

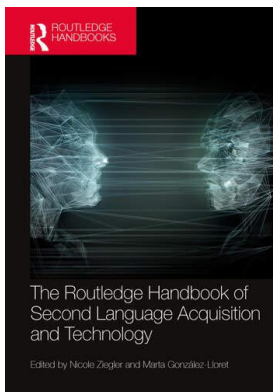
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LANGUAGE LEARNING IN ONLINE ENVIRONMENTS

Katharine B. Nielson

Introduction

As a result of the COVID-19 global pandemic, instruction in nearly every context, including language learning, has become virtual. This emergency shift to the online environment is sending learners and teachers head long into the world of technology-mediated language learning, whether they want to be there or not. And, unsurprisingly, most teachers lack any experience in offering virtual instruction. Without the benefit of training, teachers are taking some of the same early approaches that online language teaching pioneers took back in the late 1990s, when the very first online language courses were offered. Some of these early online courses were far more elaborate, costly, and labor-intensive than their face-to-face counterparts (see, e.g., Fleming et al., 2002, for a description of a mid-1990s distance Chinese course at the University of Hawaii using ITV for real-time collaboration) whereas others were essentially correspondence courses using e-mail, textbooks, and possibly self-study software to offer distance learning (see, e.g., Wang & Sun (2001) for a discussion of the four generations of distance language learning courses or Cahill & Catanzaro's (1997) review of an early, online Spanish course at Christopher Newport University). Fortunately, we know more now than we did then about how to create effective online language learning environments. We have decades of data on how tools can help foster the psycholinguistic processes necessary for language learning (Golonka et al., 2014), and technology itself has made incredible advances in the past 20 years, allowing us to go beyond what is possible in traditional, face-to-face classrooms. After a brief discussion of terminology, this chapter will focus on research-based best practices for language learning in online environments. Drawing upon empirical research from both formal and informal online language learning contexts, the discussion will focus on what we know about how to promote language learning in online environments as well as the opportunities for research and study afforded by online language learning.

Historical Perspectives

As technology has changed over the past three decades, so too have the terms used to describe technology-mediated learning environments. The term "online environment" can cover all sorts of virtual spaces, and there are numerous ways people might find themselves learning in such a context. Learners can be enrolled in formal, online courses where all instruction is virtual and learners interact with one another and teacher(s) through technology-mediated methods, such as the online advanced Spanish course evaluated by Enkin and Mejias-Bikandi (2017), and the online Chinese

course for high school students evaluated by Nielson (2014). Blended, sometimes called hybrid, language courses are even more common places for online learning, with some of the learning taking place in an online environment, such as the blended English course for Japanese speakers evaluated by Alizadeh et al. (2019) or the very early example of blended language courses offered at Carnegie Mellon University reviewed by Chenoweth and Murday (2003). In addition to fully online and blended instruction, learners are also able to engage in online language learning through self-study courses and software packages. Nielson (2011) reviews the literature on self-study language learning in her study of learners using Rosetta Stone to learn Spanish, Arabic, and Mandarin in a workplace context, and Loewen et al. (2019) offer a more recent study of learners in a university setting studying Turkish entirely via Duolingo. Finally, as technology has become increasingly easy to access and more integrated into everyday life, there are many opportunities for informal online language learning, either as a supplement to more formal instruction as in Lin et al.'s 2016 study of learners informally engaged with LiveMocha, or casual language learning via Massive Open Online Courses (MOOCs) (see Sallam et al., 2020, for a survey on an exploration of the literature on MOOCs related to language learning), or, perhaps most effectively, in the course of everyday tasks, such as playing online video games as Jabbari and Eslami's (2019) analysis suggests.

Notwithstanding the various circumstances under which language learners find themselves engaging in an online environment, the environments themselves have varied widely. There are language courses taught through general purpose Learning Management Systems (LMS) like Blackboard, Moodle, and Canvas, including, for example, the Open University's language courses, which leverage Moodle as the medium of instruction (Hampel & Stickler, 2005, 2012). Blended language courses often employ language learning software applications, such as those reviewed by Lafford et al. (2007) for teaching Spanish, those discussed in Hubbard's (2006) evaluation framework, or commercially available packages as studied in García Botero et al. (2019) or Loewen et al. (2019). And, alongside these online environments designed specifically for language instruction, there are scores of examples of social computing tools being leveraged for online language learning. From using synchronous communication tools such as Gchat, Whatsapp, or Facebook Messenger for language learning study groups (see, e.g., Wu et al. (2017) for a discussion of using the chat tool LINE to promote oral proficiency skills in a flipped EFL classroom) to using videoconferencing software such as Zoom, Google Meet, or Skype for real-time communication (see, e.g., Lenkaitis, 2020 and Satar, 2015), the Second Language Acquisition (SLA) literature has a number of examples of social computing and communication tools serving as the online environment.

The research on language learning in online environments tends to be as varied as the environments themselves. There are studies that consider classes of learners throughout the course of a semester, analyzing and comparing proficiency improvement at the outset and at the end, such as in Blake et al.'s (2008) study comparing the proficiency gains of learners in hybrid, online, and face-to-face Spanish courses or Loewen et al.'s (2019) study of learners using Duolingo over the course of a semester. There are studies of how learner discourse changes throughout a specific time period, such as Gromik's (2012) study, which examined the language in learners' self-made video recordings over the course of a semester or Schenker (2019), which considered how the composition of online discussion forum participants affected the amount and level of learners' online contributions. In addition to these longer-term studies of learners' language changing over time as a result of some aspect of technology, there are also a large number of laboratory-based studies, which often examine the effect of a particular instructional treatment on a specific example of learners' language production. One recent example of this is Loewen and Isbell (2017), which considered face-to-face and audio-online synchronous computer-mediated communication and its effect on pronunciation-focused language-related episodes. Finally, there are a number of researchers who have considered meta-analyses of specific types of technology-mediated research, from Sallam et al.'s 2020 analysis of language learning MOOCs to Golonka et al.'s (2014) review of the evidence supporting the utility of various types of technological tools.

Critical Issues and Topics

For nearly 30 years, institutions have been developing and offering online language courses. However, despite repeated calls for research to determine how well they work (Blake, 2009; Chapelle, 2001; Chapelle & Voss, 2016; Goertler & Winke, 2008; Tarone, 2015), with the exception of a few studies that have compared learner performance in specific aspects of online courses to their face-to-face equivalents (e.g., Blake et al., 2008; Violin-Wigent, 2014) there has been very little published on the effectiveness of online language instruction. And there has been almost nothing published on how to evaluate online language-learning programs (González-Lloret & Ortega, 2014; Stanley, 2013; Van Deusen-Scholl, 2015). What is striking about this lack of systematic course evaluation research is that there is no dearth of data from online language courses; unlike in traditional, face-to-face learning environments, most learner activity in online courses is automatically tracked. The data available as a result of online instruction can offer course developers, instructors, and institutions a unique view into learner engagement, performance, and proficiency improvement.

One possible reason for this lack of online program evaluation research is simply that there may be too much information. As Zacharis (2015) points out, “Learning management systems (LMS) ... provide teachers a vast amount of data about how often students log in, how often they post in discussion boards, what they view, how long they stay on the site, etc. Although the extraction of data from the LMS is easy, finding meaningful behavioral patterns and relationships that inform effective learning is a time consuming task” (p. 52). When every learner’s every click is tracked, the sheer amount of available data becomes an impediment to analysis and evaluation. The emerging field of learning analytics has identified variables that can predict learner achievement in online courses in general, but recent research in this field has shown that context and domain matter and that “learning analytics cannot be decoupled from actual, situated learning and teaching practice” (Gašević et al., 2016). SLA researchers have begun to delve into the possibilities of mining the data of large-scale distance learning courses although there is much work to be done. For example, Martín-Monje et al. (2017) examined the patterns of behavior in language MOOCs and discovered that short video segments were the most engaging feature of MOOCs and that learners who submitted work to be graded were far more likely to persist with the courses than learners who engaged passively. It is toward promising research like this that we now turn our attention—the following section will summarize the findings from recent research on how to drive learning outcomes in online environments in order to motivate specific, practical recommendations for instructors.

Given the vast assortment of online learning settings, environments, and tools, as well as the research methods used to evaluate them, it should come as no surprise that evidence of their usefulness for language learning varies widely as well. Golonka et al. (2014) offer a thorough review of the empirical research on the effectiveness of a wide variety of language learning technologies and platforms, finding promising results only for speech recognition technology in promoting the development of pronunciation skills and for computer-mediated communication tools in promoting productive skills. In both of those cases, the online environment is being used to solve a specific problem, and one that is more difficult to address in a traditional classroom. Automated pronunciation practice tools can give learners individualized, granular feedback in real time on the comprehensibility of their spoken language and, as the large body of research on CMC attests (see, e.g., Ziegler, 2016) text chatting offers learners a chance to produce output with time to think as well as to reflect on their production, at times driving gains in their productive skills. It is important that practitioners identify and take advantage of the benefits that technology can bring to the learning experience. This is far more likely to lead to an effective learning experience than simply using technology because it’s available or using it to try to re-create the traditional, offline learning environment.

As Payne (2020) points out, “Transitioning to teaching fully online requires reimagining how to help students achieve the learning outcomes you have set for them under a different configuration

of capabilities and constraints” (p. 247). In other words, online environments must be structured so that they foster language learning. “Quality online instruction at the very minimum requires a well-structured curriculum, adequately trained instructors, an appropriate choice of technologies aligned with measurable goals and objectives, and adherence to solid pedagogical principles, including ample opportunities for spontaneous interaction among students, including meaningful communication, access to teacher input, and the presence of a learner community” (Van Deusen-Schol, 2015, p. 400). To that end, the most critical issue for fostering language learning in online environments is ensuring that course developers, teachers, and learners themselves follow empirically-motivated best practices, grounded in established practices for SLA and/or distance learning.

Current Contribution & Research

At a minimum, a successful online language learning environment must offer access to the building blocks for SLA: input, output, interaction, and feedback. Learners require examples of rich target language input so that they can read, watch, and listen to others producing the language they are learning (Gass, 2003; Long, 1981). However, input is not enough—learners must also have opportunities to produce the language themselves (Izumi, 2002, 2003). Beyond simply producing the language by themselves, in a low-stakes way, learners need the opportunity to communicate with others. Interaction, which links processing input with producing output along with real-world time constraints is a must-have for language learners (Long, 1996; Mackey, 2007). Finally, learners need feedback on their emerging language skills. Whether it is implicit, explicit, interactional, or, likely a combination of the three, feedback from others is a necessary part of the language learning process (see Li [2010] for a meta-analysis of 350 corrective feedback studies; Lyster and Saito (2010) for a review of studies on oral corrective feedback; and Kang and Han (2015) for a review of studies on written corrective feedback).

An online environment that meets these basic requirements is sufficient to create a space where language learning can theoretically take place, but, as countless researchers have pointed out, the role of technology should be to enhance the language learning experience, improving the likelihood of positive learning outcomes (Blake, 2011; Golonka et al., 2014; González-Lloret & Ortega, 2014). For example, we know from decades of research on SLA and cognition that attention is a requirement for language learning (see Robinson et al., 2012 for a discussion). Online learning can help direct learners’ attention to target language features improving learning outcomes (see, e.g., Ziegler et al., 2017 for a discussion of a promising empirical study of input enhancement, including a thorough review of the literature on using technology to make L2 input more salient). There is an enormous body of research on individual difference variables, such as motivation and aptitude, and how they interact with second language learning outcomes (DeKeyser, 2012). Online environments that are designed to work with learners’ individual differences are yet another way that we can use the virtual space to improve upon traditional learning experiences. For example, CMC can help learners with low working memory capacity improve the amount and quality of their second language output, leading to improved language practice and proficiency (Payne & Ross, 2005; Payne & Whitney, 2002).

Ideally, technology-mediated instruction should solve problems that are inherent with face-to-face classes. For instance, online environments address problems of space and time, allowing learners, teachers, and interlocutors to communicate regardless of where they are in the world, something that dramatically increases learners’ ability to practice using the target language to accomplish real tasks (Blake, 2009, 2011; Doughty & Long, 2003; White, 2006, 2014). The ability to easily videocapture language learners’ speech offers time for deeper reflection on productive skills that is impossible when productive practice goes unrecorded (Gromik, 2012; Rodgers & Dhonnchadha, 2016). Recently, studies have begun to consider the benefits of connecting language learners with fluent interlocutors via videoconference for speaking practice, something that is quite difficult (if not

impossible) in more traditional learning environments (Carruthers, 2017; Martinsen & Thompson, 2019). Finally, by leveraging learner data and artificial intelligence algorithms, language learning software can adapt instruction in real-time to meet learners' needs and can personalize the content that is delivered to learners based on their interests and goals, something which is outside the scope of most classroom teachers (Faria et al., 2019; Jee & O'Connor, 2014; Nielson, 2018).

Learner data is useful not only to enable the automated individualization of instruction, but also to monitor learner activity. By analyzing what learners do in online environments, we can make better decisions about how to structure virtual learning experiences. From early studies in distance learning, we know that a sense of community is vital for driving learner engagement (Liu et al., 2007; Rovai & Jordan, 2004). When learners do not feel like they are part of a community, they are far less likely to participate actively in online courses. And the community itself matters as well. For example, Schenker (2019) found that discussion forum groups that are composed of both native speakers and non-native speakers generate more conversation than discussion forums with language learners alone. Nielson (2014) found that learners were engaged far more with the parts of the online course that required synchronous conversation with a conversation partner or tutor and disengaged from participation during autonomous learning activities. In a large-scale analysis of learner behavior and online course design, Reintes et al. (2015) found that social-constructivist learning activities generated far more engagement than other types. Limited engagement with self-study activities is a common theme throughout the literature on informal learning. García Botero et al. (2019) found that learners using Duolingo for autonomous, informal learning had very low rates of participation, despite initial enthusiasm. While 118 learners agreed to use the software over a yearlong period as part of mandatory "informal learning" portion of their language studies, only 10% of the participants actually used the self-study software with any regularity (p. 76). Further complicating matters, learners themselves were not always aware of how little they actually used the platform. This supports the research on self-directed learning conducted by, for example, Fischer (2007) who demonstrated this point convincingly with a detailed comparison of learner self-report data with automatically tracked data from software applications.

Citing these studies and others (e.g., Loewen et al., 2019; Nielson, 2011; Stockwell, 2008) researchers have called for instructors in online environments to push learners to engage with language learning software; however, the presence of an instructor is not the only requirement when structuring a successful online learning environment. Reintes et al. (2018) "found strong support that the way language teachers design their modules directly predicts students' online behavior," p. 19. And not only do learners need well-structured online environments, they also need training and support in how to learn online. As Larsen-Freeman (2018) points out, empowering participants to be active participants in their own learning can give them a sense of agency, an important piece of the puzzle in helping them resolve the issues of engagement and persistence that we see with self-directed learning. Hromalik and Koszalka (2018) found, in their study of first year language students in an online Spanish class, that giving learners specific strategies for managing their online learning led to better outcomes. García Botero et al. (2019) confirmed that students who were trained in self-regulation and who received scaffolding to support their use of a mobile language learning app significantly out-engaged learners left to their own devices. In a first-year French class with an optional online component, Chakowa (2018) found that giving learners multiple software and tool options was essential to driving ongoing engagement. Giving learners the tools that they need to manage their own outcomes in online environments, particularly because these environments rely so heavily on self-directed learning, is the key to their success.

In online learning environments, measuring learners' outcomes and overall success is critical, both to add to the growing body of research on how to leverage online environments for language learning but also to investigate the relationship between various instructional components and the development of L2 skills. One of the benefits that language learning in online environments

has over more traditional language learning environments is that technology makes it relatively straightforward to collect the type of data that can demonstrate learning outcomes and overall program success. For example, LMSs, language learning software, mobile applications, and social computing platforms all offer opportunities to measure the amount, duration, and frequency of learning, ongoing examples of language use, mastery of content, and proficiency improvement. Administrators of online programs have the unique opportunity to use these data to inform their own practices, but also to make them available for researchers, offering the raw materials necessary to investigate how well technologies and techniques that show promise in the lab actually work in the field.

The truth is that online environments intertwine opportunities for learning and assessment, and instructors of these courses should receive professional development in both technology and language assessment in order to address the paucity of studies assessing L2 growth as a result of online instruction. “Many of the same basic technologies that play a role in language teaching are also put to work in language testing; but in language testing, they can take on new meaning. Grasping their meaning requires knowledge of basic concepts in language assessment, which to date have not become common currency among language teachers and other professionals in applied linguistics” p. 124 (Chapelle & Voss, 2016). As administrators and teachers of online programs think about improving both learning outcomes from online courses and ease of use for both learners and instructors, they should consider the following best practices.

Recommendations for Practice

As discussed throughout this chapter, one of the most critical issues for language learning in online environments is that they be organized to promote language learning. To that end, we offer six best practices that can be used by instructors, administrators, researchers, or even learners themselves. Following these practices should, at a minimum, satisfy Payne’s (2020) objective to ensure that online environments are designed in a way that learners can achieve the language learning outcomes established for them, and going a step further, that we can demonstrate that their objectives have been met.

The first three recommendations are concerned with setting up online learning experiences to optimize their usefulness. Best Practice #1 is intended to ensure that online language learning environments be designed to offer learners input, opportunities for output and interaction, and feedback on errors, as these are basic requirements for the psycholinguistic processes underpinning second language acquisition. Best Practice #2 pushes instructors, instructional designers, and administrators to think beyond the constraints of face-to-face language learning and consider the ways in which online environments might improve the language learning process. This leads directly to the third best practice, which recommends using technology to resolve issues that are problematic with in-person instruction. For example, resolving issues related to scheduling classes, capturing learner output for offline review, or differentiating content to meet the needs and interests of diverse learners are all ways that language learning in online environments can help solve problems that persist in more traditional models of language learning.

The final three best practices are recommendations for what to do while online learning is underway. Best Practice #4, which recommends that learner activity in online environments be monitored, ensures that teachers and other stakeholders keep an eye on what their students are doing so that they can intervene when problems arise. If teachers and administrators have easy access to learner performance data, they are able to engage in the fifth best practice, which is to encourage students to engage with online learning. Sometimes, a well-timed nudge from a teacher is all that is necessary to have learners comply with online course requirements. Finally, Best Practice #6 recommends that we measure learning outcomes in online environments to ensure that they are working and to identify areas for future research.

Future Directions

Despite these empirically-grounded best practices, there are still unanswered questions about how to most effectively foster language learning in online environments, including the best way to structure experiences to meet learners' unique needs. We know that personalization is important for language learning and that online environments can help individualize instruction (Chakowa, 2018; Doughty & Long, 2003). However, it is less clear what exactly should be personalized or how we should go about determining this. Godwin-Jones (2019) suggests that some of this ambiguity in how exactly to personalize instruction might stem from the fact that, as we see in the literature on autonomous language learning, much of the work in CALL continues to examine isolated pieces of the online learning puzzle (e.g., investigating the effectiveness of CMC, analyzing what happens during real-world practice, measuring the effectiveness of technology-enhanced input). As he states, "Studying variables in isolation can be informative but may convey a cause-and-effect impression that belies the interdependence of individual traits, social interactions, institutional forces, socio-economic factors, and political or power relations" (p. 18).

Following this logic, one way that researchers might identify which instructional elements to personalize is by considering the effects of different instructional treatments on learners with different cognitive characteristics. In other words, the increasingly sophisticated research on aptitude-by-treatment interaction (ATI) is a logical place to examine the best way to use technology to personalize instruction for language learning (DeKeyser, 2012). Understanding how to measure learners' cognitive individual difference variables and then understanding how to use technology to tailor instructional treatments to work with those variables would go a long way toward making useful recommendations for online instruction and intervention (DeKeyser, 2019). For example, investigating the way variables like working memory capacity, processing speed, motivation, and proficiency level interact with instructional design choices, such as the provision of pre-task planning time, the ability to repeat audio/video recordings, or the availability of subtitles or glosses would permit the designers of online language learning environments to personalize instruction in order to best suit learners' individual needs.

However, we cannot wait for the ATI research to evaluate the effectiveness of existing online language learning programs. As stated above, one of the critical issues facing administrators and teachers who are facilitating language learning in an online environment is the lack of longitudinal studies of learners in online environments and the paucity of online language course evaluation research, possibly due to an overwhelming amount of data from these courses as well as the difficulty involved in managing these data. We need more studies like Rientes et al. (2018), which was undertaken in order to better understand how the design of distance learning modules influences engagement in language courses. The researchers examined data from over 2000 students enrolled in distance foreign language courses through the Open University, finding that up to 55% of the variation in what learners completed each week was due to the design of the learning modules themselves. The authors suggest that it might be the combination of humans and machines that truly drives learning outcomes. In other words, if we can take the data from learner performance in online environments, automatically analyze it, and make recommendations to teachers for how to use insights from those data in their instruction and pedagogic interventions, we could make instruction more effective. This is supported by the work of Liu et al. (2017) who point out that the human element is missing from all of the work on big data and learning analytics.

We propose increasing the focus on systems that enhance the decision-making skills and support abilities of humans (i.e. teachers, students, and support staff) and truly achieve personalized learning scenarios. The rich set of existing data sources, sophisticated algorithms to discover knowledge, and complex visualizations still need to be considered under a lens that brings the human to the center of the design and formally leverages the

Table 17.1 Best Practices for Language Learning in Online Environments

<i>Best Practice</i>	
1	Offer learners input, opportunities for output and interaction, and feedback on errors
2	Take advantage of technology to enhance the language learning experience
3	Solve problems that are inherent in face-to-face classes
4	Monitor learner activity
5	Push learners to engage in virtual learning experiences
6	Measure learner outcomes and overall success

effect of technology in their day-to-day operations. Humans are in the best position to establish the required connection between data, algorithms, and educational underpinnings. We propose the notion of personalized learning support actions as the focal point where contributions should aim in order to make a quantifiable difference. Our argument is that this approach allows for greater relational connection between students and teachers.

(pp. 23–24)

This is a promising line of inquiry that should be the subject of more empirical investigation.

If the research on language learning in online environments repeatedly calls for teachers or human facilitators to promote engagement via learning design, direct intervention, or some other means, then perhaps it is the role of the technology to help the teacher make the most informed decisions about what to point out and prioritize. When technology is able to offer meaningful, actionable recommendations for teachers in instructor-mediated settings, it will deepen the connection between theory and practice and offer even more opportunities for applied language research.

Conclusion

As Hockly (2015) pointed out, research on language learning in online environments needs to adapt: “As online language learning opportunities have moved beyond the confines of the formal course, so too it falls to research agendas to do the same” (p. 313). We need more studies of informal language learning, with data from learners who use technology in their everyday lives in their second languages. This chapter has synthesized decades of research on language learning in online environments, making recommendations for the six best practices for structuring virtual language learning outlined earlier (see Table 17.1).

These recommendations are intended to serve as a guide for the development of online learning experiences, regardless of the technology, hardware, or learning environment being used to facilitate them. They can guide both practitioners and researchers as we continue to evolve our understanding of human-computer interaction and its role in the second language acquisition process, whether this process is taking place in a formal online classroom or a real-world, social computing context. And further research into how to best personalize learning, how to structure online learning experiences, and online language course program evaluation will help make these starting guidelines more nuanced.

Further Reading

Blake, R. J. (2011). Current trends in online language learning. *Annual Review of Applied Linguistics*, 31(1), 19–35. <https://doi.org/10.1017/S026719051100002X>

It offers a review of some of the earlier research on online, hybrid, and blended courses, with a discussion of how to facilitate learning using different combinations of tools

Gacs, A., Goertler, S., & Spasova, S. (2020). Planned online language education versus crisis-prompted online language teaching: Lessons for the future. *Foreign Language Annals*, 53(2), 380–392. <https://doi.org/10.1111/flan.12460>

It illustrates the difference between emergency online learning and well-planned online learning, offering a set of guidelines for both practitioners and researchers.

O'Rourke, B., & Stickler, U. (2017). Synchronous communication technologies for language learning: Promise and challenges in research and pedagogy, *Language Learning in Higher Education*, 7(1), 1–20. <https://doi.org/10.1515/cercles-2017-0009>

Payne, J. S. (2020). Developing L2 productive language skills online and the strategic use of instructional tools. *Foreign Language Annals*, 53(2), 243–249. <https://doi.org/10.1111/flan.12457>

They both offer a look on the promise of synchronous tools for productive practice in online learning

White, C. (2014). The distance learning of foreign languages: a research agenda. *Language Teaching*, 47(4), 538–553. <https://doi.org/10.1017/S0261444814000196>

It provides an in-depth look at a research agenda for distance learning that is still applicable today

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