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# Review of research on computer-assisted language learning with a focus on intercultural education

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## ABSTRACT

We reviewed articles on computer-assisted language learning, focusing on intercultural education studies published in the last five years. We investigated the following aspects: (1) the theoretical foundation that the studies were based on, e.g., theory, hypothesis, model, or framework, (2) the technologies used by the participants, (3) the languages and cultures that the studies focused on, (4) the methodology of the reviewed studies, and (5) the findings reported by researchers. Our results showed that Byram's intercultural communicative competence model, sociocultural theory, and social constructivism were the most frequently used theoretical foundations. The participants frequently used discussion forums, Facebook, email, and Skype. English was the most popular language, and American culture received more attention than any other culture. In terms of the methodology, most studies were conducted for four to 18 weeks, and undergraduate students with advanced language skills were the most frequent participants. The participants interacted with their partners, e.g., introduced cultural backgrounds, created collaborative products, and reflected on learning experiences. Researchers in most studies used questionnaires and interviews to collect the data, and their results demonstrated that intercultural telecollaboration in foreign language education promotes language and culture learning. Benefits such as students having positive attitudes toward technology-supported learning activities and learning activities contributing to developing language abilities and intercultural skills were reported by the researchers. However, according to the results, high cost and learning burdens were the most frequently reported drawbacks of CALL for intercultural education. Several implications were drawn from the results of this review study. The significance of this study is that it provides up-to-date information on CALL-based intercultural education, keeps track of changes in technologies and their applications to language and culture learning, and focuses on aspects that are important to the field but were neglected in earlier review studies.

## KEYWORDS

Review; technology;  
language learning;  
intercultural education

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## 1. Introduction

The use of technology plays an important role in language and culture learning (Jung et al., 2019; Lee & Park, 2017; Mitchell, 2018; Oakley et al., 2018; Sevilla-Pavón & Haba-Osca, 2017; Wang, 2020). For this reason, several review studies on computer-assisted language learning (CALL) with a focus on intercultural education have been carried out (Çiftçi & Savaş, 2017; O'Dowd, 2018; Piri & Riahi, 2018). However, some important aspects in this context were not considered by earlier review studies. For example, it is important to understand the theoretical foundation (i.e. theory, hypothesis, model, or framework) because it is the base on which research studies are rooted. Diverse languages and cultures were involved in CALL-related intercultural research, scholars used various methodologies and obtained different results in their research. Languages and cultures that scholars focused on, methodologies used, and results obtained are essential elements of any research, and knowing such information can help us better understand the field and guide the design of future studies. However, these aspects were neglected in earlier studies. Another critical point is that because technologies advance rapidly in recent years, changes in technologies and their applications to CALL-based intercultural education take place and they need to be reported in review studies. Therefore, we need up-to-date information about research on computer-assisted language learning with a focus on intercultural education.

The present study aims to fill in the above-mentioned gap in the literature related to CALL-based intercultural education by reviewing related research articles published in the last five years. The goal of the present study is to explore related research with the following aspects: (1) the theoretical foundation that the studies were based on, e.g., theory, hypothesis, model, or framework, (2) the technologies used by the participants, (3) the languages and cultures that the studies focused on, (4) the methodology of the reviewed studies, and (5) the findings reported by researchers. To this end, the following research questions were addressed: What was the theoretical foundation of the reviewed studies? What technologies were used by participants in the reviewed studies? What languages and cultures were involved in the reviewed studies? What methodologies were applied by scholars to the reviewed studies? What results were reported in the reviewed studies?

The present research is original because it provides more up to date information (i.e. from studies published in the last five years), it reports changes in technologies (i.e. those that scholars stopped to use and those that they started to employ in the last few years), and it considers a wider range of topics in CALL and intercultural education (e.g., theoretical

foundations, languages and cultures, methodology and results). For this reason, results of the present research are significant to the field.

In order to fill in the gap in the literature and contextualize the study and its research questions, we discuss related research in the following section. First, we explain the relationship between language and culture. We also describe how language and culture learning can be supported by technology. After that, we discuss the theoretical foundation of computer-supported language and culture learning. Next, we review related studies to demonstrate diversity of languages and cultures involved and varieties of methodologies used. We also explain the need to focus on the above mentioned aspects in the present study. Finally, we describe earlier review studies and how the present review differs from them.

## **2. Literature review**

### ***2.1. Language and culture learning***

The interrelated nature of culture and language has received considerable attention. That is, understanding culture and cultural differences helps learners attain language proficiency effectively and vice versa (Garrett-Rucks, 2013). In order to foster successful language use, a learning context that combines both cultural understanding and language learning needs to be created (Chen & Yang, 2016). To this end, educators and researchers try to incorporate the teaching of culture in the language classroom (Özdemir, 2017). For example, language learners are instructed about culturally appropriate ways to use the target language in specific situations and to explore culturally based linguistic differences (Angelova & Zhao, 2016). Furthermore, educators and researchers try to connect language learners with people from other countries so that learners can be exposed to different cultural backgrounds and have opportunities to communicate in the target language (Luo & Gui, 2019).

### ***2.2. Languages and cultures in related research***

The evidence suggests that scholars focused on various languages and cultures in their studies. For example, preservice teachers from the U.S. helped Chinese students improve their English and develop intercultural awareness (Angelova & Zhao, 2016). Students from Britain and Spain were engaged in a language exchange project to develop their target language proficiency and to experience each other's culture (Clavel-Arroitia, 2019). An intercultural language learning project by Chen and Yang (2016) was carried out to improve language skills and to promote intercultural understandings of students from Canada, Lebanon, the

Netherlands, and Ghana. With such diversity, we need to know what languages and cultures educators and researchers focus on in their studies, which can increase our understanding of the target languages and cultures involved in the research (Shadiev & Sintawati, 2020). Such knowledge will inform us about what languages and cultures received considerable attention in research and which did not, to guide future studies.

### ***2.3. Computer-assisted language learning and intercultural education***

In order to connect language learners with speakers of the target languages and representatives of the target cultures so that learners are able to communicate in the target language and experience the target culture, educators and researchers employed various educational technologies (Çiftçi & Savaş, 2017; Shadiev & Dang, 2022). Scholars suggested that the use of educational technologies can help solve the problem related to constraints by time, distance, and cultural differences in contact among learners from different countries (Angelova & Zhao, 2016; Çiftçi & Savaş, 2017; O'Dowd, 2011; Piri & Riahi, 2018; Shadiev & Sintawati, 2020). Educational technologies can create authentic learning environments in which learners are able to learn languages and cultures by interacting with speakers of the target languages and who represent the target cultures despite the above-mentioned problems (Shadiev et al., 2019). This notion leads to the appearance of a computer-assisted language learning (CALL) context that focuses on intercultural education. This context is concerned with technology applications in language teaching and learning (Levy, 1997) emphasizing the learning of different cultures and their similarities and differences through direct and indirect contact with people from other countries (Byram, 1997). Because language and culture are interrelated, in the above-mentioned context, learners not only learn the target language but also the culture of a particular social group through authentic learning experiences in learning environments created by educational technologies.

Educators and researchers applied different technologies to carry out language and cultural learning projects. For example, Özdemir (2017) used a social network (i.e., Facebook) to promote the intercultural communicative effectiveness of English as a foreign language (EFL) for learners in Turkey. Liaw (2019) used an open social platform to facilitate EFL learners' intercultural communication skills. In Yang (2018), English learners from China and English-speaking Chinese learners from the U.S. exchanged instant text messages on mobile devices for language and cultural learning. The results of the abovementioned studies showed that technology created an authentic learning environment in which

language learners from different countries were able to meet virtually and to develop language proficiency as well as to experience the target culture through communication and information exchange with their foreign partners (Chen & Yang, 2016; Luo & Gui, 2019).

There is much other evidence that shows how technology plays an important role in language and learning about culture. For example, technology is beneficial in developing different skills and competencies, e.g., linguistic and cultural competencies (Oakley et al., 2018; Sevilla-Pavón & Haba-Osca, 2017; Wang, 2020). In addition, language learners can experience various cultures and enhance their perceptions of language learning through meaningful learning situations relevant to real-life communicative events (Jung et al., 2019; Lee & Park, 2017; Mitchell, 2018).

As technology plays an important role in language and culture learning, we need to keep track of its development and applications to the field. For example, scholars have started to use newly emergent technologies such as virtual reality, robots, and artificial intelligence in the last few years but there is not much knowledge about such technologies and their applications to education (Shadiev et al., 2021; Zhang & Zou, 2021). Therefore, we need to know how these technologies were used in the learning process and their potential to support language learning and intercultural education.

#### **2.4. Theoretical foundation of CALL and intercultural education**

In addition to exploring technologies, it is also imperative to know about other important aspects of CALL and intercultural education studies. For example, a majority of culture-related CALL studies have emphasized interaction and information exchange among language learners with different cultural backgrounds (Luo & Gui, 2019; Shadiev et al., 2019). Such an approach is based on sociocultural theory (Vygotsky, 1978), which suggests that learning is a social process and that knowledge is highly contextualized and related to the situations in which it occurs. In this way, learners interact with others and the target culture and develop cognitive abilities. Apart from language skills, learners need to acquire a set of other competencies to communicate in the target language effectively. Intercultural communication competence, for instance, is essential for effective and appropriate communication in the target language in cultural contexts, and according to the intercultural communicative competence model (Byram, 1997), it includes knowledge, attitudes, skills of interpreting and relating, discovery and interaction skills, and critical cultural awareness. For example, knowledge refers to the knowledge of social groups, their practices, products, and interactional processes, while attitudes are about curiosity, openness and a

willingness to learn about other cultures (Chen & Yang, 2016). There are many other related theories, hypotheses, models or frameworks used by scholars as a foundation for their research. Understanding theoretical foundations is important; they specify which research variables influence CALL and intercultural education, highlighting the need to examine how those variables might differ and under what circumstances (Aydemir et al., 2015).

### ***2.5. Methodologies in CALL and intercultural research***

The literature demonstrates that methodologies (i.e., a system of methods used in research, such as the characteristics of participants, design of the learning activity, and data collection) also varied across culture-related CALL studies. For example, some studies involved university students (e.g., in Lee & Song, 2019b), others involved primary school students (e.g., in Porto, 2016), some studies were carried out for a couple of weeks (Liao & Lu, 2018), and others lasted several months (e.g., in Porto, 2016). Furthermore, the evidence shows that data collection was also different across related studies. The study of Angelova and Zhao (2016) was qualitative and the scholars analyzed students' essays to see learning gains, while the study of Özdemir (2017) was quantitative and students' scores were compared across different conditions to prove the effects of the intervention. Understanding the methodologies of related studies may guide the design of future studies by providing the course of action to complete the research (Creswell, 2014).

### ***2.6. Related review studies and originality of the present research***

Several review studies of CALL and intercultural education have since been carried out. Çiftçi and Savaş (2017) reviewed 17 studies published between 2010 and 2015 to investigate the role of telecollaboration in language and culture learning. The following main points were considered in Çiftçi and Savaş (2017): the studies' focus, participants, country context, technologies used, and reported findings. According to the results, language and cultural learning were the main focus of the reviewed studies. The participants were primary, middle, high school, and university students and in-service teachers. Videoconferencing, email exchanges, learning management systems, and blogs were the most frequently used tools among the studies, followed by text-based chat and discussion boards (Çiftçi & Savaş, 2017, p.6). The most frequent intercultural exchanges took place between participants from Spain and the U.S. In another study, O'Dowd (2018) analyzed literature published between 2003 and 2016 to explore innovations and challenges



in using online communication technologies in content and language integrated learning (CLIL). O'Dowd (2018) focused on the following aspects: (1) goals of reviewed studies, (2) virtual exchange implementation, (3) online intercultural interaction, (4) learning tasks, (5) teachers' role in virtual exchange, and (6) challenges and their solutions. The results showed that online intercultural collaboration initiatives may have an important role in achieving the goals of CLIL. O'Dowd (2018) concluded that the body of research, as well as the established online learning networks and communities, should be exploited by CLIL educators to give their students first-hand online intercultural collaboration and exchange experiences. Piri and Riahi (2018) reviewed 27 studies published between 2007 and 2017 to explore cultural perspectives in technology-enhanced language learning. Piri and Riahi (2018) focused on subjects, study duration, the technology used, the countries involved, and major cultural findings of the reviewed studies. They found that most research was carried out in the U.S., followed by China and Germany. The most frequently employed digital tools were emails and online forums, followed by podcasts and blogs. Most of the studies were conducted for one to four months and collected data through case studies. Finally, Piri and Riahi (2018) found that the participants had positive attitudes toward using digital tools for intercultural learning. Research projects facilitated the development of critical cultural awareness, intercultural communicative competence, and various aspects of language learning.

The present review goes beyond existing reviews in the following ways. The studies mentioned above (i.e., Çiftçi & Savaş, 2017; O'Dowd, 2018; Piri & Riahi, 2018) reviewed research articles that were published over a single decade. However, articles that have been published after 2015 have yet to be reviewed. Another reason relates to technological development. We need to keep track of changes in technologies and their applications to language and culture learning and review these relevant studies promptly due to technological advances. Finally, some important aspects of CALL and intercultural education were omitted in earlier review studies. For example, theoretical foundations in reviewed articles were ignored in earlier review studies (i.e., in Çiftçi & Savaş, 2017; O'Dowd, 2018; Piri & Riahi, 2018), despite their importance. For this reason, the present study seeks to fill the existing gap in the literature related to CALL and intercultural education. We aim to achieve this goal by reviewing related research articles published in the last five years. The following research question was addressed in this study: What do current research in CALL and intercultural education reveal about (a) theoretical foundations used in the reviewed studies; (b) technologies applied in the reviewed studies; (c) languages and cultures involved in



the reviewed studies; (d) methodology used in the reviewed studies; and (e) results reported in the reviewed studies?

Accordingly, the originality of this research lies in (1) its use of a different time frame, i.e., we reviewed articles published over the last five years; (2) keeping track of changes in technologies and their applications due to rapid technological advances; and (3) focusing on aspects that are important to the field (i.e. theoretical foundation, methodology and results of current research on CALL and intercultural education) but were neglected in earlier review studies, such as the theoretical foundations used by scholars. The main contribution of this article is that it provides much-needed and timely information on CALL and intercultural education. The findings can serve as a valuable reference for educators and researchers in the field and can be useful by providing guidance on the use of technology for language and culture learning.

### 3. Methodology

To carry out a scientific review, this study uses the preferred reporting items for systematic reviews and meta-analyses (PRISMA) guidelines (Figure 1). The PRISMA statement was published by Moher et al. (2009) to set standards for the reporting of systematic reviews and meta-analyses. The PRISMA statement has been used in the educational research

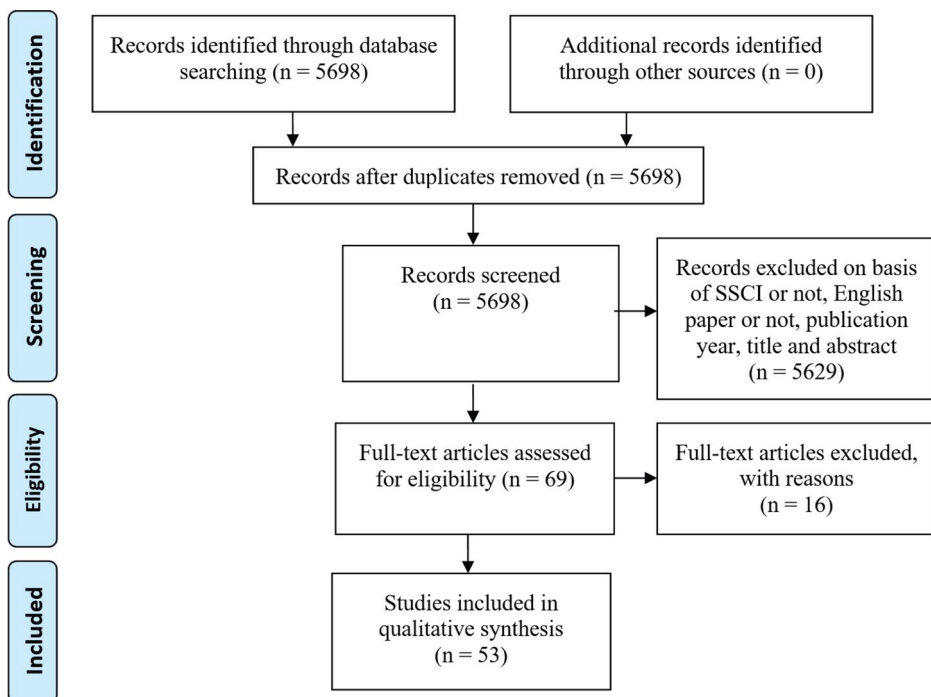


Figure 1. PRISMA flow diagram for the screening process.

community, e.g., in a review of the Shadiev & Dang (2022) and of Crompton et al. (2019).

### 3.1. Article search

The authors selected the Web of Science database to search for research articles. The following search terms in different combinations were used: foreign, second, language, cross-cultural, intercultural, multicultural, trans-culture, cross-culture, interculture, multiculture, culture, telecollaboration, learning, instruction, technology and computer. These terms were chosen because they are often used with respect to CALL and cultural learning (Çiftçi & Savaş, 2017; O'Dowd, 2018; Piri & Riahi, 2018).

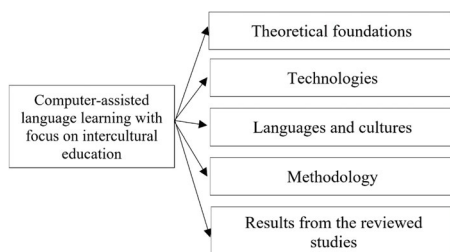
Initially, 5,689 articles were identified through database searches. The following screening criteria were then added to narrow down the selection of articles:

1. Studies published in Social Science Citation Index (SSCI) journals;
2. Studies published between 2015 and 2020;
3. Studies on CALL with a focus on intercultural education;
4. Studies published in English; and
5. Empirical studies as they are generally viewed as objective, scientific, and highly credible. Results and conclusions from empirical studies are strictly derived from the data that were systematically collected and analyzed through observations or experiments rather than from theory or belief, and thus, can be of more significant reference for educators and researchers in the field.

Based on the screening criteria, 5,629 articles were excluded, and the remaining 69 articles were assessed for eligibility in this review study. After the assessment, only 53 articles fully met all the requirements. A manual search was also carried out in SSCI journals to ensure the database search's reliability; the results confirmed the number of articles that were identified through the search.

### 3.2. Framework for the study

Guided by related review studies (Çiftçi & Savaş, 2017; O'Dowd, 2018; Piri & Riahi, 2018), we propose a CALL and intercultural education framework for the present review study. This framework includes the main constructs of CALL and intercultural education, such as *theoretical foundations, technologies, languages and cultures, methodology, and results from the related studies* (Figure 2), and it served as the basis for reviewing the targeted articles and their content analysis.



**Figure 2.** A framework for review of studies on CALL with a focus on intercultural education.

### 3.3. Content analysis

The open coding approach was used for the content analysis of this study (Creswell, 2014). This method can segment information and form categories of information about the phenomenon being studied (Shadiev & Dang, 2022). The coding process was completed by one researcher and then checked by another researcher to ensure its reliability.

## 4. Results

The results are presented in the following order: (1) theoretical foundations; (2) technologies; (3) languages and cultures; (4) methodology; and (5) results from reviewed studies.

### 4.1. Theoretical foundations

The results showed that various theoretical foundations were used as the basis for research in the reviewed studies (Supplementary [Appendix A: 1 Theoretical foundation](#)). They can be grouped into five categories: related to social learning ( $n=29$ ), related to cultural learning ( $n=25$ ), the cognitive and language learning theoretical foundation ( $n=6$ ), other theoretical foundations ( $n=5$ ), and not specified ( $n=18$ ). Theoretical foundations related to social learning were the most frequently used and include the following: sociocultural theory ( $n=12$ ), social constructivism ( $n=10$ ), activity theory ( $n=2$ ), social presence ( $n=2$ ), tandem model ( $n=2$ ), social interdependence theory ( $n=1$ ) and social pedagogies ( $n=1$ ). Scholars built their theoretical foundations mostly on sociocultural theory and social constructivism. Sociocultural theory views learning as a social process and suggests that the learning environment plays an important role in a learner's learning development (Vygotsky, 1978). Social constructivism describes language learning as a learner-generated, social, and collaborative process (Bereiter, 1994). Drawing on sociocultural theory, Wang (2020) studies situated language learners in an

international learning environment in which they studied global picture books and interacted with native speakers of the target language. Guided by social constructivist theory, Yang (2018) carried out an intercultural online exchange project between language learners in two countries and explored the dynamics and educational value of online synchronous text communication in language and cultural learning.

Theoretical foundations related to cultural learning were the second most frequently used. They related to different aspects of cultural learning and included the following: Byram's intercultural communicative competence model ( $n = 18$ ), intercultural pragmatics ( $n = 2$ ), Ladson-Billings' cultural responsiveness theory ( $n = 1$ ), Hofstede's cultural dimensions theory ( $n = 1$ ), the intercultural curriculum framework ( $n = 1$ ), multicultural competence ( $n = 1$ ), and transcultural competence ( $n = 1$ ). The most reviewed studies were built on the intercultural communicative competence model, which explains a language learner's ability to communicate effectively and appropriately in various cultural contexts (Chen & Yang, 2016). Some scholars posit that intercultural communicative competence includes components such as knowledge, attitudes, skills of interpreting and relating, discovery and interaction skills, and critical cultural awareness (Chen & Yang, 2016; Kusumaningputri & Widodo, 2018). For example, Kusumaningputri and Widodo (2018) investigated digital photograph-mediated intercultural tasks to promote students' intercultural communicative competence in the language learning context, particularly their critical intercultural awareness.

The researchers in the reviewed studies also used cognitive and language learning theories and other theories. Cognitive and language learning theories include the interaction hypothesis ( $n = 2$ ), critical pedagogy ( $n = 1$ ), Kolb's learning cycle ( $n = 1$ ), positioning theory ( $n = 1$ ), and pushed output theory ( $n = 1$ ). Others included multiliteracy pedagogy ( $n = 2$ ), systems theory ( $n = 2$ ), and systematic functional linguistics ( $n = 1$ ). No theoretical foundations were specified in 18 of the studies. To help the reader, we have identified the theoretical foundations (see references with asterisks in Supplementary [Appendix A: 1 Theoretical foundation](#)) based on the concepts and terms used and the references drawn on in the reviewed articles.

## 4.2. Technologies

The results showed that 90 different technologies were used in the reviewed articles (Supplementary [Appendix A: 2 Technologies](#)). We grouped them into six categories: (1) Web 2.0 ( $n = 43$ ), (2) Web 1.0 ( $n = 11$ ), (3) video communication tools ( $n = 16$ ), (4) instant messaging technology ( $n = 10$ ), (5) virtual reality and augmented reality ( $n = 3$ ), and

(6) other technologies ( $n=7$ ). There are possible overlaps in the classification adopted, e.g. Zoom and Skype are video teleconferencing software programs and they utilize Web 2.0 features. For this reason, we grouped technologies based on their primarily and main use. In case of Zoom and Skype, we classified them as video communication tools because they were used in the reviewed research for video communication purpose primarily.

The most frequent technologies were in the Web 2.0 category, including online social resources, that emphasized user-generated content and collaboration, such as social networking sites (e.g., Facebook) or online collaborative tools (e.g., Wiki platforms). For example, a virtual learning community for cultural and linguistic exchange between Portuguese learners in the United States and English learners in Brazil was created using social networking sites. The participants met online regularly and conversed in the two target languages using Facebook functions to promote their language skills and intercultural competence. In Chen and Yang (2016), language learners from Canada, Lebanon, the Netherlands, and Ghana used the Wiki platform as an online interaction space to learn about one another's cultural backgrounds and collaborate in the question-research-findings process. For example, the participants posted their self-introductions, summaries of analysis and synthesis, and reflections on learning experiences and gains on the Wiki so that their created content could be easily accessed and read by their learning partners. The platform created an authentic language-use environment so that the students' language development and cultural learning were enhanced.

The next most frequently used technologies were in the Web 1.0 category. In contrast to Web 2.0, Web 1.0 does not emphasize content creation, and most users act merely as consumers of content. The Web 1.0 category included email and website pages. For example, language learners from China and the U.S. interacted using email to tutor/learn different aspects of English grammar and develop cultural awareness (Angelova & Zhao, 2016).

Technologies in the video communications category were the third most frequently used. Such technologies allowed language learners in different locations to hold face-to-face meetings without being together in the same location. This category includes platforms such as Skype, Zoom, Big Blue Button, and Live On. For example, in Aristizábal and Welch (2017), Skype was used by language learners from Brazil and the U.S. to converse with native speakers of the target language to practice speaking skills and learn about each other's culture.

Technologies in the instant messaging category were also used, including WeChat or QQ ( $n=2$ ), WhatsApp ( $n=2$ ), KakaoTalk ( $n=2$ ), Moodle Chat

( $n=2$ ), MSN ( $n=1$ ), and Google Hangouts ( $n=1$ ). These tools are usually used by two or more language learners for text-based communication over the Internet using computers or mobile devices. Language learners from China and the U.S. in Luo and Gui (2019) used WeChat for one-on-one conversations and group discussions on various cultural topics. They typed texts and sent voice messages in either English or Chinese to compare and contrast aspects of Chinese and American cultures.

The least frequently used technologies were in the virtual reality and augmented reality category. Virtual reality (VR) is an immersive and interactive medium mediated by computer manipulations of the visual, tactile, and aural senses. A learner may enter a virtual world to explore various locations and interact with other learners in the target language using a headgear or a computer (Shadiev & Yang, 2020). VR enables learners to immerse themselves in a learning environment in which their experiences come very close to the real world. This provides great opportunities for intercultural communication and interaction in the target language (Liaw, 2019; Shadiev & Yang, 2020). Augmented reality (AR) is a technology that integrates digital information and real environments (Miranda Bojórquez et al., 2016). Augmented reality facilitates the learner's sense of reality and features the following characteristics: interaction in real time, integration of real and virtual worlds, and operation in a 3D space. A learner may also find useful information about objects, people, and surrounding contexts through a headset or mobile phone with AR technology (Shadiev & Yang, 2020). A learning environment was created in Liaw (2019) using a VR platform to provide language learners with opportunities to enhance oral skills and acquire intercultural communicative competence. Language learners practiced oral language tasks and engaged in conversations with peers in the VR environment. Miranda Bojórquez et al. (2016) introduced a mobile augmented reality application for learning the Mayo language. Learners used a mobile device camera to target and recognize objects of interest. AR superimposed the real model of the recognized object and played a recording message with the name of the object in Mayo and an explanation in Spanish to assist learning.

A closer look at Other technologies category indicated the inclusion of robots, enhanced video tools, smartphone applications, digital photographs, films, e-books, and digital stories. However, since those technologies were used with very low frequency, they could not be classified into the above-mentioned categories.

#### **4.3. Languages and cultures**

The results showed that the reviewed studies focused on ten different languages (Supplementary [Appendix A: 3 Languages](#)). Forty-three studies

focused on English, eight studies focused on Spanish, and seven on German. Some studies focused on other languages, including French ( $n=3$ ), Chinese ( $n=2$ ), Korean ( $n=2$ ), Portuguese ( $n=2$ ), Italian ( $n=1$ ), Japanese ( $n=1$ ), and Mayo ( $n=1$ ). The reviewed studies focused on developing five different language skills (Supplementary [Appendix A: 4 Language skills](#)): writing ( $n=24$ ), listening ( $n=16$ ), speaking ( $n=13$ ), reading ( $n=13$ ), and grammar ( $n=2$ ). Some studies aimed to improve learners' language proficiency in general ( $n=21$ ).

Thirty-three different cultures were involved in the reviewed studies (Supplementary [Appendix A: 5 Cultures](#)). The most frequently involved cultures were from Europe, North America and Asia. The second most frequently involved set of cultures was from South America and the Middle East. The least involved cultures were from Australia and Africa.

Scholars have attempted to enhance the various intercultural abilities of their participants. Based on Byram's (1997) recommendations, intercultural skills identified in the reviewed studies were grouped into the five categories: competence, understanding, awareness, sensitivity, and others (Supplementary [Appendix A: 6 Cross-cultural skills](#)).

Competence, i.e., the participants' abilities to do something successfully or efficiently in intercultural situations (Byram, 1997), included multiple competencies such as intercultural communication competence, intercultural competence, transcultural communicative competence, multicultural competence, and plurilingual competence. The most common competencies were intercultural communication ( $n=22$ ) and intercultural competence ( $n=17$ ). The remaining skills included only one or two items. For example, intercultural understanding, i.e., the ability to understand various cultural constructs such as social groups and their products and practices in one's own and in one's interlocutor's country ( $n=6$ ) (Shadiev et al., 2021), and intercultural sensitivity, i.e., one's ability to develop a positive emotion towards understanding and appreciating cultural differences ( $n=2$ ) (Chen & Starosta, 1997).

Awareness, i.e., the ability to evaluate critically on the basis of explicit criteria, perspectives, practices, and products in one's own and other cultures and countries (Byram, 1997), included intercultural ( $n=2$ ) and critical intercultural ( $n=2$ ) awareness. Scholars also focused on other skills, such as intercultural citizenship, i.e., the emphasis on civic action in the community from citizenship education ( $n=1$ ), and cultural responsiveness, i.e., the ability to learn from and relate respectfully with people of one's own culture as well as those from another culture ( $n=1$ ).

For example, Angelova and Zhao (2016) paired American students from an ESL teaching program with Chinese students majoring in English. The study aimed to improve American students' teaching skills by tutoring nonnative speakers of English, improving the language skills of



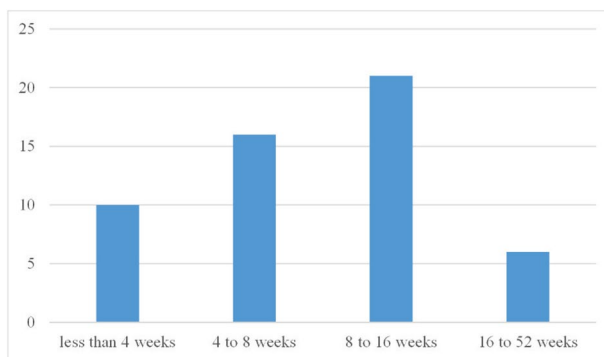
Chinese students, and developing intercultural awareness of students through communication. Similarly, Chinese English learners and English-speaking Chinese learners in Yang (2018) were paired. They communicated with each other using a questioning strategy in an online synchronous text communication context to improve their writing skills. The participants learned about Chinese and American culture and tried to improve their understanding of their partner's culture. Clavel-Arroitia (2019) paired British and Spanish secondary school students for language exchanges, which developed intercultural competence and improved each other's language skills. The participants also learned about British and Spanish culture in the project. In Chen and Yang (2016), learners of English were involved in various kinds of collaborative learning activities (e.g., information collection, analyzing data, and generating research findings) with partners from Canada, Lebanon, the Netherlands, and Ghana in an intercultural exchange project designed to improve their speaking and listening skills. Chen and Yang (2016) attempted to promote intercultural understandings and language use of the participants.

#### **4.4. Methodology**

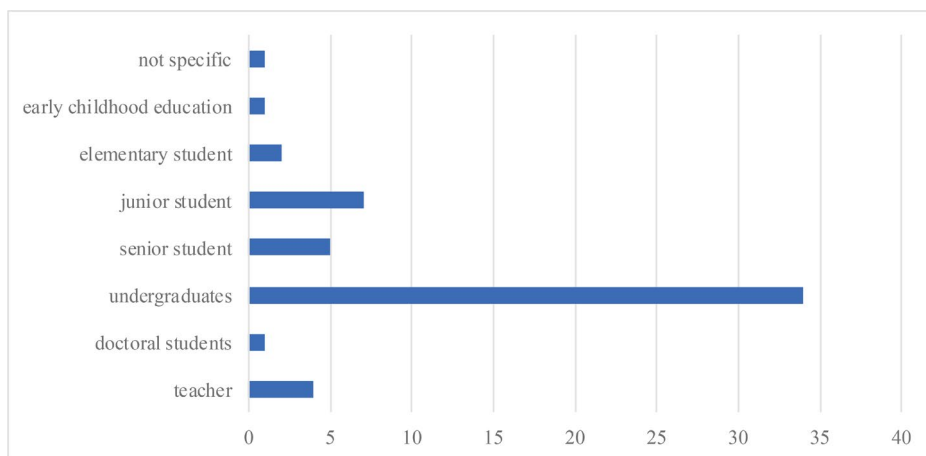
In this section, we report the research methods that scholars used in their studies. The results are presented in Supplementary [Appendix B](#) and show that most studies used mixed methods ( $n=33$ ). For instance, Angelova and Zhao (2016) used content analysis and interviews, Chen and Yang (2016) used content analysis, questionnaires, and interviews, Jin (2015) used observation and interviews, and Özdemir (2017) used experiments, content analysis, questionnaires, and interviews. Few studies used other research methods, such as case studies ( $n=2$ ) or surveys ( $n=1$ ). According to the results, focus groups were not used in any of the reviewed studies. The results show that most studies were based on qualitative research methods.

Next, we report the details of the methodologies in the reviewed studies, such as the learning process, participants, and data collection instruments. The learning process relates to acquiring new knowledge and skills that ultimately influence attitudes, decisions, and actions. Participants are those who participated in reviewed studies by being the target of observation by researchers. Data collection instruments were used by researchers to collect information to answer the posed research questions presented in the studies.

The results related to the duration of the learning process are shown in [Figure 3](#). The results indicate that most of the reviewed studies were conducted for four to eight weeks ( $n=16$ ) and for eight to 16 weeks ( $n=21$ ). Ten studies took less than four weeks, and six studies lasted from 16-52 weeks.



**Figure 3.** Duration.

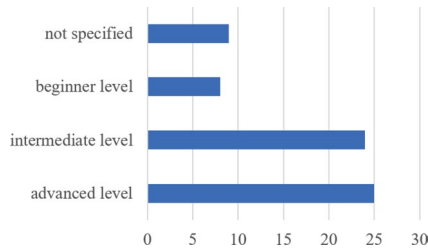


**Figure 4.** Academic level of the participants.

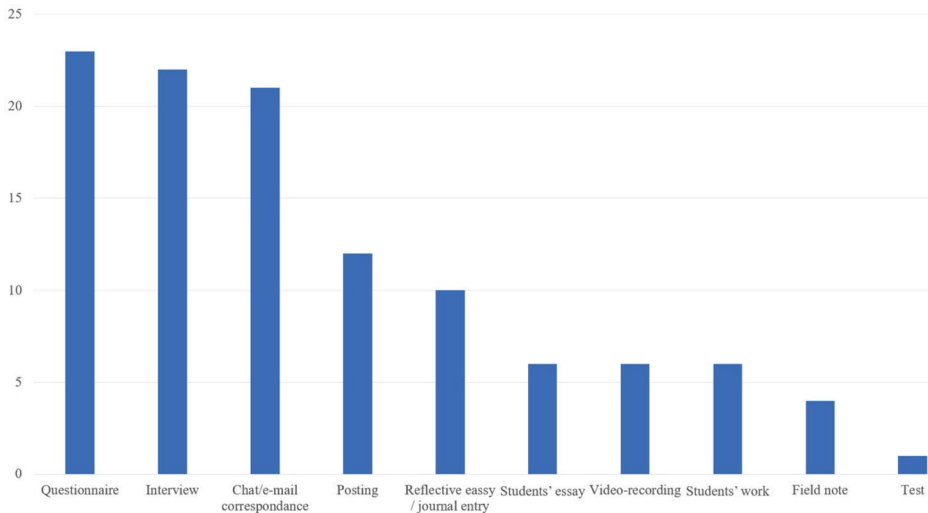
Learning activities (Supplementary [Appendix A: 7 Learning activities](#)) were diverse. Interactive activity ( $n=42$ ), i.e. when students interacted with each other to practice their language skills, reflective activity ( $n=18$ ), i.e. when students reflected on past language and culture learning experiences, considered real-world implications, and let this reflection guide future actions and activities, collaborative activity ( $n=16$ ), i.e. when students worked together with others in pairs or groups to complete assigned tasks or create collaborative products, and introductory activity ( $n=13$ ), i.e. when students introduced themselves, their academic and cultural background, interests, and so on, were the most frequent in the reviewed studies.

Participants in most reviewed studies were from universities ([Figure 4](#)). The second most frequent group of participants were K12 students. The least frequent participants were adults, such as teachers and doctoral students.

Regarding the foreign language level of the participants, [Figure 5](#) shows that most of the participants in the reviewed studies were at an advanced level ( $n=25$ ), followed by an intermediate level ( $n=24$ ) and then by a



**Figure 5.** Foreign language level of the participants.



**Figure 6.** Data collection instruments.

beginner level ( $n=8$ ). The participants with advanced foreign language skills were involved in the reviewed studies more frequently because this type of participant had higher-level language abilities and could communicate with their partners from other countries more freely and efficiently than those with lower levels of language competency. The foreign language level of the participants was not specified in nine studies.

According to the results shown in [Figure 6](#), the most commonly used data collection instruments were questionnaires ( $n=23$ ), followed by interviews ( $n=22$ ) and chat/email correspondence ( $n=21$ ), posting ( $n=12$ ) and reflective essays/journal entries ( $n=10$ ), students' essays ( $n=6$ ), video recordings ( $n=6$ ), students' work (e.g., digital stories and images) ( $n=6$ ), and field notes ( $n=4$ ). The least frequently used data collection instruments were tests ( $n=1$ ). According to the results, most studies employed qualitative research methods such as content analysis, case studies, and discourse analysis. Scholars collected nonnumerical data to gain in-depth insights into a problem and to understand concepts, opinions, or experiences. Only a few studies employed quantitative research methods to establish causal relationships among the research variables.

For example, Lee and Song (2019a) conducted their study with university students studying foreign languages in South Korea and the U.S. for six weeks. Students from different cultural backgrounds interacted to learn each other's culture and the target language. Students introduced themselves, searched for cultural information from their partners, compared it with their own, made oral presentations, and then reflected on their culture and language experiences. Lee and Song (2019a) collected qualitative data (i.e., questionnaires, reflective writing, interviews, and student essays) to assess language skills and intercultural communication competence development. Participants in Sevilla-Pavón and Haba-Osca (2017) were undergraduate students from Spain and the United States. They watched various educational videos and then discussed and reflected on stereotypes from different countries. Interactive and collaborative activities were carried out online with native speakers of the target language for three months. Sevilla-Pavón and Haba-Osca (2017) collected the data using the questionnaire and measured student linguistic and intercultural skill development.

#### **4.5. Results reported in the reviewed studies**

The results reported in the reviewed studies are shown in Supplementary Appendix A: 8 *Results reported in the reviewed studies*. The researchers' most frequently reported result in the reviewed studies was that intercultural telecollaboration in foreign language education promotes language and intercultural learning ( $n=37$ ). The rest of the results included interactions among telecollaborative projects that promoted intercultural communicative competence ( $n=2$ ), increased citizenship awareness ( $n=2$ ), or revealed some key differences in conflict styles ( $n=2$ ). Most studies reached this result because they focused on facilitating language and intercultural learning through computer-assisted learning, and their outcomes were positive toward targeted constructs.

Some benefits and drawbacks of CALL for intercultural education were also reported in the reviewed studies. All benefits were for students. The most frequently reported benefits were language learning activities supported by technology that helped develop intercultural and language skills (Supplementary Appendix A: 9 *Benefits*). In addition, the teacher's instructional strategies and support helped language learners. Other reported benefits included opportunities for intercultural learning offered through telecollaboration projects and technologically created authentic learning environments. Scholars also reported that students had special learning experiences, increased their learning motivation, and corrected stereotypes. For example, students in Mitchell (2018) developed their intercultural skills because of cultural instruction inside the foreign

language classroom. The instruction required students to explore the target culture through Pinterest and write journal entries as reflections on their experiences. Özdemir (2017) reported that students' intercultural communicative competence improved because of intercultural instruction, requiring them to learn the language and cultural content and discuss it using Facebook. Most students agreed that discussion on Facebook in the target language helped enhance their language skills. Yang (2018) found that interaction among language and cultural learners through questioning in an intercultural online exchange project was beneficial for productive discussion and facilitated students' language and cultural learning.

The most frequent drawbacks (Supplementary [Appendix A: 10 Drawbacks](#)) were high implementation cost and learning burden ( $n=8$ ), data collection issues ( $n=8$ ), short courses ( $n=7$ ), technical issues ( $n=6$ ), lack of prior knowledge ( $n=6$ ), a small sample ( $n=6$ ), and a large number of variables beyond the control of researchers ( $n=6$ ). Other drawbacks that were less frequent included the fostering of misleading and extra anxiety ( $n=3$ ), different understandings of related concepts ( $n=3$ ), the disorientation experienced by some learners in a new, unfamiliar, and open environment ( $n=2$ ), learners thinking it was not a fun way to learn a foreign language ( $n=2$ ), limitations of cultural topics ( $n=2$ ), external intervention ( $n=2$ ), and the robustness of the model tested ( $n=2$ ). For example, scholars reported that language and culture instruction placed a heavy burden on students because they had to speak in a foreign language with their partners most of the time (Luo & Gui, 2019) or there were too many learning sessions among students (Lee & Park, 2017; Luo & Gui, 2019). Lee (2018) mentioned about the high implementation cost which was not merely financial but related to a sufficient level of teachers' social and cultural capitals and their commitment to the CALL for intercultural education project such as personal time and effort to innovate or change teaching practices. In addition, the cultural and linguistic capital of students from different socio-economic backgrounds needs to be considered as it may impact their learning practices and outcomes in the project. Porto (2016) warned that the intercultural telecollaborative project took an extremely long time to plan and execute. Scholars also complained that some important instances of the whole-class and group discussions of cultural topics were not digitally recorded. This issue caused data collection issues because such important instances went unnoticed and could be used by students for later reflection (Kusumaningputri & Widodo, 2018). Students also lacked research and language use skills because of limited prior knowledge (Chen & Yang, 2016).

## 5. Discussion and conclusion

In the present review study, we reviewed research on computer-assisted language learning with a focus on intercultural education. That is, studies in which learners learned the target languages and related cultures with peers representing these languages and cultures using technologies were considered in the review. 53 articles published in the last five years were reviewed with respect to their (1) theoretical foundation, (2) used technologies, (3) focused languages and cultures, (4) methodologies, and (5) research findings. The results showed that Byram's model of cross-cultural communicative competence, social cultural theory and social constructivism were the most commonly used theoretical foundations. Participants often used forums, Facebook, email, and Skype. English was the most popular language, and American culture has received more attention than any other culture. In terms of methodology, most studies were conducted for 4 to 18 weeks, with undergraduates with advanced language skills being the most common participants. Participants interacted with their partners, e.g. to introducing cultural background, to create collaborative products and to reflect on learning experiences. Most researchers used questionnaires and interviews to collect the data. Their results showed that cross-cultural distance collaboration in foreign language education promotes language and cultural learning. Researchers reported on benefits such as students' positive attitudes towards technology-supported learning activities and that learning activities helped develop language and cross-cultural skills. However, according to the results, high cost and learning burden were the most frequently reported shortcomings. Some enlightenments were drawn from the results of this review study.

### 5.1. Theoretical foundations

Understanding what theoretical foundations scholars used to ground and drive their research is important for educators and researchers in the field, as there are various related theories, hypotheses, models or frameworks. As Aydemir et al. (2015) pointed out, theoretical foundations specify what research variables influence culture-related CALL and the nature of the influence.

The results demonstrated that the intercultural communicative competence model, sociocultural theory, and social constructivism were the most frequently used theoretical foundations because they directly relate to language and cultural learning. That is, in most studies, scholars viewed learning as a social process (Liao & Lu, 2018) in which language

learners constructed knowledge through interaction with others (Yang, 2018) and learned how to communicate effectively and appropriately in various cultural contexts (Byram, 1997; Chen & Yang, 2016; Kusumaningputri & Widodo, 2018). Therefore, educators and researchers may consider building their future research projects on these theoretical foundations, as they can better explain CALL and intercultural education. However, other theoretical foundations also need to be considered by researchers in the future.

Eighteen studies did not acknowledge any theoretical foundations, i.e., in more than one-third of the reviewed studies (i.e., references with asterisks in Supplementary [Appendix A: 1 Theoretical foundation](#)). A potential explanation is that the authors focused on other parts of the article more, e.g. their methodology such as how to design CALL activities with focus on intercultural education and results from the intervention, so that their explanation of the theoretical basis was neglected. For this reason, it is not clear what theories, hypotheses, models, or frameworks were used in these studies to carry out the research. Knowing the theoretical basis of any research is important, as it can guide research scientifically and help readers understand the research questions. It is suggested that in the future, scholars explicitly state what theoretical foundation they used to conduct their studies.

## **5.2. Technologies**

Discussion forums, Facebook (i.e., Web 2.0), email (i.e., Web 1.0), and Skype (i.e., video communication tools) were found to be the most popular technologies in intercultural telecollaborative learning projects because they easily create social learning environments in which learners can produce target language output through interaction and culturally related information exchanges. Virtual reality and augmented reality technology on the other hand were the least frequently used technologies. The potential reason for the lack of studies on virtual reality and augmented reality technology can be due to its late appearance and relatively high cost. This technology develops and advances very fast in the last few years, and as a result it becomes more affordable in academia.

Based on the results, we suggest using various CALL and cultural learning tools. Educators and researchers need to consider their instructional objectives, pedagogical affordances of technologies and other aspects such as learners' needs and their instructors' abilities when selecting and employing certain tool. Most of these technologies can connect language and culture learners from different locations worldwide. For example, Web 2.0 technologies are conducive to the formation of online communities (Wang & Vasquez, 2012) and Web 1.0 tools enable



cross-border exchanges through asynchronous communication among learners from different time zones and with different course settings (Aristizábal & Welch, 2017; Priego & Liaw, 2017). Video communication technology provides an easy and inexpensive way of communicating and exchanging culturally related information among learners from different cultural and ethnic backgrounds (Angelova & Zhao, 2016; Luo & Gui, 2019). Video communication technology also provides opportunities for practicing speaking skills with a native speaker or other learners (Aristizábal & Welch, 2017; Luo & Gui, 2019); thus, language learners can improve their pronunciation and speaking skills (Angelova & Zhao, 2016). As for virtual reality, it enables authentic and immersive language and cultural learning experiences which are very close to those in the real world (Shadiev & Yang, 2020; Liaw, 2019).

If we compare technologies reviewed in earlier research and those reviewed in the present study, we discover one interesting finding: we could identify no instance of the use of podcasts or learning management systems. However, we found that Web 2.0 tools have become very popular in the last five years. We also did not observe any instances of use of some emerging technologies, such as virtual and augmented reality (VR/AR), in language and cultural learning in the previous review studies (Çiftçi & Savaş, 2017; O'Dowd, 2018; Piri & Riahi, 2018). However, these tools have appeared in studies published over the last few years because they become widely available and affordable to educators and researchers, and scholars found them as potential tools to support CALL and intercultural education.

Many other emerging technologies currently exist that were not reported in earlier or current research. These included artificial intelligence, cloud computing, natural language processing, air three-dimensional imaging technology, computational thinking, and many others. Scholars use them in various fields, including medicine, education, and business. We assume that they have great potential to be employed in CALL and intercultural education. For example, artificial intelligence performs learning and instructional tasks through visual perception, speech recognition, and decision-making without human intervention (e.g., the Siri application in the iOS operating system uses voice queries and a natural-language user interface to answer questions, make recommendations, and perform actions by delegating requests to various Internet services). It is possible that cloud computing can also help achieve the large-scale sharing of educational resources for collaborative language and cultural learning without using too much device memory. Natural language processing can recognize the learning state of language and cultural learners and their learning problems and then provide timely and necessary assistance. Although these technologies are advancing

rapidly and becoming affordable in academia, they still have not received much attention in CALL and intercultural education context but could become a critical source in promoting skills in the future. Therefore, it is suggested that these technologies have a potential in CALL and intercultural education. They can be considered by educators and researchers in future educational projects based on their pedagogical affordances. More research on the applications of emerging technologies will also develop knowledge to guide practice. Additionally, policies are needed to make emerging technologies available to educators and researchers, encouraging them to use such technologies more frequently.

### **5.3. Languages and cultures**

The vast majority of studies focused on English as a foreign language because English is a compulsory language in primary school and, above all, is included in undergraduate and graduate programs in many non-English speaking countries and regions (Wang, 2020). For the same reason, American culture was most often the target culture, or learners from the United States were most often involved in language and cultural learning. Intercultural communication competence was popular in the reviewed research because it entails multidimensional skills such as multicultural knowledge, linguistic competence, communicative competence, personal attitudes, self-awareness, and knowing others' values and norms (Baker, 2016).

Based on our results, we suggest that tendencies favoring certain contexts should be addressed. Future studies may consider using different contexts (i.e., various languages and cultures), to bring diversity, depth, and range into related research. We also suggest that educators and researchers consider various language and cultural skills in future studies.

### **5.4. Methodology**

Various groups of learners can be involved in language and culture research. However, the most frequently involved group was undergraduate students because the length of each class in the university was long, and complex learning activities could be carried out. The foreign language level of most of the participants was advanced, and such learners usually learned a foreign language before entering university. Advanced learners could communicate more smoothly across cultures, thereby engaging more with intercultural issues rather than dealing with the language barrier.

It is suggested that learners with other academic and proficiency levels also need to be considered in future research on CALL and intercultural

education. For example, kindergarten or elementary school students can be involved in the future. Scholars have argued that digital literacy and social and intercultural interactions are essential 21st-century skills and should be integrated into early childhood practice, such as the curriculum and daily routines of kindergarten and elementary school students (Sylva et al., 2020). However, when involving these groups, it should be noted that learners do not have advanced language skills, and therefore, the instructor/s needs to provide timely assistance. In addition, some assisting technologies, such as computer-aided translation, can be applied to assist the interaction of language learners with low language abilities.

Most studies lasted for four to sixteen weeks. Educators and researchers may consider such duration of studies in the future. Scholars suggested avoiding short-term studies to offset the influence of various confounding variables, such as the novelty effect (Chwo et al., 2018). On the other hand, scholars claimed that although long-term studies make observing changes more accurate and provide unique insight that might not be possible any other way (Chwo et al., 2018), they are usually time-consuming, labor-intensive, expensive, and logistically problematic (Barkhuizen, 2009). In addition, participants of long-term studies tend to drop out over time, thus shrinking the sample size and decreasing the amount of data collected (Jenkins et al., 2011).

The most frequent learning activity was interaction because learners had to introduce themselves, learn about their partners, collaborate on product creation, and reflect on their language and cultural experiences. This is in line with the social nature of language and cultural learning (Vygotsky, 1978); learners are involved in the social learning process, which fosters their cognitive development (Liao & Lu, 2018; Yang, 2018).

Reviewed studies adopted questionnaires, interviews, and communication content for data collection because, with such data, scholars were able to understand the participants' language and cultural learning process and learning experiences more deeply. These instruments, as well as those that were less used in reviewed studies (e.g., students' reflection, learning behavior and field notes), can be considered in future research projects, as the perspectives of language learning have broadened to include situated activities and thus, more qualitative methodologies are used.

### **5.5. Results reported in the reviewed studies**

The most frequently reported benefits were the development of intercultural and language skills. For example, Özdemir (2017) stated that discussions on Facebook in the target language were an effective tool to improve language skills and help develop intercultural skills. Lee and

Song (2019a) also found that online contact with the target culture contributed to cultural knowledge development. Lenkaitis and Loranc-Paszylk (2019) suggested that synchronous computer-mediated communication-based telecollaboration was an effective vehicle for intercultural communicative competence development. Furthermore, the teacher's instructional strategies and support also played an important role. For example, Flowers et al. (2019) claimed that both autonomous and guided exchange contributed to intercultural communicative competence. Dooly and Sadler (2016) found that through carefully scaffolded and meticulously planned technology-enhanced language learning activities, learners gradually developed more sociopragmatic competences in their use of formulaic chunks in contextualized "everyday" talk. This is a reminder to teachers that choosing the right technologies is as important as implementing the right instructional strategies. After selecting a tool, teachers should design appropriate learning activities and provide corresponding support.

Various issues that were reported in the reviewed studies can be resolved through various approaches. For example, securing financial resources in advance can help with cost increase problems (Lee & Park, 2017). The telecollaborative program can be turned into a separate credit course rather than as an attachment to an existing course to handle the learning burden problem (Luo & Gui, 2019). To address data collection issues, it would be necessary to collect data (i.e., have students conduct oral interviews) for two distinct intervals (Cunningham, 2019). Future studies may also use recording devices to record the whole class learning process (Kusumaningputri & Widodo, 2018). To address technical issues, teachers should be supported by designated technical personnel (Lee & Park, 2017; Lomicka & Ducate, 2019; Priego & Liaw, 2017). To address a lack of prior knowledge in learners, teachers need to preselect appropriate learning resources based on students' foreign language proficiency levels (Lin & Wang, 2018), and learners should be adequately prepared before starting the task (Chen & Yang, 2016; Liao & Lu, 2018; Miranda Bojórquez et al., 2016; Ryshina-Pankova, 2018). To make students less anxious during language and cultural exchanges, educators and researchers should arrange training sessions before the exchange, actively guide students through the learning activities, and provide them timely assistance when necessary (Yang, 2018). In addition, students can be allowed to speak both in the target and native languages, and advanced language ability learners can help low language ability peers increase the efficacy of CALL and culture learning programs. Therefore, educators and researchers need to consider challenges identified in this review study and corresponding solutions to run their CALL and intercultural education projects more smoothly and effectively.

## 6. Limitations

This study acknowledges that the search for research articles was limited to SSCI journals only. Many articles reporting experiences regarding CALL and intercultural education published in non-SSCI journals, conference proceedings, and book chapters were not included in this review. Future studies may review articles from other sources to provide more extensive and detailed information on CALL and intercultural education. Another limitation is that 18 reviewed studies included no information related to theoretical foundations. To help complete the information, two researchers of the present study analyzed the articles and identified the missing content based on the concepts and terms used and the references drawn on in the reviewed studies. Although the two researchers were experienced and followed strict protocols, the results still should be used with caution, as the scholars in these 18 reviewed studies did not state their theoretical approaches explicitly. In future studies, such information should be included, as it is important and can help guide research.

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## Data availability statement

The dataset will be provided on request after we finish this project.

## References

- \*Angelova, M., & Zhao, Y. (2016). Using an online collaborative project between American and Chinese students to develop ESL teaching skills, cross-cultural awareness and language skills. *Computer Assisted Language Learning*, 29(1), 167–185. <https://doi.org/10.1080/09588221.2014.907320>
- \*Aristizábal, J. C., & Welch, P. M. (2017). Rio de Janeiro to Claremont: Promoting intercultural competence through student-driven online intercultural exchanges. *Hispania*, 100(2), 225–238. <https://doi.org/10.1353/hpn.2017.0037>
- Aydemir, M., Özkeskin, E. E., & Akkurt, A. A. (2015). A theoretical framework on open and distance learning. *Procedia-Social and Behavioral Sciences*, 174, 1750–1757. <https://doi.org/10.1016/j.sbspro.2015.01.833>
- Baker, W. (2016). Culture and language in intercultural communication, English as a lingua franca and English language teaching: Points of convergence and conflict. In P. Holmes, & F. Dervin (Eds.), *The cultural and intercultural dimensions of English as a lingua franca* (pp. 70–89). Multilingual Matters.
- Barkhuizen, G. P. (2009). Topics, aims, and constraints in English teacher research: A Chinese case study. *TESOL Quarterly*, 43(1), 113–125. <https://doi.org/10.1002/j.1545-7249.2009.tb00231.x>
- Bereiter, C. (1994). Constructivism, socioculturalism, and Popper's world. *Educational Researcher*, 23(7), 21–23. <https://doi.org/10.3102/0013189X023007021>
- Byram, M. (1997). *Teaching and assessing intercultural communicative competence*. Multilingual Matters.
- Chen, G. M., & Starosta, W. J. (1997). A review of the concept of intercultural sensitivity. *Human Communication*, 1, 1–16.
- \*Chen, J. J., & Yang, S. C. (2016). Promoting cross-cultural understanding and language use in research-oriented Internet-mediated intercultural exchange. *Computer Assisted Language Learning*, 29(2), 262–288. <https://doi.org/10.1080/09588221.2014.937441>
- Chwo, G. S. M., Marek, M. W., & Wu, W. C. V. (2018). Meta-analysis of MALL research and design. *System*, 74, 62–72. <https://doi.org/10.1016/j.system.2018.02.009>
- Çiftçi, E. Y., & Savaş, P. (2017). The role of telecollaboration in language and intercultural learning: A synthesis of studies published between 2010 and 2015. *ReCALL*, 30(03), 278–298. <https://doi.org/10.1017/S0958344017000313>
- \*Clavel-Arroitia, B. (2019). Analysis of telecollaborative exchanges among secondary education students: Communication strategies and negotiation of meaning. *Porta Linguarum*, 31, 97–116.
- Creswell, J. W. (2014). *Educational research: Planning, conducting, and evaluating quantitative*. Pearson Education.
- Crompton, H., Burke, D., & Lin, Y. C. (2019). Mobile learning and student cognition: A systematic review of PK-12 research using Bloom's Taxonomy. *British Journal of Educational Technology*, 50(2), 684–701. <https://doi.org/10.1111/bjet.12674>
- \*Cunningham, D. J. (2019). Telecollaboration for content and language learning: A Genre-based approach. *Language Learning & Technology*, 23(3), 161–177.
- \*del Rosal, K., Conry, J., & Wu, S. (2017). Exploring the fluid online identities of language teachers and adolescent language learners. *Computer Assisted Language Learning*, 30(5), 390–408. <https://doi.org/10.1080/09588221.2017.1307855>

- \*Dooly, M., & Sadler, R. (2016). Becoming little scientists: Technologically-enhanced project-based language learning. *Language Learning & Technology*, 20(1), 54–78.
- \*Feryok, A., & Oranje, J. O. (2015). Adopting a cultural portfolio project in teaching German as a foreign language: Language teacher cognition as a dynamic system. *The Modern Language Journal*, 99(3), 546–564. <https://doi.org/10.1111/modl.12243>
- \*Flowers, S., Kelsen, B., & Cvitkovic, B. (2019). Learner autonomy versus guided reflection: How different methodologies affect intercultural development in online intercultural exchange. *ReCALL*, 31(3), 221–237. <https://doi.org/10.1017/S0958344019000016>
- Garrett-Rucks, P. (2013). A discussion-based online approach to fostering deep cultural inquiry in an introductory language course. *Foreign language Annals*, 46(2), 191–212.
- \*García-Gómez, A. (2020). Intercultural and interpersonal communication failures: Analyzing hostile interactions among British and Spanish university students on WhatsApp. *Intercultural Pragmatics*, 17(1), 27–51. <https://doi.org/10.1515/ip-2020-0002>
- \*Guichon, N. (2019). A self-tracking study of international students in France: Exploring opportunities for language and cultural learning. *ReCALL*, 31(3), 276–292. <https://doi.org/10.1017/S0958344019000090>
- \*Hsu, S. Y. S., & Beasley, R. E. (2019). The effects of international email and Skype interactions on computer-mediated communication perceptions and attitudes and intercultural competence in students. *Australasian Journal of Educational Technology*, 35(1), 149–162. <https://doi.org/10.14742/ajet.4209>
- Jenkins, A., Akerman, R., Frumkin, L., Salter, E., & Vorhaus, J. (2011). *Literacy, numeracy and disadvantage among older adults in England*. University of London.
- Jin, S. (2015). Using Facebook to promote Korean EFL learners' intercultural competence. *Language Learning & Technology*, 19(3), 38–51.
- \*Juan-Garau, M., & Jacob, K. (2015). Developing English learners' transcultural skills through content- and task-based lessons. *System*, 54, 55–68. <https://doi.org/10.1016/j.system.2015.04.017>
- \*Jung, Y., Kim, Y., Lee, H., Cathey, R., Carver, J., & Skalicky, S. (2019). Learner perception of multimodal synchronous computer-mediated communication in foreign language classrooms. *Language Teaching Research*, 23(3), 287–309. <https://doi.org/10.1177/1362168817731910>
- \*Kohn, K., & Hoffstaedter, P. (2017). Learner agency and non-native speaker identity in pedagogical lingua franca conversations: Insights from intercultural telecollaboration in foreign language education. *Computer Assisted Language Learning*, 30(5), 351–367. <https://doi.org/10.1080/09588221.2017.1304966>
- \*Ku, D. T., & Chen, N. L. (2015). Influence of wiki participation on transnational collaboration learning anxiety in middle school students. *Internet Research: Electronic Networking Applications and Policy*, 25(5), 794–810. <https://doi.org/10.1108/IntR-05-2014-0142>
- \*Kurek, M., & Mueller-Hartmann, A. (2017). Task design for telecollaborative exchanges: In. *Search of New Criteria*. *System*, 64, 7–20.
- \*Kusumaningputri, R., & Widodo, H. P. (2018). Promoting Indonesian university students' critical intercultural awareness in tertiary EAL classrooms: The use of digital photograph-mediated intercultural tasks. *System*, 72, 49–61. <https://doi.org/10.1016/j.system.2017.10.003>
- \*Lee, J., & Song, J. (2019a). Developing intercultural competence through study abroad, telecollaboration, and on-campus language study. *Language Learning & Technology*, 23(3), 178–198.



- \*Lee, J., & Song, J. (2019b). The impact of group composition and task design on foreign language learners' interactions in mobile-based intercultural exchanges. *ReCALL*, 32(1), 63–84. <https://doi.org/10.1017/S0958344019000119>
- \*Lee, J. Y., & Park, S. (2017). Analysis of critical success factors of online international learning exchange of Korean school pupils with English-speaking counterparts. *British Journal of Educational Technology*, 48(6), 1228–1238.
- \*Lee, K. (2018). Implementing computer-mediated intercultural communication in English education: A critical reflection on its pedagogical challenges. *Journal of Computer Assisted Learning*, 34(6), 673–687. <https://doi.org/10.1111/jcal.12275>
- \*Lenkaitis, C. A., Calo, S., & Venegas Escobar, S. (2019). Exploring the intersection of language and culture via telecollaboration: Utilizing videoconferencing for intercultural competence development. *International Multilingual Research Journal*, 13(2), 102–115. <https://doi.org/10.1080/19313152.2019.1570772>
- \*Lenkaitis, C. A., & Loranc-Paszyk, B. (2019). Facilitating global citizenship development in lingua franca virtual exchanges. *Language Teaching Research*, 25(5), 711–728. <https://doi.org/10.1177/1362168819877371>
- Levy, M. (1997). *CALL: Context and conceptualization*. Oxford University Press.
- \*Liao, J., & Lu, X. (2018). Exploring the affordances of telepresence robots in foreign language learning. *Language Learning & Technology*, 22(3), 20–32.
- \*Liaw, M. L. (2019). EFL Learners' Intercultural Communication in an Open Social Virtual Environment. *Educational Technology & Society*, 22(2), 38–55.
- \*Lin, Y. J., & Wang, H. C. (2018). Using enhanced OER videos to facilitate English L2 learners' multicultural competence. *Computers & Education*, 125, 74–85. <https://doi.org/10.1016/j.compedu.2018.06.005>
- \*Lomicka, L., & Ducate, L. (2019). Using technology, reflection, and noticing to promote intercultural learning during short-term study abroad. *Computer Assisted Language Learning*, 34(1–2), 35–65. <https://doi.org/10.1080/09588221.2019.1640746>
- \*Luo, H., & Gui, M. (2019). Developing an effective Chinese-American telecollaborative learning program: An action research study. *Computer Assisted Language Learning*, 34(5–6), 609–636. <https://doi.org/10.1080/09588221.2019.1633355>
- \*Maíz-Arévalo, C. (2017). Small talk is not cheap': Phatic computer-mediated communication in intercultural classes. *Computer Assisted Language Learning*, 30(5), 432–446. <https://doi.org/10.1080/09588221.2017.1304423>
- \*McNeil, L. (2017). Language about intercultural communication: The occurrence and conceptual focus of intracultural peer collaborative dialogues. *Language Awareness*, 26(3), 151–169. <https://doi.org/10.1080/09658416.2017.1377723>
- \*Melo-Pfeifer, S. (2015). Blogs and the development of plurilingual and intercultural competence: Report of a co-actional approach in Portuguese foreign language classroom. *Computer Assisted Language Learning*, 28(3), 220–240. <https://doi.org/10.1080/09588221.2013.818556>
- \*Miranda Bojórquez, E., Vergara Villegas, O. O., Cruz Sánchez, V. G., García-Alcaraz, J. L., & Favela Vara, J. (2016). Study on mobile augmented reality adoption for Mayo language learning. *Mobile Information Systems*, 2016, 1–15. <https://doi.org/10.1155/2016/1069581>
- \*Mitchell, C. (2018). Pinterest: A vehicle to promote cross-cultural awareness in an introductory Spanish course. *Hispania*, 101(4), 573–586. <https://doi.org/10.1353/hpn.2018.0179>
- Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & The Prisma Group. (2009). Prisma statement - preferred reporting items for systematic reviews and meta-analyses.

- Journal of Chinese Integrative Medicine*, 7(9), 889–896. <https://doi.org/10.3736/jcim20090918>
- \*Nishio, T., & Nakatsugawa, M. (2020). Successful participation in intercultural exchange: Tensions in American-Japanese telecollaboration. *Language Learning & Technology*, 24(1), 154–168.
- \*Oakley, G., Pegrum, M., Xiong, X. B., Lim, C. P., & Yan, H. (2018). An online Chinese-Australian language and cultural exchange through digital storytelling. *Language, Culture and Curriculum*, 31(2), 128–149. <https://doi.org/10.1080/07908318.2017.1386193>
- O'Dowd, R. (2011). Online foreign language interaction: Moving from the periphery to the core of foreign language education? *Language Teaching*, 44(3), 368–380.
- \*O'Dowd, R. (2015). Supporting in-service language educators in learning to telecollaborate. *Language Learning & Technology*, 19(1), 63–82.
- O'Dowd, R. (2018). Innovations and challenges in using online communication technologies in CLIL. *Theory into Practice*, 57(3), 232–240. <https://doi.org/10.1080/00405841.2018.1484039>
- \*Oskoz, A., & Gimeno-Sanz, A. (2020). Exploring L2 learners' engagement and attitude in an intercultural encounter. *Language Learning & Technology*, 24(1), 187–208.
- Özdemir, E. (2017). Promoting EFL learners' intercultural communication effectiveness: A focus on Facebook. *Computer Assisted Language Learning*, 30(6), 510–528. <https://doi.org/10.1080/09588221.2017.1325907>
- Piri, S., & Riahi, S. (2018). Cross-cultural perspectives on technology-enhanced language learning: A review of research. In Tafazoli, D., Gomez Parra, M. E., & Huertas-Abril, C. (Eds.), *Cross-cultural perspectives on technology-enhanced language learning* (pp. 1–15). IGI Global.
- \*Porto, M. (2016). Ecological and intercultural citizenship in the primary English as a Foreign Language (EFL) classroom: An online project in Argentina. *Cambridge Journal of Education*, 46(4), 395–415. <https://doi.org/10.1080/0305764X.2015.1064094>
- \*Priego, S., & Liaw, M. L. (2017). Understanding different levels of group functionality: Activity systems analysis of an intercultural telecollaborative multilingual digital storytelling project. *Computer Assisted Language Learning*, 30(5), 368–389. <https://doi.org/10.1080/09588221.2017.1306567>
- \*Ryshina-Pankova, M. (2018). Discourse moves and intercultural communicative competence in telecollaborative chats. *Language Learning & Technology*, 22(1), 218–239.
- \*Schenker, T. (2016). Syntactic complexity in a cross-cultural E-mail exchange. *System*, 63, 40–50. <https://doi.org/10.1016/j.system.2016.08.012>
- \*Sevilla-Pavón, A. (2019). L1 versus L2 online intercultural exchanges for the development of 21st century competences: The students' perspective. *British Journal of Educational Technology*, 50(2), 779–805.
- \*Sevilla-Pavón, A., & Haba-Osca, J. (2017). “Learning from real life and not books”: A gamified approach to Business English task design in transatlantic telecollaboration. *Ibérica, Revista de la Asociación Europea de Lenguas Para Fines Específicos*, (33), 235–260. <https://www.redalyc.org/articulo.oa?id=287050576010>
- Shadiev, R., & Dang, C. (2022). A systematic review study on integrating technology-assisted intercultural learning in various learning context. *Education and Information Technologies*. <https://doi.org/10.1007/s10639-021-10877-6>
- Shadiev, R., Sun, A., & Huang, Y. M. (2019). A study of the facilitation of cross-cultural understanding and intercultural sensitivity using speech-enabled language

- translation technology. *British Journal of Educational Technology*, 50(3), 1415–1433. <https://doi.org/10.1111/bjet.12648>
- Shadiev, R., & Sintawati, W. (2020). A review of research on intercultural learning supported by technology. *Educational Research Review*, 31, 100338. <https://doi.org/10.1016/j.edurev.2020.100338>
- Shadiev, R., Wang, X. Y., Wu, T. T., & Huang, Y. M. (2021). Review of research on technology-supported cross-cultural learning. *Sustainability*, 13(3), 1402. <https://doi.org/10.3390/su13031402>
- Shadiev, R., & Yang, M. (2020). Review of studies on technology-enhanced language learning and teaching. *Sustainability*, 12(2), 524. <https://doi.org/10.3390/su12020524>
- Sylva, K., Sammons, P., Melhuish, E., Siraj, I., & Taggart, B. (2020). Developing 21st century skills in early childhood: The contribution of process quality to self-regulation and pro-social behaviour. *Z Erziehungswiss*, 23, 465–484. <https://doi.org/10.1007/s11618-020-00945-x>
- \*Tudini, V. (2016). Repair and codeswitching for learning in online intercultural talk. *System*, 62, 15–25. <https://doi.org/10.1016/j.system.2016.06.011>
- \*Üzümlü, B., Akayoglu, S., & Yazan, B. (2020). Using telecollaboration to promote intercultural competence in teacher training classrooms in Turkey and the USA. *ReCALL*, 32(2), 162–177. <https://doi.org/10.1017/S0958344019000235>
- \*Van der Zwaard, R., & Bannink, A. (2019). Towards a comprehensive model of negotiated interaction in computer-mediated communication. *Language Learning & Technology*, 23(3), 116–135.
- Vygotsky, L. S. (1978). *Mind in society*. Harvard University Press.
- Wang, S., & Vasquez, C. (2012). Web 2.0 and second language learning: What does the research tell us? *CALICO Journal*, 29(3), 412–430. <https://doi.org/10.11139/cj.29.3.412-430>
- \*Wang, Y. (2020). “It broadens our horizon”: English learners learn through global literature and cultural discussion. *Journal of Adolescent & Adult Literacy*, 63(4), 391–400. <https://doi.org/10.1002/jaal.965>
- \*Ware, P., & Kessler, G. (2016). Telecollaboration in the secondary language classroom: Case study of adolescent interaction and pedagogical integration. *Computer Assisted Language Learning*, 29(3), 427–450. <https://doi.org/10.1080/09588221.2014.961481>
- \*Wu, Z. (2018). Positioning (mis) aligned: The (un) making of intercultural asynchronous computer-mediated communication. *Language Learning & Technology*, 22(2), 75–94.
- \*Yang, R. (2018). The use of questions in a synchronous intercultural online exchange project. *ReCALL*, 30(1), 112–130. <https://doi.org/10.1017/S0958344017000210>
- Zhang, R., & Zou, D. (2021). Types, purposes, and effectiveness of state-of-the-art technologies for second and foreign language learning. *Computer Assisted Language Learning*, 1–47. <https://doi.org/10.1080/09588221.2020.1744666>
- \*Articles reviewed in the study