

# Development of Computer-Assisted Language Learning Literacy Framework for Foreign Language Teachers

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## **Abstract**

The burgeoning interest in integrating technology into language education has necessitated language teachers to enhance their competencies and literacies. Consequently, a pressing need arises for a framework tailored to meet teachers' evolving requirements. To address this imperative, I conducted two studies within two distinct teaching contexts. The first study, a phenomenological inquiry, entailed interviews with 12 foreign language teachers in Iranian higher education. Its objective was to delineate the principal components of the computer-assisted language learning (CALL) literacy framework along with its influential factors. Subsequently, the second study aimed to validate the emergent framework from the initial inquiry. This validation was accomplished by utilizing the Delphi method involving ten Persian language experts. The findings elucidated that CALL literacy manifests as a dynamic interplay between language literacy, teaching literacy, and digital literacy. Moreover, influential factors affecting teachers' CALL literacy were identified to encompass academic degrees and qualifications, cognitive abilities, communicative competence, intercultural competence, managerial competence, creativity, and cultural responsiveness. Importantly, these factors were observed to be intricately nested within the contextual milieu. The implications drawn from these findings extended to both language teachers and teacher educators, offering valuable insights into the cultivation and enhancement of CALL literacy within educational settings.

*Keywords:* Computer-assisted language learning (CALL) literacy framework, language teachers, CALL integration, TPACK model, phenomenological study, Delphi method

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## Background

In the 21st century, digitalization has become an intrinsic component of our social, political, economic, and pedagogical landscapes. From a language education perspective, the advancement of technology and its integration into the teaching of foreign languages have sparked considerable inquiry within language academia over the past decades (Son et al., 2024). This inquiry has precipitated the emergence of computer-assisted language learning (CALL) as a focal point (see Bax, 2003; Levy, 1997; Levy & Hubbard, 2005). As pivotal figures in the realm of language education, teachers have found themselves compelled to enhance their skill sets to align with technological advancements. This necessitates the acquisition of more critical new literacies, thereby enabling them to become more competent teachers.

The plethora of new literacies, including technoliteracy (Erben, 1999), multiliteracies (Gee, 1992), and electronic literacy (Warschauer, 1999), among others, transcend traditional reading and writing abilities. Many of these literacies exhibit overlap in their definitions. For the purpose of this study, the researcher adopted a specific conceptualization, using digital literacy to denote “the ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills” (Digital Literacy Task Force, 2013, p. 2).

A critical aspect often overlooked in discussions on digital literacy is the realization that merely incorporating technology into teaching practices does not inherently bring about transformative changes. In other words, the role of digital literacy in language education extends beyond the mere utilization of technology tools and devices; its essence lies in empowering language teachers to leverage technology effectively to fulfill students’ ultimate objectives, namely language learning. However, research in CALL has consistently highlighted a significant challenge faced by teachers: the lack of digital literacy (e.g., Anas et al., 2022; Bilki et al., 2023; Cote & Milliner, 2018; Dashtestani, 2019; Hazaea et al., 2021; Kohnke, 2021; Meskill et al., 2022). For instance, in a recent mixed-methods study conducted by Anas et al. (2022), 14 English language teachers in Indonesian higher education were investigated to discern their perspectives on enhancing their digital literacy. The findings from teachers’ self-evaluations and focus group interviews revealed disparities between what teachers know, think, and believe and their classroom practices. Researchers identified the lack of digital literacy as a primary obstacle hindering teachers’ growth regarding utilizing technology in their practices and professional development.

In addition to the challenges posed by the lack of digital literacy, language teachers have encountered a myriad of obstacles stemming from the intricacies of integrating CALL, particularly during COVID-19, when teachers were forced to teach online (Stickler, 2022), such as learners’ limited engagement, learners’ experience of anxiety and boredom, the provision of effective feedback to students, fostering meaningful communication and collaboration with students, assessment practices, managing and organizing classes, addressing teachers’ cognitive challenges, and the inadequacy of CALL teacher education and professional development initiatives (Bahari, 2023; Demir & Kayaoğlu, 2022; Ekmekçi, 2023; Jiang et al., 2022; Li, 2020; Tafazoli & Picard, 2023; Taghizadeh & Ejtehadi, 2023; Xu et al., 2021). These

challenges span various domains, including individual teacher factors, contextual factors, and CALL teacher education (see Hong, 2010).

A major obstacle is the limited engagement of learners. Taghizadeh and Ejtehad (2023) emphasize that numerous students encountered difficulties in staying engaged in online environments due to the absence of immediacy and personal connection found in face-to-face interactions. This lack of engagement frequently resulted in decreased participation, lower motivation, and ultimately, subpar learning outcomes. An additional critical concern pertains to the anxiety and boredom experienced by learners. For instance, Demir and Kayaoğlu's (2022) research revealed that the abrupt transition to online learning led to heightened levels of anxiety among students, mainly stemming from their unfamiliarity with digital platforms and the solitary nature of studying from home. Similarly, Jiang et al. (2022) observed that the repetitiveness of prolonged screen exposure contributed to feelings of boredom, ultimately reducing students' motivation and involvement in the learning process.

Providing effective feedback has presented a significant challenge in online learning. Ekmekçi (2023) highlighted that the synchronous nature of many online platforms has hindered timely and meaningful feedback, which is essential for student development. Without immediate feedback, students often struggle to correct errors and enhance their language skills effectively. Furthermore, fostering meaningful communication and collaboration in a virtual environment has proven to be difficult. Ekmekçi (2023) also noted that while online learning platforms offer various communication tools, they often fall short in replicating the natural interactions of physical classrooms. This lack of real-time communication has impacted on the development of language proficiency, which relies on interactive and spontaneous exchanges.

Finally, the existing inadequacies in CALL teacher education and professional development initiatives have left many educators ill-prepared to address these challenges. According to Li (2020) and Tafazoli and Picard (2023), current teacher education programs inadequately cover the practical skills required to effectively incorporate technology into language teaching. This lack of training has further compounded the difficulties teachers face, as they often have to navigate new digital tools with minimal guidance or support.

In light of the above-mentioned real-world challenges faced by language teachers in integrating CALL, it becomes apparent that relying solely on digital literacy may not suffice for teachers to effectively navigate the complexities of today's digital landscape. Teachers need to equip themselves with a spectrum of literacies that enable them to comprehend and engage with emerging technology-based discourses in language education. Furthermore, the dynamic nature of technology underscores the need for continuous alignment between teachers' literacy development and evolving technological advancements, presenting a significant hurdle in the planning of teacher education initiatives. Hence, there arises a necessity for teachers to cultivate a new literacy – one that amalgamates digital literacy, language literacy, and language teaching methodologies literacy. This integrated literacy framework takes precedence over merely mastering the technical aspects of new technologies. Recognizing this demand, there has been a call for the development of a comprehensive framework for language teachers' professional development, one that enhances their literacy across the intersecting domains of technology, language proficiency, and teaching methodologies. This composite literacy is termed as CALL literacy, denoting the synergistic interplay between technology, language

proficiency, and teaching methodologies. Consequently, the objective of this study is to ascertain:

RQ1: What are the components of CALL literacy framework?

RQ2: What are the influential factors on the effective CALL literacy framework?

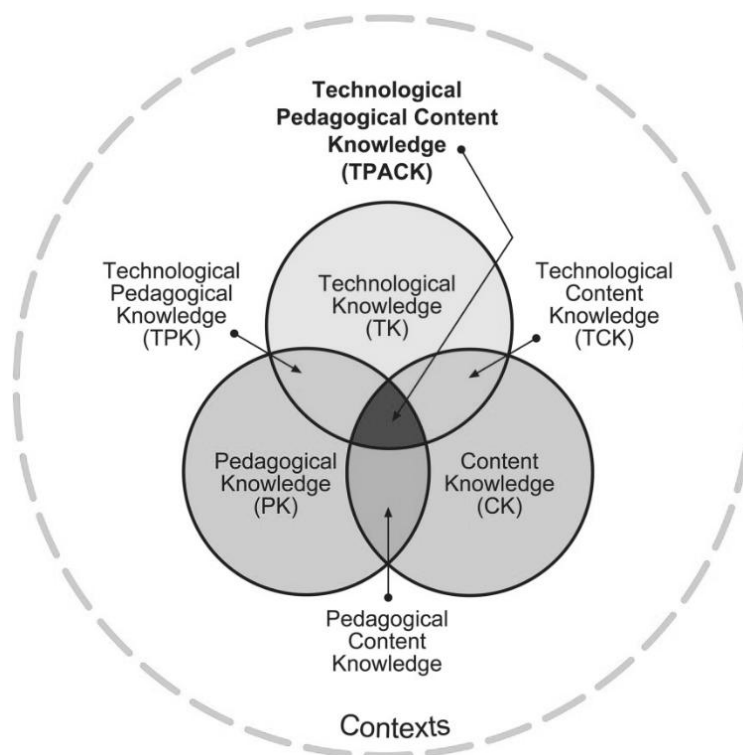
RQ3: To what extent can the emerged framework be applied in a different language context?

## Revisiting the TPACK Model: A Critical Perspective

The Technological Pedagogical Content Knowledge (TPACK) model (Mishra & Koehler, 2009) is a commonly used and influential framework in education, particularly in language education (e.g., Celik, 2023; Crosthwaite et al., 2023; Hu et al., 2023; Kohnke et al., 2024; Park & Son, 2022; Rienties et al., 2022; Schmid et al., 2020; Tafazoli & Meihami, 2023; Tseng et al., 2022). TPACK focuses on teachers' integration of technology and positions itself as an effective approach to subject and content teaching with technology (Koehler & Mishra, 2009). Figure 1 illustrates the TPACK framework and the interconnections between its three main components of knowledge.

**Figure 1**

*TPACK Framework (Adapted from <http://tpack.org>)*



The TPACK model comprises teachers' three primary knowledge domains: content knowledge (CK), pedagogical knowledge (PK), and technological knowledge (TK). Through their interconnections, these domains give rise to new knowledge constructs, namely pedagogical content knowledge (PCK), technological content knowledge (TCK), and technological pedagogical knowledge (TPK). Ultimately, the convergence of these interconnected knowledge domains culminates in the formation of TPACK, which is defined as the "knowledge that goes beyond all three core components" (Koehler & Mishra, 2009, p. 66). While Koehler and Mishra provided definitions for each knowledge domain, their use of general terms in descriptions has been identified as one of the principal pitfalls of the TPACK framework.

Content knowledge (CK), as defined by Koehler and Mishra (2009, p. 63), encompasses "teachers' knowledge about the subject matter to be learned or taught." This includes a breadth of understanding outlined by Shulman (1986), comprising concepts, theories, organizational frameworks, evidence, proof, and established practices in the field. However, while Koehler and Mishra proposed this model to be applicable across all disciplines, its broad and general definitions may not adequately capture the nuanced and diverse nature of language education. In the context of language education, the complexity of content knowledge is evident. Tsui (2011) offers a more refined definition tailored to second language teachers, describing it as "teachers' knowledge of the underlying systems of language (including phonological, lexical, grammatical, and discursal features of L2), and their meta-linguistic knowledge" (p.28). Furthermore, scholars like Borg (2015) and Andrews (2007) advocate for a focus on subject matter cognition rather than mere subject matter knowledge, emphasizing the involvement of teachers' beliefs and cognitive factors in their professional practice. Therefore, one significant drawback of integrating the TPACK model into language education lies in its lack of specificity regarding sub-components and implementation of the aforementioned knowledge. Additionally, the model developers, Punya Mishra and Matthew J. Koehler, have acknowledged that TPACK may face challenges in practical implementation within the classroom (see Brantley-Dias & Ertmer, 2013; Koehler et al., 2015).

Another significant weakness of the TPACK model is its oversight of the importance of teachers' culture and context (see Adam, 2015). The intricate relationship between language and culture is undeniable, with "language acts as a carrier of culture" (Wei, 2005, as cited in Tafazoli & Egan, 2022, p. 66). Numerous studies on the integration of CALL underscore the pivotal roles played by contextual and cultural factors in determining the successful adoption of technology by teachers (e.g., Caldwell, 2020; Dashtestani, 2014; Hong, 2010). For instance, Dashtestani's (2014) mixed-methods study involving 208 EFL teachers and 15 teacher educators in Iran revealed, through in-depth interviews and questionnaires, that besides teachers' lack of expertise, skills, and training, cultural resistance to the use of CALL materials emerges as a primary barrier to CALL integration. Similarly, Abbitt (2011) has criticized the TPACK model for its lack of clarity regarding the concept of context and has advocated for further revisions of the model to address this deficiency.

To revisit the TPACK model and develop a framework tailored to the genuine needs and challenges faced by language teachers, the researcher conducted two qualitative studies: 1) A phenomenological study was conducted with a cohort comprising 12 foreign language teachers specializing in English, French, German, and Arabic. The aim was to discern the

components of the CALL literacy framework and identify influential factors impacting CALL literacy development. 2) Subsequently, a Delphi method study was employed, involving ten TPSOL (Teaching Persian to Speakers of Other Languages) experts. This phase aimed to determine the extent to which the emerged CALL literacy framework could be adapted and implemented across diverse language teaching contexts.

## Methods

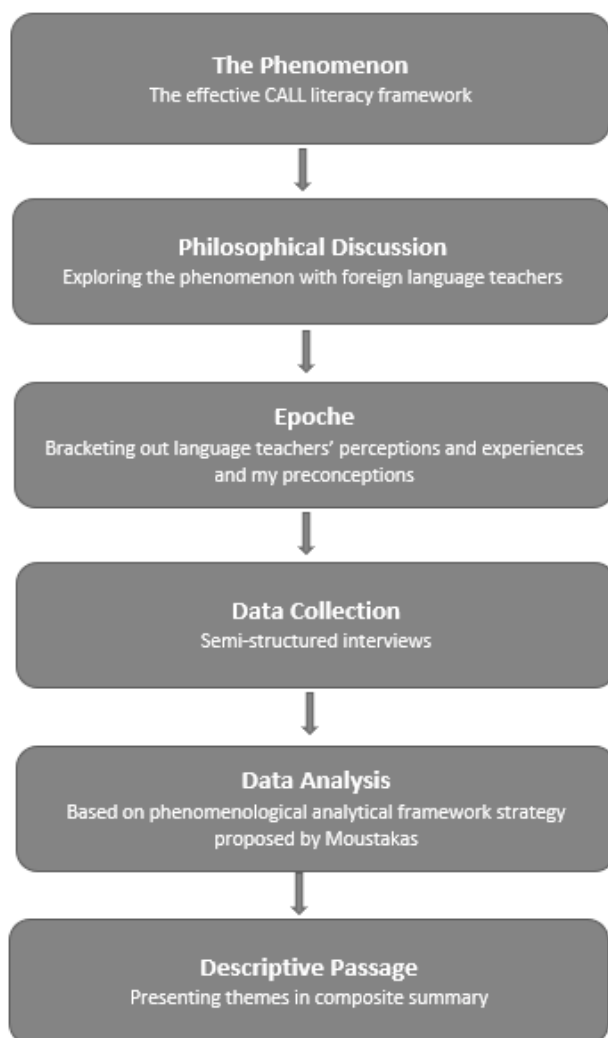
### *Study 1: Phenomenology*

#### Research Design

To address the phenomenon of multilayers of CALL literacy and establish an effective framework based on the foreign language teachers' lived experiences, I employed a phenomenological approach. Phenomenology is an appropriate approach to investigate and describe participants' lived experiences, particularly in understanding specific phenomena (Creswell, 2013). Figure 2 provides an overview of how I applied the phenomenological approach.

#### **Figure 2**

##### *Stages of the Study Based on Phenomenological Approach*



## Participants

The study received approval from The University of Newcastle's Human Research Ethics Committee (HERC), permitting the recruitment of eligible participants from a university in Iran. The selected university houses various foreign language departments, including English, German, French, Arabic, and Italian, within the Department of Foreign Languages. Participants were purposefully selected (Creswell, 2013), targeting faculty members and foreign language teachers with experience in both face-to-face and online teaching. A total of 12 foreign language teachers e-signed the consent forms and participated in the interviews. This number of participants is deemed acceptable in phenomenology, ensuring data saturation in qualitative research (Creswell, 2013). Table 1 provides an overview of the recruited participants' demographic information.

**Table 1**

### *The Participants' Demographic Information*

Name (Pseudonym)	Age	Gender	Academic Degree	Foreign Language	Teaching experience (Years)
Habib	51	Male	PhD	French	21
Javid	38	Male	MA	French	12
Sara	35	Female	MA	German	3
Reza	62	Male	PhD	English	22
Eli	54	Female	PhD	French	19
Kia	45	Male	PhD	English	9
Babak	40	Male	PhD	Arabic	10
Sama	37	Female	PhD student	English	3
Hamid	52	Male	MA	English	14
Mahsa	35	Female	PhD	German	7
Dina	44	Female	PhD	Arabic	8
Arad	30	Male	PhD student	English	3

## Data Collection

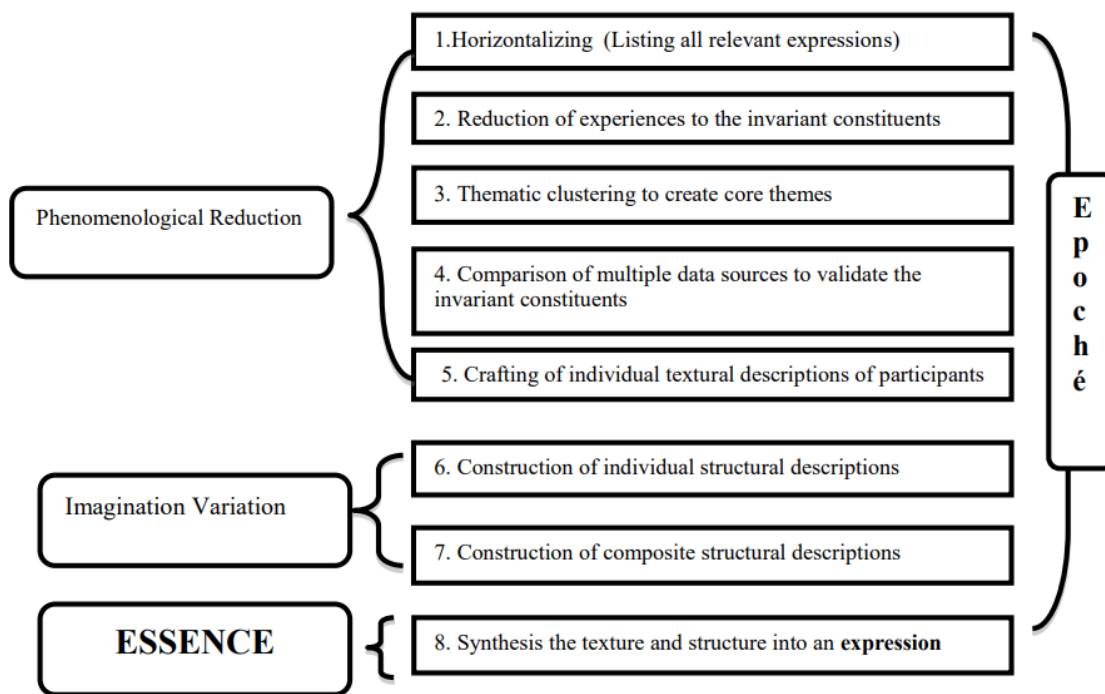
To comprehensively understand the complex lived experiences of foreign language teachers, an in-depth investigation was imperative. Therefore, I employed semi-structured interviews to elicit detailed, meticulous, and methodical descriptions of phenomena (Roulston, 2010). Open-ended questions were used to allow for thorough and free sharing of experiences (Moustakas, 1994). Due to COVID-19, the interviews were conducted remotely via Zoom and recorded with participants' consent. All of the interviews were conducted in the Persian language. Each session lasted between 45 to 60 minutes. My focus was on active listening, and follow-up questions were used to clarify any issues and gain deeper insights (Vagle, 2018).

## Data Analysis

In the data analysis phase of the study, I adhered to Yüksel and Yıldırım's (2015) steps of phenomenological analysis, which are grounded in Moustakas' (1994) phenomenological analytical framework strategy. Accordingly, I prepared the data, reduced them phenomenologically, engaged in imaginative variation, and finally disclosed the essence of the experience (Figure 3).

**Figure 3**

*The Steps of Data Analysis (Yüksel & Yıldırım, 2015, p.11)*



During the data preparation phase, I commenced by adopting the principles of ‘Epoché, setting aside any preconceptions or biases towards the phenomenon under investigation. Subsequently, in the initial step of phenomenological reduction (i.e., horizontalizing), I sifted through the data, omitting duplicate and irrelevant verbatims while retaining the horizons or textural meanings. Following this, I progressed to the second step, wherein I identified various sub-themes by clustering the horizons. Each sub-theme encapsulated a singular meaning derived from multiple horizons. Moving to the third step, I clustered the relevant sub-themes into cohesive “core themes of the experience” (Moustakas, 1994, p. 121). The fourth step involved comparing the emerging themes with existing literature to ensure their accuracy and transparent representation. Next, narratives were employed in the fifth step to elucidate the meaning units, enhancing their comprehensibility.

In the subsequent phase of imagination variation, I embarked on two key activities. Firstly, I constructed structures based on the textural descriptions and imaginative variation. Secondly, I integrated these structures into the end of each paragraph to formulate a structural description, aiding the comprehension of the phenomenon.

In the “essence” phase, I synthesized all narratives (i.e., textures and structures) into an expression representative of the collective experiences of the participants. This facilitated a

deeper understanding of the essence of the phenomenon based on lived experiences. The “findings” of the data analysis are presented in the subsequent section utilizing “verbal counting” (Sandelowski, 2001, p. 236). This approach involves using qualitative descriptors such as a few (less than 20%), some (21% to 50%), many (51% to 70%), the majority (71% to 90%), and most or almost all (91% to 100%) instead of providing specific numerical figures regarding participant response.

### ***Study 2: The Delphi Method***

#### Research Design

The third research question delves into the extent to which the emerged framework can be applied in diverse language contexts. For this phase of the research, a different approach was adopted to solicit the perspectives of experts in the field. Their wealth of experience and expertise was leveraged to validate the emerging framework from the literature review and teachers’ lived experiences in the first study. I selected the Delphi method for its dependability and systematic approach to gathering expert opinions (Linstone & Turoff, 1975). To overcome various COVID-19, time, and cost constraints, I utilized an online approach for enhanced communication. The Delphi method aligned perfectly with this phase of the study, enabling the researcher to shape policy, define terms, and make informed decisions by comprehensively understanding various perspectives and considerations related to implementing the framework (Nworie, 2011).

#### Research Context and Participants

The study is situated at an international TPSOL center in Iran, which is known for its extensive array of on-site and virtual TPSOL courses catering to language learners from diverse backgrounds. This institution has one of the largest TPSOL departments in Iran, consisting of dedicated academic and professional staff. There is no predetermined number of experts for the Delphi study. According to Hsu and Sandford (2007), to achieve a ‘representative pooling of judgments’ and ensure an adequate response rate, ten experts were deemed sufficient for the purpose of this study. Maintaining the anonymity of the experts was prioritized, with each panel member afforded an equal opportunity to share their opinions in a democratic and confidential environment, thus minimizing the influence of dominant members (Anastasio & Morgan, 1972). Experts were chosen through purposive sampling to ensure the panel comprised individuals with above-average knowledge of the issue (Helmer, 1966). The meticulous approach to panel selection also serves to safeguard the study against researcher bias. Details regarding the experts and their required qualifications are presented in Table 2.

**Table 2***Experts' Required Experiences*

Teacher	Researcher
- Had experience in teaching TPSOL	- Has conducted research related to educational technologies in TPSOL
- Had experience in using educational technologies in the classroom.	- Has authored publications in the area of educational technologies in TPSOL
Manager	Policymaker
- Had experience as a university- and institute-level administrator or manager	- Had experience or have a position in developing university/institute- or national-wide regulations for the use of educational technologies in TPSOL classrooms
- Had experience as a syllabus and curriculum designer in TPSOL	- Has participated in national-wide panels with a focus on educational technology implementations in TPSOL

In the final stage, ten experts were carefully selected to comprise the expert panel. Table 3 indicates the experts' demographic information.

**Table 3***Expert Panel's Demographic Information*

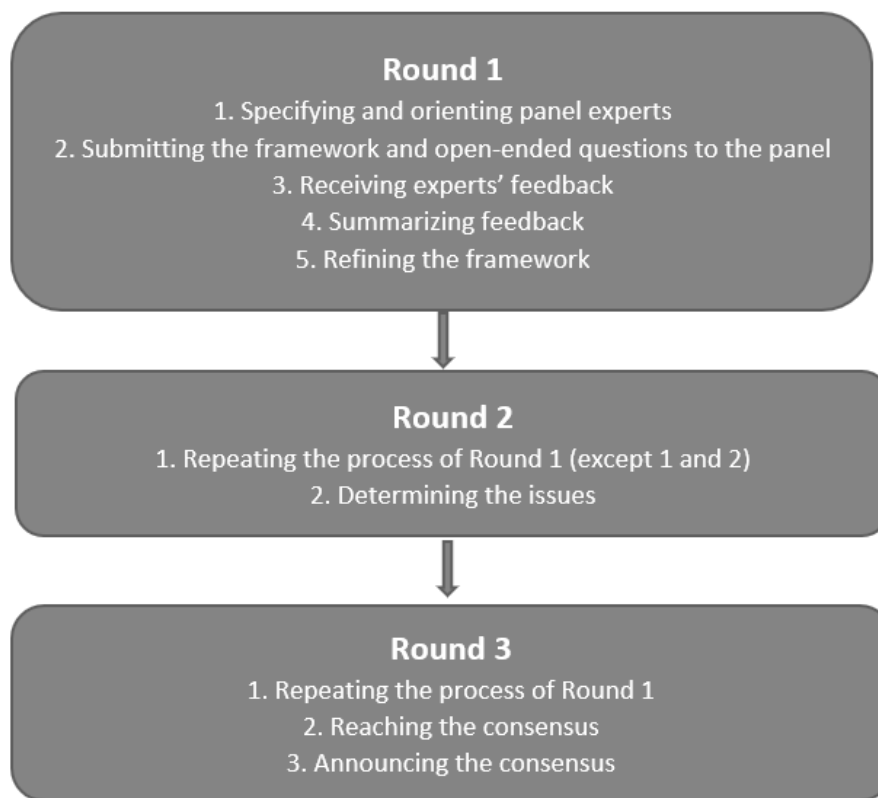
Name (Pseudonym)	Age	Gender	Academic Degree	Position
Kian	49	Male	PhD	Policymaker
Hafiz	53	Male	PhD	Policymaker
Yalda	38	Female	PhD	Manager
Omid	42	Male	PhD	Manager
Hiva	41	Female	PhD student	Researcher
Asoo	33	Female	PhD student	Researcher/teacher
Shervin	41	Male	MA	Teacher
Khodanoor	35	Male	PhD student	Teacher
Adel	29	Male	MA	Teacher
Peyman	32	Male	MA	Teacher

Procedure, Data Collection and Analysis

After assembling the panel of experts, I presented the developed CALL literacy framework to the panel along with a detailed explanation. Subsequently, I sought their input regarding the accountability and applicability of the framework in TPSOL. The data collection and analysis in the Delphi method were structured into three rounds: 1) soliciting opinions, 2) identifying key issues, and 3) managing opinions as guided by Keeney et al. (2001) (see Figure 4).

**Figure 4**

*Three Rounds of the Delphi Method for Study 2 (Inspired by Salkind, 2007)*



Following the identification and assignment of panel experts, a thorough briefing was conducted to ensure their familiarity with the research objectives. An open-ended questionnaire was then distributed in Persian, which requested their opinions and included demographic information. To ensure the questionnaire's reliability, feedback was obtained from two Education experts regarding its accountability and clarity, resulting in necessary edits. The open-ended questions within the questionnaire addressed the following key areas:

- Please explain which part of the framework lacked clarity.
- Please explain which part of the framework causes concern about applicability.

- Please explain how this framework is applicable in TPSOL.
- Please share if you have any other questions or concerns about this framework.

After receiving comments and responses, the framework underwent refinement and the refined version was submitted for the second round, during which the most significant modification took place. The meticulous consideration of responses by the inter-rater and myself ensured the interpretive validity. This same process from the first round was repeated for the second round. Finally, in the third round, consensus was announced. The findings of the two studies are presented in the next section.

## Findings

The findings of the study are categorized into three main sections: 1. Components of CALL literacy, 2. Influential factors on effective CALL literacy, and 3. Consolidation of experts' opinions.

### *Components of CALL Literacy*

According to data analysis, I identified three primary components: a) language literacy, b) teaching literacy, and c) digital literacy. However, it became apparent that it was challenging to delineate distinct boundaries between each component based on the teachers' lived experiences. Rather, teachers perceived CALL literacy as an integrated and comprehensive skill, wherein the integration of language literacy, teaching literacy, and digital literacy was inevitable. Consequently, during their discussions, the interconnection of these components emerged naturally. The only component that could be partially distinguished was language literacy, particularly concerning target language proficiency.

### Language Literacy/Proficiency

The study's findings revealed unanimous agreement among all participants regarding the crucial importance of target language proficiency for the success of foreign language teachers. Many teachers emphasized that possessing native-like speaking and pronunciation skills is essential to serve as a good role model for language learners. Arad illustrated this by stating that "*students perceive a good teacher as someone who speaks like Barack Obama.*" Similarly, Mahsa emphasized the expectation for teachers to have pronunciation similar to that in foreign language movies and series. In contrast, Reza suggested that being a non-native speaker might actually make one a better teacher, emphasizing the importance of proficiency levels ranging from B2 to C2 across all language skills. Additionally, Hamid shared a significant anecdote from an Applied Linguistics conference, where students prioritized the speaker's pronunciation over his expertise, highlighting the weight placed on language proficiency by learners.

The sub-theme of *knowing the subject* exhibited significant overlap with language literacy, making it challenging to differentiate between the two. For example, while grammar is considered a language skill, a few teachers referenced it as a subject matter that a teacher must master. Mahsa exemplified this, expressing the need to improve her proficiency in German grammar, which is crucial for effective language instruction.

### Teaching Literacy

Participants unanimously agreed on the multifaceted nature of a literate language teacher. Essential abilities and skills included lesson planning, assessing learning, understanding learners' needs, providing feedback, and managing the classroom effectively.

Regarding the importance of *lesson planning skill*, Kia highlighted the need for teachers to anticipate potential challenges and respond effectively with well-structured plans, especially in the face of technology glitches in online teaching. Dina expressed her struggle with sequencing and timing tasks within lesson plans, acknowledging the demanding nature of the job and lamenting instances where she felt her students' time was wasted due to inadequate planning. Javid showcased his strength in connecting various activities coherently to enhance student learning and learning strategies, referring to it as his "*superpower*" despite his experience, emphasizing the ongoing process of reflection on lesson plans.

The *ability to assess students' learning*, also known as 'assessment literacy,' was emphasized by the participants. Habib emphasized the necessity of accuracy in assessing language learners, noting that competence lies in precision, especially in evaluating students' online activities. Javid stressed the significance of understanding the differences between online and face-to-face teaching, emphasizing the need for teachers to be knowledgeable about online assessment principles and practices. Sara echoed this sentiment, underlining the essential skill of utilizing various online testing and assessment tools effectively.

Many teachers stressed the importance of *understanding learners' needs*. Babak emphasized selecting educational tools aligned with students' requirements. Sama highlighted the necessity of basing tools, materials, and tasks on learners' needs to avoid inefficiency. Kia noted the importance of aligning syllabi with students' 21st-century skills and the need for occasional modifications. Additionally, all teachers emphasized the critical role of *classroom management* in effective teaching. Eli admitted struggles with control in online teaching, feeling inadequate due to difficulties managing the setting and time. Reza echoed these challenges, expressing disbelief in establishing and maintaining discipline in online classes. In contrast, Sara viewed her ability to make appropriate decisions in challenging situations as a hallmark of effective teaching.

*Providing appropriate feedback* emerged as another essential skill for an efficient teacher. For example, Kia stressed the importance of analyzing students' errors and offering constructive feedback, highlighting it as essential for literate online teaching. Eli shared her approach to providing feedback on student writing, describing a process involving the use of Google Docs for peer corrective feedback, which she then reviewed and marked. Although some skills were mentioned less frequently, they are still worth mentioning. These include the ability and skill to "use inclusive materials and practices," "develop students' 21<sup>st</sup>-century skills," "facilitate effective interactions in the classroom," "motivate students," and "promote student autonomy."

### Digital Literacy

Concerning digital literacy, analysis of participants' responses revealed several keywords commonly cited, including digital tools, digital content, netiquette, and e-safety.

*Digital tools* are a top priority for language teachers, viewed from two primary perspectives: knowing how to use them effectively and selecting the most appropriate one for teaching purposes. Mahsa emphasized the need to master online tools and integrate them effectively into teaching, considering technical issues and content alignment. Habib expressed a desire to learn more about digital tools to enhance teaching effectiveness. Kia highlighted the challenge of selecting suitable tools amidst numerous options.

Foreign language teachers also underscored the importance of digital literacy by emphasizing the role of *digital content*. Sama stressed the efficiency of preparing digital content aligned with teaching strategies. Kia highlighted the evolving role of language teachers as content developers for online teaching. Hamid emphasized the need for teachers to assess the potential effectiveness and cultural appropriateness of digital content and tools. Teachers also emphasized the significance of *netiquette* and *e-safety* in ensuring a safe and respectful online teaching and learning environment. Babak emphasized adherence to online conduct rules and respectful communication. Arad stressed professionalism in online teaching, emphasizing politeness and professionalism. Eli highlighted the importance of respecting copyright rules. Dina emphasized e-safety, including protecting private information and promoting secure connections and antivirus use.

### ***Influential Factors on Effective CALL Literacy***

To gain a comprehensive understanding of effective CALL literacy for teachers, I also elucidated the influential factors based on foreign language teachers' interviews, including education and training, cognitive abilities, communicative competence, intercultural competence, managerial competence, creativity, and cultural responsiveness.

Almost all teachers stressed the eminence of relevant *education and training*. For instance, Reza emphasized the significance of holding academic degrees in foreign languages, noting its correlation with CALL literacy. Arad stressed the necessity of CALL training, especially for online teaching, even in the absence of formal coursework. Hamid emphasized the value of language qualifications such as CELTA, DELTA, and TESOL for training in online teaching.

Many teachers believe that CALL literacy and qualifications are intertwined with *cognitive abilities* and *communicative competence*. Kia emphasized the need for critical thinking, problem-solving, and planning skills in teaching through technology. Sama highlighted the importance of verbal and non-verbal communication strategies to engage students effectively. Javid recognized the significance of facial expressions and gestures in effective communication, particularly in speaking courses.

Culture was deemed a vital element in language education by some teachers, which referred to *intercultural competence* and *cultural responsiveness*. Hamid stressed the importance of cultural responsiveness in selecting appropriate materials and content, while Reza emphasized the need for cultural competency to prepare students for a multicultural setting. Dina highlighted the importance of building strong relationships with students from various ethnicities and incorporating their social and cultural values into teaching.

Finally, a few teachers focused on *managerial competence* and *creativity* as additional influential factors. Babak described teachers as managers with numerous responsibilities, including sourcing materials, time management, student encouragement, decision-making, and maintaining discipline. Mahsa emphasized creativity as essential for handling unforeseen challenges during online teaching, while Sara highlighted the need for spontaneity and adaptability in lesson planning and teaching methods.

### ***Consolidation of Experts' Opinions***

In Study 1, a preliminary version of the competence framework was developed. Each round of the Delphi method involved refining competencies that did not meet the consensus criteria based on feedback from the experts. After three rounds, the preliminary framework was enhanced and reinforced according to the experts' opinions. The final validated framework comprised nine competencies, organized into two main sections representing the knowledge domains of a competent CALL teacher, as illustrated in Figure 5. These competencies embody the objectives that all language teachers should aim to attain.

## Discussion

The objectives of this study were to determine the main components of the CALL literacy framework and its influential factors. Additionally, the study aimed to validate the framework that emerged from the first study through the Delphi method with Persian language experts.

The study's findings revealed that CALL literacy is the interplay between language literacy, teaching literacy, and digital literacy. However, it should be noted that CALL literacy should be considered as a whole, and distinguishing between the components is not advisable. Language literacy/proficiency is regarded as one of CALL literacy's main components, which is often overlooked in the CALL literature. This oversight may be due to the assumption that foreign language teachers inherently possess sufficient proficiency in the target language. I believe that due to the dynamicity of CALL literacy, each teacher from A1 to C2, according to the Common European Framework of Reference for Languages (Council of Europe, 2001), can benefit from CALL literacy; however, as the finding suggested, the more proficient teacher in the target language, the higher CALL literacy level he possesses.

Moreover, the study found that teachers considered subject knowledge to be intertwined with language literacy, further underscoring the complex nature of CALL literacy. This finding is particularly relevant in the context of non-native language teachers, challenging prevailing notions about the necessity of native-like language proficiency. While the CALL literature has been largely silent on this aspect, debates surrounding foreign language proficiency levels persist in applied linguistics and foreign language education. However, the adequate level of language proficiency, which is also called the threshold level (e.g., Richards, 2010), is still vague (see Tsang, 2017). This finding is in contrast with the vast majority of discussions about native-like mastery and speakerism (see Canagarajah, 1999; Holliday, 2006), in which researchers believe that foreign language teachers are not necessarily native speakers and there is no need to have native-like ability to be a good teacher (e.g., Richards, 2017).

As mentioned above, one of the critical insights from this study is the recognition of language literacy as a core component of CALL literacy. While the TPACK framework provides a broad definition of content knowledge (CK), this study delves into the specifics of language literacy, focusing on metalinguistic awareness, phonological, lexical and grammatical knowledge, and the effective teaching of these elements in diverse settings. Language literacy in CALL goes beyond mere subject matter knowledge, encompassing the complexities of second language acquisition theories, the sociolinguistic aspects of language teaching, and the adaptability of teaching methods across different linguistic and cultural backgrounds. This nuanced understanding is crucial for language educators, particularly in non-native language environments, where they face challenges that extend beyond content delivery. This aligns with the call for more tailored pedagogical approaches, as discussed by Tsui (2011) and Borg (2015).

Teaching literacy is another crucial component that shapes CALL literacy, encompassing various aspects, such as lesson planning, assessing learning, understanding learners' needs, providing appropriate feedback, managing the classroom, using inclusive materials and practices, developing students' 21st-century skills, making effective interactions

in the classroom, motivating the students, and boosting students' autonomy. These findings corroborate with previous studies in CALL, which emphasized the importance of lesson planning (e.g., Crosthwaite et al., 2023), assessing learning (e.g., Xu et al., 2021), understanding learners' needs (e.g., Gacs et al., 2020), providing appropriate feedback (e.g., Ekmekçi, 2023), managing the classroom (e.g., Demir & Kayaoğlu, 2022), developing students' 21st-century skills (e.g., Shadiev & Wang, 2022; Stickler et al., 2020), making effective interactions in the classroom (Demir & Kayaoğlu, 2022), motivating the students (Demir & Kayaoğlu, 2022), and boosting students' autonomy (Demir & Kayaoğlu, 2022; Jiang et al., 2022; Taghizadeh & Ejtehadi, 2023) for effective language teaching in technology-enhanced environments.

However, what is often overlooked in CALL studies is the necessity of using inclusive materials and practices which take into account students' diverse backgrounds and characteristics. This entails considering factors such as language and social background, cognitive, academic, and physical abilities, behaviors, disabilities, age, gender, race, ethnicity, religion, beliefs, and sexual orientation. While there are relatively few studies that focus specifically on inclusive CALL, to my best knowledge, only two journal articles on Massive Open Online Courses (Barcena et al., 2020; Read et al., 2021) and an edited book titled "Inclusive language education and digital technology" (Beltrán et al., 2013) give prominence to the significance of inclusive CALL materials and practices.

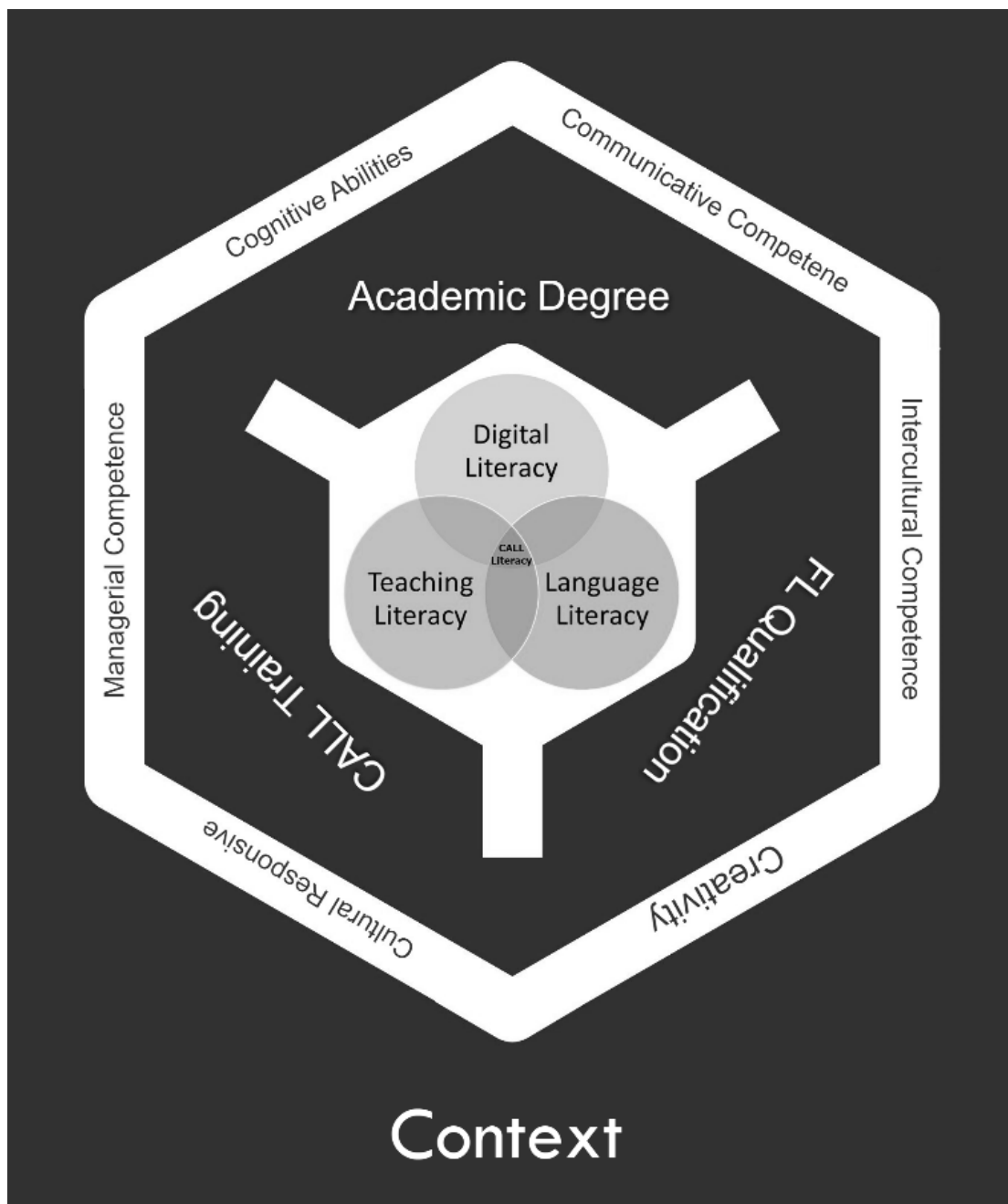
Teaching literacy within the CALL literacy framework goes beyond the general pedagogical knowledge (PK) in TPACK. This study emphasizes that teaching literacy includes specific competencies essential for language instruction, such as differentiated instruction, scaffolding, and fostering communicative competence. Importantly, this component also underscores the importance of inclusive teaching practices, acknowledging students' diverse backgrounds, including language, culture, cognitive abilities, and physical abilities. These inclusive practices are critical in language education, where student backgrounds can significantly influence learning outcomes.

Finally, the third component is digital literacy, encompassing proficiency in utilizing digital tools, creating digital content, adhering to netiquette, and ensuring e-safety. This finding underscored the crucial role of digital literacy for foreign language teachers in effectively integrating technology into their teaching practices. CALL teachers must possess the skills to utilize and select appropriate digital tools, sometimes even creating digital content themselves. Additionally, it is essential for them to adhere to netiquette guidelines and prioritize e-safety to uphold a safe and respectful atmosphere in the online environment. The importance of digital literacy highlighted in this study aligns with the views of CALL researchers who have identified a lack of digital literacy as a significant challenge for teachers in leveraging technology effectively (e.g., Anas et al., 2022; Cote & Milliner, 2018; Dashtestani, 2019; Hazaea et al., 2021). I believe that the importance of being a digitally literate teacher extends beyond the scope of teaching and provides opportunities for equitable access and participation in various CALL professional development initiatives worldwide. Teachers with high digital literacy would be able to develop their 21st-century skills through various channels. Figure 5 illustrates the main components of the CALL literacy framework and the influential factors on effective CALL literacy.

Digital literacy within the CALL literacy framework extends beyond mere technological knowledge (TK) as defined in TPACK. It encompasses not only proficiency in using digital tools but also the critical ability to select and evaluate digital resources, create pedagogically sound digital content, and uphold ethical standards in online environments, including netiquette and e-safety. The findings emphasize that digital literacy is not solely about technology use; it involves leveraging technology to enrich language learning, which demands a deep understanding of both the tools and the pedagogical strategies that best support language acquisition. This correlates with the broader literature that underscores the difficulties language teachers encounter in attaining digital literacy, essential for successful technology integration in language classrooms.

**Figure 5**

*CALL Literacy Framework*



Following the second research question and aiming to avoid oversimplification of the TPACK model, I delved into the influential factors shaping effective CALL literacy. As depicted in Figure 5, CALL literacy is influenced by various factors such as academic degrees (e.g., BA, MA, PhD), foreign language qualifications (e.g., TESOL, DELTA, CELTA), and participation in CALL training courses. These credentials and qualifications interact with cognitive abilities, communicative competence, intercultural competence, managerial

competence, creativity, and cultural responsiveness. All these abilities, skills, competencies, and literacies are nested in the context.

The finding disclosed that CALL teacher education and training are necessary for CALL teachers. However, consistent with prior research, language teachers expressed dissatisfaction with the availability and relevance of existing courses (e.g., Li, 2020). Additionally, limited attention has been given in the literature to the significance of academic degrees, foreign language qualifications, and CALL in the literature. Notably, among the identified influential factors, the importance of teachers' managerial competence has been overlooked in CALL studies and warrants further exploration. On the other hand, factors such as teachers' cognitive abilities (e.g., Bahari, 2023), communicative competence (e.g., Stockwell & Ito, 2023), intercultural competence (e.g., Wu, 2023), and cultural responsiveness teacher (e.g., Cheng et al., 2022) have received considerable attention within the CALL community, and researchers widely acknowledge their significance in effective language teaching and learning.

The study also acknowledged two notable limitations of the TPACK framework as outlined in the literature: the lack of specificity regarding sub-components and the omission of cultural and contextual factors. Through the development of the CALL literacy framework, this study offers a more comprehensive and refined comprehension of the knowledge domains crucial for language teachers.

Firstly, sub-components within each knowledge domain are explicitly detailed in this framework. For example, within digital literacy, the sub-components include not just the use of digital tools but also the creation of digital content and adherence to ethical standards. These sub-components are particularly relevant in language education, where the mere presence of technology does not guarantee successful learning outcomes. Instead, the effective integration of technology requires teachers to be both digitally literate and pedagogically competent in utilizing these tools to meet language learning objectives. This focus on sub-components addresses the critique that TPACK's broad definitions may not adequately capture the complexities of language teaching (Brantley-Dias & Ertmer, 2013; Koehler et al., 2015).

Secondly, the CALL literacy framework explicitly incorporates cultural and contextual factors as influential elements in effective language teaching. The study's findings highlight that language teaching cannot be divorced from the cultural context in which it occurs. This is particularly true in CALL, where the integration of technology into language teaching is often mediated by cultural attitudes toward technology, the language being taught, and the educational context (Dashtestani, 2014). The framework's emphasis on cultural responsiveness and intercultural competence ensures that language teachers are not only technically proficient but also culturally sensitive, which is essential for successful language education in diverse settings (Adam, 2015).

## Conclusion

The COVID-19 pandemic has accelerated the integration of technology in language education (Stickler & Emke, 2023), promoting increased interest among teachers in acquiring CALL literacy to enhance their effectiveness. Recognizing this demand, the study aimed to delineate the main components of CALL literacy among foreign language teachers based on their lived experiences.

The findings revealed that CALL literacy entails the interplay of language literacy, teaching literacy, and digital literacy, with influential factors including academic degrees and qualifications, cognitive abilities, communicative competence, intercultural competence, managerial competence, creativity, and cultural responsiveness—all contextualized within the teaching environment. This study holds significance for both teachers and teacher educators. For teachers, it offers insight into the essential literacies and competencies needed to enhance their proficiency as CALL instructors in both online and traditional classroom settings. For teacher educators, the findings serve as a practical guide for designing CALL teacher education and professional development courses, enabling them to tailor their instructional approaches to better meet the needs of pre-service and in-service language teachers.

While the study yields valuable insights into CALL literacy, it is essential to acknowledge its potential limitations. The framework developed for CALL literacy may be influenced by the specific context of foreign language teachers in Iran, warranting further investigation across diverse linguistic and cultural contexts. Additionally, employing a phenomenological approach limited the data collection to interviews with language teachers, suggesting the need for diverse data collection methods such as observation, demonstration, and recording to capture a broader spectrum of perspectives. Finally, future research endeavors should focus on validating the CALL literacy framework with teachers in specific foreign language contexts to delineate any potential variations.

## Conflicts of Interest Statement

The author declares no potential competing interests with respect to the research, authorship, and/or publication of this article.

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## References

- Abbitt, J. T. (2011). An investigation of the relationship between self-efficacy beliefs about technology integration and technological pedagogical content knowledge (TPACK) among pre-service teachers. *Journal of Digital Learning in Teacher Education*, 27(4), 134-143. <https://doi.org/10.1080/21532974.2011.10784670>
- Adam, A. (2015). *Understanding teacher educators' pedagogical and technological cultural habitus (PATCH): An ethnographic study in the Maldives*. [Doctoral dissertation, The University of Waikato, New Zealand]. <https://hdl.handle.net/10289/9552>
- Anas, I., Basri, M., & Musdariah, A. (2022). Digital language teacher professional development from a CALL perspective: Perceived knowledge and activeness in ECCR. *CALL-EJ*, 23(1), 1-21. <http://callej.org/journal/23-1/Anas-Basri-Musdariah2022.pdf>
- Anastasio, E. J., & Morgan, J. S. (1972). *Factors inhibiting the use of computers in instruction*. EDUCOM. <https://files.eric.ed.gov/fulltext/ED069219.pdf>
- Andrews, S. (2007). Researching and developing teacher language awareness. In J. Cummins & C. Davison (Eds.), *International handbook of English language teaching* (Vol. 15, pp. 945-959). Springer. [https://doi.org/10.1007/978-0-387-46301-8\\_63](https://doi.org/10.1007/978-0-387-46301-8_63)
- Bahari, A. (2023). Challenges and affordances of cognitive load management in technology-assisted language learning: A systematic review. *International Journal of Human-Computer Interaction*, 39(1), 85-100. <https://doi.org/10.1080/10447318.2021.2019957>
- Barcena, E., Read, T., & Sedano, B. (2020). An approximation to inclusive language in LMOOCs based on appraisal theory. *Open Linguistics*, 6, 38-67. <https://doi.org/10.1515/opli-2020-0003>
- Bax, S. (2003). CALL - past, present and future. *System*, 31(1), 13-28. [http://dx.doi.org/10.1016/S0346-251X\(02\)00071-4](http://dx.doi.org/10.1016/S0346-251X(02)00071-4)
- Beltrán, E. V., Abbott, C., & Jones, J. (Eds.) (2013). *Inclusive language education and digital technology*. Multilingual Matters.
- Bilki, Z., Satar, M., & Sak, M. (2023). Critical digital literacy in virtual exchange for ELT teacher education: An interpretivist methodology. *ReCALL*, 35(1), 58-73. <https://doi.org/10.1017/S095834402200009X>
- Borg, S. (2015). *Teacher cognition and language education: Research and practice*. Bloomsbury.
- Brantley-Dias, L., & Ertmer, P. A. (2013). Goldilocks and TPACK: Is the construct 'just right?' *Journal of Research on Technology in Education*, 46(2), 103-128. <http://dx.doi.org/10.1080/15391523.2013.10782615>

- Caldwell, M. (2020). An investigation into the perceptions of Japanese university educators on the use of ICT in an EFL tertiary setting. *CALL-EJ*, 21(2), 1-16. [http://callej.org/journal/21-2/Caldwell\\_2020.pdf](http://callej.org/journal/21-2/Caldwell_2020.pdf)
- Canagarajah, A. S. (1999). Interrogating the native speaker fallacy: Non-linguistic roots, non-pedagogical results. In G. Braine (Ed.), *Non-native educators in English language teaching* (pp. 77–92). Lawrence Erlbaum.
- Celik, I. (2023). Towards Intelligent-TPACK: An empirical study on teachers' professional knowledge to ethically integrate artificial intelligence (AI)-based tools into education. *Computers in Human Behavior*, 138. 107468. <https://doi.org/10.1016/j.chb.2022.107468>
- Cheng, M-M., Chuang, H-H., & Smith, T. J. (2022). The role of teacher technology experiences and school technology interactivity in teachers' culturally responsive teaching. *Computers in the Schools*, 39(2), 163-185. <https://doi.org/10.1080/07380569.2022.2071231>
- Cote, T., & Milliner, B. (2018). A survey of EFL teachers' digital literacy: A report from a Japanese university. *Teaching English with Technology*, 18(4), 71-89. <https://files.eric.ed.gov/fulltext/EJ1195805.pdf>
- Council of Europe. (2001). *Common European Framework of Reference for Languages: Learning, Teaching, Assessment*. Cambridge University Press.
- Creswell, J. W. (2013). *Qualitative inquiry & research design: Choosing among five approaches* (3<sup>rd</sup> ed.). SAGE.
- Crosthwaite, P., Luciana, & Wijaya, D. (2023). Exploring language teachers' lesson planning for corpus-based language teaching: A focus on developing TPACK for corpora and DDL. *Computer Assisted Language Learning*, 36(7), 1392-1420. <https://doi.org/10.1080/09588221.2021.1995001>
- Dashtestani, R. (2014). EFL teachers' knowledge of the use and development of computer-assisted language learning (CALL) materials. *Teaching English with Technology*, 14(2), 3-27. <https://files.eric.ed.gov/fulltext/EJ1143473.pdf>
- Dashtestani, R. (2019). English for academic purposes instructors' use and acceptance of technology in EAP courses. *CALL-EJ*, 20(1), 115-134. <http://callej.org/journal/20-1/Dashtestani2019.pdf>
- Dashtestani, R., & Hojatpanah, S. (2022). Digital literacy of EFL students in a junior high school in Iran: Voices of teachers, students and Ministry directors. *Computer Assisted Language Learning*, 35(4), 635-665. <https://doi.org/10.1080/09588221.2020.1744664>
- Demir, N., & Kayaoğlu, M. N. (2022). Multi-dimensional foreign language education: The case of an eTwinning project in Turkey. *Computer Assisted Language Learning*, 35(9), 2201-2238. <https://doi.org/10.1080/09588221.2020.1871027>

- Digital Literacy Task Force. (2013). *Digital literacy, libraries, and public policy*. Report of the Office of Information Technology Policy's Digital Literacy Task Force. [https://alair.ala.org/bitstream/handle/11213/16261/2012\\_OITP\\_digilitreport\\_1\\_22\\_13\\_Marijke%20Visser.pdf?sequence=1&isAllowed=y](https://alair.ala.org/bitstream/handle/11213/16261/2012_OITP_digilitreport_1_22_13_Marijke%20Visser.pdf?sequence=1&isAllowed=y)
- Ekmekçi, E. (2023). Pursuing a standardized content of a CALL course for pre-service EFL teachers: the procedure, impacts, and reflections. *Computer Assisted Language Learning*, 36(5-6), 1005-1039. <https://doi.org/10.1080/09588221.2021.1968913>
- Erben, T. (1999). Constructing learning in a virtual immersion bath: LOTE teacher education through audiographics. In R. Debski & M. Levy (Eds.), *WORLDCALL: Global perspectives on computer-assisted language learning* (pp. 229–248). Swets & Zeitlinger.
- Gacs, A., Goertler, S., & Spasova, S. (2020). Planned online language education versus crisis-prompted online language teaching: Lessons for the future. *Foreign Language Annals*, 53(2), 380-392. <https://doi.org/10.1111/flan.12460>
- Gee, J. (1992). *The social mind: Language, ideology, and social practice*. Bergin and Garvey.
- Hazaea, A. N., Bin-Hady, W. R. A., & Toujani, M. M. (2021). Emergency remote English language teaching in the Arab League countries: Challenges and remedies. *CALL-EJ*, 22(1), 207-229. <http://callej.org/journal/22-1/Hazaea-BinHady-Toujani2021.pdf>
- Holliday, A. (2006). Native-speakerism. *ELT Journal*, 60(4), 385–387. <https://doi.org/10.1093/elt/ccl030>
- Hong, K. H. (2010). CALL teacher education as an impetus for L2 teachers in integrating technology. *ReCALL*, 22(1), 53-69. <https://doi.org/10.1017/S095834400999019X>
- Hsu, C. C., & Sandford, B. A. (2007). The Delphi technique: Making sense of consensus. *Practical Assessment, Research & Evaluation*, 12(10), 1–8. <https://doi.org/10.7275/pdz9-th90>
- Hu, C-C., Yeh, H-C., & Chen, N-S. (2023). Teacher development in robot and IoT knowledge, skills, and attitudes with the use of the TPACK-based Support-Stimulate-Seek approach. *Interactive Learning Environments*, 31(9), 5811-5830. <https://doi.org/10.1080/10494820.2021.2019058>
- Jiang, L., Zang, N., Zhou, N., & Cao, H. (2022). English teachers' intention to use flipped teaching: interrelationships with needs satisfaction, motivation, self-efficacy, belief, and support. *Computer Assisted Language Learning*, 35(8), 1890-1919. <https://doi.org/10.1080/09588221.2020.1846566>
- Keeney, S., Hasson, F., & McKenna, H. P. (2001). A critical review of the Delphi technique as a research methodology for nursing. *International Journal of Nursing Studies*, 38(2), 195-200. [https://doi.org/10.1016/S0020-7489\(00\)00044-4](https://doi.org/10.1016/S0020-7489(00)00044-4)

- Koehler, M., & Mishra, P. (2009). What is technological pedagogical content knowledge (TPACK)? *Contemporary Issues in Technology and Teacher Education*, 9(1), 60-70.
- Koehler, M. J., Mishra, P., & Zellner, A. L. (2015). Mind the gap: Why TPACK case studies? In M. Hofer, L. Bell, & G. Bull (Eds.), *Practitioner's guide to technology pedagogy and content knowledge (TPACK): Rich media cases of teacher knowledge* (pp. 2.1-2.8). Association for the Advancement of Computing in Education (AACE).
- Kohnke, L. (2021). Professional development and ICT: English language teachers' voices. *Online Learning*, 25(2), 36–53. <https://doi.org/10.24059/olj.v25i2.2228>
- Kohnke, L., Fong, D., Zou, D., & Jiang, M. (2024). Creating the conditions for professional digital competence through microlearning. *Educational Technology & Society*, 27(1), 183–197. <https://www.jstor.org/stable/48754850>
- Levy, M. (1997). *CALL: Context and conceptualization*. Oxford University Press.
- Levy, M., & Hubbard, P. (2005). Why call CALL “CALL”? *Computer Assisted Language Learning* 18(3), 143-149. <https://doi.org/10.1080/09588220500208884>
- Li, M. (2020). Multimodal pedagogy in TESOL teacher education: Students' perspectives. *System*, 94, 102337. <https://doi.org/10.1016/j.system.2020.102337>
- Linstone, H. A., & Turoff, M. (1975). *The Delphi method: Techniques and applications*. Addison-Wesley.
- Marshall, C., & Rossman, G. B. (1999). *Designing qualitative research* (3<sup>rd</sup> ed.). SAGE.
- Meskill, C., Anthony, N., & Sadykova, G. (2022). Learning how to teach languages online: Voices from the field. *Online Learning*, 26(4), 494–518. <https://doi.org/10.24059/olj.v26i4.2964>
- Moustakas, C. (1994). *Phenomenological research methods*. SAGE.
- Nworie, J. (2011). Using the Delphi technique in educational technology research. *Tech Trends*, 55(5), 24-30. <https://doi.org/10.1007/s11528-011-0524-6>
- Park, M., & Son, J-B. (2022). Pre-service EFL teachers' readiness in computer-assisted language learning and teaching. *Asia Pacific Journal of Education*, 42(2), 320-334. <https://doi.org/10.1080/02188791.2020.1815649>
- Read, T., Sedano, B., & Barcena, E. (2021). Inclusive language MOOCs. *Journal of Universal Computer Science*, 27(5), 437-449. <https://doi.org/10.3897/jucs.67932>
- Richards, J. C. (2010). Competence and performance in language teaching. *RELC Journal*, 41(2), 101–122. <https://doi.org/10.1177%2F0033688210372953>

- Richards, J. C. (2017). Teaching English through English: Proficiency, pedagogy and performance. *RELC Journal*, 48(1), 7–30.  
<https://doi.org/10.1177%2F0033688217690059>
- Rienties, B., Lewis, T., O'Dowd, R., Rets, I., & Rogaten, J. (2022). The impact of virtual exchange on TPACK and foreign language competence: Reviewing a large-scale implementation across 23 virtual exchanges. *Computer Assisted Language Learning*, 35(3), 577-603. <https://doi.org/10.1080/09588221.2020.1737546>
- Roulston, K. (2010). Considering quality in qualitative interviewing. *Qualitative Research*, 10(2), 199-228. <https://doi.org/10.1177%2F1468794109356739>
- Salkind, N. J. (2007). *Encyclopedia of measurement and statistics*. SAGE.  
<https://dx.doi.org/10.4135/9781412952644.n128>
- Sandelowski, M. (2000). Whatever happened to qualitative description? *Research in Nursing & Health*, 23(4), 334-340. [https://doi.org/10.1002/1098-240X\(200008\)23:4%3C334::AID-NUR9%3E3.0.CO;2-G](https://doi.org/10.1002/1098-240X(200008)23:4%3C334::AID-NUR9%3E3.0.CO;2-G)
- Schmid, M., Brianza, E., & Petko, D. (2020). Developing a short assessment instrument for Technological Pedagogical Content Knowledge (TPACK.xs) and comparing the factor structure of an integrative and a transformative model. *Computers & Education*, 157, 103967. <https://doi.org/10.1016/j.compedu.2020.103967>
- Shadiev, R., & Wang, X. (2022). A review of research on technology-supported language learning and 21<sup>st</sup> century skills. *Frontiers in Psychology*, 13.  
<https://doi.org/10.3389/fpsyg.2022.897689>
- Son, J.-B., Park, M., & Liu, M.-H. (2024). Language teacher development in technology integration: Exploration, communication, collaboration, and reflection. *Online Learning*, 28(3), 474-496. <https://doi.org/10.24059/olj.v28i3.3842>
- Stickler, U. (2022). *Technology and language teaching*. Cambridge University Press.  
<https://doi.org/10.1017/9781108874403>
- Stickler, U., & Emke, M. (2023). Future-proofing language teaching: How the COVID-19 pandemic has changed our profession. *CALICO Journal*, 40(2), 137-152. <https://doi.org/10.1558/cj.26204>
- Stickler, U., Hampel, R., & Emke, M. (2020). A developmental framework for online language teaching skills. *Australian Journal of Applied Linguistics*, 3(1) pp. 133–151.  
<http://dx.doi.org/doi:10.29140/ajal.v3n1.271>
- Stockwell, G., & Ito, Y. (2023). Computer-assisted language learning and communicative competence. In M. Kanwit & M. Solon (Eds.), *Communicative competence in a second language: Theory, method, and applications* (pp. 171-186). Routledge.

- Tafazoli, D., & Egan, K. (2022). The antagonism between western and Islamic cultures in Iranian English textbooks. *Porta Linguarum*, 37, 63-88. <https://doi.org/10.30827/portalin.vi37.21243>
- Tafazoli, D., & Meihami, H. (2023). Narrative inquiry for CALL teacher preparation programs amidst the COVID-19 pandemic: Language teachers' technological needs and suggestions. *Journal of Computers in Education*, 10, 163-187. <https://doi.org/10.1007/s40692-022-00227-x>
- Tafazoli, D., & Picard, M. (Eds) (2023). *Handbook of CALL teacher education and professional development: Voices from under-represented contexts*. Springer. <https://doi.org/10.1007/978-981-99-0514-0>
- Taghizadeh, M., & Ejtehad, A. (2023). Investigating pre-service EFL teachers' and teacher educators' experience and attitudes towards online interaction tools. *Computer Assisted Language Learning*, 36(8), 1633-1667. <https://doi.org/10.1080/09588221.2021.2011322>
- Tsang, A. (2017). EFL/ESL teachers' general language proficiency and learners' engagement. *RELC Journal*, 48(1), 99-113. <https://doi/10.1177%2F0033688217690060>
- Tseng, J-J., Chai, C. S., Tan, L., & Park, M. (2022). A critical review of research on technological pedagogical and content knowledge (TPACK) in language teaching. *Computer Assisted Language Learning*, 35(4), 948-971. <https://doi.org/10.1080/09588221.2020.1868531>
- Tsui, A. (2011). Teacher education and teacher development. In E. Hinkel (Ed.), *Handbook of research in second language teaching and learning* (Vol. 2, pp. 21-39). Routledge.
- Vagle, M. D. (2018). *Crafting phenomenological research*. Routledge.
- Warschauer, M. (1999). *Electronic literacies: Language, culture, and power in online education*. Lawrence Erlbaum.
- Wu, S. (2023). Unpacking themes of integrating telecollaboration in language teacher education: a systematic review of 36 studies from 2009 to 2019. *Computer Assisted Language Learning*, 36(7), 1265-1287. <https://doi.org/10.1080/09588221.2021.1976800>
- Xu, Y., Jin, L., Deifell, E., & Angus, K. (2021). Chinese character instruction online: A technology acceptance perspective in emergency remote teaching. *System*, 100, 102542. <https://doi.org/10.1016/j.system.2021.102542>
- Yüksel, P., & Yıldırım, S. (2015). Theoretical frameworks, methods, and procedures for conducting phenomenological studies in educational settings. *Turkish Online Journal of Qualitative Inquiry*, 6(1). <https://dergipark.org.tr/en/download/article-file/199867>