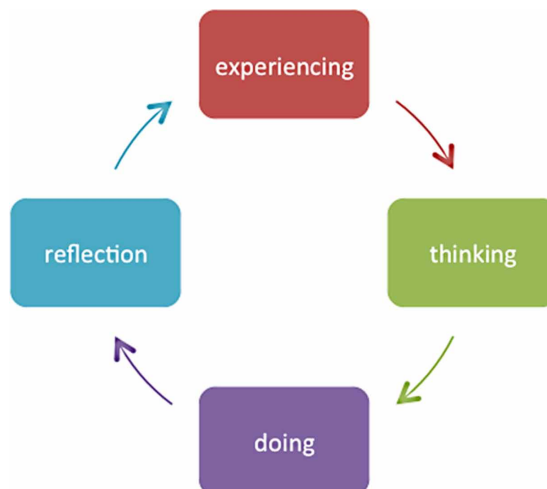
Contextual knowledge is an important knowledge domain that students demonstrate in their reflections, which includes two core elements: students and technology availability. It is evident that students' needs (students' level and interest) is an important element – in fact, because student teachers put emphasis on student's needs, this demonstrates their underlying pedagogical consideration being learner-centred. Knowing what students know and what they need to know is the basis of learner-centredness. Together with authenticity of the text, learner-focused approach is the core aspect of communicative language learning (Kramsch et al. 2000). It is important to notice that student teachers demonstrate critical and sufficient local knowledge about technology availability. Such knowledge is important as in the CALL integration literature, technology availability is constantly quoted as a key factor influencing how teachers use technology (e.g., Yang and Huang, 2008; Li and Walsh, 2011). One thing that should be kept in mind is that CALL knowledge cannot be separated from the general pedagogical content knowledge of the students. They are not two different sets of knowledge, but are complementary and may inform each other. The fact that the content analysis of reflections revealed student-centredness as a key issue is also dependent on the previous academic learning of these candidates. To be more specific, language teacher education curriculum in Turkey, in addition to many other local and contextual

educational and academic dynamics, may have had an impact on our findings too. Although we can clearly generalise many of the findings, other contexts should also be explored and different local belief and knowledge patterns of teacher candidates need to be investigated too.

Hubbard (2008) points out that one reason for the problem of teacher education in technology use is the lack of established methodology and insufficient infrastructure. What this study suggests is ‘experiential learning’ cycle where students can practise what theory says in real-life contexts (see Figure 2). Unlike Kolb’s experiential learning model, where the learner must possess and use analytical skills to conceptualize the experience and develop decision making and problem-solving skills in order to use the new ideas gained from the experience, this model consists of four important components – experiencing, thinking, doing and reflection. Students experience learning through technology (learning CALL module through technology) and in this process students observe how technology is used in their learning and think about the important elements in using technology as a learning tool. Then students develop some e-learning materials for a particular group of learners to meet their needs and implement their materials in teaching. Based on this practical work, students engage in critical reflection with support and dialogues with peers, which could become the new cycle of experience stage. As students encounter authentic problems and engage in group reflection, the knowledge development process thus is a context-based dialogic one. This model of learning equips student teachers with learner-centred pedagogy as student teachers tend to “select the tools to support their teaching and determine what CALL applications language learners are exposed to and how learners use them” (Hubbard 2008, 176).

One of the important implications of this study is that it suggests a new model for teacher training in CALL pedagogy: an experiential learning cycle with four core elements: experiencing, thinking, doing and reflecting. In teacher training, the focus should not only be placed on the theoretical aspect but student teachers need to be given opportunities to link the theory to practice, and subsequently engage in critical reflection. Such reflection should be in a dialogic manner with peers through peer evaluation and group reflection work. Second, as this study reveals, teacher knowledge development is a personal practical knowledge process, thus a context related and practice-oriented approach should be encouraged among all teachers to develop their own knowledge, even at very early stages of pre-service teacher education (e.g. Balaman & Sert, 2017). Third, it is interesting to see that knowledge domains are very closely related to factors contributing to decision-making, so perhaps it is useful to raise students’ awareness of linking their knowledge about discipline, pedagogy (instruction)

Figure 2. Experiential learning cycle



and context to the factors potentially influencing their implementation of ideas. This could further catalyse the personal practical knowledge development. Furthermore, pedagogical knowledge by and large stays at the instructional level, perhaps explicit CALL pedagogy should be incorporated in the training. A final implication is that although questionnaire based studies that try to reveal teacher beliefs and CALL knowledge can to some extent be helpful, categories emerging from student teachers' reflections proved to be an invaluable resource for us to understand the development of CALL knowledge. Student teachers' development of CALL knowledge requires teacher trainers' careful planning, guidance and particular focus on knowledge development.

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ENDNOTES

- ¹ The course syllabus can be downloaded at <https://sertolcay.wordpress.com/course-syllabus/>
- ² Available at <http://hotpot.uvic.ca/>
- ³ See the following link for a sample website prepared for this class <http://yunus.hacettepe.edu.tr/~aysenur.korkmaz12/aysenur/index.htm>
- ⁴ In order to establish intercoder reliability, 12 of the reflective writings (26% of the whole data) were randomly selected for coding by an independent researcher. Intercoder reliability ranged between 94% to 99% for each theme.

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