An Invitation to CALL

Foundations of Computer-Assisted Language Learning

Phil Hubbard

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Written by

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An Invitation to CALL:
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The Asia-Pacific Association for Computer-Assisted Language Learning (APACALL) Book Series covers a wide range of issues in computer-assisted language learning (CALL) and offers opportunities for CALL researchers and practitioners to engage in research and discussion on their areas of interest.

This book is a meaningful exploration of the field of CALL. It looks at key aspects of CALL and offers useful information, materials and resources for language teachers, teacher educators, researchers and learners. With his extensive experience in research and practice, Phil Hubbard invites readers to participate in discussions on the past, present and future of CALL.

As the sixth volume of the APACALL Book Series, the book is certainly a valuable contribution to CALL communities.

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Jeong-Bae Son
APACALL Book Series Editor

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Preface

Computers and related technologies have become pervasive in our lives and those of our students outside the classroom, but it is also important for us as language teachers to understand their role in language instruction. Without such a foundation, it is difficult to make informed judgments about how to incorporate technology into language classes to make certain aspects of student learning more engaging, efficient, and/or effective. This became especially apparent when many classroom language teachers were suddenly faced with the necessity to teach online with the outbreak of the COVID epidemic.

Ideally, a language teacher being trained today should either have one or more full courses in computer-assisted language learning (CALL) or be engaged in a professional training program where the integration of technology into language teaching permeates the whole curriculum. Over time that ideal may be met, but currently CALL training remains somewhat spotty. Furthermore, many competent practicing teachers may be interested in learning more about CALL as part of their professional development but not know how to fulfill that interest. This book aims to provide one such resource.

An Invitation to CALL: Foundations of Computer-Assisted Language Learning is an e-book providing a short introduction to the field of CALL. It has been drawn almost entirely from a website designed to complement in-class instruction of a CALL "mini course" that I taught annually beginning in 1998. This was an optional 1-unit seminar connected to an ESL methodology course at Stanford University, Linguistics 291: Linguistics and the Teaching of English as a Second or Foreign Language (see https://web.stanford.edu/~efs/ling291/call.html). I have recently retired from Stanford, but the original website remains basically as it was in March 2020 when the class ended: see https://web.stanford.edu/~efs/callcourse2/.

The goal of this book is to make the material on that site available through the APACALL book series to a wider audience for general reference, self-instruction, and in-service or pre-service training. The target audience is language teachers, but teacher educators in particular are welcome to review it for ideas or even to use it as one of the texts for their classes. I am grateful to the series editor Jeong-Bae Son for the invitation. In preparing the book, I have made some minor additions and updates to the previous notes but have not attempted any fundamental changes. Like the course it came from, the book offers a broad but shallow overview of the field to get teachers started on the road to greater CALL expertise. Please note that all links were working at the time of this writing.

Chapter 1 first introduces CALL by providing a thumbnail sketch of its history and the many names it has gone by. It then discusses the nature of technology mediation, the goals of using CALL in language teaching, and the roles of teachers with an emphasis on meeting the TESOL Technology Standards, which are integrated throughout the book. It concludes with a list of some recommended books and journals. In addition to the many in-line links, this chapter and those that follow include a list of references and one or more suggested activities.

Chapter 2 begins with advice on identifying CALL resources and features of the technology environments relevant to the teacher and students, including home, school, online, and mobile. It then gets into the topic of evaluating courseware (apps and online websites with material to support language learning), introducing a framework built around determining the degree to which the material and operation of the courseware provides an appropriate fit for both leaners and teachers. It briefly discusses alternative approaches to evaluation as well as the related topics of development and implementation.

Chapter 3 surveys the forms and uses of computer-mediated communication (CMC) in language learning. The important dimensions here are timing (synchronous/real time vs. asynchronous), and modality (text, audio, video, and multimodal). There is a brief discussion of CMC in distance education and virtual worlds. Finally, suggestions for incorporating CMC into language classes, including virtual exchanges linking your students with students in other classes working on collaborative tasks.

Chapter 4 focuses on the uses of technology to support the development of language skills, including a description of online collections of materials for this purpose. Examples in the four core skills of listening, speaking, reading, and writing are covered, along with the areas of grammar, vocabulary, pronunciation, and culture.

Chapter 5 delves more deeply into the topic of environments for language learning that involve technology. It then introduces tools such as online dictionaries, machine translation, lexical analysis applications, media players, and collaborative writing options like Google Docs. Examples of both authentic materials and materials designed for language learners are provided, along with advice on locating learning activities and lesson plans.

Chapter 6 begins with a discussion of CALL theory, noting that the theoretical landscape for the field is quite varied and offering a framework for how theory has been incorporated into CALL research and practice. It then moves to the area of research, discussing some research trends and giving a table illustrating example research studies along with summaries of their results.

Chapter 7 embraces the related areas of teacher education, professional development, and learner training. It provides a framework and discusses options for teacher education that are also largely relevant for professional development. The learner training section begins with the argument that, while students may be comfortable with personal and social uses of technology, they do not necessarily know how to use it effectively for language learning when working on their own. Principles for learner training are provided, accompanied by a framework distinguishing technical, strategic, and pedagogical dimensions.

Chapter 8 covers several additional areas in CALL, both well-established and emerging ones. These include concordancing and working with corpora, learning management systems, computer-based language assessment, student tracking, and supporting learner autonomy. It touches on online, blended, and flipped classrooms, areas from daily life such as social media, mobile learning, virtual worlds, and gaming. It also mentions the increasing amount of informal language learning opportunities available in the "digital wilds". It concludes with a brief discussion of the emerging impact of artificial intelligence (AI) on language learning and use.

Following the last chapter, an appendix lists annotated links to a variety of professional organizations and other resources for professional development.

Please understand that this book is an adaptation of course notes from a class targeted at students who may have had little or no language teaching experience. Experienced teachers, especially those already somewhat comfortable with technology, may well find a lot here that they already know. Hopefully, enough gaps will be filled to make your efforts going through this worthwhile. As a book purporting to provide the foundations for further study in CALL, it would be ideal if it offered a balanced view of the various elements of the field. However, there are biases in it. The parts of CALL that I have the most personal experience with are often given more weight than some other author might. Similarly, areas I have less experience with, such as assessment, are barely covered in the short course this book sprang from (just eight 75-minute sessions in 2020). Thus, while broad in scope, this book is not as comprehensive an introduction as readers might desire. It is rather an opportunity to go on a journey with me through some of the wonders that digital technology has brought to the field of language teaching. Whether you are a teacher, a teacher-educator, a developer, or a language learner, I hope it sparks enough interest for you to continue that journey on your own.

I dedicate this book to my wife, Dovie.

<div align="right">
Phil Hubbard
August 2021
</div>

Chapter 1
Introduction to Computer-Assisted Language Learning

What is CALL?

Before we answer the question posed in that heading, let me make two points. First, if you haven't read the preface, go back and do so: you will be a better-informed consumer of this material if you understand what I'm trying to do with it. Second, because this book came from notes for a small, face-to-face seminar, the tone is more personal and less academic than you may be used to in textbooks. That's on purpose. So, let's get started.

CALL is the acronym for computer-assisted language learning. Although, as we will see below, the field or significant parts of it sometimes go by other names, CALL seems to be the most widely accepted generic term. In this foundation course, CALL will be used in a broad sense to refer to any endeavor involving the use of computers and associated technologies of all types - desktops, laptops, tablets, smart phones, mp3 players, interactive whiteboards, etc. - in some significant way in language learning and teaching.

There are a number of ways to conceptualize the field of CALL, but one useful way, especially for those just entering the field, is to divide computer use according to the functional roles of *tutor* and *tool*, concepts popularized for CALL by Levy (1997). A vocabulary flashcard program or set of online grammar exercises would represent tutor uses, where the computer in some way has a teaching function. A language learning activity involving social media, an email program, or a web search engine like Google would represent tool uses, where the computer has no overt teaching function. A third and increasingly important area is *digital resources*: texts, audio recordings, and videos or other multimedia objects readily available on the web or through dedicated apps. These provide language content for learners to support reading and listening skills as well as a window into the target language cultures. They can also provide material to support interactive discussions. Some online gaming platforms like *World of Warcraft* and *Minecraft* can simultaneously involve language resources and interactivity.

This distinction is sometimes reflected in an unfortunate division in CALL between those who see the computer primarily as a machine for delivering interactive language learning and practice material - the computer as tutor - and those who see it mainly as a means for learners to experience the authentic language and communication opportunities and enhancements afforded by computers - the computer as tool. Because most early CALL applications were

tutorial and tool use arguably dominates now, it is easy to think of CALL as evolving, leaving tutorial CALL as something of a dinosaur.

In reality, all aspects of CALL have continued to develop, and in this book, we do not attempt to rate one as being more important or useful than the other. In fact, it is possible, even preferable, to recognize these not as opposing philosophies but as end points along the same sort of language teaching continuum, analogous to the one that balances teacher-fronted and group work in a classroom. In other words, effective language learning can include elements of both. Consequently, in this introductory book, I will try to strike a balance between them so that you are better prepared to recognize the potential advantages of using one or both for a given teaching situation.

Acronyms and Attitudes

This field has gone by a number of different names as groups of practitioners have attempted to promote their own views and philosophies, in some cases in an attempt to distance the field from tutorial CALL, which is sometimes regarded as incompatible with interactionist and social constructivist approaches to language teaching. The list below is representative but not exhaustive.

- CALL - Computer-assisted language learning, sometimes expanded as computer-aided language learning.
- CELL - Computer-enhanced language learning; suggests the computer's role is to make learning better.
- TELL - Technology-enhanced language learning; this accommodates more than just computers, often bringing in video and seeing the computer as just one part of a larger system. It is popular as a generic term: for instance, while TESOL has a CALL Interest Section, California TESOL has a TELL Interest Group.
- TALL - Technology-assisted language learning; variant of CALL and TELL.
- CALI - Computer-assisted language instruction; with "instruction" in it, it is more teaching oriented.
- CBLT - Computer-based language training; views elements of language learning as "training" and tends to use an approach with definable, measurable objectives.
- IT and ICT - Information Technology/Information and Communication Technologies are common acronyms outside of language teaching, particularly in Europe; sometimes this is presented as IT or ICT for LT (Language Teaching); see http://www.ict4lt.org/.

- NBLT - Network-based language teaching; an older term, it focuses on computers linked in networks, both locally and through the Internet, especially for computer-mediated communication
- DLL - Digital language learning; a relatively new term encompassing computers and other digital devices
- MALL – Mobile-assisted language learning; learning with mobile devices like smartphones and tablets (sometimes also used for multimedia-assisted language learning; see https://www.kamall.or.kr/.
- Technology-mediated language learning – To me, this is probably the most generic and descriptive modern term, but it does not have a memorable acronym.

While acknowledging the existence of these alternative labels, for the purposes of this book, we will call CALL "CALL" (Levy & Hubbard, 2005). One reason is because CALL as a label for the field may have more traction in university settings because of its association with the term *computer* in departments of computer science and computer engineering. There, the concept of computer encompasses the full range of digital devices and the networks that connect them, as well as the software, including mobile apps.

A Thumbnail Sketch of CALL History

CALL began in the 1960s with mainframe-based drill and practice materials, especially those based on the University of Illinois' PLATO system. It remained an insignificant alternative for language learning outside of a few universities until the spread of the microcomputer into educational settings in the early 1980s. Early programs were written by teacher-developers on Apple II, IBM PC, and BBC computers, and were often distributed for free. Commercial programs, when available, were usually quite expensive but were generally more stable and technically sophisticated (though not as innovative). There was some work done with interactive laser disks during this time, which provided the foundations for multimedia. The traditional language labs began to be replaced with dedicated computer labs for language learning.

In the late 1980s and early 90s, the Apple Macintosh replaced the Apple II in many educational settings in the US and became an immediate favorite among teacher-developers because of the support of HyperCard, a powerful but easy-to-use authoring program. The Mac had built-in sound, making it easier to work with than PCs, which had incompatible proprietary boards competing with one another. Early Macs (and HyperCard) did not support color, however, so commercial programs continued to appear for PCs. The PC market was also dominant in most countries outside the US because the machines could be obtained much more cheaply than Macs. Reasonably priced authoring programs became available for PCs, and with the development of the Windows

operating system for PCs and standardization of sound formats, the distinction between PC and Mac became less critical.

During this period, the use of the computer as a tool increased, especially as teachers developed innovative techniques for using email and word processors became integrated into writing classes. Some teachers helped students develop their own HyperCard projects or ones in similar applications developed for the PC. It was observed that building collaborative projects around the computer and using computer-mediated communication (CMC) activities had a strong effect on some students' motivations and seemed to make it easier for shy students to become involved. Some teachers built assignments around student interactions in multi-user domains (MUDs and MOOs), types of enriched chat environments.

Two major changes came starting in the mid-1990s. One was the dramatic increase in commercial multimedia for language learning as CD-ROMs became standard in desktop and laptop computers. The other was the development of the World Wide Web. Because of the web and increased access to the Internet in general, the past saw a major shift toward tool uses, and many CALL users still see the field almost entirely in those terms. Increasingly, CALL is being integrated into language learning activities both in and out of class.

The first decade of the 21st century saw a continuation of all the previous areas along with the growth of language learning applications and activities for mobile devices, especially mobile phones (MALL), the spread of Web 2.0 (https://en.wikipedia.org/wiki/Web_2.0) and social media, and experimentation with language learning in virtual worlds. Increasingly, CALL was being integrated into language learning activities both in and out of class. In particular, streaming video services like YouTube made it possible to have access to an incredible supply of free, authentic spoken-language and cultural material. In 2009, I published a four-volume edited set, *Computer Assisted Language Learning: Critical Concepts in Linguistics* (Routledge), an anthology of 74 key articles covering the whole field of CALL up to that point. The introductory chapter, available at https://web.stanford.edu/~efs/callcc/callcc-intro.pdf, provides a more detailed overview of how the field developed through the late-2000s.

In the 2010s, we witnessed the incredible spread of smartphones and their apps into our lives, rapid expansion of streaming media, video CMC through Skype and many other applications, ubiquitous computing (including wearables, like watches), gamification, and increasing normalization (Bax, 2003), the last referring to a state where we are so used to technology that we may stop thinking about it as something special.

2020 brought the sudden shift to widespread emergency online teaching, a situation largely continuing at the time of this writing in early 2021. This turned Zoom and similar applications into a part of the daily lives of many millions of language learners and their teachers. Now more than ever, language teachers need to understand technology and how to use it effectively.

The Core of CALL – Technology Mediation

Second language acquisition research and language teaching methodology today often involve technology as part of the context. At the core of CALL is the idea that this technology mediation is not neutral.
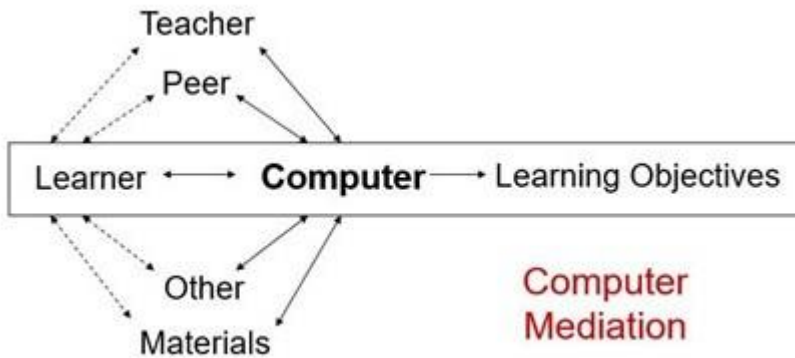

Figure 1. Technology mediation.

Figure 1, adapted from Levy and Hubbard (2005), shows how the learner interacts through the "computer" in the broadest sense with teachers, peers, others, and materials in the pursuit of language learning objectives. Among other things, this mediation can involve the following:

- Archiving & indexing
- Transferring
- Linking
- Time control
- Transforming

These mediating processes can and often do change the nature of the interaction, as when machine translation or speech recognition (speech transformed to text) is used by a learner. Later chapters will discuss the impact of some of these changes.

Interesting, but why do it?

Presumably, the basic reason for doing CALL is to make language teaching or learning "better". But what does "better" mean? Here are some ways in which CALL can positively affect the learning process:

- Learners pick up language knowledge or skills faster or with less effort (learning efficiency).
- Learners pick up what is targeted, retain language knowledge or skills longer, and/or learn more of what they need (effectiveness).
- Learners can get materials or experience interactions that would otherwise be difficult or impossible (access).
- Learners can learn with more or less equal effectiveness across a wider range of times/places (convenience).
- Learners enjoy the language learning process more or are willing to engage in it more (motivation).
- Learners require less space, less teacher time, or less expensive materials (institutional efficiency).

These have been the goals of CALL since the beginning (along with making the *teacher's* life better). It has become clear in recent years, though, that another reason for integrating technology into language learning is because, when the teaching is done, learners will become *users* of the language and technology is likely to be the mediator of their language use as well. Thus, teaching with technology is an example of *authenticity,* not just an add-on to the classroom. In the 2020s, this is true more than ever.

Examples of Recent Trends

CALL comes in many varieties, a number of which are discussed in the chapters that follow, but for now, here is a taste of the sort of topics covered in recent academic journals and other scholarly resources attempting to build our understanding of how technology mediates second language learning and use.

- Virtual exchanges or telecollaborations. Descendants of the "pen pals" of the past, these activities involve groups of language learners connecting online and typically collaborating on joint projects using the languages they are learning in their classes.
- Digital literacies. This is a growing area for both language learners and native speakers, learning to become both critical consumers and skilled producers of language and culture. For an overview, see https://markpegrum.com/overview-of-digital-learning/e-learning-with-web-3-0/

- Game-based language learning. Language learning may be enhanced through the motivation and engagement provided by digital game environments or by "gamifying" learning activities and tasks.
- Mobile-assisted language learning (MALL). Moving beyond the notion of just "anytime, anywhere" learning, the mobility can be in the learner, the device, or the task (Pegrum, 2019)

These applications and others are discussed in the following chapters.

Teachers and CALL

Teachers interested in using technology can get involved in a number of different ways, which can be seen as different *teacher roles*.

- As researchers: into second language acquisition, human-computer interaction, what works for CALL
- As consumers of CALL for class use or for homework or other outside student activities
- As directors and curators, helping students find and use supplementary CALL materials or web resources
- As managers of CMC among learners in and out of class
- As software or web developers, either "from scratch" or adding new materials to existing templates
- As coaches to help students produce software and websites, and develop general digital literacy
- As CALL experts for their program, assisting other teachers and administrators with CALL implementations
- As CALL professionals, consulting on external projects, doing software reviews for journals, making conference presentations, writing papers, interpreting and applying CALL research, and/or providing input to the field at large.

Mike Levy and I (Hubbard & Levy, 2006) have taken this idea of role and developed it further it to try to delineate the field for the purposes of CALL teacher education. Specifically, we distinguish two types of roles for individuals engaged in CALL: institutional and functional. Institutional roles include classroom teachers, both pre- and in-service, specialists of various kinds (language lab managers, language skill area specialists, etc.), and professionals (those whose career centers on CALL). Functional roles include practitioners, developers, researchers, and trainers. These roles will be covered in more detail in Chapter 7.

TESOL Technology Standards

It is easy to state that language teachers should be knowledgeable about and skilful with relevant technologies, but what knowledge and skills are needed? In late 2008, TESOL International Association (formerly Teachers of English to Speakers of Other Languages: https://www.tesol.org) published the *TESOL Technology Standards Framework*, the first set of technology standards aimed specifically at teachers and learners of English, but readily extendable to other languages. I was one of six members of the writing team that developed those standards.

The Standards are meant to serve a number of purposes, including the following:

- Lead teachers to learn to use digital technology appropriately and effectively for language learning and ensure their students can do likewise.
- Lay out a clear set of targets for judging technology competencies for language learning.
- Motivate teacher educators and teacher education programs to integrate technology training and use into their curricula.
- Guide administrators and policy makers as they develop curriculum, arrange training for in-service teachers, and make new hiring decisions.

Readers are encouraged to become familiar with the teacher standards in particular and to use them as guides in setting targets for continuing professional development. They are referenced throughout the book. The Standards Framework is available for free from the TESOL website: https://www.tesol.org/docs/books/bk_technologystandards_framework_721.pdf

I highly recommend that you begin your CALL journey by reviewing the Standards and evaluating your current CALL proficiency with respect to them. See the performance indicators starting on page 29 of the framework document or alternatively in a "can-do" form for the basic level ones: https://web.stanford.edu/~efs/TTS-CDs.pdf. I had the students in my course do this to help them distinguish the areas they were confident in and those that needed more work. The goal at the end was to have filled in as many of the weaker areas as possible in our short time together and to have some direction on how to continue on their own.

Some General Remarks

I had two calls a few years back that stuck in my mind: one from someone interested in knowing about best practices and cutting-edge apps and another from someone trying to collect support for the idea that online learning was not effective for language learning. The calls represented the range between those who almost blindly accept the notion that new technology automatically equates with better learning and those that continue insisting that technology across the board gives a degraded learning experience. The key concept is this: technology mediates between learners and teachers, peers, others (including native speakers), and a vast array of digital text, audio, and video materials. It is understanding the nature of that mediation and how learners react to it that defines this field. As we will see in Chapter 7, both teachers and learners will profit from knowledge and skill training in this area.

Some Recommended Books

There have been many introductory CALL books, especially edited volumes, written in the past 40 years and the number has increased noticeably since the turn of the century. Here is a sample of a few worth looking at, but there are many more.

- o Beatty, K. (2013). *Teaching and researching computer-assisted language learning* (2nd edition). Routledge. A broad general introduction to the field of CALL.
- o Blake, R. J. & Guillén, G. (2020). *Brave new digital classroom: Technology and foreign language learning* (3rd ed.). Georgetown University Press. An updated overview of the CALL field with an emphasis on social and gaming elements.
- o Ducate, L., & Arnold, N. (Eds.). (2019). *Engaging language learners through CALL: From theory and research to new directions in foreign language teaching* (3rd ed.). Equinox. An introductory textbook covering a range of topics; each chapter includes a literature review, discussion of key principles, and practical applications.
- o Farr, F., & Murray, L. (Eds.). (2016). *The Routledge handbook of language learning and technology*. Routledge. A wide-ranging overview of the field with chapters written by CALL specialists covering theory to practice.

Some Recommended Journals

CALL has been around as a distinct domain of language teaching and learning since the early 1980s. There are a number of professional organizations

devoted to the field around the world (see Appendix), dedicated national and international conferences, and refereed academic journals, such as those below.

- o *Language Learning & Technology* (http://www.lltjournal.org/): Primarily a theory and research journal, though it includes reviews; an outstanding *free* resource since it began publishing in 1997. Full articles are available online.
- o *CALL-EJ Online* (http://callej.org/): CALL Electronic Journal Online; another free resource; more practice oriented than *LLT*
- o *CALICO Journal* (https://www.equinoxpub.com/journals/index.php/CALICO): Journal of the Computer-Assisted Language Instruction Consortium (https://calico.org); online, free to members and available to individual and institutional subscribers; articles over three years old and reviews are available free.
- o *Computer Assisted Language Learning* (https://www.tandfonline.com/toc/ncal20/current): Independent of any specific organization but highly regarded; articles are available to institutional and individual subscribers.
- o *ReCALL* (https://www.cambridge.org/core/journals/recall): The journal of the EuroCALL professional organization (https://www.eurocall-languages.org) published by Cambridge University Press; online, free to members and available to individual and institutional subscribers.

Suggested Activities

1. To experience CALL from the students' perspective, try learning a *new* language through web-based or mobile app software for an hour or two and reflect on your experience. Here are some options:

> https://www.busuu.com
> https://www.duolingo.com/
> https://www.memrise.com

See comments on these and alternatives at https://www.thebalance.com/the-7-best-free-language-learning-apps-1357060. Think critically about what you can and cannot acquire through such learning.

2. Download the free version of the TESOL Technology Standards Framework at https://www.tesol.org/docs/books/bk_technologystandards_framework_721.pdf. Starting on page 29, use the performance indicators to help rate yourself in terms of meeting the Teacher Standards. Alternatively, try the "can-do" statements that I adapted from the performance indicators at https://web.stanford.edu/~efs/TTS-CDs.pdf.

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Levy, M., & Hubbard, P. (2005). Why call CALL "CALL"? *Computer Assisted Language Learning*, *18*(3), 143-149.

Pegrum, M. (2019). *Mobile lenses on learning: Languages and literacies on the move*. Springer.

Questions for Further Discussion and Investigation

1. Visit the website of the journal *Computer Assisted Language Learning* at https://www.tandfonline.com/toc/ncal20/current. Browse a full year of papers (e.g., Volume 33, 2020). Looking just at the titles (or the abstracts for interesting ones), what is the range of topics that this journal carrying the name of the CALL field publishes?

2. The content of this book is based on a course most recently taught from January to mid-March 2020. What elements of this chapter might you modify or supplement to take into account the sudden shift to emergency remote teaching during the COVID-19 pandemic?

3. How well do you know your own digital devices (computers, tablets, and smartphones)? Pick one of these and explore the settings and preferences, main menu, etc. Try to find some options, controls or applications that you were previously unaware of. If you enjoy this process, dig deeper on that device and try it with others you might have. You can also look online for videos and tutorials about Windows, Mac OS, Android, Chrome OS and iOS – these are the more popular operating systems for devices, but there are others.

Chapter 2
Finding and Evaluating CALL Resources

Overview

Goal 2, Standard 1 of the TESOL Technology Standards (2008, 2011) states: "Language teachers identify and evaluate technological resources and environments for suitability to their teaching context." In line with that standard, identifying and evaluating resources and environments is the focus of this chapter. Relevant resources can include CALL software, online materials for teachers, online materials for students, and resources for connecting teachers and students. The focus here is not on the resources themselves – later chapters will provide a lot of examples for English language learning and some for other languages as well. Rather, we are going to look at the process of identifying candidate resources and more importantly evaluating their suitability for your curriculum and students.

Identifying Resources

Despite the increasingly large number of resources available for English and other commonly taught languages, finding suitable ones is not an easy task. Dedicated resources (those designed specifically for language learning) abound, both free and commercial ones. To locate desired materials on the web, good searching skills are needed. Becoming familiar with Google's more advanced search techniques (https://www.google.com/advanced_search?hl=en) and trying a range of search terms rather than just the first one that comes to mind will usually yield more favorable results than a basic search using a broad category term like "ESL". Other sources include professional organizations. For example, the TESOL CALL Interest Section has a virtual library with hundreds of tagged resources: https://www.diigo.com/user/call_is_vsl. Although the focus there is on ESL, some of the materials, tools, and activities can be used for foreign language teaching and learning as well. For those interested in tutorial software, the TESOL CALL Interest Section Software List has been archived by Deborah Healey at https://www.eltexpert.com/softlist/index.html. Though last updated 2011, the list can still provide useful ideas for searches for more current apps. Current and past *CALICO Journal* reviews are available for English and other languages on the journal website: https://www.equinoxpub.com/journals/index.php/CALICO. The reviews can be found by issue in the archives, but many can also be located using a search term like "courseware review" on the journal site. Another source of CALL activities and materials is book publisher's websites: a number of textbooks

published in recent years include additional online resources for teachers and supplementary materials and exercises for students. Some of these can be accessed even if you are not using the textbook. For examples from Pearson see https://www.pearson.com/english/professional-development/resources.html.

Identifying Environments

The overall technology environment includes both local and online elements. The local environment is that of the user – the teacher and students – and includes the institutional setting, home setting, and other places where Wi-Fi is available, such as libraries or Internet cafes in proximity to the institution or student homes. The local environment consists of a number of factors.

- The hardware resources available: Computers, other digital devices such as smartphones and tablets, audio and video recorders, peripherals like printers and scanners, and so on.
- The software tools: Applications such as word processors, communication applications, audio and video recording software, and media players. Increasingly, we see these in the online environment as well. In some cases the users may not even be aware whether the software resides on their own device or somewhere else (consider the local Microsoft Office applications on your hard drive vs. online Office 365 online (https://www.office.com/online) or Google Docs and related applications (https://drive.google.com/).
- Openness to the Internet, especially bandwidth: Note that upload and download speeds can vary depending on the digital infrastructure, the number of users, and proximity to the access point. In some places students may need to pay for access.
- Accessibility: Availability of institutional and online resources. For example, if there is a computer lab, how open is it to your students for class or drop-in use? What commercial software are you licensed to use?

The online environment has some of these same considerations plus some additional ones.

- Delivery formats: Are your local devices able to use the resources you find? For example, audio and video material may require players capable of handling a variety of formats. Also, some institutions may block popular sites like Facebook or YouTube if they are seen as distractions to learning.
- Free or fee: Online materials and applications vary as to cost. Some are provided free and hosted by institutions or individuals, some are hosted by "open-source" communities (e.g., the Audacity sound recorder at

https://www.audacityteam.org/), some are hosted by individuals or companies that use advertising to provide income, some have both free and fee versions (e.g., https://www.englishbaby.com), and some are only available for a fee, usually on a subscription basis.

- Security: Security and safety are issues at any time online for both students and teachers. The TESOL Technology Standards for Learners, Goal 1, Standard 3, states: "Language learners exercise appropriate caution when using online sources and when engaging in electronic communication." However, in addition to the normal precautions, there is a question of what information the sites may be collecting on students and how student privacy is being assured. On some free sites especially, personal information may be collected and a non-exclusive right to the student's work may be a condition for use. In the US, such practice can be seen as a violation of FERPA, a federal act, and teachers are advised to take care accordingly: https://www2.ed.gov/policy/gen/guid/fpco/ferpa. Teachers should be aware of TESOL's Technology Standards for Teachers Goal 1, Standard 4, regarding responsibility for legal and ethical use of technology.
- Uptime and downtime: It is important for an online site to be available when you need it. In some cases, sites may go offline for hours or days or even disappear altogether. It is a good idea to have an alternative ready.
- Speed: Although this seems to be changing for the better, sometimes popular free educational sites may be slow during the school day. Similarly, if working in an environment where the available bandwidth is shared by others, sites may be slower on your end during times of heavy use or even unavailable. This was especially noticeable during the COVID crisis when parents were working online from home (or maybe watching streaming media if not working) at the same time their children were online for school.

The Mobile Environment: Apps, apps, and more apps ...

The rise of smartphones and tablets like iPads and their Android competitors has opened up a new environment for learning that is "anytime, anywhere". Apps come in various types. Some are not significantly different from the disk-based programs of the 1980s and 90s, allowing mobile learning and review of vocabulary, grammar, and pronunciation. Others, like WhatsApp (https://www.whatsapp.com/) and the many mobile versions of social networking sites like Facebook, are primarily for taking communication and social interaction beyond the level of the phone call and text message. Despite the fact that they are convenient, ubiquitous, and often free or very

inexpensive, apps need to be treated no differently than other potential learning tools. First, you need to find them. Then, candidates must be evaluated judgmentally for their potential value as language learning supports for your teaching context. The section below provides guidelines for doing so.

Ultimately, understanding a prospective environment is a key step in determining what resources you will actually be able to use effectively in it. A 2013 paper I co-authored with Glenn Stockwell openly discusses general aspects of the mobile environment and offers a set of principles for teachers, developers and learners to consider in implementing mobile language learning: https://www.tirfonline.org/wp-content/uploads/2013/11/TIRF_MALL_Papers_StockwellHubbard.pdf.

Evaluating Courseware (Including Apps)

The evaluation component of this chapter begins by looking at the sub-field of tutorial CALL from the perspectives of both of the end users: teachers and students. It introduces the term *courseware,* which refers to software (including mobile apps) used to support deliberate language learning. In practice, *courseware* has been used to refer to everything from complete software packages that can be used without a teacher to software that is just a part of a language learning course, sometimes a minor or optional supplementary part. We will use the term interchangeably with that of *tutorial software* to include any software designed for language learning purposes. Although CALL courseware has arguably lost the dominant position it once had, it is still widely used and continues to be a significant part of the field. At the very least, it is worth exploring so that you can make an informed decision about whether to incorporate it in your own teaching or recommend it to your students for independent study. Besides dedicated language learning courseware, there is educational, native-speaker courseware that can sometimes be adapted for language learning purposes, especially in reading and vocabulary development. And of course, many apps like Duolingo are courseware.

I have been interested in evaluation for some time, and in a series of papers from 1987 to 1996, I attempted to develop a comprehensive methodological framework for CALL that integrated evaluation with development and implementation. The CALL world has turned out to be more complex than that original vision (it did not anticipate the rise of CMC (Chapter 3), for example, and other uses centered on the computer as a tool). However, I believe it still serves a purpose in laying out areas of consideration for any software that has an identifiable teaching presence. As we will see, it can be adapted somewhat for use in evaluating a broader range of CALL tasks and activities. The framework expanded on an earlier model by Martin Phillips (1985) and used

the Richards and Rodgers (1982) framework (Method: approach, design, and procedure) as an organizing scheme to characterize the apparent relationships between elements of language teaching and learning and the computer. The driving force behind it was the observation that existing approaches to instructional design and in particular evaluation did not pay sufficient attention to *language* learning or else limited themselves to specific teaching approaches. I introduce a simplified version of the framework here. Although the focus of this chapter is evaluation, I briefly discuss its relationship to development and implementation as well.

Organizing Principles

Development, evaluation, and implementation are part of a logical progression in any situation that has an end product. If a company produces a computer program for balancing your checkbook, they need to (1) design it with the needs of the end users in mind, (2) evaluate it in-house and encourage outsiders to review it, and (3) have a mechanism to implement it, including figuring out how to make it available and training end users in its effective operation. Of course, this can be and often is cyclic rather than linear, with the feedback from evaluation and implementation providing data for subsequent revision and improvement.

CALL software is a bit different from a simple checkbook balancing program in that it typically involves a more diverse view of who the evaluators and end users are. Evaluation, for instance, may just be connected to the developer and used for improving the courseware prior to release. Or evaluation may be done by an outside reviewer for a professional journal. It may also be done by individual teachers representing a school or institute, selecting materials for their own class, or blogging for the wider language teaching community. It may even be by a student evaluating for possible use or purchase, or to communicate impressions to other users. As Chapelle (2001) notes, evaluation can be done judgmentally at the level of initial selection, based on how well-suited a piece of software appears to be, but it can also be done empirically, based on data collected from actual student use.

Development, evaluation, and implementation are thus simultaneously part of a logical progression of a courseware project and interacting manifestations of its reality. This is true whether the project is for CALL or for some other educational purpose. However, the specific domain of language teaching and learning imposes on these three a set of considerations that are not exactly the same as we would find in courseware for, say, history or chemistry or math. The framework that follows addresses those considerations. This is a revised and simplified form of the content in Hubbard (1996) and in the related papers

listed below (see references). The others go into more depth in language teaching approaches (1987), evaluation (1988), and development (1992). Note that an updated version for evaluation can be found in Hubbard (2006): https://web.stanford.edu/~efs/calleval.pdf, also covering Chapelle's (2001) framework and the topic of evaluation checklists.

Two final notes. First, in an extensive critique of this framework in Levy (1997) argues that "Hubbard's framework for CALL materials development, which assumes that all CALL is tutorial in nature, is not generally applicable to the computer as a tool. Similarly, the Richards and Rodgers model ... only has limited application for the computer as tool" (p. 211). I think there is more applicability than he suggests, but for the moment we will follow Levy's view and assume this is a framework for tutorial CALL only. We will return to a more expanded application of it below.

Second, like Richards and Rodgers' framework, but unlike most others for CALL, there is an attempt to be agnostic here with respect to what actually constitutes good language teaching and learning through computers. For the field as a whole, we need a framework which can be used equally by those whose language teaching approaches might be as diverse as those of grammar-translation, lexical, communicative, sociocultural, or interactionist proponents. Thus, the framework is *descriptive* rather than *prescriptive*.

Framework Fundamentals

The three modules in Figure 2 – development, evaluation, and implementation – share core components inspired by Richards and Rodgers (1982). In each case their original components are adapted, interpreted, and supplemented to include the reality of the computer as the mediator between the teacher/developer, the materials, and the learner. (In some sense, there is a teacher in any tutorial program, or at least a teaching presence, just as there is a teaching presence in a textbook.) The development and evaluation modules are most closely related in terms of the elements considered. Implementation feeds on the output of evaluation. However, each module can impact the others over time, as when information from evaluation and implementation is returned to developers for updates, patches, or considerations in later versions of the product.
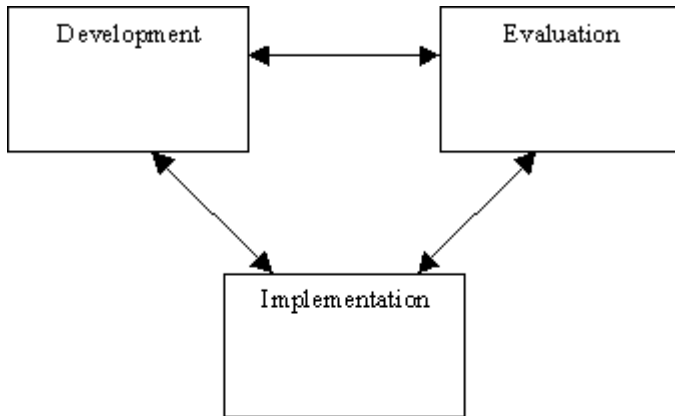
Figure 2. CALL framework interrelationships.

The Evaluation Module

Evaluation involves three kinds of considerations: operational description, learner fit, and teacher fit (Figure 3). The evaluation flow begins with understanding what the courseware actually does before attempting to judge it: the *operational description.* This essentially focuses on the procedure level elements, the units, activities, and interactional sequences of the program. Suspending judgment is, not surprisingly, difficult to do because as soon as we start interacting with a program we want to judge it. Try to suppress that urge at this stage and be as objective as you can. Once the courseware operation is understood, the other two components of the framework come into play, and these do involve judgments. The design elements essentially can be subsumed under the label "learner fit". That is, based on the information from the operational description, you are looking to see how well the design elements of language difficulty, program difficulty, program content, etc. fit the students you are evaluating for. The approach elements, in this case approach-based evaluation criteria, can be subsumed under the label "teacher fit" – broadly, what does the software appear to represent in terms of assumptions about what language is and how language is learned, and how compatible are such assumptions with those of the teacher doing the evaluation? More generally, what kind of "teaching" is the software likely to be doing? Ultimately, evaluation consists of getting a clear understanding of what the software actually has in the way of material and interaction, and then judging how closely it fits with the learner's needs as determined by their profiles and learning objectives (perhaps themselves determined by a course syllabus) and your own language teaching approach.
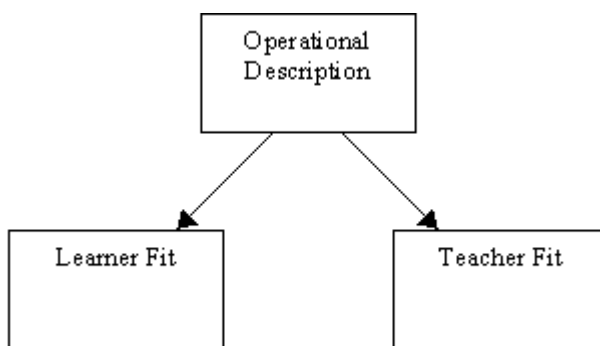
Figure 3. CALL evaluation framework.

Though I initially developed this framework in 1988, I am happy to report that a modified version of it is still used by the *CALICO Journal* https://www.equinoxpub.com/journals/index.php/CALICO for its courseware reviews. See the resources and references sections below for more details about this and alternative conceptions: https://www.equinoxpub.com/home/wp-content/uploads/2018/04/CALICO_LearningTechnologyReviewGuidelines.pdf.

Extending the Model to Other Resources

In a more recent paper (Hubbard, 2019), I have extended the preceding model to the web more generally, that is, to resources beyond those that have a clearly tutorial component, and to mobile apps. While Levy's tutor/tool framework still has value in describing the applications themselves, in the case of tools and resources in particular (e.g., discussion boards, email programs, media players, social networking sites, learning management systems, repositories of authentic audio and video), the key is *how* they are used for language learning, the activities and tasks that are built upon them. Admittedly, the methodological framework in its original form is not a perfect fit: operational description, for example, will not include input judgment and feedback in non-tutorial materials, but other components such as screen layout, types of input accepted, help options, and so on still need to be addressed. Teacher fit and learner fit similarly remain relevant: whatever resource is utilized, it should be done in a way consistent with your assumptions of how languages are learned and with the curricular objectives and student characteristics taken into account as well.

Additionally, the mobile revolution of the past few years has brought tutorial CALL back into the mainstream. There are numerous mobile apps for individual skills (notably vocabulary, pronunciation, and grammar) as well as multi-skill apps like Duolingo, and the preceding framework can be applied to evaluate these. Rosell-Aguilar (2017; see below) among others has revisited evaluation with a new look at the dimensions mobility brings.

Alternatives

The methodological approach I present here has proven useful over the years but there are at least two other approaches that deserve mention, especially once we begin to look beyond tutorial CALL. First, despite some of the limitations and biases in checklists, they have persisted over the years. In fact, the methodological framework above may be rather awkward to use in its raw form, and translating it into a checklist format for a *specific* combination of teacher fit and learner fit considerations (representative of a teacher's own language learning approach, course design, and student characteristics, for example) provides a practical instantiation of its intent. Reinders and Pegrum (2016) have produced an interesting checklist-style framework for mobile learning (MALL) apps and tasks based heavily in a socio-cultural perspective: https://innovationinteaching.org/docs/book-chapter-2016-Framework-for-Mobile-Materials-Development.pdf.

Another general approach, that of building a framework on theoretical principles derived from SLA research, is seen in the work of Chapelle (2001): see https://www.lltjournal.org/item/2368 for a review. She identifies six general evaluation criteria, usable not only for software but more broadly for CALL tasks: *language learning potential, meaning focus, learner fit, authenticity, impact, and practicality*. It is important to note that these criteria are relevant for both judgmental purposes and for evaluating *outcomes*. In line with the latter, another TESOL Technology Standard, Goal 3, Standard 3, references the need to evaluate "specific student uses of technology" for effectiveness. An example application of Chapelle's framework can be seen at https://journals.equinoxpub.com/index.php/CALICO/issue/view/1942 (pp. 93-138). Unlike the methodological framework, which was developed originally for courseware evaluation and requires some adaptation to accommodate other types of CALL activities, Chapelle's framework was designed for what she refers to more generally as "CALL tasks", encompassing a broader set of options. Beyond courseware and learning tasks, Son (2005) has offered criteria specifically for the evaluation of websites, in particular the notion of *authority*: https://drjbson.com/papers/Son_ch13_2005.pdf.

Development and Implementation Considerations

Development, evaluation, and implementation are part of an integrated process yielding supportable CALL materials, tasks and activities. Implementation considerations are relevant during the evaluation process, but they become crucial when deciding how best to use software that is available. Some of the key questions to address in implementation are the following:

- What is the setting in which the students will be using the software (classroom, lab, home, etc.)?
- What kinds of training or preparatory activities are warranted?
- What kinds of follow-up activities either in or out of class will there be?
- Given the options provided by the program, how much control will the teacher exert, and how much control will be left to the learner?

Computer exercises should be clearly linked to the rest of the course, whether they are done in class together, in a lab individually or in pairs working together, outside of class at a computer cluster, or using the student's own computer or mobile device. This does not mean they have to be fully integrated. Arguably, activities with CALL courseware can be supplementary or complementary to the classroom part of the course (including the virtual classroom in an online setting), required or optional, and still be useful. However, the instructor needs to be sure that learners see the connections and that the computer work is compatible in terms of content, level, and approach to the rest of the course material and activities. For a more detailed description of the components to consider in implementation and their interrelationships, see Hubbard (1996).

Resources for Evaluation

Besides the evaluation framework presented here, it is common to see evaluation checklists or other procedures. Here are a few examples.

- CALICO's Learning Technology Review Guidelines for apps and online learning: https://www.equinoxpub.com/home/wp-content/uploads/2018/04/CALICO_LearningTechnologyReviewGuidelines.pdf (based on the methodological framework)
- Using Software in the Adult ESL Classroom (https://www.cal.org/caela/esl_resources/digests/SwareQA.html) by Susan Gaer
- A Place to Start in Selecting Software (http://www.deborahhealey.com/cj_software_selection.html) by Deborah Healey and Norm Johnson
- ICT4LT evaluation form: downloads as a Word document - http://www.ict4lt.org/en/evalform.doc
- For mobile learning: see Rosell-Aguilar's (2017) taxonomy and evaluation framework at https://journals.equinoxpub.com/CALICO/article/view/27623/pdf_1.
- Language Learning App Review Form (https://drjbson.com/projects/apps/) by Jeong-Bae Son (2015)

Suggested Activity

Visit the CALICO website at
https://www.equinoxpub.com/journals/index.php/CALICO. The reviews can
be found by issue in the archives, but many can also be located using the search
term "software review" on the journal site. Find an interesting-looking piece of
software and read the review, noting (1) what you can learn from it and (2) any
questions that arise that might help inform your own evaluation process. If you
feel energetic, try two or three. You should note the difference between a
published review intended for a wide audience and your own evaluation, which
should be situated with respect to your own approach, your students' abilities
and needs, and the environment of your class.

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Questions for Further Discussion and Investigation

1. Finding resources begins with good searching skills. All the work for this book was done using Google (if you have another search engine you prefer or if Google is not available, get to know it well). Perform a Google search for something like "ESL resources" or a similar term if you teach a different language. Take one of the results – notice the three vertical dots at the end of the URL. If you click on that (in a relatively new version of Google), you will get a pop-up window with information about the source. There is a button on the bottom right marked "cached". What does that do? Click it and find out. Then type in "Google search techniques" to discover more.

2. What do you know about the differences between the static (at home or in the classroom) and mobile environments you and your students work in? How reliable are they? How secure are they? How private are they? How equitable are they? In exploring these questions, take notes to help you understand and possibly improve your settings.

3. The concept of "learner fit" shows up in two of the evaluation frameworks above. What can you do to enhance your understanding of this concept in your current or an anticipated future teaching setting?

Chapter 3
Computer-Mediated Communication

Overview

The past chapter dealt with dedicated CALL courseware, or tutorial CALL, and other types of computer-based resources. However, in many cases the tool uses may be more available and consistent with a given teaching approach or teacher's experience, or may simply serve a given learning objective better. In one category of tool uses, computer-mediated communication, or CMC, computers are a means through which teachers communicate with learners, learners communicate with one another and learners may even communicate with native speakers. That communication takes place through variations in the following elements: timing (synchronous or asynchronous), number and patterning of participants (one to one, one to many, or many to many), and medium (text, voice, or video). In addition, the physical properties of the device may offer a significant variable: some CMC applications are only available on a smartphone rather than a computer (e.g., WhatsApp). In this chapter, we briefly examine the options and then go over some of the rationale for various uses to support language learning.

The TESOL Technology Standards address this area for both learners and teachers. Learner Goal 3, Standard 3 states: "Language learners appropriately use and evaluate available technology-based tools for communication and collaboration." Teacher Goal 4, Standard 1 says: "Language teachers use communication technologies to maintain effective contact and collaboration with peers, students, administration, and other stakeholders." As teachers and students have come to incorporate digital devices and applications into their daily lives, in most cases knowing how to use the technologies themselves at a basic level is not the main issue. CMC has become normalized (Bax, 2003). What is different for teachers may be using CMC for language instructional purposes. And for the learners, it is using what may be a familiar application in an unfamiliar setting: the target language rather than their native one.

Text-Based CMC

Due to both the history of technology development and the ease of text use, most CMC has been done using the medium of text, although this is changing rapidly as Skype, WhatsApp, and other free audio and video communication tools proliferate. In particular, 2020 saw the rapid mass deployment of Zoom and other multimodal platforms in the language teaching and learning context incorporating text, audio, and video in real time. We will look at the text uses

first both for their own value and as a vehicle for introducing concepts relevant also to audio and video-based CMC.

Asynchronous text. An early use of CMC in language teaching involved email exchanges from teachers to students and among students within classes. Email is an example of *asynchronous* communication, in that the interaction is not in real time. You create and send an email, and the recipient typically gets it within a few seconds, but may not read it or respond until much later. Under such circumstances, there are clear differences between email and conversation that go beyond the use of text as a medium.

Email can be used for a number of educational purposes. Teachers can receive homework from students and give responses to it. Students can email teachers with questions and requests for clarification of assignments. Students can communicate with one another to practice using the language, to discuss issues, to fulfill communicative tasks, or to collaborate on projects. For instance, a student can interview another through email, asking a set of questions, getting the answers, and then reporting the result in class the next day. Teachers can also assign information gap activities, where students are paired and each has some of the information both need to complete a task. Outside of the class, students can communicate with "keypals", the equivalent of traditional penpals: there are a number of sites that provide services for linking up such as Interpals (https://www.interpals.net/). Another service is ePals at https://www.epals.com/, which serves as a clearinghouse for teachers looking for partners in other countries for class keypal exchanges or collaborative projects.

Another form of asynchronous communication is discussion lists or listservs, where the email goes out to groups rather than individuals (one to many). There are two alternatives for this: email from anyone on the list can be delivered automatically to everyone on the list, or the messages can be maintained on the web so that list members can check in and browse the subject lines – many lists now do both. The latter are similar in some ways to web-based discussion boards, which may be limited to members (like lists) or be open to anyone who finds them. One of the first discussion boards, or forums, for ESL learners was Dave's ESL Cafe (https://www.eslcafe.com/students), but there are many others (e.g., https://www.englishbaby.com). An advantage of these (besides limiting the clutter in people's email) is that discussions can be "threaded", where communications regarding new topics and subtopics are kept separate. Students can log into existing discussion lists or teachers with appropriate software can create their own for a class. Email lists and discussion boards are critical for online learning and are integrated into course management systems like Blackboard (https://www.blackboard.com/), Moodle

(https://www.moodle.org), and Canvas (https://www.instructure.com/canvas). Other places for asynchronous discussion are the comment sections attached to media reports and stories, blogs, and postings on social networking sites.

The use of mobile phones brought about a specific type of short, asynchronous CMC, the text message or SMS (short message service). A well-known version of this in the social networking domain is Twitter. Other applications (apps) in this area include WhatsApp and WeChat, which can send much larger messages (as well as photos, audio, and video), as well as support audio and video calls (see below).

An important consideration for CMC assignments is to get them to fit into the course curriculum in some reasoned fashion. Ideally, like other class activities and homework, they should not just constitute entertainment or "busy work". As we will see in Chapter 7 (learner training), it is also important to take time to prepare students for these activities and to hold regular debriefings to clarify their objectives.

Synchronous text. With synchronous text, or chat, the messages are exchanged in text form, but in real time. Some of the early research on CMC was built around a type of chat program, *InterChange*, that was part of the Daedalus Integrated Writing Environment system (see the Internet Archive version from January 1, 2007: https://web.archive.org/web/20070101204711/http://www.daedalus.com:80/). Students could carry out synchronous discussion in a computer classroom using this tool. While this may seem odd at first (if they are in the same room, why not have them discussing orally face to face?), a number of early studies showed that some students communicate more when they don't have to speak or be face to face with interlocutors, that communication overall is more evenly distributed among participants (e.g., Warschauer et al., 2000), and that they may even use a much wider range of discourse functions than they do in face-to-face settings with the same material (Kern, 1995).

The chat rooms of the past have been largely supplanted by social media and the chat features in applications like Skype and Zoom. However, there are still some specialized chat rooms for English language learners available at sites such as English, Baby! (https://www.englishbaby.com/), where learners can have conversations with others on chosen topics, often moderated by an English teacher. It is worth noting that text chat and current instant messaging applications are sometimes labeled "quasi-synchronous" in that the presentation of material is not completely instantaneous as it is in speaking on the phone (the message is not sent until the "Enter" key is hit). In principle, this allows for a language learner to review and edit a message before sending.

MUDs (multi-user domains) or MOOs (multi-user domains, object-oriented) are relatives of chat rooms where pairs or larger groups of individuals can get together to "converse" through text messages while making reference to a virtual environment in which the conversation is taking place: these were the precursors of the virtual worlds discussed in Chapter 8. Synchronous messaging can also be found on social networking sites, like Facebook.

Audio/Video CMC

Asynchronous audio. Like text, audio or video interaction can be either asynchronous or synchronous. One example of asynchronous voice interaction would be the audio and video communication services offered by a number of companies for free (Facebook, WhatsApp, Skype, etc.). Using this, students can leave messages for one another or for the teacher. Some learning management systems have audio-enabled discussion boards. It is also possible to send audio messages in wav or some other common format like mp3s as attachments to emails. An excellent free resource for doing such recordings is Audacity (https://www.audacityteam.org/) for both PCs and Macs.

Asynchronous video. Some sites for sharing video (most notably YouTube) are not really designed for exchanging video messages. However, the potential for language learning in asynchronous video is strong, both because of the psycho-social motivation visual representations can provide and the ability to view facial expression, gesture, and lip shape and synchronization to aid in both comprehension and pronunciation development. Services exist that allow for setting up groups, which would be more appropriate (and private) than YouTube for teaching purposes. Examples are Dropbox and Google Drive. Also, synchronous video apps like Skype, WhatsApp, and Facebook Messenger allow video recorded messages.

Synchronous audio/video. Synchronous audio is possible using Internet telephony (or just the telephone, for that matter) for one-to-one conversation (e.g., Skype). Conference call versions of this allow for group interaction. There can be some issues, including delays and reduced voice quality due to the compression requirements, but these have become less common in recent years. Following the shift to emergency online teaching for many of us in early 2020, the familiarity and comfort with synchronous video interaction has greatly increased for both teachers and students. In spring 2020, I taught an advanced listening class through Zoom to students across multiple time zones. Audio/video quality was rarely an issue, and with another year behind us, we can almost consider such interactions normalized.

Another area for CMC is the virtual world: like https://www.secondlife.com/; see https://www.youtube.com/watch?v=mdkz59vfn3g . In virtual worlds

students have avatars that can move in a 3D environment and interact with other avatars through text and voice chat. Note that virtual worlds relying heavily on CMC also exist in online gaming settings that can be exploited for language learning, such as World of Warcraft.

Multimodal CMC

Although for language classes text, audio, and video have been the focus of much previous work, there is increasing use of *multimodal* communication where these are combined. We can see this in Skype or Zoom, where video may be accompanied by a chat box on the side, and in the case of Zoom and similar platforms, may also have icons for raising one's hand or applauding. For social media in its primary asynchronous form, photos and videos can be accompanied both by the sender's text description and by comments from others. In text messages, emails, and elsewhere, emoticons are used as communicative devices, as are graphics, including animated GIFs. We can expect multimodality to become more prevalent in second language learning and language use, as the blurring of boundaries between pure "language" and other communication forms increases. In fact, within applied linguistics, there is a strong turn toward multilingual, multimodal communication as a norm (see Douglas Fir Group, 2016).

Integrating CMC into ESL Classes

Synchronous CMC by definition is considered real-time communication. Learners are put on the spot to produce language quickly, and we can expect less accuracy (including typos if in a text mode). So, they will arguably be practicing something that overlaps a lot with face-to-face communication. However, a number of studies have shown that there are differences, especially in the way students engage in collaborative interactions with synchronous text. Smith (2008), for example, notes that screen capture can show the way learners start a sentence and then change it before sending it out on chat, so called self-initiated self-repair. Face-to-face interaction does not readily allow this level of reflection prior to speaking. Asynchronous CMC allows for even more thought and planning, and thus it may be more reasonable to expect closer attention to organization and language forms, as well as more extended monologues.

One of the great advantages of modern CMC compared with a decade or so ago is that most teachers and students are already comfortable with the medium for social uses and the tools are often present or readily available. Additionally, unlike tutorial CALL, the language content is not prewritten but is rather created by the demands of the activities themselves. These features make it much easier to integrate CMC into classes. This does not, however, imply that

CMC activities are always useful or that students will be motivated to engage in them and interact in ways we want them to. As with any other CALL activity, a CMC exercise or project should be introduced thoughtfully, and learners should be given appropriate training not only in the technology but also in linking their actions to the language learning objectives of the course.

There has been a tendency for those first engaging in CMC activities with students to note, and in some cases report, only the positive aspects. However, it is important to realize that the nature of the tasks, the applications used, and the groupings all can have a major impact on the degree of success. Jackson (2011), for example, explored differences in convergent (information gap with a solution) and divergent (open-ended) tasks, finding convergent ones led to more turns and use of questions. Thorne (2003) showed that there is a "culture of use" that needs to be considered with respect to various CMC applications. In one of the three cases he discussed, an American and a French student who were assigned to communicate transatlantically by email switched to an instant messaging program instead and ended up conversing for many more hours than expected. Robert Blake's retrospective on his first CMC article from 2000 (https://www.lltjournal.org/item/2955) and the technology and L2 speaking section of his review article on technology and the four skills (https://www.lltjournal.org/item/2951), both from 2016, provide a useful overview of CMC issues.

In recent years, *telecollaboration*, also called *virtual exchange*, has become an active area for research and development within CMC, especially in Europe. O'Dowd (2018) provides an excellent overview of the state-of-the-art in these areas: https://files.eric.ed.gov/fulltext/ED592404.pdf . A 2019 special issue on virtual exchanges from *Language Learning & Technology* can be found here*:* https://www.lltjournal.org/collection/col_10125_63560.

As noted above, CMC is a critical component of online language teaching and learning. There are a number of issues that come into play regarding the positive or negative impact of CMC in such settings. These can include the CMC tool itself (Skype vs. Google Meet vs. Zoom, for example), the infrastructure available to both teachers and learners (especially reliability and bandwidth for synchronous communication), and especially, the skill with which the participants utilize the online environment for instruction and communication. For many, including myself, it is a challenge to maintain cohesion in the video interaction while simultaneously monitoring the chat.

Suggested Activity

Visit a discussion board or chat room
at https://www.englishbaby.com/, https://ell.stackexchange.com or a similar

site where language learners congregate. Try participating in a chat and/or making a posting to one of the discussion board topics. Examine the language the learners are producing and reflect on your experience, including an assessment of how you think chat or discussion could be integrated into a class you were teaching.

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Questions for Further Discussion and Investigation

1. Identify your favorite communication app (WhatsApp, WeChat, etc.). Using Google Scholar or some other academic search engine, what can you find in the way of studies showing how it has been used in language teaching and learning? Read one of these. What did you learn?

2. Using text-based chat in one of its many forms has elements of both synchronous and asynchronous interaction because typically the user has to hit "Enter" before the message is sent, allowing the sender to monitor their output in ways impossible in speaking. What could you do to help your students take advantage of this feature while still maintaining a sense of real-time interaction?

3. Current communications platforms like Zoom and Skype are set up for multi-modal communication. In Zoom, for example, besides the real-time audio-video channel, there is a space for group or private text chat and various iconic gestures like raising a hand or applauding. On the one hand, this provides a richer set of communicative options; on the other, it splits attention, especially for those not proficient in the language of interaction. What advice would you have for language learners at different levels regarding effective use of this multi-modality to enhance their learning experiences?

Chapter 4
CALL and Language Skills

Overview

Skills-oriented language teaching remains a common approach for many curricula as well as for self-learning, and this is true of CALL as well. In this chapter, we look at how both tool and tutor software can be used to support specific skills. In particular, we will survey some websites that focus on these skill areas. Many of these are for free, but like everything else that is free on the web, the sites need to be examined carefully for their pedagogical value. Once you understand what they do, try to judge their fit to your potential students and your own teaching approach. You can also use them to get ideas for your own future CALL materials development. The questions you should be trying to answer are the following:

1. What have teachers/developers done to teach the skill areas using computers?
2. To what extent does what they have done actually enhance learning?
3. And most importantly, how can you use these resources to support your students' learning objectives?

In the 20th Anniversary Issue of *Language Learning & Technology* (June 2016), Robert Blake provides a valuable review of some key developments in the four skills (listening, speaking, reading, and writing) for CALL, framing it under the umbrella of task-based language teaching. He notes that isolating each of the four-skills in practice is no longer as relevant as it was historically, given contemporary views of integrated language development and multi-modal expression. However, the content and commentary that the article provides remain valuable for curricula incorporating technology, regardless of whether they isolate or integrate those skills: https://www.lltjournal.org/item/2951.

ESL Collections

Because of the enormous number of English teachers and learners, there are quite a few multi-skill collections for ESL. A few, such as https://www.manythings.org/ by the Kelly brothers (Larry and Charles) (https://aitech.ac.jp/~lkelly/ and https://aitech.ac.jp/~ckelly/) are mostly labors of love for students and colleagues around the world. Often, however, these collections are at least partly commercial, aimed at getting "eyeballs" for advertisers. Some of these sites are divided by skills: see for

example https://www.eslgold.com/ or just type "ESL" plus the skill you are interested in into a search engine and see what you get back. Collections for other commonly taught languages can be found in a similar way. Some have links to external websites, some have only their own material, and some have both, such as https://www.rong-chang.com/. If you are teaching a language other than English, there are likely similar sites: see https://multidict.net/clilstore/, especially for vocabulary development.

Listening

Listening is one of the most promising areas for CALL integration. This is because multimedia computing has everything standard audio and video have with the addition of a variety of meaning technologies such as text support, hyperlinked glossaries, and translations. Listening activities typically involve presentations followed by comprehension questions – some also include full or partial dictations. One type of presentation specific to CALL is the *punctuated* presentation, in which the flow is interrupted at intervals to ask questions along the way. This in theory encourages more focused attention and allows a learner to get a check on understanding early in the activity. This technique was popularized in products by DynEd (https://www.dyned.com/) beginning around 1990. Surprisingly, few multimedia programs have followed their example.

You can see an example of a course website for one of my listening classes at https://web.stanford.edu/~efs/693b/. The course notes have instructional material, links to both tools and content resources, and examples of listening tasks for students to engage in, along with support for doing so independently. Useful sites for authentic videos can be found at https://www.ted.com/, https://ecorner.stanford.edu/, and https://www.cnn.com/cnn10. Authentic podcasts for listening can be found at https://www.scientificamerican.com/podcast/60-second-science/ among other sites. There are also a number of dedicated ESL listening sites: three well-established ones are https://www.esl-lab.com/, https://www.elllo.org and https://www.englishbaby.com/.

Speaking

In terms of *direct* synchronous practice of speaking, learners can interact with teachers and peers through any number of applications. The question is what sorts of tasks to use (Blake, 2016). Asynchronous speaking practice is possible through audio/video discussion applications like https://voicethread.com/ or by simply attaching sound files to email. Using the audio or video message feature of Skype, WhatsApp, or Facebook Messenger serves the same purpose. There has also been interest in having students produce and publish audio or video podcasts. For synchronous speaking practice, there are sites for tandem

learning such as https://www.mylanguageexchange.com/, which can connect language exchange partners through Skype. A list of a number of other language exchange sites can be found at https://www.thebalance.com/free-language-exchange-websites-1357059. Technology devices can be a catalyst as well as the tool for speaking: having students share a device in groups of two or more can get them talking about the task in the target language and improve speaking, although research has not always borne this out. Like many other CALL activities, it depends on the students' readiness and motivation. For tutorial CALL, practicing speaking has always been a challenge because the computer cannot really respond intelligently to the speaker's input, although "intelligent" assistants like Siri, Alexa, and Google may be of some value in speaking practice if a learner's accent is transparent to their speech recognition systems. A program I co-authored that used speech recognition and branching dialogues for speaking and listening practice was *TRACITalk: The Mystery* (CPI, 1997), an example of a participatory drama: see https://learning2gether.net/tag/traci-talk/ for a discussion. AlKhayat (2017) describes her students' experience with a chatbot (https://www.rong-chang.com/tutor_mike.htm), noting that, while students enjoyed the experience, more work is needed to determine appropriate pedagogy for such interactions to support learning. Rapid developments in AI (artificial intelligence) suggest that chatbots will become more accurate at comprehending accented speech and engaging in more open-ended and socially oriented interactions.

Finally, there are indirect methods to support speaking: one is simply to listen to conversational dialogues on the web or through apps, using these dialogues as models for interactions in common situations. It has also been suggested by practitioners as well as researchers (e.g., Payne & Whitney, 2002) that engaging in text-based chat supports the development of speaking skills indirectly due to the synchronous and informal nature of chat.

Reading

In the early days of CALL, reading software was designed to improve skills in order to transfer them to paper materials. More recently, reading in digital form is becoming more and more common. Given the increasing popularity of electronic readers such as Amazon's Kindle (with its ability to link to an electronic dictionary) the tools used for reading are likely to become richer supports for language learning.

Most CALL reading instruction, first on disk and later on the web, has involved the use of meaning technologies. These include dedicated supports, such as hypertext glossaries, translations, and notes (on grammar, usage, and

culture), put together by developers for particular texts. Available technologies also include generic applications such as electronic dictionaries, encyclopedias (especially Wikipedia), and translation systems like Google's https://translate.google.com/. A number of studies have shown an advantage for comprehension and vocabulary acquisition when reading materials that are supported by multimedia glossaries, and both native speaker and language learner texts exist with voice enhancement (text to speech) and dynamically illustrated material.

Here are some other ways CALL can be used to support reading:

- Just using the web: teachers give students tasks that require finding, comprehending, and sometimes consolidating information on the web through tasks like WebQuests: http://blog.tesol.org/3-webquests-to-engage-your-ells-with-content/.
- Educational sites with ESL or adult literacy support: see the Learning Resources Adult Education Reading Site https://literacynet.org/learningresources/.
- Text reconstruction activities, such as cloze exercises and jigsaw readings.
- Timed or paced readings to develop speed.
- Multimedia reading, such as voice enhanced texts and dynamically illustrated material on websites and apps.
- Online graded readers, which allow learners to increase their reading proficiency and build vocabulary in somewhat systematic increments: https://erfoundation.org/wordpress/graded-readers/.

Writing

Writing was revolutionized for everyone with word processing, and the addition of spell checkers was helpful for native writers and language learners alike. Grammar and style checkers have been less reliable to date but are improving: see https://www.grammarly.com/. Writing has also been a common skill taught as a course online due to its natural asynchronous nature.

Some other ways computers enhance writing instruction include the following:

- Use of email, discussion boards, and similar applications for fluency development.
- Online writing resources such as Purdue's Online Writing Lab: https://owl.purdue.edu/owl/english_as_a_second_language/esl_students/index.html and tutorials, like https://www.monash.edu/rlo/research-writing-assignments.

- Collaborative writing tasks. These are made easier today with tools such as Google Docs: https://docs.google.com/.
- Writing support practice (e.g., CALL activities with fill-ins for structured writing)
- Publication opportunities (both paper and web) as motivators. See Tom Robb's classic description of an early web publishing project at https://www.cc.kyoto-su.ac.jp/~trobb/projects.html.

With respect to the last point, writing publication opportunities are readily available through Wikis and Blogs. Wikis are webpages that can be easily modified by multiple users (see, for example, Wikipedia at https://www.wikpedia.org) and are particularly good for collaborative projects: see https://callej.org/journal/13-1/Li_2012.pdf. Blogs can be published by individual students or groups, allowing others to leave comments on: see https://www.edutopia.org/blog/blogging-for-english-language-learners-rusul-alrubail. Social media sites also allow for a form of publication. As a reminder, be sure to protect student safety and privacy when asking them to publish any of their work online. Check your institutional policy for details.

Grammar

Grammar practice was perhaps the earliest use of CALL. Today grammar work is largely focused on the following:

- Workbook-style exercises (on apps and online): online examples can be seen at https://www.grammar-quizzes.com/.
- Grammar test prep materials (especially TOEFL https://www.toefl.com and TOEIC https://www.toeic.com)
- CD-ROMs and online exercises accompanying grammar textbooks
- Hypertext-linked grammar notes accompanying reading materials
- YouTube and other sites with instructional video: these can cover specific grammar points. For example, https://www.youtube.com/watch?v=q1LKzp2ozVM, https://www.youtube.com/watch?v=_8ObuO5neR0, and https://www.youtube.com/watch?v=XgLdOI6UsJY – all discuss the differences between present perfect and simple past for ESL learners.

As a reminder, as with all material found online, it is important as a teacher to curate it, selecting the tools, exercises, and instructional content you think reflect the best teacher and learner fit.

Pronunciation

As with grammar, direct instruction videos for pronunciation are easily found online (e.g., https://pronuncian.com/videos). However, computer mediation allows for much more. Pronunciation practice on the computer is generally of three types:

- Listen, repeat/record, and compare. This option shows up in many multimedia programs and apps and is analogous to the tape-based language lab technique in the audio-lingual method. However, the instantaneous response of digitized speech (no rewinding needed) makes the computer a more effective instrument for this.
- Visualization: wave form, pitch contour, spectrogram. Wave forms are easy for a computer to produce, but they only clearly show the bands of intensity across time. They may be helpful in visualizing rhythm but are otherwise difficult to interpret: see https://journals.equinoxpub.com/CALICO/article/view/22973/18979 . Spectrograms, sometimes called voice prints, are most useful if they have high detail, which they generally do not on CALL software, and they also require training in phonetics to interpret them: see https://en.wikipedia.org/wiki/Spectrogram. However, visualization of pitch contour has been found to be quite helpful for some students in recognizing and producing both the patterns and ranges of intonation (Chun, 1998). An open-source program called Praat can be used to provide visualizations for teachers interested in producing their own. See https://pdfs.semanticscholar.org/c4a8/c157bb0b88ae67d8add828f1 87761bc43cbc.pdf.
- ASR (automatic speech recognition) scoring. Here, the computer uses speech recognition software to grade accuracy. ASR and visualizations are also used in commercial products such as Rosetta Stone: https://www.rosettastone.com. Students can get practice and feedback on their speech through ASR at https://www.englishcentral.com/ by repeating lines from online videos. A relatively sophisticated and comprehensive ASR-based system is Carnegie Speech's Native Accent, https://www.carnegiespeech.com/products/nativeaccent.php, which offers individualized practice on both segmental and suprasegmental components (as well as grammar) based on an intelligent tutoring system. For an example of a standardized test that uses ASR, see Pearson's Versant: https://www.pearson.com/english/versant.html. It should be noted that ASR scoring is often not the same as a native speaker or pronunciation teacher would give. Sometimes a native speaker will even be marked low. Also, problems with the quality of the microphone, environmental noise, electronic or mechanical noise from the computer, and input

settings for the microphone can all affect the accuracy of speech recognition, and certain speech sounds are more accurately recognized than others.

There are a number of online tools for improving pronunciation, though increasingly these appear as web-based downloads or apps. There are also some commercial and teacher-produced sites with pronunciation instruction. Among the more comprehensive is Rachel's English: https://www.rachelsenglish.com/.

Vocabulary

Vocabulary activities have been around since the early days of CALL in the form of electronic flashcards (linking L2 word to L1 translation or L2 word to L2 definition). Other common CALL implementations for vocabulary include the following:

- Hypertext dictionaries. WordWeb (https://wordweb.info/free/) is a memory-resident dictionary system that runs in the background on your computer (Windows only). Clicking a word in any text-readable document brings up its definition. Browsers like Safari and Chrome can also have this functionality.
- Digital dictionaries: Longman, Oxford, and Cambridge have learner's dictionaries that include pronunciation and sometimes other multimedia support. An online version is at https://www.ldoceonline.com/.
- Concordance programs: these programs look for words in collections of texts, or corpora, and return examples of the word in the immediate context it occurs in. An online one is available at https://lextutor.ca/conc/eng/.
- Picture dictionaries: though once popular, theses have largely been superseded by image search online, like https://images.google.com. Try "alizarin" and "pangolin" if you don't know what they mean (or even if you do) for an example of what a picture can do for meaning. It also works for other languages.
- Word lists & vocabulary tests for English: see the New General Service List, https://www.newgeneralservicelist.org/; https://www.lextutor.ca/tests/levels/productive/.

An outstanding site for vocabulary teaching and research tools is Tom Cobb's Compleat Lexical Tutor (https://www.lextutor.ca/).

Culture

Obviously, this is a huge area for foreign language teaching, where authentic cultural material is readily accessible through the web. There are many ways to use the authentic material found on websites to support cultural learning. YouTube is a particularly useful application for this purpose with intermediate and advanced students, see https://eduwithtechn.wordpress.com/2007/08/18/teach-culture-through-youtube-your-students-do-it/. Links specifically for teaching culture can be found at http://iteslj.org/. To review a proposed pedagogical framework for culture and technologies, see Levy (2007) at https://www.lltjournal.org/item/2576. MIT hosts a website for the Cultura Project, supporting development of cultural understanding and connecting students from different cultures to one another https://cultura.mit.edu/, as does the UNICollaboration group through its Erasmus virtual exchange project (https://www.unicollaboration.org/index.php/eve/).

Suggested Activity

Select *one* skill area that particularly interests you. After reviewing some of the sources mentioned above, find several *other* web sources on your own and evaluate them for their potential to integrate into or supplement your class activities.

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Questions for Further Discussion and Investigation

1. Consider the skill area of listening. There are many authentic online videos available that can provide learners with opportunities for improving their listening, vocabulary, and cultural understanding. What resources are you

aware of for the language you teach? What advice can you give students to use these resources effectively?

2. There are many devices and applications known as "personal assistants, like Siri for iPhones and Alexa for Amazon Echo" that use speech recognition and natural language processing to allow users to request help and engage in other spoken interactions. What are some of the challenges in using these to support language learning? How might learners overcome or reduce the impact of some of these challenges?

3. Take look at one of the electronic flashcard programs like Anki (https://apps.ankiweb.net/) or Quizlet (https://quizlet.com/). They support vocabulary practice but are typically limited to linking a word to its definition or translation. What advice or tasks could you give students to help them work with these so that a deeper level of vocabulary learning is achieved?

Chapter 5
Environments, Tools, Materials, and Activities

Overview

This chapter looks at four dimensions of CALL: the environments in which it is used, the digital tools, the materials available (especially on the web), and the types of activities. Some of the points here have already been touched on in previous chapters but we revisit them and explore them in greater depth here. This chapter is primarily about exploring, so be sure to follow up on links that look interesting.

Environments

Goal 2, Standard 1 of the TESOL Technologies Standards for Teachers states, "Language teachers identify and evaluate technological resources and environments for suitability to their teaching context." Similarly, Goal 1, Standard 2 refers to teachers' knowledge of a wide range of technology options and especially their ability to use those options "in a given setting". Indeed, environments determine to a large degree what a teacher or learner can and can't do with technology. This section will discuss different environments for users (both teachers and learners) and how those environments impact the nature of interaction and learning.

- Classrooms. The technology available in classrooms is currently in a state of transition across institutions and in many cases within institutions as well. When I was teaching, I might have one course in a room with an electronic white board and another in a room with only a chalk board. For the foreseeable future, teachers should be aware of the need to be flexible and adapt to the classrooms they find themselves in.
- Computer centers. In some institutions, language teachers have access to general purpose computer clusters. In order to make these useful for language teaching, it may be necessary to work with lab coordinators or other IT staff to ensure that items such as headsets and microphones are included, along with language-focused tools like digital recording software and multi-lingual word processors.
- Dedicated language labs. The language lab of the past with networked audio recorders and listening stations has been replaced by computer clusters specifically for language learning (see for example, Stanford's Digital Language Lab: https://thelab.stanford.edu/) The International Association for Language Learning Technologies (IALLT) has

published a valuable guide on language center design: https://iallt.org/resources/publications.

- Homes. Obviously, there is a great deal of variety in terms of what students and teachers have in the way of technology at home. When you assign technology-dependent homework of any kind, it is important to know exactly what sort of devices, applications, and connectivity your students have in order to provide equitable learning opportunities.
- Online from home. In 2020, many teachers had to move their teaching from the classroom to an online platform like Zoom, with some place in their own home as their teaching environment. Students similarly had their homes or other available locales become their "classroom". It is not clear to what extent this will become the norm in the future, but teachers should become aware of what this means for them and their students when the locus of control is no longer the physical classroom.
- Outside the home. In some settings the only access some students will have is at public access locations away from home. It is important to note the limitations of these in terms of bandwidth, security, privacy (noise) and expense to the students. See https://lifewire.com/how-to-find-free-wifi-locations-1358040 for lists and useful information. On a personal note, in summer of 2020, I worked with a graduate student on a research project who had to go to a parking lot to use the Wi-Fi at a local grocery store in order to get sufficient bandwidth to run our Zoom meetings from her car.
- Mobile computing. The smartphones that students and teachers are carrying these days are computational devices that greatly exceed the power of desktop computers from a decade or so ago. They offer convenience especially for working with materials like vocabulary that can be handled in short chunks of time. However, they are often used in environments that include other distractions, and students and teachers should take these into account.

Note that increasingly teachers and students are both relying on BYOD – bring your own device – whether it is a laptop, tablet, or smartphone. As opposed to earlier times when everyone might be on the same model of a computer in a language lab, teachers need to be aware of what devices their students are using and how they might be different from one another.

The Web vs. Apps

We can connect to tutors, tools, and resources online in two ways: through web browsers and through dedicated apps (short for "applications", what we used to call software programs).

Web browsers like Chrome, Safari, and Firefox connect to sites through their URLs (Uniform Resource Locators) using a normal or secure method to transfer data known as a "protocol". The "http" you see at the beginning of most web addresses (URLs) stands for "hyper-text transfer protocol". When an "s" is added (i.e., https) that means it is secure: in modern browsers this is represented by a "lock" icon. Increasingly, you and your students should use the https option if it is available, and exercise caution when it is not.

Dedicated apps are small programs that connect directly to servers representing their owners. Many tools have both options – you can connect to Facebook, for example, through a web browser (https://www.facebook.com) or through the dedicated Facebook app and that shows up as an individual icon on your phone screen.

Some websites are programmed to be dynamic in their ability to change their interface to conform to the smaller screens of smartphones. These "webapps" can sometimes be more convenient than a dedicated app, but they may also lack certain features, connect more slowly, or demand more access to your private information than you wish to reveal.

As part of knowing the device you are working with, you should always be aware of whether you are using an app or a browser, and whether you are online or offline. You need to be sure that your students share that awareness.

Tools

As noted in Chapter 1, tools are applications that allow users to take advantage of the mediational properties of digital devices to perform useful tasks. Especially, they link, control time, and transform.

- Automated meaning technologies: Machine translation (e.g., https://translate.google.com) and popup online dictionaries like the Chrome extension by Google (https://chrome.google.com/webstore/detail/google-dictionary-by-goog/mgijmajocgfcbeboacabfgobmjgjcoja).
- Lexical tools: Tom Cobb's Compleat Lexical Tutor (https://www.lextutor.ca/).
- Media players. Media players have a range of controls that can aid in comprehension, such as the ability to show or even automatically produce captions (see YouTube). Some, like the VLC media player, https://www.videolan.org/vlc/index.html, have sliders to adjust playback speed and controls allowing jumping back 2 seconds to repeat what was just heard {Shift+back arrow}.

- Google Docs (https://docs.google.com) allow for online writing and multiple-author collaboration through the sharing feature.

Note: There are many more tools for collaboration and learner production on the web. These are just a few examples. For more ideas, check the current issue and archives of the *CALL Electronic Journal*: http://callej.org.

Materials

Authentic Language Materials. There are many, many options for this – here are just a few (some have been discussed previously):

- General news sites such as CNN (https://www.cnn.com) have rich web presences. The News Hour (https://www.pbs.org/newshour/) from PBS and CNN Student News (www.cnn.com/cnn10) include scripts and audio or video together.
- Podcasts at https://www.scientificamerican.com/podcast/60-second-science/ and many news and entertainment sites
- Google News (https://news.google.com): An excellent technique for more advanced students is to have them go to Google News for their own language, find an interesting story and read it, and then follow up by reading three or more versions of the same story in English from different online sources.
- Scripts and transcripts from SimplyScripts (https://www.simplyscripts.com/tv_all.html) for movies and TV shows – great for building vocabulary of English in context when integrated with watching the videos of the movies or shows.

Dedicated Language Materials & Exercises:

- Using tutorial software on the web, like Randal's Cyber Listening Lab (https://www.esl-lab.com/) and English, baby! (https://www.englishbaby.com/)
- ESL podcasts: https://www.eslpod.com/website/index.php
- Commercial course sites like EF English Live (https://englishlive.ef.com/en-us)
- Major publishers increasingly have websites that complement their textbooks, like Longman (https://www.pearsonelt.com/professional-development/resources.html)
- Online language tutoring, like https://www.italki.com/.

Collecting, Tagging, and Curating Materials

There is a growing need to provide students with more direction in terms of selecting content at an appropriate language level for learners, especially authentic materials. Some of this may be automated; for example, the captioning function in advanced video search only finds captioned videos (https://www.google.com/advanced_video_search). Collaboratively produced collections include those at https://www.openculture.com, especially https://www.openculture.com/freelanguagelessons. Curating, in the sense used here, involves collection and interpretation of stable online content by human experts, much as a museum director organizes and interprets the collected artifacts in museum exhibits, which goes beyond simple linking and tagging. See https://web.stanford.edu/~efs/693b/TED1.html for an example of TED Talks that I curated for an advanced listening class. See also https://multidict.net/clilstore/ for material collected for other languages as well as English, tagged with an approximate level according to the Common European Framework indicators.

Activities

Lesson Plans & Projects

- Finding content for projects, both individual and group. Note the importance of balancing seeking and production time with language learning and practice time. See https://www.insightstoenglish.com/student-projects/.
- Ideas and lesson plans for Internet, web, and class activities: Sources such as https://www.tefl.net/esl-lesson-plans/; do an online search for your specific needs.
- Making resource pages for individual classes. You can use programs like Dreamweaver or even MS-Word to produce websites. See my websites for EFS 693B, https://web.stanford.edu/~efs/693b (Advanced Listening) for example. If you don't have access to webspace at your institution, you can also make your own site easily, hosted by Google, at https://sites.google.com/.
- Sending your students out on WebQuests: https://www.world-english.org/webquests.htm.

Other Resources: Some CALL experts have websites with useful links:

- Claire Bradin Siskin (https://edvista.com/claire/)
- Deborah Healey, (https://www.deborahhealey.com/)
- Vance Stevens (https://vancestevens.com/)
- Mark Pegrum (https://markpegrum.com/)
- Jeong-Bae Son (https://drjbson.com/)

The key to using online resources is to be prepared. Know what the objective of your lesson is and try to make sure students are trained in what they need to know to accomplish that objective. Try to build some flexibility into the assignment or activity so that if something isn't working as expected the task can still go on.

Suggested Tasks

1. The web can be a resource for both classroom and online lessons: take a look at two or three of the lesson plans on the web (Use Google to find "ESL lesson plans" if none of the sites above has what you are looking for). Do you think they represent activities that are consistent with your language teaching approach? Is there anything obvious you could do to improve them?
2. Meaning technologies like Google Translate and online scripts for audio and video can hinder as well as help, since they can interfere with normal language processing. What are some ways to use them positively and to train learners in their use? See https://web.stanford.edu/~efs/phil/MT.pdf for an early discussion of this issue.
3. Try three or four of the sites listed above that you have not visited before. Note ways you might use them in current or future classes.

Questions for Further Discussion and Investigation

1. In 2020, many teachers and students all over the world shifted from the classroom to the home or some other environment for online language learning. If you experienced that, what were some of the problems you became aware of, and how did you try to solve them. If teachers need to teach out of their homes again, what could be done to make that environment better for supporting learning?

2. Youglish (https://youglish.com/) is an online tool for finding words spoken in context. When you type in a word in English (or one of several other supported languages), the program immediately links to a set of excerpts from YouTube videos where the word appears. The developers say that this is good for practicing pronunciation. Explore using Youglish if you can, and then think of how you could use it in your classes for not just pronunciation but possibly other purposes?

3. Search the web for some materials (text, graphic, audio, and/or video) that you believe would be useful for your students working on their own. Collect these and try to organize them according to language level, using your intuition and any objective measures (e.g., speed, accents, vocabulary level). How successful do you think you were? What challenges did you have?

Chapter 6
CALL Theory and Research

Overview

Arguably, any applied field is defined by three dimensions: theory, research, and practice. The bulk of this book focuses on practice, but in this chapter we will also briefly consider the role of theory and examine some of the types of research that have been conducted, along with a few example results.

The TESOL Technology Standard most closely allied to this chapter is Goal 2, Standard 4: "Language teachers use relevant research findings to inform the planning of language learning tasks and activities that involve technology." While it is natural to extend face-to-face classroom research to the CALL domain, much more relevant sources can be found within the field itself. Scholars have been studying CALL technology, materials, tasks, environments, and interactions for four decades, yet many teachers who use technology and even present their experiences with it at major conferences seem to know little or nothing of this literature. The purpose of this chapter is to offer an introduction to CALL theory and research to provide you with a foundation and some resources for further exploration on your own.

Theory

What is CALL theory? Egbert and Hanson Smith (2007) claim that "CALL theory" is unneeded: "educators do not need a discrete theory of CALL to understand the role of technology in the classroom; a clear theory of SLA and its implications for the learning environment serves this goal" (p. 3). The key term for me there is "the learning environment". As noted in Chapter 1, I am convinced that what the technology brings to the learning environment as a mediating actor is significant enough that any attempt to characterize such an environment without a deep understanding of how technology impacts that environment – and the learning process – will be incomplete. I have defined CALL theory elsewhere as follows:

> Collectively, *CALL theory* is the set of perspectives, models, frameworks, and specific theories that offer generalizations to account for phenomena related to the use of computers and the pursuit of language learning objectives, to ground relevant research agendas, and to inform effective CALL design and practice ... *a* CALL theory is a set of claims about the meaningful elements and processes within some domain of CALL, their interrelationships, and the impact that they

have on language learning development and outcomes (Hubbard, 2009, p. 3).

There is an interesting gap in the area of theory for CALL. Unlike the case of second language acquisition in general, CALL does not have a dedicated theory yet and, based on current trends, it is unlikely that it will ever have a comprehensive one. Instead, CALL theory comprises the "set" mentioned above, a set drawn from a number of sources including SLA theories, general learning theories, linguistic theories, human-computer interaction theories, and others. In Hubbard (2009), I propose a framework for the relationship of theory to CALL research and practice. The framework starts by noting that much of CALL research to date has been *atheoretical*, i.e., produced without reference to any specific theory or framework. When theory is referenced, by far the most common approach is simple *theory borrowing*, where a theory from some other domain such as SLA or general education is used without any changes. A more interesting form is *theory adaptation*. In this case, a theory is modified or enhanced to accommodate the differences inherent in the computer versus the face-to-face environment. A much rarer occurrence is *theory synthesis*, where two or more theories from different sources are combined to accommodate the special qualities of the computer-mediated language learning environment. CALL has witnessed only a few examples of *theory creation*, following the description for "a CALL theory" above, and none of these have gained traction. Examples of each of these may be found in Hubbard (2009). Two additional categories are introduced in Hubbard and Levy (2016). One is *theory instantiation*, where a general framework like Activity Theory that explicitly has a place for both the technology and language learning is incorporated in a study. The second is *theory ensembles*, an increasingly common approach where perspectives from two or more theories are combined in a specific study without synthesizing them into a more permanent unitary entity.

There is a great deal of variety in theoretical underpinnings to CALL. As an example, I researched all the instances of the word *theory* in 25 years of *CALICO Journal* articles (Hubbard, 2008). Across those several hundred CALICO articles (3-4 issues per year), there were 113 distinct theory references. Only 17 of these were mentioned in three or more articles, and there were no dominant ones. Of specific theories (as opposed to general types like "learning theory", which was mentioned in 20 articles), the two leaders were schema theory and item-response theory, the latter only applying to designing assessments.

In terms of general theoretical approaches these days, the influence of both cognitive theories (e.g., information processing) and sociocultural theories (e.g., Activity Theory) is evident. Within that division, there is a tendency toward quantitative approaches for research in the cognitive tradition and

qualitative approaches for sociocultural studies, although mixed methods are increasingly valued.

Research

We can distinguish two main kinds of research in CALL. One is descriptive and exploratory, looking at what happens when language learners engage in CALL to see what, if anything, happens differently. The second kind tries to determine what might be "better" about using particular instances of CALL. But what exactly is "better?" Some possible interpretations were offered in Chapter 1, repeated here for convenience:

- learners pick up language knowledge or skills faster or with less effort (learning efficiency)
- learners pick up what is targeted, retain language knowledge or skills longer, and/or learn more of what they need (effectiveness)
- learners can get materials or experience interactions that would otherwise be difficult or impossible (access)
- learners can learn with more or less equal effectiveness across a wider range of times/places (convenience)
- learners enjoy the language learning process more or are willing to engage in it more (motivation)
- learners require less space, less teacher time, or less expensive materials (institutional efficiency)

Beyond learners, we can also research CALL elements such as teaching efficiency, teaching effectiveness, and effective teacher education.

There are no doubt other ways of defining "better", but even if we just consider these, a question arises: What are we comparing them to? One way is by comparing a CALL activity to some corresponding non-CALL activity to see which gives us superior results for a given language learning target. This comparative approach has strong face value: language teachers and program administrators want evidence that CALL is worthwhile before putting time and expense into it, and comparative research seems the easiest way to provide definitive answers. Unfortunately, after four decades CALL researchers have not been able to provide those answers definitively. In fact, a number of influential researchers long ago came to the conclusion that in most cases the type of study that pitted CALL against non-CALL broadly was of limited value (Chapelle & Jamieson, 1989; Dunkel, 1991). Ultimately, the more interesting and answerable questions were not about the computer vs. its absence, but about specific applications, specific features of applications, specific types of activities, specific environments, and specific characteristics of learners.

As with other chapters, the objective here is to just give a taste of what is an enormous and constantly growing area. Those with more serious research interests are encouraged to consult the reference list. It should be mentioned before continuing that not *all* CALL research is aimed primarily at improving language teaching and learning with technology. In some cases, researchers may simply want to observe how the technology environment influences or changes the way humans interact with one another, without necessarily judging whether or not it is "better" for language learning. Although such basic research is important to social scientists and may lead to more applied hypotheses, it does not directly impact teaching and learning and so will not be explicitly addressed here.

CALL Research Trends

As suggested above, most CAI (computer-assisted instruction) and early CALL research focused on comparing computer users with a control group typically using traditional methods. The results were mixed, often showing no significant difference, sometimes favoring the computer users, and occasionally favoring the traditional approaches (see Dunkel, 1991). As noted above, over time researchers began to argue against comparative research, stating that the number of variables was too great. There are now many areas being researched using a variety of quantitative and qualitative methods (although interest in comparative research remains, particularly in comparing face-to-face interaction with various types of CMC). The results vary widely, and, according to several research reviews going back to Felix (2005), Hubbard (2005), and Huh and Hu (2005), the field has been hampered by widespread problems with research designs and reporting.

Research has continued in many areas of CALL but here are some of the more popular ones:

- Computer-mediated communication; especially, interaction in synchronous chat settings and email in tandem settings
- Visual, text and sound annotation to promote comprehension and vocabulary acquisition;
- Effectiveness of online constructivist activities, including development of communities and collaborative writing;
- See also LLT special issues on learner autonomy (https://www.lltjournal.org/collection/col_10125_35919), gaming (https://www.lltjournal.org/collection/col_10125_35926), and mobile learning (https://www.lltjournal.org/collection/col_10125_35924). A look at more recent special issues of *LLT* and other journals will give you a sense of some current themes of interest.

See also the review articles in the 20th Anniversary Issue of *Language Learning & Technology*: http://www.lltjournal.org/item/2949 (technology & SLA research), http://www.lltjournal.org/item/2950 (technology & language assessment), http://www.lltjournal.org/item/2951 (technology & the four skills), http://www.lltjournal.org/item/2952 (technology & autonomy).

Table 1 presents a few example studies. A more complete list is available at https://web.stanford.edu/~efs/callcourse2/CALL6.htm. Keep in mind that these and other studies are generally conducted on small groups in specific settings and may suffer from methodological limitations of various sorts. As with all research, proceed with caution in connecting any findings to your own setting.

Table 1

Example research studies

Study	Description	Some Results
Belz, J. (2001). Institutional and individual dimensions of transatlantic group work in network-based language teaching. *ReCALL, 13*(2), 213-231.	Investigated tandem learning with German & US university students	Of 3 tandem groups studied, 1 failed & 2 succeeded, showing individual & group differences are important, not just tasks & technology
Green, A., & Youngs, B. (2001). Using the web in elementary French and German courses: Quantitative and qualitative study results. *CALICO Journal, 19*(1), 89-123	Reports on study of replacing one of four language class days with independent study on the web	No significant difference in performance after replacing 1 of 4 class days with web.
Schwienhorst, K. (2002). Evaluating tandem language learning in the MOO: Discourse repair strategies in a bilingual Internet project. *Computer Assisted Language Learning, 15*(2), 135-145.	Reviewed MOO (an elaborated form of chat) logs for examples of repair strategies in a tandem setting.	Students said they used repetition requests a lot but logs disagreed; negotiation occurred and was more prevalent than avoidance or misunderstanding; Germans preferred paraphrases but their partners gave them translations
Stockwell, G., & Harrington, M. (2003). The incidental development of L2 proficiency in NS-NNS email	Reports on a study of proficiency development via email:	Showed gains in error-free t-units. Recurring pattern was high performance on first

interactions. *CALICO Journal, 20*(2), 337-359.	messages 1, 5, 10 & 15 were analyzed	msg, then drop on 5th followed by gradual increase to 15th.
Thorne, S. (2003). Artifacts and cultures-of-use in intercultural communication. *Language Learning & Technology, 7*(2), 38-67	Reports on 3 case studies demonstrating artifact- mediated practices as cultural practices in US university students	Case 2: a dyad had an initial problem w/email but went to IM (instant messenger) on their own and started with a 6-hour session. Case 3: US students find email inappropriate for social interaction; prefer IM.
Liang, M.-Y. (2010). Using synchronous online peer response groups in EFL writing: Revision-related discourse. *Language Learning & Technology, 14*(1), 45-64.	Describes the interactions of three online peer groups in a Taiwanese undergraduate ELF writing class. Aim was to study the types of interaction and see how they contributed to subsequent revision.	There was little in the way of meaning negotiation, error correction, or technical actions related to revision. Instead, social talk, task management and discussion of content dominated the discourse. Learner training is suggested.
Smith, B. (2009). The relationship between scrolling, negotiation and self-initiated self-repair in an SCMC environment. *CALICO Journal, 26*(2), 231-245.	Uses screen capture instead of just text chat logs to discover what students do during German jigsaw (information gap) activities.	Captured self-initiated self-repairs (SISRs) by subjects *prior* to sending their text to their partners. Negative correlation between scrolling and negotiation of meaning; more SISRs with grammatical points. Argues for a methodological shift in data collection and analysis.
Winke, P., & Goertler, S. (2008). Did we forget someone? Students' computer access and literacy for CALL. *CALICO Journal, 25*(3), 483-509.	Reports on a survey of over 900 students at Michigan State in foreign language courses to determine their facility with computer-based tasks and multimedia tool.	Many students do not have access to or literacy in the specialized tools for CALL. Training is needed because the computer skills for personal purposes do not transfer to the language learning environment.

*Nishio, T., & Nakatsugawa, M. (2020). 'Successful' participation in intercultural exchange: Tensions in American-Japanese telecollaboration. *Language Learning & Technology*, 24(1), 154-168.	Investigated tensions that emerged during a six-week telecollaborative project between 20 American learners of Japanese (AMU students) and 33 Japanese learners of English (JPU students). Data collected for analysis were participants' responses to a pre-discussion and post-discussion questionnaire, chat logs, journals, and interviews.	A divergence in the definition and understandings of successful participation among learners caused tensions in intercultural telecollaboration. (e.g., one AMU student valued the quality of discussion more, whereas one JPU student valued promptness and frequency of messages more.).
*Dizon, G. (2020). Evaluating intelligent personal assistants for L2 listening and speaking development. *Language Learning & Technology,* 24(1), 16–26.	Evaluated the impact of intelligent personal assistants' (IPAs – Amazon Alexa in this case) usage on L2 listening and speaking development.	IPAs are more useful for improving speaking proficiency than for improving listening comprehension.
*Satar, M. (2020). L1 for social presence in videoconferencing: A social semiotic account. *Language Learning & Technology*, 24(1), 129–153.	Studied the use of L1 for target language learning, specifically L1's role as a catalyst for the establishment of social presence. Analyzes the videoconferencing interactions of three pairs of language learners and offers a social semiotic account illustrating transformative processes of transformation, transduction and mimesis.	L1 is used by language learners in videoconferencing as a social semiotic resource to support social presence. This suggests L1 use can be emphasized to foster opportunities to establish strong interpersonal relationships in L2 learning.

*Thanks to students in my 2020 CALL class for these!

There are many areas of CALL that have been looked at, and we only cover a few of them here. Check the "locating research studies" at the end for resources

to continue your CALL research review. Note before continuing that CALL research has long been burdened by a problem which has not plagued most classroom-based SLA research: the technology adds a dimension of complexity, *and* it is constantly changing. In addition, the technology competence of the teachers and learners is also variable. In 2020, thousands of teachers and millions of students were forced into online learning for the first time. It is unclear how that will affect future attitudes toward CALL and implementations of it. Consequently, definitive answers in any area do not seem to exist. However, there is still much of value to be learned from CALL research to suggest more and less fruitful directions for practice.

Survey of Unanswered Questions in CALL Research

One of the major concerns that scholars seem to have upon entering this field, particularly if they are trying to develop a project for a master's or doctoral thesis, is what sorts of research questions to study. To address that problem, in the summer of 2002, I sent a survey to 120 CALL professionals around the world asking them to articulate *one* research question in the field that they would like to see answered. I received 64 responses. A writeup of the results and the actual questions proposed by the contributors can be viewed at https://web.stanford.edu/~efs/callsurvey. Although now almost two decades old, many of the questions there remain relevant.

Subject Characteristics in CALL Research

In 2004, I carried out a study of research articles found in four CALL journals over a 2 to 3-year period, focusing on subject characteristics. The overall conclusion was that "CALL research as a whole is unbalanced in the direction of the study of novices working on novel tasks or using novel applications" (Hubbard, 2005, p. 363). Among other recommendations, I suggested that more studies be done using experienced and/or trained learners so that we can get a more complete idea of the potential effectiveness of specific CALL software and tasks. This should not be taken as a general criticism of more basic observational research (i.e., what do students do naturally when left on their own in a CALL environment), which is also quite important. The point is that the CALL research domain should have been more balanced than it seemed to be at that time. Results from an unpublished follow-up study looking exclusively at CMC research reached a similar conclusion – see https://web.stanford.edu/~efs/pacslrf06.

Doing Research

As noted in the introduction, this book is largely aimed at classroom teachers interested in beginning or expanding their use of CALL, and teachers can take

the role of researchers themselves: identifying a learning gap, creating a possible solution for it – in this case using technology – and then doing research on the effectiveness of that solution. There are several avenues available to teachers in the role of researchers of their own classroom or students.

- Observation. When your students are using software or doing a computer-based task in a lab or other venue where you can – watch them. You can look over their shoulder, check their interactions, and make brief notes of what you notice. Interact with the students as they interact with the software. This can give you feedback on the effectiveness of a given piece of software, CALL exercise, or CALL task, and it can also help you determine student training needs.
- Tracking. Some software has built-in tracking features. If you are using a discussion board, all student posts can be reviewed. Some chat programs also allow the sessions to be logged for later review.
- Student surveys. Ask specific questions about usage – note that it is best to do this as soon as possible after a CALL session since memories fade rapidly.
- Pre- and post-testing to evaluate outcomes of the use of technology.
- Student journals. Getting students to keep a reflective journal of their experiences with software or other CALL activities is useful both for them and to the teacher.

Examples of both formal and informal teacher research can be found in Hubbard and Ioannou-Georgiou (Eds.). (2017): https://web.stanford.edu/~efs/tert/.

Locating Research Studies

My preferred way to find research materials on a CALL topic is to search through Google Scholar (https://scholar.google.com) using appropriate keywords. However, a problem is that many of the sources discovered in this manner will not be freely available. If your library does not carry journals such as *Computer Assisted Language Learning*, *ReCALL*, or *System*, then the two most useful sites to search are the *CALICO Journal* (https://www.equinoxpub.com/journals/index.php/CALICO), where articles over three years old are freely available, and *Language Learning & Technology* (https://www.lltjournal.org/), where all the journal articles back to 1997 are freely available. Both sites have internal search features. In particular, you can locate many of the articles mentioned in Table 1 by going directly to those two journal sites.

Suggested Activity

Take a technology-mediated activity or task you have used in class as either a learner or a teacher. Plan (and if possible complete) an informal research project to accumulate observations and other data to improve it for a subsequent class.

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Questions for Further Discussion and Investigation

1. Go to https://web.stanford.edu/~efs/callsurvey and look at several of the research questions there in areas that look interesting to you. These are from 2002. Which do you think are still relevant? What is a research question you would like answered?

2. Think about a CALL area you are interested in. Using Google Scholar or some other academic search engine, look for studies in the last two or three years. Pick three of them that you are able to access, and describe them using the format in Table 1. What areas of agreement/disagreement do you notice among the studies?

3. What theory or theories do you use to guide your thinking about your language teaching? How well do they accommodate the notion of computer mediation? How might you need to adapt or supplement them?

Chapter 7
CALL Teacher Education, Professional Development, and Learner Training

Overview

This chapter covers three intertwined areas: teacher education, professional development, and learner training. All of these involve the development of knowledge and skills in the use of technology in the pursuit of learning objectives. By *teacher education* we refer primarily to both pre-service and in-service education of a formal nature found through degree and certificate programs, individual courses, and workshops, viewed from the perspective of the educator. *Professional development* may involve some of the same formal mechanisms but also many informal ones and is regarded mainly from the viewpoint of the practicing teacher. *Learner training* refers to the process through which the teacher or other instructional entity (software, video, webpage, etc.) guides students to become more effective users of technology for language learning.

Teacher Education

It is presumed that most of the users of *An Invitation to CALL* will be primarily interested in using the concepts and content of this resource to inform technology implementations in their own classes. However, it is often the case that teachers who know more about CALL than their local colleagues begin to take on a role, formally or informally, of a teacher educator. In fact, the TESOL Technology Standards for Teachers recognize different levels (basic and expert) in the performance indicators of the various standards. Hence, this section may be of interest even to those who don't see themselves in the expert role yet but may be moving into that higher classification.

As noted in Chapter 1, Mike Levy and I (Hubbard & Levy, 2006) have proposed a role-based framework to delineate the field for the purposes of CALL teacher education. Specifically, we identify two types of roles for individuals engaged in CALL: institutional and functional. Institutional roles include classroom teachers, both pre- and in-service, specialists of various kinds (language lab managers, language skill area specialists, etc.), and professionals (those whose career centers on CALL). Functional roles include practitioners, developers, researchers, and trainers. Institutional roles as the name suggests are relatively stable. Functional roles, on the other hand, are much more flexible and depend on what an individual is doing at a particular time.

The focus of the present teacher-oriented course is illustrated in Figure 4, where these institutional and functional roles can be seen as two dimensions in a matrix. As the shading suggests, the focus is primarily on teachers as practitioners, making effective use of what others have produced in the way of materials and lessons. The secondary focus is on teachers as developers of CALL software/apps, websites, resources, and language learning activities and tasks. The functional roles of researcher and trainer are touched on as well, though less centrally. Note that pre- and in-service teachers are not explicitly distinguished for our purposes. However, there are a number of differences that can be notable, in particular the in-service teachers' ability to make immediate, experience-based judgments regarding the relevance – and feasibility – of a given CALL application in their specific settings.

	Practitioner	**Developer**	**Researcher**	**Trainer**
Pre-service classroom teachers	X	X	X	X
In-service classroom teachers	X	X	X	X
CALL specialists (many types) (expert/adjunct)	X	X	X	X
CALL professionals (expert/adjunct)	X	X	X	X

Figure 4. A role-based framework for CALL education.
Note. Rows represent institutional roles (often linked to job titles and descriptions) while columns represent functional roles.

As we have gone through the previous chapters, we have been filling in some of the X's in the shaded cells above. These cells can be seen as representing two types of knowledge and skills. The first is technical; however, as important as this is, we have only been able to touch on it occasionally. As noted in the introduction, this book assumes a basic comfort level on the computer and either the willingness to learn more on your own or the availability of technical support to get help locally.

The second type is *pedagogical* knowledge and skills, the ability to take the ideas presented here and embed them effectively – in an environment involving

technology – in the process of achieving the learning objectives for your language class. Integrating this technical knowledge with pedagogical for language teaching and learning can be seen as an instantiation of what has been called "technological pedagogical content knowledge" (TPCK or TPACK, an extension of Shulman's concept of pedagogical content knowledge: see https://www.tpack.org/). Although this is the main direction for our course, as it is a survey course, the knowledge and skills you are introduced to will be broad but rather shallow. With this foundation, you should be better prepared to engage in additional formal education in this area or to continue venturing forth on your own.

Teacher education options. If you are looking ahead to a Master's or certificate program, it is worth checking to see which ones include technology training and what the nature of that training is. CALL certifications, degrees or specializations are available at a few universities. Arizona State University has a CALL certificate: https://silc.asu.edu/degrees/grad/CALL. The Cyprus University of Technology offers an online graduate degree program available to teachers worldwide, see https://www.cut.ac.cy/studies/masters/master-programmes/lce-gr-call/?languageId=1. Iowa State University has a CALL specialization within their MA TESL/Applied Linguistics program: https://apling.engl.iastate.edu/ma-program-in-teslapplied-linguistics/. In finding a suitable CALL training opportunity, it is important to identify one that fits your needs depending on your existing level of computer expertise. Some certificate programs and workshops, in particular, may focus overly on *how* to use the technology rather than *why.* Beyond formal programs, both CALICO and EuroCALL have special interest groups devoted to teacher education: https://calico.org/sigs/teacher-education/ and https://www.eurocall-languages.org/sigs/call-teacher-education-sig-homepage.

Teacher standards. One way of improving especially the technical competence of teachers is through general proficiency training in this area, and this is also true of learners (see below). The International Society for Technology in Education (https://www.iste.org/standards/for-educators) has promoted both teacher and student standards (primarily focused on the US K-12 constituency). As noted above and in previous chapters, TESOL has also produced a technology standards framework for students and teachers aimed internationally at all levels. Both organizations acknowledge the responsibility of teacher education programs and educational institutions to ensure students and teachers meet these standards. The Standards are available through TESOL at https://www.tesol.org/docs/books/bk_technologystandards_framework_721.pdf or in an expanded version at https://www.amazon.com/Tesol-Technology-Standards-Description-Implementation/dp/1931185727. The teacher standards are relevant for both initial teacher education and in-service professional development.

Other teacher education resources. For more information on the types of issues involved in teacher education, *Language Learning & Technology* has a 2015 special issue on Teacher Education and CALL at https://www.lltjournal.org/collection/col_10125_45829. Son and Windeatt (2017) have edited a useful volume for teacher educators that describes in detail a range of CALL courses around the world, including the one on which this book is based. In a recent monograph, Son (2018) discusses a range of issues in CALL teacher education and offers a practical model for it.

Professional Development

Teacher Goal 4, Standard 2 of the TESOL Standards states: "Language teachers regularly reflect on the intersection of professional practice and technological developments so that they can make informed decisions regarding the use of technology to support language learning and communication." Goal 1, Standard 3 says: "Language teachers actively strive to expand their skill and knowledge base to evaluate, adopt, and adapt emerging technologies throughout their careers." Together these standards indicate that attention to CALL is a central part of ongoing professional development for those already practicing their profession, not just during the time when teachers are working toward degrees or certification. It can refer both to maintaining existing levels of professional expertise and more importantly to expanding existing areas and gaining new ones. This section will discuss ways that teachers can continue developing their CALL proficiency once they have left the support of a formal teacher education program structure.

Besides proceeding entirely on their own, avenues for teachers to engage in professional development include online resources (like this one), communities of practice, professional organizations, workshops and classes, readings, projects, and collaborations.

Online resources. We have seen a number of useful resources for learners throughout this book, but there are a number of resources that are valuable to teachers as well. Russell Stannard provides a good example of these with a series of free videos on how to use various ICT applications for language teaching: https://www.teachertrainingvideos.com. Nik Peachey's blog also has useful material: https://nikpeachey.blogspot.com/.

Communities of practice. While we have assumed here that you can learn about CALL through course work or self-study, another way is to interact with other language teachers who are similarly on their own. Communities of

practice involve practitioners who support and learn from one another. An example is https://www.learning2gether.net/, an outgrowth of an early CoP, the Webheads (https://webheadsinaction.org/) community. Elizabeth Hanson-Smith provides a partially annotated list of community of practice resources at http://webpages.csus.edu/~hansonsm/CoP_Resources.html.

Professional organizations. Professional organizations like TESOL, IATEFL and ACTFL support technology integration and offer presentations and workshops at their conferences. Various government sponsored organizations like CARLA (Center for Advanced Research in Language Acquisition) have resources as well: https://www.carla.umn.edu/technology/modules/. A list of some leading CALL-focused organizations appears in the Appendix. Note that these organizations typically have newsletters or academic journals to support professional development as well.

Workshops and classes. Besides the conference-centered workshops and classes, professional organizations and other institutions offer face-to-face or online training for professional development purposes. For example, TESOL has an annual "electronic village online" consisting of 5-week technology-focused courses offered free to both members and non-members. TESOL also has a fee-based program for a certificate in online English teaching: https://sites.tesol.org/MemberPortal/Events/2020/PL20_PPOL8/TESOL-Event-Detail?EventKey=PL20_PPOL8.

Readings. Throughout this book, we have seen links to a number of online journals and books. There is an enormous amount of valuable information about CALL, available in both formal and informal formats. A few hours of reading about the research results or just personal reflections of practitioners on a topic of interest could save a lot of frustration later on. If you are not sure where to find these readings, (1) become an expert with Google and Google Scholar or whatever your favorite search engine is, so that you are more likely to find what you are looking for quickly and (2) try posting to forums through professional organizations and communities of practice asking for sources. If you find an article you are interested in that you don't have access to, you can try emailing the author to see if they are able to send you a pre-publication copy or authorized digital reprint.

Projects and collaborations. Perhaps the best way to develop professionally is to have a specific project in mind that integrates technology. As teachers, we already know the value of project-based learning for our students. By engaging in a specific project, rather than just looking on passively at what others are doing, the learning becomes situated and is likely to be more effective. Projects can be done independently, but projects with either local collaborators or online ones can be helpful both for the combined expertise and for the social

contact they offer. It is easier to be motivated when you aren't working by yourself.

For more details, see my article on "Technology and Professional Development" from the *TESOL Encyclopedia of English Language Teaching* (2018), available free at the time of this writing at http://onlinelibrary.wiley.com/doi/10.1002/9781118784235.eelt0426/full.

Whatever the path taken, 21st century language teachers have to be prepared for ongoing professional development throughout their careers. As we will see in the next chapter, technology marches on – it is better not to be left in the digital dust.

Learner Training

Throughout this book, we have referenced various points from the TESOL Technology Standards for Teachers, but TESOL also has promulgated learner standards. The three overarching goals for the TESOL Technology Standards for Learners address (1) foundational technical skills and knowledge for a multilingual world; (2) socially and culturally appropriate, legal, and ethical use of technology for language learning; and (3) effective use and critical evaluation of technology tools for language learning. Institutions, teachers, and students share the responsibility of meeting those standards, but teachers especially need to understand how the standards connect with respect to specific class objectives, especially when learners are working on their own.

CALL has given us some amazing possibilities for improving language learning. However, these possibilities create a problem. Absent a teacher, students using computers are typically given more control over their own learning. However, they may be unprepared to take on this responsibility even if they are comfortable using technology for personal and social purposes. They may not use it in ways that are effective for achieving language learning objectives, and it is even less likely that they will use it in ways that are *most* effective.

One way out of this dilemma is to spend time training learners in dealing appropriately with the courseware, tools, and resources you expect them to use on their own. In the process, we may be able not only to help them with their CALL use, but also to help them in general to become more confident and effective autonomous learners. Surprisingly, this is not a well-developed area of CALL. However, it is important enough in my experience to warrant significant attention.

Before continuing, let's consider three alternatives to CALL learner training.

One solution is to try to build software in such a way that it adapts to the learner on a number of different levels: language proficiency, computer proficiency, learning style, topical interest, motivational type and intensity, and so on. This was an early promise of CALL software; however, arguably we have not even come close to realizing such a program, and the degree of software-directed adaptation remains low or non-existent in currently available materials.

A second alternative is to take the philosophical position that learners have a right to self-discovery and that left alone they will naturally move to the strategies that work for them and that are consonant with their learning style. This would mean that given a tutorial program or digital tool with a set of options, they would make use of the ones that are most efficacious for them and ignore the others. It seems highly unlikely that this would be the case for most students. For example, you probably know how to use *Microsoft Word* (or some similar word processing application). How many of the features along its "ribbon" do you *really* know how to use? Open *Word* now and look at the top level (MS Word for Windows appears in Figure 5, but almost any feature-rich piece of software will suffice). For example, do you know what's under "References" and "Mailings"? Do you recognize that "Nuance PDF" is an add-on?
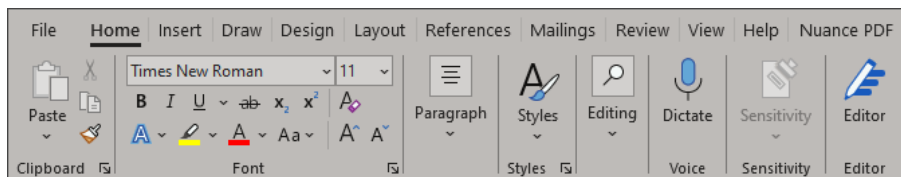

Figure 5. MS-Word ribbon.

If you open those menus and find some potentially useful features you are uncertain about or never knew existed, this is a good demonstration of how hours (hundreds of hours in some cases) of contact alone with a piece of software will not automatically lead to efficient use. (By the way, if you already know most of this stuff, you are in the minority). Evidence that a high percentage of today's university students do not have the skills they need to use computers effectively for language learning can be found in Winke and Goertler (2008) and later works.

A third alternative is to acknowledge that learners would profit from training but that it is just too much trouble to train them since it obviously takes a lot of time away from other aspects of language learning and there is no guarantee it

will be successful. This may indeed be the case in some instances, but this should be determined on a case-by-case basis, using at least a rough cost vs. benefit analysis.

For a more elaborate set of supporting arguments, see my paper "Making a case for learner training in technology enhanced language learning environments": https://web.stanford.edu/~efs/LT-CALICO-CC.pdf, (2013), *CALICO Journal, 30*(2).

Technical Training

Let us proceed under the assumption that it is worth the trouble to do at least some training. What do we need to do? Here is an example.

Technical training: controlling speed on the media player. First, download the VLC media player: go to https://www.videolan.org/vlc/. It is free, though you can donate to them if you wish. They have versions for both Windows and Mac, as well as other operating systems.

1. Load the video into the VLC Player, using the Media menu. It is best to use videos you have already downloaded. You can also try to use "Open Network Stream" if you have a URL for direct streaming. If you don't have the URL handy, right click on the video screen and select "properties" to find it.

Figure 6. VLC Media Player speed control.

2. Note that the speed control is easy to use (see the red circle in Figure 6). You may need to click on "status bar" under the "View" menu to get the control. I recommend using it around 80% speed – certainly no slower than 75%. Besides helping with listening, I recently showed a student in a presentation class who was speaking too quickly what he would look and sound like if he slowed down, using a video of his own presentation – it was a breakthrough for him! Although many learners may be aware that some media players have play speed controls, in my experience, some do not know this and those that do may not have

thought of using the control for language learning activities. The VLC media player also has keyboard shortcuts for jumping forward and back instead of using the slider. For example, using Shift + back arrow jumps back 3 seconds – a very valuable feature when listening to audio or video for language learning purposes.

3. Besides media players, some popular resources now have built-in speed controls. YouTube, for example, has a 75% speed option, as does the TED website (https://www.ted.com), which is useful for language learners to gain them more processing time for connected speech; however, they need to know it exists and where to find it.

Pedagogical Training

In Hubbard (2004), I made a case for giving training not just on technical aspects but also on pedagogical ones, that is, how to use the tutorial software or tool effectively to meet specific learning objectives. To this end, I offered a set of five principles for learner training, summarized below.

1. **Experience CALL yourself.** Try a piece of CALL software (like https://www.duolingo.com/) for a language you don't know, or visit a chatroom for a language you are not fluent in. The assumption here is that by knowing what it's like from the learner's side, you will be able to give better advice. Also, always be sure you can operate the technology you ask the students to.
2. **Give learners teacher training.** Let your students know some of what you know if they are to become more independent. Help them develop a "language learning approach" that is consistent with what you consider a valid language teaching approach. In particular, try to give them practice with linking the procedures and strategies they use with software, online tasks, and CMC activities to specific language learning objectives.
3. **Use a cyclical approach.** Teach a bit at a time. Don't just have a training session at the beginning and think your job is done. If anything, let learners "play" awhile with the application so that they have some familiarity with it before formal training begins. Learning (both technical and pedagogical) should be incremental but also include plenty of recycling and reviewing key concepts and strategies.
4. **Use collaborative debriefings.** Get learners to discuss their experiences, successes and failures with the CALL tasks and software in pairs or small groups. Don't just make the instruction one-way from you. Having learners talk about how they used CALL materials outside of class during the following class session provides a way of

consolidating the experience, learning from peers, and avoiding the sense of isolation that can come from working on the computer alone.

5. **Teach general exploitation strategies.** Show learners ways to use software or go through authentic materials to make it easier if it is too hard and harder if it is too easy, as well as how to mine the material for uses different from those intended by the developer. For example, many CALL tutorial exercises involve multiple choice. By teaching learners to resize windows so that the list of possible answers is hidden, the question becomes both a more challenging and a more natural open-ended one. Learners similarly need training in how to use text support (transcripts and captions) effectively for audio and video so that the language learning objective is supported. For CMC activities, some training in the rationale for and techniques of effectively negotiating meaning is valuable. In general, learners need to build a repertoire of strategies that they can use to realize the language learning potential in dedicated CALL software, CMC tasks and online language material.

Of course, in order to be effective at training students, it is necessary to thoroughly analyze the software, task, or activity you are assigning. You need to be sure that *you* can make the connections between given actions and learning objectives before you can expect your students to do so on their own.

My colleague Ken Romeo and I expanded the previous learner training framework to acknowledge *three* domains for training instead of two – technical, strategic, and pedagogical – by moving some of what was previously considered pedagogical training to the more commonly recognized area of strategy training. See https://web.archive.org/web/20170706081046/http://www.j-let.org/~wcf/proceedings/d-060.pdf for a brief description of that model. The underlying insight is that technical training lets students know *how*, strategic training lets them know *what* and *when*, and pedagogical training lets them know *why*.

You can see a number of examples of materials used in learner training at my advanced listening website at https://web.stanford.edu/~efs/693b. A description of a learner training project conducted by teachers at a community college ESL program can be found here: https://web.archive.org/web/20170706081025/https://www.j-let.org/~wcf/proceedings/d-009.pdf.

Suggested Activity

Go to a website like https://www.esl-lab.com or https://www.elllo.org. First, familiarize yourself with the main parts of the site (or all of it). Then try to determine (1) what basic technical training students might need to use the site effectively; (2) what more advanced technical training would be helpful; (3) how strategic and pedagogical training would connect to this, both site-specific and generalized; (4) finally, how might you "teach" this information to them.

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Questions for Further Discussion and Investigation

1. If you are reading this, you are probably a teacher educator, teacher candidate, or a practicing teacher. Besides this book, what are you using (or what could you use) to continue building your knowledge and skills in CALL?

2. In a 2008 paper for the *CALICO Journal* on CALL and the future of language teacher education, I noted that a teacher being trained today could look forward to a career of 40 or more years. What will language teaching look like 10, 20, 30, or 40 years from now? If you are a relatively young teacher or teacher candidate, what could you be doing now to "future proof" your training so that you are ready for those inevitable changes when they happen? This is an especially relevant question for teacher educators.

3. This book is based on the premise that a lot of teachers (probably most) do not already know how to use technology as effectively as they would like.

There are many resources to help them, but what about the students? What do they need to know and do to be effective language *learners* today? What can you do as a teacher to help them? What parts of your curriculum can you condense to make the necessary time for CALL learner training? And what do you need to learn in order to be an effective trainer?

Chapter 8
Conclusion – Other Established and Emerging Areas of CALL

Overview

In the past seven chapters, you have been introduced to a wide variety of applications of the computer for language teaching. Chapter 1 described the history of CALL, the tutor-tool distinction, and the various roles you can play as a participant in the CALL field. Chapter 2 looked at identifying and evaluating CALL resources, especially courseware. Chapter 3 gave an overview of the different ways technology can mediate communication and the interaction in language learning tasks. Chapter 4 discussed computer uses in the four skills of reading, writing, listening, and speaking, as well as grammar, pronunciation, vocabulary, and culture, through descriptions of applications and issues in each of those areas. Chapter 5 explored CALL environments, materials, and activities. Chapter 6 touched on CALL theory and gave a rationale for and examples of CALL research. Finally, Chapter 7 introduced the overlapping areas of teacher education, professional development, and learner training for CALL. In this chapter, I revisit or touch on a number of areas related to CALL that we either did not cover at all or just mentioned in passing to provide some direction for your future self-study.

Concordancing and Corpora

Concordance programs are tools that allow you to tap into large collections of texts, called corpora, to help learners discover how language is actually used. There are also web-based concordancers available: see https://www.lextutor.ca/conc/eng/ for example. If you put in a word or phrase, for instance, these programs will search for examples of that item in context in whatever texts they have in their corpus (plural corpora) and return a listing. Although originally designed for research purposes, language teachers have adopted it as a tool for language learners. Using concordancers is connected to the more general area of data-driven language learning: a number of other useful tools in this area can be found at Tom Cobb's Lextutor site (https://www.lextutor.ca/). Some background on this area of the field can be found in Chambers (2005), https://www.lltjournal.org/item/2509. See Liu and Lei (2017) (https://bookstore.tesol.org/using-corpora-for-language-teaching-and-learning-products-9781945351129.php?page_id=21) for more information on current implementations. An interesting tool for a kind of video concordancing is https://youglish.com/. Although designed to provide

examples of pronunciation, it also gives examples of words as used in context on YouTube videos.

Learning Management Systems

Learning management systems, or LMSs (sometimes also called course management systems), include commercial systems like Blackboard and Canvas for online courses or for online elements of classroom-based courses. As the label suggests, they are used by instructors and institutions to organize course materials and assignments and maintain records of student learning activities. They have features such as discussion boards, synchronous chat and web-based testing that make them appealing for language teaching, especially online. At Stanford University, we use Canvas (https://www.instructure.com/canvas/) through an institutional agreement with Instructure. A free, open-source LMS popular with language teachers and institutions worldwide is Moodle (https://www.moodle.org). Robb (2004) provides an introduction to Moodle for language teaching: http://tesl-ej.org/ej30/m2.html. A related concept is that of content management systems (CMS) such as Drupal (https://www.drupal.org/industries/education). Importantly, LMSs used in CALL environments should have features like the ability to upload and download student and teacher produced audio and video files.

Computer-Based Language Assessment

Goal 3, Standard 1 of the TESOL Technology Standards for Teachers acknowledges the importance of teacher awareness and implementation of relevant technology resources to aid assessment. That assessment can be formative or summative for a class and can be delivered directly or through LMSs. Although proficiency testing is not a direct part of language learning, it is clearly an area of importance to language teachers. For proficiency testing, TOEFL (https://www.toefl.org) and other commercial proficiency tests are now offered primarily through the computer at testing centers or in some other format where test security can be guaranteed. Ordinate Corporation's PhonePass was a telephone-based oral proficiency test entirely machine-scored using an innovative speech recognition system. It has evolved into Pearson's online Versant testing system (https://www.pearson.com/english/versant.html). Among others, Duolingo has entered the testing market: see https://englishtest.duolingo.com. Some commercial language schools and publishers use online testing for placement and diagnostic purposes: https://lascusa.com/free-english-placement-test/.

The May 2001 issue of *Language Learning & Technology* (https://www.lltjournal.org/collection/col_10125_35881) was devoted to computer-based language testing and provides a good historical backdrop to current initiatives. Chapelle and Douglas (2006) presents an excellent overview of this area of CALL up to that time. A more recent review article on technology and language assessment was published in the 2016 *Language Learning & Technology* 20th Anniversary Issue: https://www.lltjournal.org/item/2950. One area that has been particularly fruitful is automated writing evaluation (AWE). See the special issue of the *CALICO Journal* covering a variety of AWE applications: https://journals.equinoxpub.com/index.php/CALICO/issue/view/2074.

Two assessment-oriented tools from Cambridge English that can also be used by learners for practice are https://writeandimprove.com/ and https://speakandimprove.com/, both using AI-based techniques. The writing tool has learners respond to prompts depending on their self-reported level (beginning, intermediate, or advanced), provides feedback on accuracy and other writing criteria, and can offer a proficiency rating based on the CEFR level from A1 to C2. The speaking tool engages learners in simulated conversations with a chatbot named Sandi and similarly offers feedback and proficiency ratings.

Tracking

Tracking of student use of computer applications has been a part of CALL research and practice since the beginning, but a lot of research, both formal and informal, has relied on other data such as pre- and post-testing, observation, think-aloud and recall protocols, and simply student attitude surveys to determine effectiveness. Tracking routines for tutorial software automatically record student use of software, and for CMC, you can keep logs of chat sessions or review emails or submissions to discussion boards. Tracking is important not only in research, but also in teacher diagnosis of student problems (with the language *or* the software) and in adaptive testing or intelligent tutoring. As computers become more powerful and LMSs more sophisticated, we can expect more advances in tracking. For research in particular, though, this opens up questions of privacy that must be reviewed by human subject committees. One way to track students that is not always reliable is just to ask them. Fischer (2007) provides compelling evidence that student self-reports do not correspond accurately to what CALL tracking software shows they actually did.

Teaching reflectively with technology. Overlapping with tracking, teaching reflectively means formally or informally taking stock of what happens when you introduce CALL courseware, tools, techniques, and tasks into your

language classes. This book has aimed at providing you information and resources to help you integrate digital technology effectively, but such integration does not follow a linear path. It is important to go through a reflective cycle to determine in advance what is likely to work with your students, how to prepare them, what they actually do, and whether it was effective. All too often, teachers do not look closely enough at these points. In 2017, Sophie-Ioannou Georgiou and I edited a book (a joint project of the TESOL CALL Interest Section and the IATEFL Learning Technologies SIG) to underscore the importance of reflective teaching with technology. The book contains 21 case studies of teachers reporting reflectively on their classroom experiences with a specific implementation of CALL, including not just positive results but detailed commentary on challenges they faced: see https://web.stanford.edu/~efs/tert/.

Supporting learner autonomy. A key development in recent years has been the recognition that students using technology outside the classroom or language lab are necessarily more autonomous than those who learn in more traditional settings. A special issue of *Language Learning & Technology* on autonomy (https://www.lltjournal.org/collection/col_10125_35919) provides evidence of the opportunities as well as the challenges in helping language learners develop autonomy. An excellent review article on the topic was published in the *Language Learning & Technology* 20th Anniversary Issue (2016): https://www.lltjournal.org/item/2952. This is an area I expect will continue to grow, and it is closely linked to increased and more effective learner training and to the notion of incidental language learning. See, for example, the discussion of the "digital wilds" below. It is important to be careful about making assumptions regarding students' ability and motivation to be autonomous learners: simply allowing students to work on their own does not make them autonomous. In a 2013 paper, Hayo Reinders and I (Reinders & Hubbard, 2013) discuss not only the affordances of CALL for supporting learner autonomy but also detail the challenges.

Online, Hybrid/Blended Learning, and Flipped Classrooms

The past two decades have seen increasing developments in fully online language learning, and this became the only option for many months beginning in early 2020. As noted previously, online language teaching can be accomplished asynchronously or synchronously, and can involve either individual tutoring or groups of learners. A popular asynchronous option (though with mixed results) has been the LMOOC – a massive online open course for language: see https://www.lltjournal.org/item/2863. A more common option, hybrid or blended courses typically involve some combination of learning in the classroom and online (or in the past, computer lab – see

https://journals.equinoxpub.com/index.php/CALICO/article/view/23302). One form of this is the flipped classroom. In traditional learning, new material is introduced in class, often through direct instruction, and then activities and tasks take place as homework. In a flipped class content and lectures are provided online, often through teacher-produced videos or narrated PowerPoint presentations, and students are expected to view these prior to class. Group time (in a physical classroom or online) is then spent in discussion, interaction, and collaborative activities based on this already familiar material. For an overview, see Kostka and Lockwood (2015): https://www.tesl-ej.org/wordpress/issues/volume19/ej74/ej74int/. Finally, an emerging model is *co-modal* teaching, where a class is taught simultaneously face-to-face and online with remote learners mixed in. This will require new teaching skills and likely some adjustment of classroom technology for language classes to preserve interaction opportunities for all.

Dynamic Areas from Daily Life: Web 2.0 and Social Networks

These are areas that have already transformed a lot of teacher implementation of CALL. Initially the web was used for dispensing information: it was largely one-way. Web 2.0 refers to the democratization of the web through blogs, wikis (such as Wikipedia), photo and video sharing sites like YouTube, social media spaces like Facebook, customer reviews on sites like Amazon and Yelp, and numerous other applications. Besides using these in our daily lives, these allow students access to authentic language and opportunities to collaborate and publish – critically – for an authentic audience. In this way, they are more fully expressing themselves and developing their second language identities through tasks and activities than in the typical face-to-face classroom with the teacher as primary audience. A discussion of Web 2.0 in language learning and the concept of "tagging" can be found at https://www.lltjournal.org/item/2542. See also Nik Peachey's classic introduction to Web 2.0 at https://www.youtube.com/watch?v=NfpkVYXpvyE. A *CALICO Journal* article by Blattner and Fiori (2011) shows how group interactions on social networking sites can be exploited to help students learn pragmatic features: https://journals.equinoxpub.com/index.php/CALICO/article/view/22965/18971.

Mobile Learning

Mobile-assisted language learning (MALL) as the name suggests refers to learning that takes place through mobile devices like smartphones and tablets. The mobile environment was touched on in Chapter 2. Although initially there were clear limitations to the quantity and quality of information that could be accessed and exchanged, recent generations of mobile devices and better mobile networks have largely overcome those problems. Also, the ubiquity of some of these devices and student familiarity with them makes this an

important area for continuing development. I co-authored a couple of pronunciation apps for the iPhone/iPad making use of the camera (no longer available, sadly): see https://web.archive.org/web/20160430211902/http://www.pronunciationtutor.me/). A good introduction to this area by Chinnery (2006) can be found at https://www.lltjournal.org/item/2527. In 2013, TIRF (The International Research Foundation) commissioned a set of articles focused on mobile learning in the workplace (see https://www.tirfonline.org/english-in-the-workforce/mobile-assisted-language-learning/), including one Glenn Stockwell and I co-authored. In it, we offer a set of 10 emerging principles for mobile learning, including limiting multi-tasking and environmental distractions, acknowledging and respecting learners' existing cultures-of-use, and providing learner training as needed. A special issue of *Language Learning & Technology* from 2013 also focuses on MALL https://www.lltjournal.org/collection/col_10125_35924. The rollout of widespread 5G devices and networks will likely lead to some new MALL innovations: (https://en.wikipedia.org/wiki/5G).

Virtual Worlds, Virtual Reality, and Augmented Reality

Virtual worlds are 3-dimensional online environments where students in the form of projected avatars interact with one another and native speakers as well as with "physical" objects and spaces within the world. A number of teachers have experimented with language learning in the virtual world Second Life: (https://www.secondlife.com). To date, however, the promise of virtual worlds remains unfulfilled due to both technical issues and to difficulties with getting students to focus on tasks rather than the other affordances of the environment. For an early overview, see Vance Stevens' article at https://tesl-ej.org/ej39/int.html; see also the section below on gaming. At the 2021 TESOL conference, Heike Philp showed how the virtual world tool OpenSim can be used for language learning and immersive storytelling: https://www.youtube.com/watch?v=Hhz8vdXlrrQ.

Two areas related to virtual worlds are virtual reality (VR) and augmented reality (AR). VR typically involves wearing a special headset: see https://www.oculus.com/quest-2/. AR is possible directly on smartphones, presenting an overlay on the current scene in the user's camera – a popular example is Pokemon Go: https://www.pokemon.com/us/app/pokemon-go/. Here's a short piece looking at both: https://medium.com/@denishurley/the-future-of-language-learning-augmented-reality-vs-virtual-reality-679d6668db5b. Members of CALICO's Immersive Realities SIG are continuing to develop these CALL sub-fields: https://sites.google.com/view/calico-immersiverealities-sig/home.

Gaming

We have been using games for language learning in one form or another almost since the beginning of CALL (Hubbard, 1991), but interest in online games and so-called "serious games" has increased in recent years. It has been noted that computer game interactions can be highly motivating, and that certain types of games requiring communication among players on the same team can provide a supportive environment for developing interactional skills. In addition to using existing games, there is the potential to "gamify" language learning activities and exercises to increase learner motivation by providing competition against oneself or others and receiving digital awards for accomplishment. A valuable special issue of *Language Learning & Technology* from June 2014 offers an introduction to relevant research: https://www.lltjournal.org/collection/col_10125_35926. The guest editors of that issue also produced a book on the subject, *Language at Play* (J. Sykes & J. Reinhardt, Prentice Hall, 2012). *ReCALL* also had a special issue on this topic (2012) with a number of useful articles: see https://www.cambridge.org/core/journals/recall/issue/6CC6FC3F7BF098735B4710909CF4013E.

The Digital Wilds

Related to autonomy and other categories above, there is a growing interest in digitally-mediated language experiences outside of the classroom. This is generally referred to as "informal language learning" because of its extramural nature. For incidental learning, this can be based solely on language use. However, from the perspective of the language teacher and many students, the goal is more likely to be intentional language learning, where some attention is paid to rehearsal and reflection in the pursuit of language learning goals. A 2019 special issue of *Language Learning & Technology* devoted to informal learning is at https://www.lltjournal.org/collection/col_10125_58892. My most recent publication at the time of this writing (Hubbard, 2020) covers this topic from the perspective of the teacher's role in preparing students to succeed at informal language learning.

The Future?

As Goal 4, Standard 2 of TESOL's Technology Standards for Teachers states: "Language teachers regularly reflect on the intersection of professional practice and technological developments so that they can make informed decisions regarding the use of technology to support language learning and communication." That means that the work you have done in this book is only the beginning. To be effective as a technology-using language teacher in the

future, you will need to view yourself as a lifelong learner in the technology realm.

Where will the field go next? Predictions made 15-20 years ago tended to focus on more intelligent tutorial software and the promise of multimedia. We were looking for opportunities to make learning more efficient and individualized through computers. Then came the web and the spread of CMC, along with social constructivist methodology, making collaboration and communication through computers a stronger focus. I am betting on a future that has room for both. Claire Bradin Siskin and I have argued for a softening of the tutor-tool distinction (Hubbard & Bradin Siskin, 2004), and the rise of mobile apps has brought tutorial CALL back into some prominence. I anticipate increased recognition that blended environments building on the complementary strengths of tutorial software; text, audio, and video CMC; authentic language from the web; and the face-to-face interaction of students to teacher and students to students will yield more effective learning than any of these in isolation. Of course, we will continue to see development of the new areas discussed above.

One thing we know – artificial intelligence (AI) is in our future. This will likely bring applications such as more useful chatbots (applications of Siri, Google Home, Amazon's Alexa, and so on) that can respond appropriately to learner accents. We can expect to see more – and better – individualization in commercial systems. Here are some announcements from 2018 – these should be well underway now:

- https://e27.co/monks-hill-ventures-leads-us3-2m-ai-powered-language-learning-app-elsa-20180307/;
- https://www.nextpittsburgh.com/latest-news/pittsburghs-wespeke-cnn-use-technology-teach-english-world/;
- http://vator.tv/news/2018-02-06-quizlet-raises-20m-to-build-out-its-ai-capabilities;
- http://hitechnewsdaily.com/2018/03/dont-panic-grab-your-babel-fish-the-cutting-edge-earbuds-offer-real-time-translation/.

Who knows what's next? CALL will never be boring! But if you are curious, I give my own views in a 2012 article looking 20 years into the future here to 2032: http://newsmanager.commpartners.com/tesolc/issues/2012-05-01/3.html.

Suggested Activity

Try one of the following: these were suggestions for the term project that was a requirement for students taking my 1-unit CALL course for credit.

(1) Write a critical review of a CALL book or article.
(2) Write an evaluation of a piece of software/app or a website. Be sure to follow the general guidelines described in Chapter 2 (operational description, teacher fit, learner fit).
(3) Design a piece of software/app, a website, or a language learning task that employs technology mediation. Include a clear justification of the learning objectives and why you think your proposed software, website or task will help meet them.
(4) Design and program/script a piece of software/app or website for a particular purpose. Create a working demo with at least some functionality.

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Questions for Further Discussion and Investigation

1.Have you used or do you currently use a learning management system? If so, what has been your experience – how has it made your teaching more efficient

and/or effective? How familiar are you with all of its options? What does it seem to be missing that you would like it to have?

2. Think about your future teaching ten years from now. What do you think your language class will be like? How might the digital devices and networks – and the students – be different from those of today? What can you be doing to prepare yourself for that future?

3. If you are currently teaching, what are you doing to help prepare and motivate your students for informal language learning? What are you doing or could you be doing yourself to enhance your proficiency in a second language through informal channels?

APPENDIX

Some Professional CALL Organizations

APACALL (Asia-Pacific Association for Computer-Assisted Language Learning): https://www.apacall.org/. An on-line association of CALL researchers and practitioners in the Asia-Pacific region. Membership is free.

CALICO (Computer-Assisted Language Instruction Consortium): https://calico.org/. A US-based organization with international membership focused on using technology in the teaching and learning of modern languages. See also their list of sister organizations and journals: https://calico.org/home/sister-organizations-journals/

EUROCALL (European Association for Computer-Assisted Language Learning): https://www.eurocall-languages.org/. Provides a European focus for the promulgation of innovative research, development and practice relating to the use of technologies for language learning.

IALLT (International Association of Language Learning Technology): https://www.iallt.org/. Devoted to development, integration, evaluation, and management of instructional technology for the teaching and learning of language, literature, and culture.

IATEFL Learning Technology SIG - Interest group of IATEFL: https://ltsig.org.uk/. Concerned with all issues involving using technology for English language teaching and learning.

PacCALL (Pacific CALL Association): https://paccall.org/. Promotes the use and professional support of CALL throughout the Pacific region, including the coastal countries of the Americas.

TESOL CALL Interest Section: https://www.call-is.org. An interest section within TESOL, CAL-IS runs the Electronic Village at TESOL conventions and the pre-conference EV Online sessions

Some Recent Free Online CALL Books

Giannikis, C., Constantinou, E., & Papadima-Sophocleus, S. (Eds). (2019). *Professional development in CALL: A selection of papers*. Voillans, France: Research-publishing.net. https://research-publishing.net/publication/978-2-490057-28-3.pdf

Papadima-Sophocleus, S., Constantinou, E., & Giannikis, C. (Eds). (2019). *ESP teaching and teacher education: current theories and practices*. Voillans, France: Research-publishing.net. https://research-publishing.net/publication/978-2-490057-45-0.pdf

Son, J.-B. (Ed.). (2019). *Context-specific computer-assisted language learning: Research, development and practice*. APACALL. https://www.apacall.org/research/books/4/cs_call_2019.pdf

Son, J.-B. (Ed.). (2020). *Technology-enhanced language teaching in action*. APACALL. https://www.apacall.org/research/books/5/TELT_Action_2020.pdf

Phil Hubbard's Homepage (https://web.stanford.edu/~efs/phil/)
This has links to my CV and several book support websites as well as the
CALL course this book came from.

APACALL Book
Series Editor: Jeong-Bae Son

The APACALL Book Series covers a wide range of issues in computer-assisted language learning (CALL) and offers opportunities for CALL researchers and practitioners to engage in research and discussion on their areas of interest.

An Invitation to CALL: Foundations of Computer-Assisted Language Learning is based on the notes of a course on CALL taught by the author at Stanford University from 1998 to 2020. It is aimed at providing a survey of CALL with an emphasis on foundational topics and concepts of value to language teachers, teacher educators, and program administrators. Its eight chapters provide a base for teachers to continue exploring the use of CALL on their own.

Phil Hubbard is Senior Lecturer Emeritus in the Stanford University Language Center. Working in CALL since the early 1980s, he has published and presented in the areas of CALL theory, research, methodology, evaluation, listening, teacher education, and learner training (see https://web.stanford.edu/~efs/phil/).