


# Chapter 12

## Technology in Lifelong Language Learning

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### **ABSTRACT**

*Language learning through apps and other technologies is gaining popularity with adult learners, driven by recreational and pragmatic motivations. This chapter explores how various technologies promote language learning. To provide effective language instruction, developers must integrate communication and support language use in authentic contexts. Learners must identify tools suited to their needs. Virtual and augmented reality tools provide immersive language experiences. Serious gaming and gamification strategies can bolster motivation, while personalized learning tools, including AI, adapt to individual proficiencies. Social media fosters interaction, and digital certifications help learners to demonstrate and receive recognition for their skills. However, as technology simplifies communication across languages, the need to develop high-level language proficiency becomes less evident. Thus, as technology reshapes communication, its use in language teaching and learning must meet users' changing needs, providing motivating, authentic methods to develop and practice language skills.*

### **INTRODUCTION**

In an increasingly global world, language learning does not come to an end with high school or college language courses. Adults may have many motivations for learning a new language or improving their linguistic and communicative skills in

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a language they studied in school. The proliferation of technologies available on the market today provides unprecedented opportunities for exposure to language and tools for improving language teaching and learning. However, because of the vast availability of these tools, effective implementation is a challenge. Students, teachers, course designers, and administrators must understand the potential and limitations of the different technologies to choose the most appropriate for different purposes and use them to their best effect. This chapter will discuss different language learning tools available to promote lifelong language learning. For the purposes of this chapter, lifelong language learning is defined as the continued improvement of language skills throughout one's life, primarily after concluding formal education. This learning may occur informally, incidentally, and individually, or in more purposeful or formal group settings. The discussion will include technologies that promote incidental learning and those that promote learning more systematically, those that are best for individual use, and those that are better for group use. While there are many other cognitive and social benefits to language learning and language learning tools, they are outside the scope of this chapter. The chapter will evaluate the benefits and limitations of different technologies specifically for language learning and discuss various considerations for their implementation.

Technology is used in various ways to support language learning in classes and independent learning situations. Although technology can be integrated in many ways, not all are equal. Technology must be used to support effectual instructional principles.

What are the principles of effective language instruction? Although research continues on the most helpful ways to teach a language, some theories about language acquisition have been so well researched over such a long period that researchers agree they should be incorporated into language instruction. These theories include the following:

1. Motivation is crucial in language learning. Technologies should help build or sustain motivation (Singleton, 2014).
2. Learning a language requires practice. Effective instruction includes opportunities to use the target language (Jones, 2018).
3. Language is used for communication. Therefore, opportunities for interaction must be included in instruction (Richards & Rogers (2014); Soon & Yunus, (2023)).
4. Comprehensible input helps with language acquisition. Students learn better from exposure to language that is challenging without being too difficult (Lichtman & Van Patten, 2021; Krashen, 1982).

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5. Comprehensible input is usually insufficient for adult language learning. Explanations are necessary, at least for some aspects of language learning (Long, 1981; Laufer, 2006).
6. Language always has context. Therefore, when language is taught explicitly, it should be taught in context rather than in isolation (Long, 1991).
7. Language proficiency involves many skills. Depending on the purpose of learning, some skills may need more emphasis, but listening, speaking, reading, and writing are all critical for gaining proficiency (Council of Europe, 2020).
8. Feedback is essential, as is the opportunity to make corrections based on the feedback. Feedback can take many forms and should not only include error correction (e.g. Ferris, 2022).

These eight principles provide a basis for evaluating the instructional quality of any language course or software used for language learning.

The technologies discussed will be divided roughly into four categories:

- those that are inherently communicative, including most forms of social media, which can be used informally with little adaptation to support language learning
- those that can stand alone and are explicitly designed for language learning, such as apps and courses
- those that have been developed for more general purposes but have great promise for integration into language learning environments, which include personalized learning and adaptive technologies, Virtual Reality (VR), Augmented Reality (AR), games and gamification, and Artificial Intelligence (AI)
- those that help with assessment and credentialing.

Language learning can potentially integrate a wide variety of technologies in endless ways. As a skill set that incorporates many other learning aspects, language learning is an ideal application of the techniques and technologies discussed throughout this book. This chapter explores the questions and challenges associated with language learning and uses language learning to examine the use of different forms of technology to create effective language learning experiences. In addition to analyzing the extent to which each of the technologies meets the criteria for effective language instruction, the practical considerations for implementing the technology in a language learning context will also be discussed.

## **ADULT MOTIVATION IN LANGUAGE LEARNING**

How successful an adult is in language learning depends a great deal on the level and type of motivation for learning (Singleton, 2014). Language learning can be undertaken out of interest in the language itself or to achieve an external purpose. Reasons for language learning vary by location and circumstances. For example, an adult native English speaker living in the United States may be more likely to learn a language for fun, whereas one in Europe is more likely to study a language for work opportunities (Jordan, 2016). An adult may choose to learn a language for fun—out of interest, for travel, to enjoy media, or for social reasons. More serious reasons include professional advancement, immigration, or migration.

While traditional ideas about language learning suggest that adults are unlikely to develop high proficiency levels, recent research has challenged these limitations (see, e.g., Caldwell-Harris & MacWhinney, 2023). Adult language learners have a wide range of attainment levels, influenced by many factors. While some factors may be biological, others relate more to individual abilities, motivation level, and the surrounding circumstances. With enough motivation and exposure to a language, adults can achieve sufficient language proficiency levels to meet their needs.

In the past, language learning motivation was an individual issue, and exposure to language depended primarily on where one lived or one's formal level of education. With the proliferation of technology, manipulating these factors has become much easier. Technology permits constant exposure to any commonly spoken language. Language learners can spend as many hours as they like watching movies and television in the target language, listening to radio, reading newspapers and books, chatting via text, and speaking with native speakers of a wider range of languages than most people fifty years ago encountered in a lifetime. Additionally, technology can make even the most mundane language learning activities, such as practicing vocabulary, more fun by integrating games or game-like activities, known as gamification. All of these activities can be self-reinforcing. If learners can engage in activities they enjoy, they are more likely to keep doing them.

## **TECHNOLOGIES AND COMMUNICATIVE LANGUAGE LEARNING**

While language teaching in face-to-face classrooms starting in the 1970s has focused on fostering communication skills and teaching specific elements of language within the communicative context (Celce-Murcia, et al., (1997), technology poses a challenge for maintaining these methods. Often, the use of technology has reverted to the rule-based and translation methods of centuries past. It is far easier to use language

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instruction technology for drill and practice than for authentic communication. Technology lends itself to practicing vocabulary with flashcard apps and completing fill-in-the-blank, ordering, or choosing the correct form exercises to practice grammar. When used in this way, technology replaces the paper worksheets of the past (Zenci, 2022). This represents an important and valid use of technology, as practice is essential for internalizing language features (DeKeyser, 2007). However, language instruction must not be limited to activities with correct answers or repetition. Even when technology can enable people to practice more effectively, such as using spaced repetition algorithms for vocabulary learning, language learning activities should not be limited to closed responses (Chong & Reinders, 2020).

Along with the ability to practice more effectively, technology creates endless opportunities for communication. Today, people read and write more than ever as part of daily life. Many more possibilities exist to communicate with speakers of other languages. At the same time, the rise of various translation apps allows people to avoid learning another language. The ability to paste text into a translation app and read it quickly means there is less reason to read in another language. Translation apps and other forms of AI large language models make it less necessary to write in one's first language, let alone to compose in an additional language. As such, technologies present both opportunities and challenges for language learning (Godwin-Jones, 2019).

For technology to serve language learning, any effective program, app, or other technology must have communication at its center (Chun et al., 2016). Technologies that promote drills, practice, and understanding rules have their place, primarily as a support for language learning. Technologies that encourage communication with real or AI partners are more promising tools for language learning. Additionally, these technologies must promote authentic communication. Authentic materials are a cornerstone of communicative language teaching methodology. These materials promote pragmatic competence (the ability to use language to achieve communication goals such as agreement or disagreement, complaint, request for information, etc.), linguistic competence (the ability to use structures correctly), and discourse competence (the ability to carry on a spoken or written conversation naturally in context). Authentic materials may also aid motivation, provided that the level of challenge is appropriate (Gilmore, 2007). Adults, who often have the ability to avoid using a second language, require extensive motivation to overcome the psychological and social barriers to language learning (Caldwell-Harris & MacWhinney, 2023). The challenge then becomes providing authentic opportunities for people to use the new language and promote reasons to increase proficiency.

## **LANGUAGE LEARNING IN THE WILD**

On one end of the learning spectrum may be termed “language learning in the wild” -completely independent learning using the various resources available on the internet. A wide range of materials is available; some are intended for language learning, and some are regularly occurring media the user can modify to facilitate language learning. Some tools intended for language learning include simplified news articles, easy language podcasts, and grammar and vocabulary exercises. Some tools that can be modified include videos with closed captioning, ebooks with clickable definitions, or anything digital that can be read with the help of dictionary or translation tools.

The advantage of using this type of material is that any authentic material can become a source for language learning. A challenge is that these materials are more accessible to people with higher proficiency levels. Fewer dedicated materials are available for beginners. Beginning learners may be better served by participating in more structured language instruction programs.

Additionally, independent selection of materials on the part of the learner means that the materials are not systematically scaffolded, unless they are part of a course or developed curriculum. These methods primarily meet the criteria of comprehensible input; they are weaker regarding other instructional requirements. For a teacher or course developer, these tools can be useful adjuncts to instruction, but they are unlikely to become the core of the teaching environment. Teachers and course designers need to be able to evaluate the levels of available materials and adapt them when necessary.

## **SOCIAL MEDIA AND COLLABORATION FOR COMMUNICATION**

Other technologies appropriate for incidental language learning or incorporation into a class are social media, which provide natural, real-world opportunities for communication. For example, WhatsApp, a popular messaging app, has been shown to have affective benefits for language learners (Alamer et al., 2023). It has also enabled the provision of feedback (Murphy et al., 2023) and for developing pragmatic competence (García-Gómez, 2022).

Not only can social media be used to connect people who speak different languages and promote the use of a given language as a lingua franca, but it can also be used as a medium of instruction with human or virtual teachers.

Collaboration is one of the most important uses of language. As such, collaborative learning is a natural fit for language instruction and language learning. Shared projects and tasks can unite people and provide an authentic context for language

use. Tools such as shared docs, digital video editing, wikis, and other tools that allow collaboration provide opportunities for peer editing, feedback, and authentic reasons for communication (Hafner & Miller, 2021) and have been shown to have benefits for second language writing (Zhang & Zou, 2022). These technologies are useful for the individual learner who wants informal practice or for a teacher to incorporate in a more structured way into a class.

## **ASYNCHRONOUS ONLINE COURSES**

On the other end of the spectrum from the incidental, casual language use afforded by social media are formal courses. Massive open online courses (MOOCs) and other self-paced online courses are available for free or at a low cost. Two examples of asynchronous open course platforms are Coursera (<https://www.coursera.org/>), a free platform and Udemy (<https://www.udemy.com/>), a paid platform. Both offer a wide range of courses, including courses in English and courses on many other topics without a specific language focus.

According to the principles outlined above, how can asynchronous online courses be used effectively for learning a language? The platforms include specific language courses, which generally include videos and readings that cover information about the target language. This type of activity provides the explicit explanation that adult learners often appreciate. Further, the courses can be good sources of comprehensible input if they present readings and videos at the appropriate levels. When recorded in the target language (TL), the explanation videos are generally not at levels appropriate for beginning students. If the videos are recorded in the first language (L1), another issue arises regarding the role of L1 in language instruction. Although broad consensus exists that some L1 use is helpful, especially for vocabulary instruction, instructional methods that rely solely on the L1 suffer from the issue of insufficient TL input (Samardali & Ismael, 2017).

The main issue with asynchronous courses without an active teacher presence is the minimal opportunity for communication and practice, aside from the repetition that learners may choose to do on their own outside of the course (Bilici & Koroğlu, 2022). Some opportunities may be afforded for writing, but these typically do not involve feedback. Even when feedback is available, it is generally automated and based on small amounts of writing. Moreover, these courses generally lack the opportunity to speak. One Coursera course on speaking English professionally presents a video on small talk followed by a multiple-choice question: “Choose one incorrect statement from the following,” followed by several statements about small talk. (The correct answer was, “Small talk is not important in the work world”) (Stevens, 2023). An exercise like this may provide interesting information about

small talk and valuable opportunities for listening and reading. However, it does not teach the student to engage in small talk.

The benefits are evident for those developing online open asynchronous courses to teach language. Asynchronous online courses offer the opportunity to teach many students simultaneously. They require only the investment of planning and development, and the course can be reused without limits. For language learners, the benefits include low cost and convenience. Given this instructional medium's benefits and convenience, how can it be used more effectively for language instruction?

One simple method of improving courses without an active teacher presence is to provide a more transparent description. "This course will provide you with opportunities to read and write about professional communication" is more accurate than "This course will teach you to communicate effectively." "This course will help you to understand grammar rules" is more accurate than "This course will teach you to use grammar more effectively." The changes reflect what an asynchronous course can and cannot do. An asynchronous course can add to one's knowledge about language and can offer opportunities to develop receptive language skills (reading and listening). They offer few opportunities to develop language production skills (speaking and writing), and even when they do offer those opportunities, they do not present the interaction and feedback necessary for improvement.

Another method for improving these courses is to focus on what the courses do best. Reading and listening are skills suitable for development in an asynchronous course, allowing opportunities for repetition and looking up words (Viriya, 2022). A third method is to increase the interactivity of the asynchronous course using available technology. H5P (H5P.org) is a free, interactive set of tools that can be integrated into many online platforms directly or through embedding. These tools include activities that require oral responses, written responses to listening comprehension activities, and many more (H5P, 2019). While they will not transform an asynchronous course into an opportunity to immerse oneself in interactive experiences, they will increase the course's level of interactivity.

One effective way of increasing the interactivity of courses that teach writing skills is to include a teacher who provides feedback and interacts with the students, even if not in real-time. Discussion boards and collaborative writing projects can encourage students to interact with each other. The issue with including real teachers in these courses is the additional cost of the teacher and often the reduced class size. Another promising tool for adding interactive experiences to asynchronous courses involves AI chatbots (Kohnke, et al., 2023). Whether through written conversations with a chatbot or the use of text-to-speech software to make it a spoken interaction, this technology provides a low-cost way of adding more extensive interaction to courses. The downside is that AI may not fully understand language levels and may



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provide interaction above the level of beginning students (Pack & Maloney, 2023; Rossi, 2023). With time, this limitation will undoubtedly improve.

Asynchronous courses may also be used for language development at intermediate or higher levels of proficiency when language *is not* the focus of the course. Because MOOCs are available in a wide range of languages, a simple way to improve language skills is to choose an interesting course in the target language. In this way, learners receive significant input on topics relevant to them. With some dedication to tasks such as looking up unfamiliar words, these courses provide extensive language input through audio and texts, and the audio is generally subtitled in either the native language or the TL, which can be helpful to intermediate and advanced-level language learners. Another activity that can aid language learning in a course with videos is if the learner replays and transcribes the audio, which helps to focus attention on language (Kessler, Lowen, & Trego, 2023).

## **SYNCHRONOUS ONLINE COURSES**

Synchronous online courses allow the flexibility of taking courses anywhere, and with the ability to schedule courses with teachers worldwide, the course timing can also be flexible. Although synchronous courses offer less flexibility than asynchronous courses, they offer many compensatory benefits. One benefit of an online synchronous course is the presence of a teacher. This can provide many more opportunities for interaction and feedback. The interaction may be limited if a group is too large. However, online instructional platforms such as Zoom allow for the use of breakout rooms, thus providing opportunities for interaction with the teacher and other students. One-on-one classes offer greater interaction with the teacher but limited opportunities to communicate with other students (Viriya, 2022).

Another option is bisynchronous courses, which offer a blend of asynchronous independent activities that provide input and practice and allow students to review explanations as needed, along with real-time activities that provide the benefits of interaction, scaffolding, and feedback that a live teacher can provide (Viriya, 2022).

## **MOBILE-ASSISTED LANGUAGE LEARNING (MALL)**

Mobile-assisted language learning has gained popularity and attention in recent years. The promise of learning a language anywhere at any time is compelling. Rather than relying on formal courses, apps utilize activities and sometimes multimedia to deliver instruction.

Duolingo and Babbel are two popular examples of this type of app. Duolingo uses a learning path to take students through carefully sequenced activities to practice speaking, listening, reading, and writing. Babbel's activities include explicit lessons, games, and podcasts. Besides their mobility, the primary benefit of mobile apps is the pleasant user experience.

Duolingo relies heavily on gamification techniques. Gamification is the addition of game-like elements to a learning experience that is not otherwise a game. Elements of gamification include points, tokens, levels, leaderboards, prizes, and other features associated with games. Duolingo, for example, offers students tokens called "Lingots" for performing desirable behaviors, such as logging in regularly, passing quizzes, meeting time goals, meeting learning goals, and many others. These techniques are meant to increase student motivation.

Duolingo and Babbel have been shown to help users progress in language learning. Users rate both as enjoyable. Both apps, however, suffer from a lack of learner persistence (Kessler Loewen, & Gönülal, 2023). Why would this be the case?

In both cases, the apps' focus on the user experience appears insufficient to motivate students to continue. To understand why, we need to look not just at the user experience but also the learning activities. Duolingo relies on a set of activities, including translation, repetition, reordering words, and dictation. While these activities can be helpful for language learning, they are more useful for beginners and do not follow many of the effective instructional principles such as authenticity, and communicative practice. They do provide feedback, but it is limited to correct and incorrect responses to constrained tasks rather than the user's authentic language production. There are no open-ended activities. The input is limited to isolated sentences rather than the more authentic, extended input necessary for language development. The activities are also lacking a larger context. An additional limitation of Duolingo is that it doesn't link its activities to an external scale, such as the CEFR. Such linkage allows for more understanding of one's proficiency and facilitates the integration of different apps and curricula.

Gamification can help to increase motivation to a point. However, if the learning experiences are not inherently motivating, a user is unlikely to persist in studying long enough to become proficient, even if the activities included are sufficient to achieve proficiency.

Users also rate Babbel highly for the user experience, but this app relies on the authenticity of the input and language games rather than gamification. Babbel prides itself on the presentation of authentic language and the development of communication skills. Activities include traditional activities, games, stories, podcasts, cultural information, and videos. Additionally, an add-on feature allows live, small-group practice with teachers. Babbel's strength involves its comprehensible input.

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Ultimately, though, its opportunities for communication are limited, especially without the add-on live classes.

Another difference between the two apps is that Babbel uses more explicit explanations of language rules, while Duolingo uses more implicit learning techniques, allowing the user to infer rules from the language presented. Neither implicit nor explicit techniques have been shown to be superior. Current research shows that implicit and explicit knowledge play different roles in language proficiency (Ellis, 2009). Explicit knowledge is necessary for self-correction and editing. Implicit knowledge is used for spontaneous communication.

Past research has shown little difference in user persistence between the two apps (Kessler, Loewen & Gönülal, 2023). More research must be conducted to determine whether the new features added to the platforms result in greater persistence. Research indicates that either app is a good way to start learning a language and will help the user to develop language proficiency. Duolingo is probably better for beginning learners. With its free version, the only investment is that of time. Once a learner has made some progress and grows tired of the app, Babbel offers an opportunity to invest further in developing language skills.

Another type of MALL involves flashcard apps designed to aid in memorization. Some of these, like Quizlet, include simple games. Anki is a desktop and mobile app that features an effective spaced repetition algorithm that allows users to review words until they master them and then presents the words periodically to encourage retention. This app is not specifically a language learning tool, nor can it teach language on its own. However, it is a valuable tool for reinforcing vocabulary learning and increasing vocabulary size when used in conjunction with other instructional activities.

## **SERIOUS GAMES AND GAMIFICATION IN LANGUAGE LEARNING**

Babbel and Duolingo highlight the differences between games and gamification in language learning. While games can be used on their own for language learning, gamification is a technique included in other technologies. Gamification uses game elements or mechanics (such as the “Lingots” used by Duolingo) to make something that is not a game look and feel like a game. In the most basic example, a traditional language class can be gamified by assigning points for attendance, completed worksheets, high test scores, or completed homework. Incorporating competition by dividing the class into teams or creating individual or group leaderboards takes gamification to the next level.

An alternative to gamification is the use of serious games. The difference between gamification and a game is the difference between awarding points for classwork completion and games such as football. While the awarding points for classwork has game mechanics but is not a game, football has game mechanics and is a game. With football, the incentive to play is fun. The points are just a bonus.

One of the biggest challenges in language learning is finding the motivation to learn the language. Even when one has a pressing and immediate need for the language, embarrassment and the required time and mental energy can all derail one's attempts to learn a language. Games and gamification provide ways to overcome these barriers.

Serious games integrate a learning goal with an inherently fun game. Flight simulators are a classic example of serious games used for pilots. The game's goal is to learn to fly, but even people with no interest in piloting an actual plane may enjoy using a flight simulator. In language learning, serious games can be used for many purposes (Chen & Hsu, 2020).

Digital serious games vary in complexity and the purposes for which they are used. One of the simplest purposes is to practice grammatical structures and vocabulary. Arcade-style shooting games, matching games, word searches, and mazes can all be used to practice identifying correct forms. In addition to increased opportunities for practice, games make the practice more fun, providing additional motivation. Games can also reinforce language concepts and promote retention of knowledge (Dixon, et al., 2022).

More complex games may not be serious but still allow users to practice structures and words and provide reasons for using authentic language. Logic puzzles, role-playing games (RPGs), and adventure games all offer authentic reasons to use language while lowering emotional barriers. Games may involve interacting with characters, reading, writing, or even speaking and have shown benefits for vocabulary acquisition (Wei, et al., 2019). Many popular RPGs and massively multiplayer online role-playing games (MMORPGs) have interfaces that can be set to other languages. Games like *The Sims* use text commands to control the characters. *Minecraft* has many educational activities that can be used for developing language skills. Games can even facilitate interaction with real people if there is a chat function in the game, as in most MMORPGs. Given the inherent motivation that these games generate, they have tremendous promise as ideal vehicles for language learning. Research has shown that the engagement strategies of digital games make them more effective than purpose-built language games for language learning (Dixon et al., 2022). Research on the impact of the type of language the game requires is mixed. It appears that players make the highest gains with games that do not require the user to produce language and those that require both speaking and writing. However, more research is needed to understand the implications of these findings.

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At this point, very few games are available that have intentionally built language development into their design. Many top-rated games include language as part of the game design. Many games are developed for the purpose of language learning. The problem is that, for the most part, truly entertaining games do not intentionally capitalize on language learning opportunities, and most games developed for language learning are basic substitutes for drills. Currently, language learning through games is primarily low-level or incidental rather than structured and intentional. A dedicated language learner who is motivated by gaming can undoubtedly use video games to improve language skills, but the games are not generally structured systematically for language development. Inclusion of strategies such as problem-based learning can help to make games more effective for learning (Gillani, et al., 2022) and inclusion of intentional sequencing can have benefits for improving reading skills (Serra & Gilabert, 2021). Because of games' potential as a tool for language learning, gaming is an area that merits further attention from the language instruction community (Becerra & Antoniadis, 2020; Pappa & Papadima-Sophocleous, 2019).

## **VR AND AR TECHNOLOGIES IN LANGUAGE LEARNING**

Some of the most effective ways of integrating communicative activities in language learning involve virtual reality (VR) and augmented reality (AR) technologies. VR activities usually involve headsets that project images and sounds that make users feel like they are in another place. VR creates the experience of putting the learner in any environment and provides low-stress opportunities to practice language with real or virtual communication partners. Language experiences in VR can be structured or incidental.

From early on, this technology showed promise for language learning. Platforms such as Second Life offer virtual worlds where one can sit (virtually) in a language class and communicate via an avatar or practice communicating in simulated environments like those in which the user might want to communicate in real life. Virtually, users can visit an art museum, for example, and converse in any language about the art they are seeing.

For learning a language for specific purposes, VR can simulate environments where one would use the target language. An immigrant doctor, for example, could practice surgery in an operating room run in the new country's language. Clear benefits exist for allowing a surgeon to improve relevant language skills before participating in a real-life operation. Some of the significant benefits of VR environments are not only cognitive but also affective, with the use of avatars allowing learners to feel less embarrassed when experimenting with another language (Hua & Wang, 2023).

Augmented reality (AR) adds features to the real-life world, allowing different languages to be integrated into the surrounding environment, including hearing or seeing explanations of one's environment. Imagine looking at an object and hearing its name in another language or hearing a guided tour of a new place in another language, in which you could even see labels of what you are looking at. Like VR, this technology includes both incidental and instructionally intentional models. ClassVR, for example, incorporates both VR and AR for language teaching. Much of the research conducted on AR has focused on its affective benefits (Punar Özçelik et al., 2022). However, research has also found benefits for pronunciation (Mozaffari & Lee, 2021) and vocabulary (Larchen Costuchen et al., 2021). AR's strongest language-related benefit is providing input, whereas VR is better for encouraging speaking. Both technologies allow for the provision of feedback to the language learner. Both VR, AR, may be used by an individual learner or can be integrated into online or face-to-face courses to provide additional practice and exposure to language. Virtual worlds can be used to host online language courses.

## **PERSONALIZED LEARNING AND ADAPTIVE TECHNOLOGIES**

Personalized learning and adaptive technologies are other examples of technologies that can be included in courses or apps to improve the quality of language instruction. Personalized learning provides learner-specific activities. Factors considered in developing personalized learning activities may include the amount of time the learner wants to spend, the topics the learner wants to study, preferred activities, or specific skills the learner wants to develop. Personalized learning can identify users' strengths and weaknesses in language production and adjust the amounts and types of practice in different areas of language use. Any app designed for individual use should include a level assessment to provide the appropriate level activities. More sophisticated apps will also take into account the user's time constraints, interests, and goals.

The advantages of personalization include efficiency of instruction and enhanced motivation for the learner. If a learner has specific goals and contexts for language learning, personalized instruction respects those needs by providing tailored instruction. For example, learners who need to learn a language for job advancement will be interested in texts and audio related to that job. The vocabulary can also be tailored to the job. The learner can learn about topics other than food and hobbies, which are often covered in beginning general language courses. Learners who primarily use language for telephone conversations do not need to practice composing essays, and people who use language primarily for text-based communications probably do not need to learn how to give presentations. Personalizing the content and types of

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activities results in higher motivation. Learners are more likely to see results in the areas in which they want to progress, which leads to persistence in the activities, confidence in their abilities, and a desire to learn more. To provide transparent language goals, personalized learning should be clearly linked to a recognized scale, such as the CEFR. Within a classroom, personalized learning technologies allow for increased levels of differentiation, allowing students to learn at their own level and pace, and receive reinforcement or enrichment, as appropriate.

Adaptive technologies adjust the level or type of instruction or assessment in response to the user's behavior. In an adaptive setting—whether a course, a test, or a game—mistakes result in further explanation, additional practice, a slower pace, or easier questions. Correct performance leads to a more advanced challenge. Adaptive technologies are a natural fit for language learning because the nature of interaction is inherently adaptive. People naturally adjust their language in response to the level and nature of the language being used. A skilled teacher uses easier words and structures, a slower pace, and more explanations or examples with a learner who does not understand the language. This is an example of providing comprehensible input. Similarly, technology functions best when providing the comprehensible input skilled teachers provide and going beyond that to precisely target materials and strategies. Technology can be used to adjust levels of text and audio to provide material that is challenging enough but not too challenging.

## **ARTIFICIAL INTELLIGENCE (AI) TECHNOLOGIES**

With the development of large language models (LLMs) such as ChatGPT and LLAMA, AI has quickly become the most important and promising technology for language learning. AI is rapidly becoming an essential component of any language application, assessment, or instructional platform (Kohnke, et al., 2023). Although, at the time of writing, AI has yet to reach the level at which it can perform all of these functions at a high level, that time is rapidly approaching. Because LLMs are entirely based on language, they are ideally suited for integration into language learning tools. LLMs are not stand-alone products for language learning functions. Instead, they are built into other tools, such as those discussed above, to create more effective learning experiences.

For example, AI can create interactive language experiences. The machine can converse with users in writing or using speech when combined with a text-to-speech engine. With additional training, the engine can provide feedback on the language the learner produces. This interaction could be incorporated as practice in an asynchronous course, a mobile language learning app, a game, or a VR or AR experience.

AI can also be used to create language assessments that determine the level of input a student needs or track progress within any learning path. AI has the potential to integrate language instruction, assessment, feedback, comprehensible input, and interaction into almost any other technology and already exists to some extent in many of them. With the rapid improvements in LLMs, the quality of these activities will continue to improve and transform language learning (Pack & Maloney, 2023).

With all of the benefits of AI, there are also significant drawbacks for language learning. The biggest pitfall of these technologies is that they can allow students to avoid learning altogether. AI technologies can help people to perform low-level language tasks without knowing the language. The issue is that people may never acquire the more advanced levels of language proficiency that may be required in professional contexts.

At this point, energy continues to be expended on understanding how to block or detect the use of technology, especially programs such as ChatGPT (Kohnke, et al., 2023). A more fruitful approach, especially with adults, is to help them understand the most effective uses of these technologies and the downsides of overreliance on them. ChatGPT could give feedback on this chapter and might have ideas for improving it, but it has yet to progress to the point that it could have written it (at least not without incorporating fiction and irrelevancies). With time, chatbots could potentially write a chapter like this effectively, but even if they create something that sounds good, they could not put together a work that represents the novel ideas of the writer. Creating tasks that require original language production in realistic ways is challenging. Educators, not only those of second languages, must rise to this challenge.

## **ASSESSMENT, DIGITAL CREDENTIALS, AND CERTIFICATIONS**

As proficiency in multiple languages becomes a requirement of many jobs, the need for recognized and readily available credentialing and proficiency certification is increasing. The Council of Europe Framework of Reference for Languages (CEFR), as well as others, provides an internationally recognized proficiency scale. Language proficiency exams and curricula should be aligned to such scales so that the credentials are transparent and internationally recognized.

Along with the proliferation of readily available and affordable methods of improving language skills, assessments must similarly be affordable and accessible to meet the needs of adult language learners. The use of AI can help lower the costs and return times of language assessments, and virtual proctoring solutions can help to ensure that the test results are trustworthy. The challenge of using these technologies is that many AI-based language exams rely on constructed responses, rather than



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authentic language as the basis of assessment. It is important to understand what assessments are measuring. If communicative proficiency is necessary, an exam that measures communicative proficiency rather than just structural knowledge should be used.

Effective assessments must measure proficiency in different contexts. Not all adult language learners require academic proficiency. Exams that measure proficiency in language related to specific jobs are often more relevant and valuable for adult learners. Technology can help make these credentials more available and affordable and allow verifiable credentials to be embedded in professional profiles and electronic CVs.

The ACTFL Language Connects in the United States and the CEFR in Europe have widely used and accepted language proficiency scales. The ACTFL assessments are connected to digital badges managed through Credly, a digital badging system (ACTFL, 2023). The European Commission is developing the European Digital Credentials Infrastructure (EDCI) to manage credentials for learning achievements (Europass, 2023). Such systems are a good starting point for recognizing levels of language proficiency internationally. The next step will involve aligning more courses and assessments to such systems, and the systems will need to be interoperable so that a credential obtained in one part of the world through any course or test will be recognized in other countries. Challenges associated with increased levels of interoperability remain, the primary one being agreement on instructional and assessment quality. Even without this, if enough information is encoded into a given badge or credential, organizations and schools can decide which credentials they will accept and from whom.

This type of system encourages transparency about what a given credential means and encourages adherence to high standards. The stronger the clarity about a given credential's meaning, the more stakeholders can make appropriate decisions for instruction and other purposes.

## **CHALLENGES AND STRATEGIES FOR IMPLEMENTATION**

The biggest challenge for implementing effective language learning tools and environments is that the same technologies that can support language learning are often used to avoid it (Godwin-Jones, 2019; Kohnke, et al., 2023). If technology can produce increasingly natural language that is understood by others, people have less reason to engage in language learning. To overcome this challenge, language instruction must integrate translation and generative language technologies when appropriate and identify situations in which language production and translation technologies are less beneficial. Helping learners understand the uses and limitations

of these technologies helps them understand what language they need to learn and focus on that.

One limitation of technology involves its obtrusive presence in a spoken conversation. Using translation devices still requires the extra step of typing or speaking into a device that translates the input into speech. This may work for brief conversations and transactions but not for anything more complex, and it does not encourage the formation of relationships. Additionally, technology misses some of the nuances of language. Even when something is translated literally and colloquially, it is challenging to translate culture, and the absence of non-verbal cues in technology further impedes communication. Technology may substitute for low levels of language proficiency, but it cannot replace high levels. Migrants, immigrants, and anyone who wants to participate in another culture must be able to use the language at levels and with a degree of nuance that is impossible when using technology for mediated communication.

Adult learners benefit from understanding why they want to learn a language. This helps to match the method of instruction to the goal and achieve more effective outcomes. If the reason is for the fun of learning or mental agility, games and gamified apps are a natural fit to make the language and the process fun. If the need for language learning is travel, then short, intensive online classes, videos, and apps are well suited to the task. If the language needs are more complex and higher proficiency is needed, focused activities directly related to the particular language use context will be necessary. Additionally, for more complex language needs, learners must understand that it will take longer to learn the language. With that comes a need for technologies that will sustain motivation. Adult learners have many activities competing for their time. Dedicating the time needed to move past an intermediate proficiency level is difficult. With a high intermediate level (B2 on the CEFR scale), an adult can conduct most activities in the target language, albeit with mistakes, vocabulary limitations, and difficulties with pronunciation. Moving from that level to advanced proficiency (C1 or higher on the CEFR scale) takes tremendous dedication and persistence. As more routine tasks can be handled by translation and other AI technologies, and people are expected to communicate more quickly and extensively than ever, the need for highly proficient speakers of two or more languages will likely increase. Technologies must enable people to meet these demands and have tremendous potential to achieve these goals.

Another challenge of technology implementation entails the vast range of options available. Selecting the appropriate technologies for specific purposes can be expensive and time-consuming. For teachers and educational programs, understanding the options and how to implement them effectively involves a paradigm shift. Teachers are most likely to use time-tested methodologies that do not use technology or do

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not use it as fully and effectively as possible. Teachers, as well as learners, need a thorough understanding of the uses and limitations of technology.

A final challenge for second language educators is understanding when teachers are necessary and when they are not. Many of the traditional roles of teachers in language learning can be performed at least as effectively with technology. Nevertheless, instructors still play an essential role in scaffolding input, curating tools, and learning experiences, supplementing and deepening technological language exposure, providing feedback, and providing explanations when needed. The skill set needed for effective language instruction is changing. Teachers must understand when and how to encourage independence in language learning and when and how to take an active role. This is a significant change from the teacher-directed instruction that was generally popular in the past.

A final challenge is that the easiest way to use technology is as a replacement for poor-quality instruction. It is certainly possible to use technology for all drills, memorization, and repetition, and to the extent that these activities are necessary, they should be done with technology, preferably in as fun a manner as possible. It is crucial, though, that these activities are not the stopping point of language instruction. Language learning does not only happen in discrete units, and technology limited to this view of language development has limited utility.

## **CONCLUSION**

Growing global workforces demand higher levels of language proficiency. Existing and emerging technologies provide tools that can help bridge language gaps for lower-level and less immediate communication. These tools may provide an alternative for language learning at lower levels. However, the demands of immediate and higher-level tasks and increased international communication require higher language proficiency. These communications are less likely to be effective when speakers depend on technology to mediate between the participants, especially during live conversations. Effective language teaching technologies help language learners identify the situations in which they will need the language and recreate these situations to motivate and facilitate language learning.

The proliferation of different technologies has great promise to improve the types and quality of language input learners receive. They can lower the affective demands of language learning by allowing learners to practice communication in low-stakes environments, even using avatars as communication proxies, until they have enough confidence to communicate face-to-face. For adult learners who need to sustain motivation over long periods, technologies can make the learning process more satisfying and entertaining.

Technologies not only have affective benefits but offer linguistic benefits by allowing the development of more accurate target language by offering multiple opportunities to receive explanation and feedback, reinforcement, and self-correction.

Technology is changing the way we communicate. It also needs to change the way we teach and learn language.

## REFERENCES

H5P. (2019). *About*. H5p.org. <https://h5p.org/>

Alamer, A., Al Khateeb, A., & Jenö, L. M. (2023). Using WhatsApp increases language students' self-motivation and achievement, and decreases learning anxiety: A self-determination theory approach. *Journal of Computer Assisted Learning*, 39(2), 417–431. <https://doi-org.ezproxy.snhu.edu/10.1111/jcal.12753>. doi:10.1111/jcal.12753

Becerra, L., & Antoniadis, G. (2020). Design of a serious game for the use of foreign languages: Towards a relevant didactic system. In *Proceedings of International Conference on E-Learning*, (pp. 195–198). IADIS Press.

Bilici, O., & Köroğlu, Z. (2022). Being Brave in a MOOC World: A Convergent Mixed-Method Study With English Language Student Teachers. In Zou, B., Thomas, M., Barr, D., & Jia, W. (Eds.). *Emerging concepts in technology-enhanced language teaching and learning*. IGI Global.

Caldwell-Harris, C. L., & MacWhinney, B. (2023). Age effects in second language acquisition: Expanding the emergentist account. *Brain and Language*, 241. [https://doi-org / doi:10.1016/j.bandl.2023.105269](https://doi-org/doi:10.1016/j.bandl.2023.105269)

Celce-Murcia, M., Dörnyei, Z., & Thurrell, S. (1997). Direct Approaches in L2 Instruction: A Turning Point in Communicative Language Teaching? *TESOL Quarterly*, 31(1), 141–152. [https://doi-org / doi:10.2307/3587979](https://doi-org/doi:10.2307/3587979)

Chen, H. J. H., & Hsu, H. L. (2020). The impact of a serious game on vocabulary and content learning. *Computer Assisted Language Learning*, 33(7), 811–832. doi :10.1080/09588221.2019.1593197

Chong, S. W., & Reinders, H. (2020). Technology-mediated task-based language teaching: A qualitative research synthesis. *Language Learning & Technology*, 24(3), 70–86. <http://hdl.handle.net/10125/44739>

### **Technology in Lifelong Language Learning**

Chun, D., Smith, B., & Kern, R. (2016). Technology in language use, language teaching, and language learning. *Modern Language Journal*, 100(S1), 64–80. doi:10.1111/modl.12302

Council of Europe. (2020). *Common European Framework of Reference for Languages: Learning, teaching, assessment*. Council of Europe Publishing, Strasbourg. www.coe.int/lang-cefr

DeKeyser, R. M. (2007). *Practice in a second language: Perspectives from applied linguistics and cognitive psychology*. Cambridge University Press. doi:10.1017/CBO9780511667275

Dixon, D. H., Dixon, T., & Jordan, E. (2022). Second language (L2) gains through digital game-based language learning (DGBLL): A meta-analysis. *Language Learning & Technology*, 26(1), 1–25. <http://hdl.handle.net/10125/73464>

Ellis, R., Loewen, S., Elder, C., Reinders, H., Erlam, R., & Philp, J. (2009). *Implicit and explicit knowledge in second language learning, testing and teaching*. Multilingual Matters.

Ferris, D. R. (2022). Feedback on L2 student writing: Current trends and future directions. In E. Hinkel (Ed.), *Handbook of Practical Second Language Teaching and Learning* (pp. 344–356). Routledge. doi:10.4324/9781003106609-28

García-Gómez, A. (2022). Learning through WhatsApp: Students' beliefs, L2 pragmatic development and interpersonal relationships. *Computer Assisted Language Learning: An International Journal*, 35(5–6), 1310–1328. <https://doi-org / doi:10.1080/09588221.2020.1799822>

Gillani, F., Inayat, I., & Val de Carvalho, C. (2022). Impact of serious game design factors and problem based pedagogy on learning outcome. In *Proceedings of the 2022 International Conference on Frontiers of Information Technology (FIT)*, (pp. 314–319). IEEE. <https://doi-org / doi:10.1109/FIT57066.2022.00064>

Gilmore, A. (2007). Authentic Materials and Authenticity in Foreign Language Learning. *Language Teaching: Surveys and Studies*, 40(2), 97–118. <https://doi-org / doi:10.1017/S0261444807004144>

Godwin-Jones, R. (2019). In a world of SMART technology, why learn another language? *International Forum of Educational Technology & Society*, 22(2), 4–13. <https://doi.org/10.2307/26819613>

- Hafner, C., & Miller, L. (2021). Language Learning with Technology in the Classroom. In L. Miller & J. G. Wu (Eds.), *Language learning with technology: Perspectives from Asia*. Springer. doi:10.1007/978-981-16-2697-5\_2
- Hua, C., & Wang, J. (2023). Virtual reality-assisted language learning: A follow-up review (2018–2022). *Frontiers in Psychology, 14*, 1153642. doi:10.3389/fpsyg.2023.1153642 PMID:37020911
- Hui, S. M., & Yunus, M. M. (2023). Revisiting Communicative Language Teaching Approach in Teaching ESL Speaking Skills. *Journal of Language Teaching & Research, 14*(6), 1515–1523. doi:10.17507/jltr.1406.09
- Jones, C. (2018). *Practice in Second Language Learning*. Cambridge University Press. doi:10.1017/9781316443118
- Jordan, J. (2016, February 6). Survey: Top reasons why people learn a new language. *Babbel Magazine*. <https://www.babbel.com/en/magazine/why-learn-languages>
- Kessler, M., Loewen, S., & Gönülal, T. (2023). Mobile-assisted language learning with Babbel and Duolingo: Comparing L2 learning gains and user experience. *Computer Assisted Language Learning, 1–25*. doi:10.1080/09588221.2023.2215294
- Kessler, M., Loewen, S., & Trego, D. (2023). Synchronous VCMC with TalkAbroad: Exploring noticing, transcription, and learner perceptions in Spanish foreign-language pedagogy. *Language Teaching Research, 27*(3), 642–659. doi:10.1177/1362168820954456
- Kohnke, L., Moorhouse, B. L., & Zou, D. (2023). ChatGPT for Language Teaching and Learning. *RELC Journal: A Journal of Language Teaching and Research, 54*(2), 537–550. <https://doi-org/> doi:10.1177/00336882231162868
- Krashen, S. D. (1982). *Principles and practice in second language acquisition*. Pergamon.
- Larchen Costuchen, A., Darling, S., & Uytman, C. (2021). Augmented reality and visuospatial bootstrapping for second-language vocabulary recall. *Innovation in Language Learning & Teaching, 15*(4), 352–363. <https://doi-org/> doi:10.1080/17501229.2020.1806848
- Laufer, B. (2006). Comparing focus on form and focus on FormS in second-language vocabulary learning. *Canadian Modern Language Review, 63*(1), 149–166. doi:10.3138/cmlr.63.1.149

### **Technology in Lifelong Language Learning**

- Lichtman, K., & VanPatten, B. (2021). Special Section: A Discussion of Input: Krashen Forty Years Later [Special Section]. *Foreign Language Annals*, 54(2), 283–340. <https://doi-org.ezproxy.snhu.edu/10.1111/flan.12552>. doi:10.1111/flan.12552
- Long, M. (1991). Focus on Form: A Design Feature in Language Teaching Methodology. In D. De Bot, R. Ginsberg, & C. Kramsch (Eds.), *Foreign Language Research in Cross-cultural Perspective* (pp. 29–52). Benjamins. doi:10.1075/sibil.2.071on
- Long, M. H. (1981). Input, interaction, and second language acquisition. In H. Winitz (Ed.), *Native language and foreign language acquisition* (Vol. 379, pp. 259 – 278). *Annals of the New York Academic of Sciences*. doi:10.1111/j.1749-6632.1981.tb42014.x
- Mozaffari, M. H., & Lee, W.-S. (2021). Second language pronunciation training by ultrasound-enhanced visual augmented reality. In *Proceedings of the 2021 IEEE International Conference on Bioinformatics and Biomedicine (BIBM)*, (pp. 3043–3050). IEEE. [https://doi-org / doi:10.1109/BIBM52615.2021.9669622](https://doi-org/doi:10.1109/BIBM52615.2021.9669622)
- Murphy, B., Mackay, J., & Tragant, E. (2023). ‘Ok I think I was totally wrong:) new try!’: Language learning in WhatsApp through the provision of delayed corrective feedback provided during and after task performance. *Language Learning Journal: Journal of the Association for Language Learning*, 51(4), 491–508. [https://doi-org / doi:10.1080/09571736.2023.2223217](https://doi-org/doi:10.1080/09571736.2023.2223217)
- Pack, A., & Maloney, J. (2023). Potential Affordances of Generative AI in Language Education: Demonstrations and an Evaluative Framework. *Teaching English with Technology*, 23(2), 4–24. doi:10.56297/BUKA4060/VRRO1747
- Pappa, G., & Papadima-Sophocleous, S. (2019). Embedding a serious game into an ESP curriculum. In S. Papadima-Sophocleous, E. Kakoulli Constantinou & C. N. Giannikas (Eds.), *ESP teaching and teacher education: Current theories and practices* (pp. 111–129). Research-publishing.net. doi:10.14705/rpnet.2019.33.929
- Punar Özçelik, N., Yangin Eksi, G., & Baturay, M. H. (2022). Augmented reality (AR) in language learning: A principled review of 2017–2021. *Participatory Educational Research*, 9(4), 131–152. doi:10.17275/per.22.83.9.4
- Richards, J. C., & Rodgers, T. S. (2014). *Approaches and Methods in Language Teaching*. Cambridge University Press. doi:10.1017/9781009024532
- Rossi, O. (2023, May 30). *Using AI for test item generation: Opportunities and challenges* [Webinar]. EALTA, Online.

Samardali, M. F. S., & Ismael, A. M. H. (2017). Translation as a tool for teaching English as a second language. *Journal of Literature, Language and Linguistics (Taipei)*, 40(0), 64. <https://iiste.org/Journals/index.php/JLLL/article/view/40072>

Serra, J., & Gilabert, R. (2021). Algorithmic versus teacher-led sequencing in a digital serious game and the development of second language reading fluency and accuracy. *British Journal of Educational Technology*, 52(5), 1898–1916. doi:10.1111/bjet.13131

Singleton, D. (2014). How do Attitude and Motivation Help in Learning a Second Language? In Vivian Cook, & David Singleton. (2014). *Key Topics in Second Language Acquisition*. Multilingual Matters.

Stevens, A. (n.d.). *Speak English professionally [MOOC]*. Coursera. <https://www.coursera.org/learn/speak-english-professionally/quiz/IL8ml/check-your-knowledge>

Viriya, C. (2022). Exploring the Impact of Synchronous, Asynchronous, and Bichronous Online Learning Modes on EFL Students' Self-Regulated and Perceived English Language Learning. *Reflections: The SoL Journal*, 29(1), 88–111. doi:10.61508/refl.v29i1.260525

Wei, X., Yang, G., Wang, X., Zhang, K., & Li, Z. (2019). The influence of embodied interactive action games on second language vocabulary acquisition. In *Proceedings of the 2019 International Joint Conference on Information, Media and Engineering (IJCIME)*, (pp. 383–387). SNHU. <https://doi-org.ezproxy.snhu.edu/10.1109/IJCIME49369.2019.00083>

Zenci, S. (2022). The Use of LearningApps Tool in Foreign Language. In A. El Shaban & R. Abobaker (Eds.), *Policies, practices, and protocols for the implementation of technology into language learning*. IGI Global.

Zhang, R., & Zou, D. (2022). Types, purposes, and effectiveness of state-of-the-art technologies for second and foreign language learning. *Computer Assisted Language Learning: An International Journal*, 35(4), 696–742. <https://doi-org/doi:10.1080/09588221.2020.1744666>

## KEY TERMS AND DEFINITIONS

**Asynchronous Courses:** Courses that a learner can do at any time, independently, regardless of the availability of an instructor. Generally, instruction is provided through readings and videos.



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**Communicative Language Learning:** An instructional approach that focuses on using language in authentic conditions for communication.

**Digital Credential:** A transferable means of showing and verifying an academic or professional achievement.

**Focus on Form:** Teaching grammar in context.

**Focus on Forms:** Teaching grammar without context.

**Game:** An activity primarily for entertainment, usually with challenges or competition.

**Gamification:** Adding game mechanics and appearance to something that is not inherently a game.

**Serious Game:** A game with an educational goal in addition to entertainment goals.

**Synchronous Course:** A course taught in real time, live.