

# Factors Influencing Preservice EFL Teachers' Technology Integration Into Language Teaching

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**Abstract**—In the 21st century, preservice EFL teachers must be able to integrate technology into language education. However, very little research has been carried out on the specific factors that influence preservice teachers to integrate appropriate technology into their language teaching. This study aimed to explore exactly what influences preservice EFL teachers to choose the appropriate technology to incorporate into their lessons through a two-cycle design-based research study. The findings suggest that preservice EFL instructors' comprehension of language teaching methods and approaches has the greatest influence on technological integration in their classrooms. In addition, the instructor's direct guidance also facilitates their appropriate technology integration into language teaching. As a result, teacher education programs are designed to provide preservice EFL instructors with language teaching methods and approaches before assisting them in learning how to incorporate appropriate technology into specific language teaching methods or approaches. Finally, the researchers suggest that instructors also provide direct advice to preservice EFL teachers as they explore the incorporation of technology into language education.

**Index Terms**—technology integration, language teaching methods and approaches, guidance, preservice EFL teachers

## I. INTRODUCTION

The increasing availability of technology has fundamentally transformed the teaching and learning process nowadays (Akayoğlu et al., 2020; Mishra & Koehler, 2006; Koehler et al., 2014). Indeed, when used appropriately, it can not only enhance teaching and learning (Lee et al., 2014) but can also play a crucial role in modern foreign language education (Park & Son, 2022). As a result, there has been an increasing necessity for preservice teachers to be able to critically analyze instructional technologies in order to teach safely, intelligently, and productively using technology in the classroom. (Akayoğlu et al., 2020; Baran et al., 2019; Tondeur et al., 2012; Tondeur et al., 2018; Tondeur et al., 2020). Teacher education programs must provide preservice teachers with the technical skills and a deeper understanding of how to use technology in language teaching, as it is essential for today's language teachers to integrate appropriate technology into language teaching to foster learning opportunities for language learners (Akayoğlu et al., 2020; Gönen, 2019; Ranellucci et al., 2020).

Still, current research suggests that preservice teachers are struggling with integrating technology into teaching, and they still feel unprepared for technology integration, finding it challenging to identify appropriate technology to support teaching and learning in the classroom (Mouza, 2016; Ranellucci et al., 2020; Wang et al., 2018). Moreover, their frequent use of technology in class did not guarantee successful integration of technology for language learning and teaching purposes (Gönen, 2019). Therefore, there is a need to better understand what factors influence preservice teachers' ability to identify and use appropriate technology to support their language teaching (Park & Son, 2022).

## II. COMMUNICATIVE LANGUAGE TEACHING

The effectiveness of a pedagogical approach hinges significantly on its alignment with the specific teaching and learning situation, its objectives, and its learners (Hu, 2005; Wu & Wu, 2014). In an English as a Foreign Language (EFL) learning and teaching context, the classroom is the most important (and perhaps the only) place for students to learn the language (Li, 2016; Shu & Zhuang, 2008; Zhang, 2003). Thamarana (2015) suggests that Communicative Language Teaching (CLT) is one of the best approaches to teaching EFL. CLT is believed to be successful in elevating students' learning performance, especially in the field of EFL (Armnazi & Alakrash, 2021; Han, 2022). Moreover, Liao

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(2004) declares that CLT is best for China. In addition, Hammer (2016) suggests that learners of different ages have different needs, competencies, and cognitive skills. Considering the participants in this study are training to be junior high school EFL teachers, their pedagogical content knowledge (PCK) is confined to CLT.

CLT is essentially the fusion of grammatical and functional instruction (Richards & Rodgers, 2014). Littlewood (1981) and Wang (2006) also put forward the idea that paying systematic attention to functional as well as structural aspects of language is one of the most characteristic features of CLT. Liu (2000) also suggests that teaching students how to use the language is considered to be as important as learning the language itself (Liu, 2020). According to Littlewood (1981), as shown in Table 1, CLT classroom activities in EFL learning include pre-communicative activities of structural activities and quasi-communicative activities, as well as communicative activities of functional communication activities and social interaction activities.

TABLE 1  
CLT ACTIVITIES IN EFL LEARNING

CLT Activities	
Pre-Communicative Activities	Structural Activities
	Quasi-Communicative Activities
Communicative Activities	Functional Communication Activities
	Social Interaction Activities

In structural activities, the teacher has an overt teaching of language items so that students are able to perceive and understand them. Quasi-communicative activities take account of communicative and structural facts about language (Littlewood, 1981). Furthermore, most of the learning exercises in the pre-communicative activities consist of various drills or question-and-answer practice. The teacher’s overall purpose is to prepare learners for later communicative activity with necessary linguistic items and essential links between language structures and meaning (Littlewood, 1981).

In functional communication activities, the teacher organizes the situation so that learners have to overcome an information gap or solve a problem. Instead of only asking and answering questions, learners can now use language for describing, suggesting, asking for clarification, helping each other, and so on. In social interaction activities, the teacher requires the students to go beyond what is necessary in simply “getting meaning across” in order to develop greater social acceptability in the language. It may also involve producing speech that is socially appropriate to specific situations and relationships (Littlewood, 1981).

### III. METHODOLOGY

#### A. Research Design

Design-based research (DBR) emerged in the early 21st century as a practical research methodology. It offers a promising means to bridge the gap between research and formal education practice and is characterized by its interventionist nature (Anderson & Shattuck, 2012; Hoadley & Campos, 2022). Therefore, the modified learning by design (mLBD) approach proposed in this DBR study was the intervention aiming to find out the factors influencing preservice EFL teachers’ appropriate technology integration into language teaching. The mLBD approach came from infusing six individual Synthesis of Qualitative Data (SQD) strategies, namely Role Models, Reflection, Instructional Design, Peer Collaboration, Authentic Experience, and Continuous Feedback (Tondeur et al., 2012; Tondeur et al., 2020) into the original learning by design (LBD) approach which is suggested in order to develop teachers’ technological pedagogical content knowledge (TPACK) through designing and redesigning curriculum materials (Koehler & Mishra, 2005a; Koehler & Mishra, 2005b; Koehler et al., 2007).

Design-based interventions are seldom executed flawlessly. There perpetually exists an opportunity for enhancements in design (Anderson & Shattuck, 2012; Hoadley & Campos, 2022). As a result, a two-cycle DBR study was chosen for this research to design, implement, evaluate, and refine the mLBD approach to discover what influences preservice EFL teachers in their integration of the appropriate technology into language teaching. The mLBD approach was implemented as part of an English Teaching Methods and Practice course taught by the researcher.

#### B. Participants

Participation in this study was completely voluntary, and informed consent was obtained before the outset of each DBR cycle. There were 27 participants in the first cycle and 29 participants in the second cycle. Both cohorts of participants enrolled in the aforementioned course that the researcher instructed. They were English education majors in China training to become junior high school English teachers and ranged in age from 19 to 22 years old. Prior to the beginning of the module, they had studied some foreign language teaching methods and approaches, including CLT, which was assumed to form their pedagogical content knowledge (PCK).

#### C. Data Sources

During the DBR study, triangulated data from audio recordings of group discussions, peer feedback, semi-structured interviews, video recordings of micro-teachings, participants’ reflection diary entries, and group lesson plans was collected. Content analysis and constant comparative analysis were used to analyze the data to find out what factors influenced the participants’ appropriate technology integration into language teaching.

## IV. FINDINGS

This study involves the use of technologies to facilitate CLT activities; therefore, in terms of the appropriateness of the technology, there were three criteria. First, the technology used must aim to facilitate CLT activities. Second, the technology used in CLT activities must be at an English level appropriate for targeted students. Third, the technology used in CLT activities must be context-appropriate for an EFL learning environment.

A. *Inappropriate Technology Integration in the First DBR Cycle*

In the first DBR cycle, each of the five participant groups made an effort to include technology in their micro-teachings. The technology they employed, however, supported their Presentation, Practice, and Production (PPP) model rather than their purported CLT.

One critical reason for the participants' inability to integrate appropriate technology into CLT to support students' meaningful communication was their superficial understanding of CLT. They misunderstood CLT as PPP. Group 3, for example, assumed their communicative function in their micro-teaching was sharing ideas on the advantages and disadvantages of printed books and e-books. They spent almost half of the time making presentations and controlled practice of the sentence pattern "It is/was + adjectives + (for somebody) + to do something" with the help of carefully crafted PowerPoint (PPT) slides and selected micro-lectures.



Figure 1. Carefully Crafted PPT Slide to Support Overt Teaching

As shown in Figure 1, Group 3 meticulously used different colors to present the different parts of the aforementioned sentence pattern. More specifically, they used light blue to present the formal subject of "It", green for the copula of "is (was)", orange for the adjectives, dark blue for "for somebody (sb.)", and purple for "to do something (sth.)". In this way, they helped students see and understand the different parts of the sentence pattern. As a result, the carefully designed PPT slide did support the teacher's presentation of the new sentence pattern.

After the presentation of the sentence pattern, a controlled practice followed with the help of pictures. As shown in Figure 2, the teacher first made a demonstration using "It is right (for us) to give seats to the elderly" to describe the left picture in Figure 2. Then, the teacher asked the students to describe the right picture using the newly learned sentence pattern. The pictures helped the students practice the sentence pattern in a controlled exercise.

As mentioned before, in CLT, the purpose of pre-communicative activities is to prepare learners for later communicative activities by providing them with the necessary linguistic items. However, in Group 3's micro-teaching, the students' acquired and repeated phrase patterns had no bearing on the subsequent "debate", which was supposed to provide chances for students to engage in meaningful conversation. In terms of technology, Group 3 did utilize an online timer to determine the speaking time for each debater, but this did not lead to any productive dialogue. The following debate excerpts demonstrate how each debater expressed their opinions in isolation, one after the other, without consulting one another. All of the debaters read their ostensibly prepared scripts without commenting or reacting to the previous debaters' ideas.

Debater 1: "Compared with e-books, paper books can be read and thought about over and over again. It's also convenient for us to take notes on paper books."

Debater 2: "Compared with paper books, e-books can save paper and reduce the number of trees cut down. It can protect the environment and be low-carbon."

Debater 3: I think paper books can help us concentrate our attention. Reading paper books can help us stop playing games and watching videos. (G3-IMT-DBR1)

Furthermore, despite the teacher's best efforts and nearly half of the micro-teaching time devoted to presenting and practicing the phrase pattern, as the aforementioned samples showed, the debaters' points had no bearing on the previously taught sentence pattern. In addition, the selected video played before the debate, as the following excerpts

showed, was too difficult for junior high school students in Grade 8.

E-books versus printed books: which is really better? Prepare for Round 1. Let's talk about the features. According to 68 percent of young adult readers with devices used for reading, a person can read in any light condition, adjust the text size, highlight text for later reference, store a lot of books on one device, and carry it anywhere. Books offer a physical aspect that an e-book does not. You can flip through its pages and directly write notes on the book itself, giving a more natural experience". (35 seconds, 87 words) (G3-IMT-DBR1)

As seen in the excerpt from the video, EFL students were given just 35 seconds to comprehend 87 words in a language they are just learning. Even more problematic, within this short period of 35 seconds, there were eight unfamiliar words and expressions noted (underlined in the excerpt above). As a result, this video was inappropriate for the English level as it failed to aptly match the students' English proficiency level.

Although the participants in the first DBR cycle used some technology to practice language items through controlled practice and introduce new language items, they neglected to equip their students with the language skills they would need for meaningful conversation in the future. Even more problematic, the technology was neither English-level appropriate nor communicative function appropriate. In a word, the technology they used failed to facilitate CLT and create opportunities for students to have meaningful communication.

### *B. Appropriate Technology Integration in the Second DBR Cycle*

In contrast to the first DBR cycle, all five groups of the second cohort of participants in the second DBR cycle displayed positive technology integration into language teaching. In particular, they used technology to help teach essential language items in a structural activity, to encourage students to practice previously learned words, to help teach phrases and sentence structures in a quasi-communicative question-and-answer session, and to close the knowledge gap so that students could engage in meaningful communication in the communicative activities. More importantly, the teaching and practice of linguistic items prepared students with the linguistic items needed to have meaningful communication in later functional and social interaction activities.

For instance, Group 2 prepared their students with the necessary linguistic resources for later meaningful communication based on their communicative function of describing something or asking somebody to describe something. To illustrate, in the beginning of their micro-teaching, they had a lesson on words, phrases, and sentence patterns such as "celebrate", "During the festival, people often do...", "fall on", "be a symbol of", and "It is one of + the + superlative degree + plural nouns" that can be used to describe the time and date, the activities, as well as the significance of festivals and events. Then, as the following excerpts show, Group 2 resourcefully practiced the learned linguistic items through asking and answering questions related to the text in a quasi-communicative activity.

T: "What is the text about?"

Ss: "Easter."

T: "Easter is an important festival in Western culture. We can use this sentence, "It is one of + the + superlative degree + plural nouns" to describe the festival. Who would like to describe the festival using this sentence pattern?"

S1: "It is one of the most important festivals in Western countries."

T: "There are many customs, especially for children. What do rabbits and eggs symbolize at Easter? Please use this phrase "by symbol of" to answer my question."

S2: "Rabbits and eggs are symbols of new life."

T: "When is Easter? Please use "depend on" and "fall on" to answer when Easter is."

S3: "The date depends on the Moon. But it always falls on a Sunday in March or April."

T and Ss: Easter does not...fall on the same day. It depends on... the Moon. (G2-IMT-DBR2)

The above excerpts showed that the newly learned two phrases "depend on" and "fall on" were not only used and practiced but also served to illustrate communicative facts. When the teacher asked when Easter is, one of the students responded to the teacher and answered the teacher's question using the newly learned language structures of "depend on" and "fall on". More importantly, in order to consolidate students' learning and communicate with more students, the teacher deliberately presented "depend on" and "fall on" in another way by saying "Easter does not" with a pause to wait for the students' response. Most students satisfactorily gave the response "fall on the same day". Similarly, the teacher said "It depends on" with a pause, and the students responded with "the Moon". In this way, not only did the language items get practiced, but they were also used in a more meaningful way. Moreover, during the process of question-and-answer, as shown in Figure 3, the teacher provided the newly learned language items in carefully crafted PPT slides and helped students answer questions in the quasi-communicative activity.

Compared to the aforementioned one-sentence description of the pictures in Group 3's controlled practice in the first DBR cycle, Group 2's question-and-answer process in the second DBR cycle created an opportunity for the students to recognize the communicative function as well as the structure of the linguistic items.

Furthermore, the aim of Group 2's teaching and practice in the question-and-answer portion was to prepare students with the necessary linguistic resources and a sense of linkage between linguistic structures and communicative function for later meaningful communication. Essentially, the learned language items were used in later authentic communication in the functional communication activity. Moreover, in order to create an information gap, Group 2 delivered three video clips to different group members within one group and asked them to watch them before class.

During class, the group members exchanged information and described what they watched. The following were some excerpts from the students' discussion and description of the Spring Festival based on the video clips watched before class.

S18: When is the Chinese New Year (another name for the Spring Festival)?

S23: Every year between late January and...

S22 (interrupting student 23): January and early February. Every year between January and early February. It depends on the Moon.

S19: Chinese New Year is a fresh start, is it?

S21: Yes, it is a symbol of...

S20 (interrupting student 21): a fresh start.

S21: A fresh start. And it falls on the New Moon that appears between January 21 and February 20.

S18: The Chinese also clean their houses and gardens.

S19: During the festival, people often...

S18 (interrupting student 23): Chinese people often clean their homes and gardens.

S22: How to celebrate it?

S19: We can... Family members and best friends can get together. (G4-FA-G2-MT2)

The excerpts showed that two-way, meaningful communication did happen. The students actively took part in describing the Spring Festival. A few students were sometimes in such a hurry to share ideas, and they interrupted the other student's description to give their own. Moreover, each of the six group members asked about or described the Spring Festival.

Most importantly, it is worth mentioning that meaningful communication was resourcefully supported by appropriate technology in the form of video clips. In order to achieve their communicative objective of asking for a description and describing something, they adeptly used video clips to create an information gap for the students. Specifically, they delivered three different video clips to different group members within each group via the online learning application. The three video clips were about what the Spring Festival is, when it is, and how to celebrate it. Each group had five to six group members, and one or two group members received the same video clip but had no idea of the other two video clips. Therefore, the three different video clips helped create the information gap for the students to have group communication. After group communication, each group member was supposed to have all of the available information from the three video clips and prepare to share this information with the whole class. In sum, the participants in the second DBR cycle used appropriate technology such as slideshows and video clips that supported students in having meaningful communication, a key characteristic of CLT.

### C. Factors Influencing Appropriate Technology Integration

The first cohort's poor technology integration and the second cohort's positive technology integration resulted from their different levels of CLT understanding and the instructor's different degree of guidance.

#### (a). Different Levels of CLT Understanding of Participants

As aforementioned, the first cohort of participants used technology to support their PPP model instead of their claimed CLT in the first DBR cycle. In contrast, the second cohort of participants in the second DBR cycle used appropriate technology to support their CLT. One of the reasons they did so was their different level of CLT understanding.

##### 1. The Superficial Understanding of CLT by the First Cohort of Participants

The participants in the first DBR cycle attempted to design CLT lessons and practice them. However, as shown in Table 2, they failed to identify proper communicative functions in their lesson plans. Since each group's micro-teaching was based on their respective lesson plan, they were supposed to implement CLT activities to achieve their targeted communicative functions in their micro-teachings. Nevertheless, three of the five groups forgot their assumed communicative functions in their practice of micro-teaching.

TABLE 2  
SEEMINGLY COMMUNICATIVE OBJECTIVES IN CYCLE ONE

Groups	Seemingly communicative functions listed in lesson plans	Seemingly communicative functions listed in micro-teachings
1	Report how people use the internet	None
2	Describe festivals and exchange information about different festivals	None
3	Share ideas on the advantages and disadvantages of printed books and e-books	Share ideas on the advantages and disadvantages of printed books and e-books
4	Express and share ideas	Express and share ideas
5	Share ideas on the advantages and disadvantages of the internet	None

Although only Groups 3 and 4 outlined their initially assumed communicative functions in their practice of micro-teaching, Group 3 limited their communicative function to sharing ideas on the advantages and disadvantages of

both printed books and e-books, which was confined to their specific given text. They did not care about how the students shared ideas about other events.

In the first DBR cycle, the participants used technology such as videos, the internet, and PowerPoint slides to support their presentation of new words, phrases, and sentence patterns along with controlled practice; still, no group recognized that the underlying objective of this technology-supported presentation and practice was to equip students with the necessary linguistic items for later communication. In other words, they had no understanding of systematic attention concerning the structural and functional aspects of language—a key characteristic of CLT. Their lessons were more like a PPP model than a CLT lesson, though they claimed their lessons were CLT lessons. Consequently, their use of technology failed to support CLT activities. The following excerpts from Group 2’s discussion on their iterative lesson plan displayed that they had a misunderstanding about meaningful communication.

P7: Perhaps we could have the students start with doing the exercises and then have them discuss and share their answers afterward.

P11: Right, sharing their answers.

P8: Also, when the teacher asked the students to answer the questions, a form of authentic communication happened.

P10: Agreed.

P9: Answering the questions was meaningful communication between the teacher and the students.

(G2-D1-ILP-DBR1)

The above discussion showed that Group 2 misunderstood what meaningful communication was. They thought the one-way ask-and-answer questions that happened in controlled practice were a kind of meaningful communication between the teacher and the students. With this misunderstanding, it was very hard for them to use technology to create opportunities for meaningful communication between students.

As aforementioned, only Group 4 listed the proper communicative function of expressing and sharing ideas in their micro-teaching. However, they just listed. They mistook generalizing the main idea of a specific text as a general expressing and sharing of ideas. The following excerpt from their discussion on redesigning their micro-teaching demonstrated this:

P20: Then, what is our communicative objective?

P21: Generalize the main idea.

P23: Yes. Stating the main idea of the text.

P22: We can ask students to discuss the main idea of the text.

P24: One student may answer “The Internet”. Another student may answer “Love”. Then we can combine their answers. This is a kind of discussion. (G4-D-IMT-DBR1)

In the iterative micro-teaching, the teacher did say that she would give students 3 minutes to discuss the main idea of the text in pairs. However, it was only after 35 seconds that the teacher declared the time was up and asked students to share their ideas. Undoubtedly, 35 seconds was too short for the students to have any real, meaningful communication, so it did not happen at all.

Clearly, the first cohort of participants not only failed to set up their targeted communicative functions but also misunderstood what meaningful communication was. In addition, they did not have the forethought to prepare students with the necessary linguistic items for later meaningful communication. Even worse, as also mentioned previously, the first cohort of participants did not implement CLT activities but rather a PPP model in their practice of micro-teaching. There was no mention of using technology to support CLT activities and create opportunities for meaningful communication between the students. In short, the first cohort of participants had a very superficial understanding of CLT.

## 2. The Deeper Understanding of CLT by the Second Cohort of Participants

In contrast to the first cohort’s superficial understanding of CLT in the first DBR cycle, the second cohort in the second DBR cycle had a deeper understanding of CLT. As shown in Table 3, each of the five groups of participants identified their targeted communicative functions in both their CLT lesson plans and micro-teachings.

TABLE 3  
TARGETED COMMUNICATIVE FUNCTION

Groups	Targeted Communicative Functions in Lesson Plans	Targeted Communicative Functions in Micro-teachings
1	Understand messages or descriptions as well as describe sth or sb.	Understand messages or descriptions as well as describe sth or sb.
2	Ask for a description of something and describe something	Ask for a description of something and describe something
3	Argue or debate	Argue or debate
4	Discuss possibilities, probabilities, or capabilities of doing something	Discuss possibilities, probabilities, or capabilities of doing something
5	Indicating agreement or disagreement	Indicating agreement or disagreement

The participants engaged in pre-communicative activities to provide their students with the language resources needed for meaningful communication in the targeted communicative function later on in the communicative activity.

In addition, they set up their respective targeted communicative functions.

Please read the following prompt:

Do the former structural activities and quasi-communicative activities prepare students for later meaningful communications in functional communication activities and social interaction activities? If yes, please illustrate how they prepare the students for meaningful communication with specific examples. If no, please explain why not and how to improve it.

As shown in the following excerpt from one of the participant's responses to the above reflection prompt, the participant's full awareness that the aim of the pre-communicative activities was to equip students with linguistic items for later authentic communication is clear. Furthermore, it also demonstrated that they paid systematic attention to functional as well as structural language aspects in their teaching.

The main communicative objective of our lesson was to indicate agreement and disagreement. In the structural activity, we explicitly taught words and phrases such as "advantages", "disadvantages", "cause", "properly", "I'm afraid I can't agree", and "As far as I am concerned". These expressions were aimed at indicating agreement and disagreement. Subsequently, during the quasi-communicative activity, we tasked the students with employing the aforementioned vocabulary to respond to questions. This process was designed to help them gain proficiency in using the previously learned expressions and to prepare them for more meaningful communication in later activities. Transitioning to a functional activity, students were prompted to apply the previously learned and practiced vocabulary to convey agreement and disagreement concerning primary school students spending 1.5 hours on the internet each day. (P24-G5-RDE4-DBR2)

The participant mentioned their targeted communicative function at first. This evidently proved that they kept their communicative function in mind in the whole process of designing and implementing each CLT activity, which demonstrated their complete understanding of CLT. To be more specific, they had full awareness that the aim of their teaching the structural activity was to prepare students with the necessary linguistic resources for their targeted communicative function of indicating agreement and disagreement. In the quasi-communicative activity that followed, the newly learned language items were practiced for later meaningful communication on the subject of indicating agreement and disagreement with the fact that primary school students' spend 1.5 hours on the internet each day.

#### (b). *Instructor's Different Degree of Guidance*

Based on the findings of the first DBR cycle, the instructor conducted after-class seminars, provided discussion and feedback guidelines, and improved the original general and abroad prompts on reflection diary entries into specific and detailed ones in the second DBR cycle.

##### 1. *Just-in-Time and Targeted After-Class Seminars*

During the first DBR cycle, the instructor's feedback on the participants' presented lesson plans and practice of micro-teaching was contained within the 1.5 hour classroom sessions during the allotted seven weeks. It was assumed these sessions would be adequate in guiding participants to effectively integrate technology into CLT activities. However, the findings of the first DBR cycle showed that it was far from enough. Different groups had different issues, and it was difficult for the instructor to conduct targeted and detailed feedback on each group's issues regarding their understanding of CLT and their technology integration into CLT activities within the limited 1.5-hour class session. Regarding this, in the second DBR cycle, the instructor organized just-in-time and targeted after-class seminars and provided targeted and specific feedback to different problems and questions of different participants in terms of CLT activities and technology integration into CLT activities.

For instance, in the initial lesson plan, Groups 2, 3, and 5 confined their communicative functions solely to the context of their respective lessons. For example, Group 2's communicative function centered around asking for a description of festivals as well as describing festivals, which clearly lacked broader real-world applicability. Interestingly, despite this limitation, none of the participants explicitly raised this concern in their feedback during the class session. However, due to time constraints within the class, the opportunity to thoroughly deliberate and identify suitable communicative objectives for these specific groups was restricted. Notably, these communicative functions stood as pivotal pillars underpinning all CLT activities. As a remedial measure, the instructor conducted targeted and timely seminars for each of these three groups after the class to help them understand what communicative functions should be and how to identify their targeted communicative functions. As a result, Group 2 modified their communicative objective by asking for a description of something and describing something.

##### 2. *Directed Feedback, Discussions, and Reflections*

In the first DBR cycle, as the following excerpts demonstrated, the participants' feedback and discussions on designing and redesigning their lesson plans and micro-teachings failed to focus on CLT activities and technology integration into CLT activities.

In the PPT slides, it was very good that they used different colors to highlight different parts of the sentence pattern. It was helpful for the students to master the sentence pattern. The teacher's intonation and pronunciation were very good. The speed was also not too fast or too slow. In addition, it was very good and helpful that the students were first required to find out the sentence pattern by themselves and then watched a

related video to consolidate their mastery of the sentence pattern. As to the shortcomings, there were so many words on the PPT slide of the learning objectives. (P6-G2-G3-IMT-F)

The above excerpts came from Group 1's feedback on Group 3's practice of micro-teaching. In the feedback, they mentioned the advantages of using different colors to indicate different parts of the sentence pattern, the teacher's intonation, pronunciation, speed of speaking English, and even the design of PPT slides. In other words, the feedback did not focus on the supposed CLT activities and technology integration; rather, they talked about whatever came to mind.

In order to direct participants to focus on CLT activities and technology integration, the instructor provided the following discussion and feedback guidelines in the second DBR cycle:

In the process of providing feedback, as well as a group discussion on designing and redesigning lesson plans and micro-teachings, the following points must be kept in mind:

- Did the group set their targeted communicative function? If yes, what is it? If no, what should it be?
- Did the structural activities and quasi-communicative activities really prepare the learners for later communication in functional activities and social interaction activities? If yes, how? If no, how can it be redesigned to prepare learners in pre-communicative activities for later communicative activities?
- Did meaningful communication happen in the class? If yes, where and how? If no, how can it be redesigned to create meaningful communication?
- Were the technologies used in CLT activities English-level (speed, vocabulary, topic, etc.) appropriate, context appropriate, and communicative-function appropriate for the targeted students?

The above guidelines reminded the second cohort of participants that communicative function should be the first thing to consider. In addition, it also alerted the participants to the aim of pre-communicative, structural, and quasi-communicative activities which was to prepare students for later meaningful communication. Moreover, they must keep in mind that the technologies used must be appropriate in terms of English level, learning context, and a targeted communicative function.

As a result, the following excerpts from Group 1's discussion on redesigning their micro-teaching imply that the second cohort of participants' discussion and feedback focused on CLT and technology integration in CLT activities in the second DBR cycle.

P1: So, how can we effectively incorporate technology?

P2: We proposed that students spend 30 minutes surfing the internet the night prior to the class.

P3: The following day, the teacher prompts each student to share their internet activity from the previous night.

P4: This is where meaningful communication would come into play. (G1-D-IMT-DBR2)

The above excerpts showed that Group 1 focused their discussion on using technologies to support CLT activities and created opportunities for students to have meaningful communication.

In addition, the original broad guidelines for reflection diary entries were improved and made into specific and detailed guidelines. For instance, the original "How do you understand technology integration into CLT activities now?" was changed into "How do you understand technology integration into CLT activities to support students' meaningful communication now? Please illustrate with specific examples." With the requirement of illustration with specific examples in the second DBR cycle, the participants had to reflect on their understanding of CLT and review the appropriateness of the use of technologies within their reflection diary entries. As the following excerpts demonstrate, the detailed and specific guidelines for their reflection diaries helped them have a deeper understanding of CLT and technology integration.

During the process of reflection, we consider and come up with ideas beyond what we learned in the previous classes. How can we better modify and enhance our lesson plan and micro-teaching? In that sense, for instance, in the CLT activities, we carefully consider how to reflect and improve our CLT activities more effectively during the process of reflection. And in this way, I think I have had a deeper understanding of CLT and know how to better use appropriate technologies to support CLT activities (P8-G2-Post-I-DBR2).

As participant 8 articulated, they would carefully consider and reflect on how to improve their activities in their process of writing reflection diary entries. Through careful reflection, they gained a deeper understanding of CLT as well as the integration of technology into CLT activities.

## V. DISCUSSION

The findings of the first and second DBR cycles demonstrated that a deeper understanding of PCK plays a pivotal role in preservice teachers' appropriate technology integration into language teaching. The inappropriate integration of technology in the first DBR cycle proved Gönen's (2019) suggestion that teachers' frequent use of technology in and out of the classroom does not guarantee successful integration of technology for language teaching purposes (Gönen, 2019). The participants' purpose in this study was to use technology to support CLT activities and create opportunities for students' meaningful communication in English in their respective targeted communicative functions. However, the first cohort of participants in the first DBR cycle only used technology to support their presentation of language structures and controlled practice. Even worse, the language structures presented and practiced had little relation to later supposed communication, while CLT requires former activities to prepare students with the necessary linguistic

resources for later communication. Therefore, the micro-teachings demonstrated in the first DBR cycle were more like a PPP model than a CLT one. Consequently, the participants' superficial understanding of the language teaching approach CLT resulted in their failure to use technology to support students' meaningful communication. As a result, a deeper understanding of language teaching methods and approaches underpins appropriate technology integration into language teaching. This finding is also in agreement with Pamuk's (2012) suggestion that technology can be effective and support learning only if it is meaningfully integrated into teaching. Therefore, teachers must make it a priority to acquire PCK before integrating technology (Pamuk, 2012). Similarly, Farjon, Smits, and Voogt (2019) also claim that technology integration is more than just merging technology into teaching. In order to integrate technology successfully, teachers need to be skilled and well-prepared regarding their PCK (Raygan & Moradkhani, 2020).

The findings of the first and second DBR cycles also implied that the instructor's directed guidance was very helpful for the participants' appropriate technology integration into language teaching. As preservice teachers have little teaching experience, they need additional guidance, in particular, to fully integrate appropriate technology into PCK during their design (Janssen, 2017; Janssen & Lazonder, 2016). As elaborated in the former section of the instructor's different degree of guidance, the second cohort of participants in the second DBR cycle did benefit a lot from the instructor's just-in-time and targeted after-class seminars as well as the instructor's directed guidance on their feedback, discussion, and reflection because careful guidance is helpful for preservice teachers to identify, integrate, and reflect on appropriate technologies to create more learning opportunities (Gönen, 2019). In contrast, the first cohort of participants in the first DBR cycle failed to focus on their PCK and technology integration into PCK because of the lack of the instructor's direct guidance. This finding is in alignment with the researchers' position that learners with little prior knowledge would benefit from the guidance offered during their learning journey (Akayoğlu et al., 2020; de Jong et al., 2023) since preservice teachers with little teaching experience have difficulty integrating appropriate technology into teaching in pedagogically meaningful ways (Valtonen et al., 2019).

## VI. CONCLUSION

There are obvious limitations to this study as the participants' PCK is just confined to CLT as the participants were preservice teachers in an EFL context training to be junior high school English teachers. What the influencing factors are for in-service teachers as well as other subjects would bring fresh ideas for technology integration into PCK. Nevertheless, this study explored the process of preservice EFL teachers' discussion, identification, and usage of technology to support their language teaching through careful design-based research. The findings of the two DBR cycles indicate that teacher education programs are supposed to equip preservice EFL teachers with a solid PCK of language teaching methods and approaches first and then support them in learning how to integrate appropriate technology into language teaching. Moreover, as preservice teachers are novice learners with little teaching experience, the instructor should provide direct guidance in their process of exploring appropriate technology integration into their language teaching.

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