The Use of Technology for Second Language Distance Learning

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This article describes distance learning (DL) for languages within the context of recent advances and research findings in computer-assisted language learning (CALL). In addition to reviewing the different DL modalities, theoretical underpinnings, and the most appropriate technological applications to second language learning, the issues of conducting DL research and training faculty to work with this new learning environment will be examined. Garrett's (1991) overview of an earlier state of the CALL field serves as the background for judging how far the field has come, especially with respect to the pedagogical challenges, which have not changed drastically since the 1990s. A key consideration is the notion of interactivity, which is analyzed in depth with relation to both tutorial CALL and social computing.

THE INTEREST IN TEACHING LANGUAGES through distance learning (DL) formats has grown markedly as a direct result of expanded Internet use and a veritable explosion in social computing or computer-mediated communication (CMC). Although the DL field draws heavily on previous research done in computer-assisted language learning (CALL), it also ushers in other considerations particular to these new learning environments. This study will focus on how CALL research—starting with Garrett's (1991) seminal overview article and her focus on interactivity, process over product, learner-centeredness, and authenticity—has shaped DL instruction in the present and near future.

Almost two decades ago, Garrett (1991) reviewed the CALL field and staked out a basic set of research and best-practice issues with surprising foresight. Foremost among them, she argued that computers should be used in support of learning rather than merely as a teacher's aid relegated to the limited curricular role of only handling the more tedious aspects of language learning (i.e., morphology and vocabulary) through "drill-and-

kill"–type exercises. Garrett took great pains to define the term interactive (p. 81) and then called for a framework of second language acquisition (SLA) that emphasized the student's ability "to construct communicative meaning in a new system" (p. 92). Garrett's CALL focus emphasized process over product as a way of creating a welcoming learning environment that encouraged as much interaction as possible in the second language (L2), including exchanges with members of the corresponding community of native speakers of the target language. Today's readers will readily recognize that she was, in essence, advocating for a learner-centered classroom rather than a teacher-centered one, an approach that still needs to recognize the importance of the teacher in the role of expert guide or interpreter along the way. More importantly, she understood all too well that the use of technology as a mere add-on would have little effect on students if the CALL techniques and materials were not properly integrated into the curriculum, an observation which in itself constitutes an urgent call for more teacher training in the use of new technologies (see Blake, 2008, ch. 6).

Although Garrett was intensively interested in CALL research, she readily recognized the failings of an obsessively comparative line of inquiry that

constantly sought to pit technologically assisted formats against traditional classroom ones. Still locked in this old paradigm, many researchers today continue to ask if technology really works and, moreover, does it work better than traditional methods. This is the wrong research question for the DL field, notwithstanding the administrative pressures to provide concrete evidence for adopting and integrating expensive new technologies into an institutional setting, as will be discussed in this article. Despite real and palpable progress in the SLA field, much of the L2 and CALL research remains flawed by too many uncontrollable variables. Likewise, because technology itself does not constitute a methodology, researchers cannot directly test the question "Does it work?" without first addressing the question of how technology is used. Once again, Garrett's sound advice was to study the process, not the product, an admonition that continues to be valid for today's CALL field and its concomitant applications to DL language education.

Less relevant for today's language professionals are Garrett's (1991) concerns with providing authentic materials through the specific use of videodiscs, satellite transmissions, or CD-ROMs—all controlled by the latest authoring system or template circumscribed by the teacher's fervent preference for PC or Macintosh. Technology has changed dramatically in the meantime, which is the nature of the CALL field. The ubiquitous source of information available through the Internet has rendered most of these issues thoroughly moot. Culturally authentic digital materials—textual, audio, and visual—abound on the Internet with only minimal requirements for a Flash, Java, or QuickTime plug-in. Web-based software and learning or classroom management systems (LMS or CMS) now provide a simple way of managing authentic materials and rendering the communities that produced them fully accessible for discussion via any computer using any number of browser and chat options. Strong computer preferences still persist, but the brand wars are ostensibly over, as is, too, the quest for the ideal authoring tool, due to a plethora of ever-changing tools. Even more fortunately, increasing compliance with UNICODE standards has liberated both students and teachers of the less commonly taught languages from the earlier CALL fixation on font problems, enabling these communities to address literacy in a straightforward manner within their own respective writing traditions.

Since Garrett penned her 1991 article for *The Modern Language Journal*, the core concern of interactivity has shifted from the locus of discrete

CALL programs to a truly interactive environment now referred to as *computer-mediated communication* (CMC) with the possibility of using the computer to exchange not only text but also audio and video via the Internet. CMC tools have suddenly made educators think more seriously about imparting their courses, or at least parts of their courses, in a DL format so as to combine the best of authentic Web multimedia materials, LMS programs, and CMC chat tools—all with an eye to harnessing as much of the student's time as possible outside the confines of the traditional classroom. In the CMC-enhanced learning environment, interaction now means exactly that: interacting with instructors, fellow L2 students, or native speakers through online textual, audio, and/or video exchanges. These changes have energized the field of DL learning, as will be examined more fully in the subsequent discussion.

Talented classroom teachers have always actively sought to provide maximum opportunities for their students to engage in collaborative interactions. The same is now true for the digital age and the variety of DL formats. Language teachers can now create the same opportunities for interaction within the CMC context, whether in real time (synchronous, SCMC) or deferred time (asynchronous, ACMC).[1] Kern and Warschauer (2000) have labeled this communication in service of language learning as *network-based language teaching* (NBLT), which includes email, discussion forums or electronic bulletin boards, blogs, wikis, and chatting with or without sound/video. The potential benefits of collaborative exchanges, whether set in the classroom or managed online, as always, depend more on sound pedagogical design of the tasks the participants are asked to perform rather than the actual locus of the learning event. In Salaberry's (2001) words, "the success of a technology-driven activity will likely depend as much or more, on the successful accomplishment of pre- and post-activities than on the technology activity itself" (p. 51). In other words, lesson planning by the teacher remains a *sine qua non* for best practice using technology as it is for the classroom.

Despite the inability to address the impact of the Internet, which only became public in 1991, Garrett's heavy pedagogical slant on the CALL field still has clear relevance for today's learners and language professionals and for the application of technology in service of DL language courses. Therefore, the rest of this article is devoted to examining distance language learning in a broad sense, reviewing the array of CALL tools that contribute to this new learning environment, taking a brief look at evaluation issues, and, finally,

arguing for the importance of teacher training and increased professional rewards for those implementing DL into their language curricula.

WHAT CONSTITUTES L2 DISTANCE LEARNING?

Kraemer (2008) has defined DL, in its essence, as planned learning that takes place whenever there is a distance between teacher and student in time and/or space. She was also careful to point out that DL comes in a great many flavors, as evidenced by the following collection of terms: online learning, e-learning, open learning, distributed learning, teleconference or videoconference learning, blended or hybrid learning, life-long learning, or independent study (also see Goertler & Winke, 2008; Hauck & Stickler, 2006; Homberg, Shelley, & White, 2005). This variety of DL offerings can often be differentiated by their respective uses of media—for example, print, audio, video-based, computer-based, or Internet-mediated sources, and/or chat with or without sound and video. Some researchers make a distinction between hybrid or technologically enhanced language courses in contrast to blended classes with regularly scheduled online and classroom meetings; others treat these terms as synonymous for all intents and purposes.

Videoconferencing has perhaps the longest DL track record (O'Dowd, 2006), although this format does not totally relieve either the teacher or the student from showing up at a specific video-equipped classroom at a given time. Asynchronous or online learning also has a long DL pedigree (Allen & Seaman, 2006) because it frees participants from both place and time constraints. However, DL courses increasingly are being devised using chat tools that leverage synchronous video, audio, and text exchanges with a principal emphasis on interactive communication in a distributed manner from any location with access to the Internet. Older conceptions of the term "distance learning" still conjure up references only to videoconferences or asynchronous online courses, but it now behooves the DL field to apply the label to all of the previously mentioned formats if all or some of the learning takes place remotely, outside of classroom sessions.

During the fall term of 2005, the Sloan Consortium (Allen & Seaman, 2006) reported that there were approximately 3.2 million higher education students, or one in six, taking at least one course online (i.e., in an asynchronous format), a figure that had increased from 2.3 million in the previous year, representing a 40% increase. In 2006, The National Center for Education Statistics (Waits & Lewis, 2003) reported a similar increase in online enrollments, up 46% from the period of 1995 to 2001 (Kraemer, 2008).

The Sloan Consortium (Allen & Seaman, 2006) further reported that these online students were overwhelmingly undergraduates and hailed almost exclusively from the larger universities (i.e., 15,000 enrollments or more). More than half (51.5%) of the online students were enrolled in 2-year associate institutions. In other words, community colleges are leading the way in the DL language education field. In terms of quality, 62% of the chief academic officers at these large universities felt that the online courses were equivalent or even superior to their face-to-face counterparts. Not surprisingly, faculty acceptance, the demands of learning new teaching methods, and the lack of student discipline in the online learning environment were all cited as the most important barriers to the implementation of online courses and programs. The Commission of Public Education (2006), for its part, concluded that although online learning was not always ideal, it constituted, nevertheless, a realistic choice for many students because of their respective work schedules, home responsibilities, and/or special needs. The commission noted that the successful online student tended to be an adult learner who was highly motivated, mature, and focused on learning.

Distance learning for L2 invites much debate in educational circles, but this brief statistical profile should make it clear that DL will continue to figure into the L2 curriculum in some significant fashion in the coming years. At present, there are only a handful of DL language courses being offered for credit at our universities and colleges (for a sample listing, see the California Virtual Campus at http://www.cvc.edu/), and even fewer evaluation studies available that could be used to argue for or against offering students DL alternatives to classroom language instruction.

Even as the attractiveness of DL language delivery grows, no language professional, not even the most technologically enamored instructor or CALL researcher, would dispute the notion that, to approach advanced proficiency (level 3 on the Interagency Language Roundtable Scale), L2 students need to interact face to face with native speakers, preferably in a country where the language is spoken (Davidson, 2007). This experience is the only way to develop an appropriate sense of pragmatic and sociolinguistic competence, let alone advanced linguistic competence.

Where does DL fit in, then, with the rest of the L2 curriculum given the time investment

required to realize a measured level of professional competence in the L2? Despite the variety of DL formats, digital interactions constitute the very heart of today's DL delivery of languages (Blake, 2005; White, 2003), whether in an asynchronous (e.g., email, discussion boards, blogs, wikis) and/or synchronous form (e.g., chat, MOOs [multiuser domains, object oriented], teleconferencing) format. In theoretical terms, the array of DL formats all use digital tools to support engagement between and among learners in ways consonant with SLA theories of either an interactionist (Gass, 1997) or sociocultural (Lantolf, 2000) persuasion. Likewise, those SLA researchers who particularly stress the role of corrective feedback (e.g., Ellis, 2009; Long, 2006), including the constructionists from the education field, have little difficulty seeing how digital exchanges can be used to shape, stimulate, and scaffold the L2 learner's progress (Doughty & Long, 2003; Hubbard & Levy, 2006; Lee, 2008; Schwienhorst, 2007; Ware & O'Dowd, 2008). At present, there are only a handful of DL language courses offered for credit at our universities and colleges (for a sample listing, see the California Virtual Campus at http://www.cvc.edu/) and even fewer evaluation studies available that could be used to argue for or against offering students DL alternatives to classroom language instruction (see Means, Toyama, Murphy, Bakia, & Jones, 2009).

Asynchronous language learning, such as what takes place within discussion forums, has long been viewed as an equalizing tool (Godwin-Jones, 2003; Warschauer, 1996) that encourages universal participation as opposed to the more complicated dynamics found in face-to-face dialogues, where certain individuals can often dominate the flow of the discourse. However, Payne (2004) cautioned that participating in asynchronous discussion forums was not the same as doing a writing assignment but rather more like a protracted conversation that takes place over time. He suggested that teachers needed to think about structuring interaction in online learning much more than in the classroom because online activities such as forums cannot be fine-tuned on the fly in the same way as discussions in the classroom context. Students carry out these activities by themselves on their own time away from the eyes of the instructor. Clear instructions, goals, and learning objectives are imperative if the tasks are going to succeed.

With respect to asynchronous online learning, The Sloan Consortium (Moore, 2004) has posited the following guidelines for asynchronous instruction in any discipline—sound guidelines that could be applied to any asynchronous or synchronous DL modalities. Notice that the concept of interaction is a key component in their list (items f and g): (a) Orientate students on how to learn online and help them adjust to their new role as more self-directed and independent learners; (b) write clear learning objectives at both the macro (i.e., syllabus) and micro (i.e., day-by-day) levels of curricular planning; (c) ensure that the quality of the online course is comparable to that of traditional classroom materials; (d) provide ready help of both a technical and content nature and respond within 24 hours (or sooner, if possible); (e) minimize technical difficulties for obtaining the necessary plug-ins and software; (f) feature interaction—with instructors, classmates, and the interface—at all possible moments; (g) include student feedback in shaping the instructional goals for specific activities; (h) recycle instruction, materials, topics, concepts, and practice through the course; (i) allow students to practice before talking exams so as to ensure positive outcomes; and (j) demonstrate to students in palpable ways the progress being made throughout the course.

With respect just to synchronous learning, teleconferencing or videoconferencing represents the most recognized format, often accepted by university faculty curricular committees as being equivalent to the classroom experience. This relatively positive reaction to this DL mode might stem from the video presence of the teacher that gives the assurance—whether true or not—that the class will be "communicative," a vague descriptor that is too often overused in characterizing the gold standard for best practice in the United States (Magnan, 2007). Quite possibly, the entrenched teacher-centered paradigm favors the teleconference format, whereas online virtual format typically incurs a heavier burden of proof that the content is equivalent to the classroom curriculum.

O'Dowd (2006) separated teleconferencing into three types: (a) teacher-to-class, (b) student-to-student, and (c) class-to-class (p. 189). All three types of teleconferencing potentially suffer from sound delays, gaps in fluidity in handovers that make the medium critically different from face-to-face interactions, the tendency toward passive viewing; and other logistical problems. Practical difficulties can become formidable obstacles to carrying out successful teleconference projects when implemented among institutions that do not share the same calendar (i.e., semesters vs. quarters) or do not have adequate mechanisms for sharing credit and

financial resources. Some critics of teleconferencing worry that group activities cannot be carried out in the same way as with face-to-face formats. Nevertheless, Fleming, Hiple, and Du (2002) described successful efforts at the University of Hawai'i to incorporate meaningful group and pair activities into their teleconference format.

Another form of DL interaction is handled completely via computers supported by synchronous chat programs (i.e., SCMC) that minimally support textual exchanges but, increasingly, audio and video ones as well. Written chat comes in two different modes: one in which written entries are posted by means of a carriage return (i.e., Internet relay chat [IRC] chat), and the other in which participants share a text field and a single cursor placed in a field with immediate display-style chat that updates the window character by character. Each modality has its advantages and disadvantages. With the immediate display-style chat, participants can see the thought process of their partners evolving on the screen, but a protocol for who gets to write at any one time must be clearly worked out among participants ahead of time. Otherwise, the chat partners could spend their time arguing over who has the stylus, with one person or the other endlessly rewriting previous contributions. The carriage-return modality allows anyone to post a message at any time, which empowers less assertive or inherently shy students. No one can stop someone else from posting ideas. Unfortunately, this modality can often produce long pauses while one's partner is typing. Frequently, questions go unanswered for several turns until the participants catch up with previous postings. This decalage or lag effect is disconcerting and even disruptive to the natural flow of any dialogue and takes some getting used to.

Payne (2004) identified the benefits of textual SCMC as follows: SCMC reduces the pace of discussion; textual exchanges are posted and, therefore, not ephemeral, but rather ever present on the screen for students to consult and continue processing; students have more time for linguistic processing to prepare their own contributions; and, finally, students' affective filters are lower in SCMC because no one is looking over their shoulders as is the case in face-to-face (F2F) exchanges.

ACMC has also received much attention. Wildner-Bassett (2005) seized on CMC's spatial independence from the immediate F2F context to stress *out-of-body* experiences, a metaphor for increased opportunities for students engaging in CMC to step back and contemplate new identities and voices that move students beyond preestablished categories. She envisaged using ACMC to establish a particular learning ecology where "learners cooperate in their ways of knowing and of being together by revealing their processes of naming and critically viewing their own identities" (p. 646). Wildner-Bassett cautioned, as did Payne (2004), that conscious stewardship by the teacher was necessary for this critical social-constructivist viewpoint to emerge. Ultimately, she stressed that both teachers and students were charged with creating a classroom climate in which all voices can be heard and all participants were willing to listen.

Other CMC benefits, whether from SCMC or ACMC, of a more controversial nature include claims that these modalities level hierarchical differences originating from ethnicity, age, gender, and shyness (Thorne, 2003). These alleged benefits depend much on the nature of the tasks, the directions from teachers, and the idiosyncratic characteristics of the students themselves. What is clear is that students like to chat, so that, by assigning CMC tasks, teachers can harness more of the students' time outside of class for L2 learning. After all, social computing is an activity students know how to do and do engage in frequently on a daily basis (e.g., Facebook, MySpace, Twitter).

From a more cultural perspective, CALL researchers have drawn heavily on Byram's (1997) ideas to validate the inclusion of CMC in the curriculum. Byram encouraged L2 students to strive for intercultural competence, which he defined as "an ability to evaluate, critically and on the basis of explicit criteria, perspectives, practices and products in one's own and other cultures and countries" (Byram, Gribkova, & Starkey, 2002, p. 9). In other words, the goals for the L2 student using CMC tools should be to become flexible and open to other cultures and ideas so as to be able to change one's own values and attitudes as a function of contact with the world. Sociocultural researchers, in particular, have focused on CMC from the point of view of the learner's own level of engagement. Schweinhorst (2007) saw in the MOO environment an architecture that can be adapted to allow students to exercise their own learner *autonomy*, an updated version of Garrett's (1991) call for a learner-centered classroom. He stressed the L2 learner's need to develop a sense of metalinguistic awareness, self-reflection, critical thinking, and experimentation. Kern and Warschauer (2000) have referred to the same goals as learners exercising their own *agency*, whereas Selber (2004) has called it the development of *computer rhetorical literacy*. In short, all these researchers envisaged using technology to enable the L2 learner of today "to plan,

monitor, and evaluate their own process of language learning" (Schweinhorst, 2007, p. 9). These theoretical constructs of learner agency also provide a cornerstone for L2 distance learning and dovetail nicely with the Sloan Consortium's recommendations for best practice (see recommendation (a) earlier).

CALL TOOLS, THEIR AFFORDANCES, AND CALL RESEARCH

Levy (this issue) has reviewed numerous CMC tools as they relate to language such as grammar, vocabulary, reading, writing, pronunciation, listening, speaking, and culture (also see Lafford & Lafford, 2005, for an excellent review of instant messaging tools). Currently, most SCMC tools have evolved or are evolving so as to include audio exchanges as well—either as half-duplex (i.e., walkie talkie-type sound exchanges) or as full-duplex sound (Voice over Internet Protocol or telephonic sound)—and sometimes even video capacity (e.g., CU-SeeMe, Wimba, NetMeeting, Adobe Connect Pro, to name only a few), which obviously requires access to more bandwidth, effectively eliminating those users with less than 56K modem connections.

Hample and Hauck (2004) and Blake (2005) have studied the benefits that accrue from chat sessions that include sound as well. The process of desktop videoconferencing is also just beginning to be studied. Develotte, Guichon, and Kern (2008) and Wang (2004, 2006) have already provided convincing illustrations of the interactive power that can be harnessed in the videoconference format.

Clearly, the type of interactivity afforded by DL formats providing video and sound exchanges put the definition of "interactivity" in another realm from Garrett's (1991) reference to CALL programs. The SLA literature has amply documented the benefits of classroom F2F negotiations carried out between native (NSs) and nonnative speakers (NNSs) (Foster & Ohta, 2005; Lomicka, 2006; Nassaji & Swain, 2000)—that is, increased negotiations that enhance cultural awareness, increased quantity of oral production, heightened explorations of cultural stereotypes, and more engaging connections with the target language/culture. Similar benefits, including a heightened focus on form via textual exchanges, have also been demonstrated for pairs engaging in SCMC in the following combinations: NSs chatting with NNSs (Lee, 2008); heritage speakers chatting with NNSs (Blake & Zyzik, 2003); and NNSs chatting with NNSs (Blake, 2000; Oskoz, 2005; Sotillo, 2005).

A special case of NS–NNS exchanges involves CMC technology to link together learners from different countries. These international partnerships, or *telecollaborations*, allow each group of students to provide expert tutoring in their respective native languages (L1s) while continuing to grow as L2 learners (Belz & Thorne, 2006; Belz & Vyatkina, 2008; O'Dowd, 2007; O'Rourke, 2008; Schweinhorst, 2007; Ware & O'Dowd, 2008). Furstenberg, Levet, English, and Maillet (2001) and Bauer, deBenedette, Furstenberg, Levet, and Waryn (2006) have reported on the successes using Cultura, a complete intermediate-level foreign language curriculum built around telecollaborations using asynchronous exchanges.

Ware and O'Dowd (2008) have shown in their research that these telecollaborations yielded their best results when the participants received precise instructions on how to give feedback, which they have dubbed *e-tutoring*, as opposed to *e-partnering* where students are not particularly encouraged or trained to give feedback. Belz and Vyatkina (2008) have demonstrated how teachers can create a *developmental learner corpus* from these telecollaborations and then use the database to have students focus on form (also see O'Keeffe, McCarthy, & Carter, 2007). Both approaches accord well with Garrett's (1991) original admonishment that the role of the teacher is crucial to the successful integration of CALL into the curriculum.

The question arises: Where does that leave the DL field with respect to tutorial CALL? In other words, will social computing (i.e., CMC) eliminate tutorial CALL all together? The DL curriculum should, and will, make use of any modality that promotes the learning, including tutorial CALL. However, there are limits with respect to the notion of interactivity as applied to CALL programs. In other words, how responsive and adaptive (or rather, effective) can computers be to students' needs at the discursive level? Laurillard (2002) has cautioned us about the limits of providing discursive feedback via computers:

> The responsiveness of the interactive medium is limited, however. Hypermedia environments, enhanced or otherwise, are not adaptive to the student's needs at either the discursive or the interactive level. It would not be possible for the student to tell if they had made an inappropriate interpretation of the resources, as the system remains neutral and unvarying with respect to anything they do . . . there is no way of the student being able to test whether their interpretation is correct, except by comparing it with the various

expert views then made available in the form of model answers. (p. 118)

In the early days of CALL (see Garrett, 1991), feedback focused more on the grammatical morpheme, word, or sentence level. Feedback was limited to tools that checked spelling, grammar, and discrete string or keyword matching. Unfortunately, most spell check functions assume that the users are already competent speakers of that language. As a result, few programs are designed with L2 learners in mind. Spell checkers do well at catching single-letter violations but often fail to analyze learner's more competence-based errors (Heift & Schulze, 2007).

Although string-matching routines, such as what is available from Hot Potatoes (http://hotpot.uvic.ca/), are far better than simple <right/wrong> responses, this approach still falls short of providing students with CALL materials that can truly be labeled as interactive. As the CALL field has moved away from the model of drill-and-kill tutorials, language professionals have demanded programs that react to student input in ways that appeared to be more context sensitive. As early as the 1980s, Underwood (1989) described what the ideal *intelligent tutoring system* (ITS) should be able to do—that is, act as a real tutor or guardian for L2 students, leading them by the hand to discover more and more about the target language with each response and prescribing the appropriate exercises and metalinguistic explanations about the language that are needed to advance. An ITS, then, involves an expert (usually some type of grammatical parser, a program capable of separating utterances into phrases, words, parts of speech, and limited semantic interpretations), a student, and a teacher module, frequently circumscribed in a highly defined semantic *microworld* or domain in order to minimize potential ambiguities and confusions.

At the time of Underwood's (1989) article, artificial intelligence (AI), a subfield of computer science, held great promise that something such as his forward-looking expert tutor would actually come to pass. Gradually, the term ITS or *expert system* has been supplanted by *intelligent CALL* or *iCALL*, but as Schulze (2001) has pointed out, a more accurate name would be *parser-based CALL*. This latter term makes it clear that natural language parsers are used to evaluate students' syntactic and sometimes semantic input. Although Schulze openly acknowledged that a parser-based CALL cannot account for the full complexity of natural human languages, "it does not mean

that interesting fragments or aspects of a given language cannot be captured by a formal linguistic theory and hence implemented in a CALL application" (p. 117). Obviously, a parser-based approach places an inordinate emphasis on morphosyntactic errors—not a bad strategy given that these types of errors appear to constitute the most frequently occurring mistakes that students make in freely produced texts (Schulze, 2001). However, the parser approach also produces its share of false acceptances and false alarms. Once again, the more constrained the semantic domain, the more successful the parser will be at diagnosing errors.

Much more serious for the iCALL field has been the fact that despite a great deal of work in AI over the years, there still only exist three Web-based iCALL programs in operation: *e*-Tutor for German (http://www.e-tutor.org; Heift & Schulze, 2007), Robo-Sensei for Japanese (http://www.usfca.edu/japanese/Rsdemo/preRSfiles/; Nagata, 2002), and Tagarela for Portuguese (http://tagarela.osu.edu) in use at Ohio State University. The goal of all these programs is to provide error-specific feedback and flexibility in handling student textual input. Clearly, these systems are crucially important to supporting a successful DL curriculum for which much of the learning takes place during individual study time.

In the case of the *e*-Tutor, a natural language parser for German is combined with a student module that tracks each student's errors and proficiency level, controlling the type of feedback that will be delivered, that is, for beginners and intermediates, rich metalinguistic feedback messages and remedial exercises (e.g., dictation, build a phrase, which word is different, word order practice, build a sentence), but something much less explicit for the advanced who need only light guidance.

Heift (2001) admitted that building this type of parser-based CALL was very labor- and time-intensive, requiring close cooperation among computer programmers, linguists, and pedagogues. However, error analysis of this sort can also be very accurate in providing the type of feedback and interactivity that is helpful to the learner, even if it does not meet the lofty AI ideals that Underwood (1989) originally imagined. The fact of the matter is that students really pay attention to well-crafted feedback. Heift (2002) discovered that 85% of her students using *e*-Tutor revised their sentences without peeking at the answers, with the weaker performers tending to be the more frequent "peekers." Heift (2004) has shown elsewhere that the more explicit and

metalinguistic in nature the feedback is, the more it helps the L2 learners successful complete their L2 tasks.

Why, then, has iCALL not gained more notice in the CALL field and, in turn, the DL curriculum? Perhaps what has distracted the field from the slow but sure advances in parser-based error analysis has been the meteoric surge of interest in social computing fanned by a corresponding increased interest in sociocultural/intercultural research. (See Thorne, Black, & Sykes, this issue, for an elaborate discussion of social computing.) In short, CALL practitioners are looking at human communication as the only true source of interactivity. However, much learning still occurs when individuals are alone, working by themselves in isolation at odd times and places, which is the bedrock of the DL curriculum. In these self-study times, iCALL has proven superior to using static workbooks alone (Nagata, 1996). When one considers that classroom teachers infrequently correct phonological and grammatical errors, but rather concentrate on discourse, content, and lexical errors (Ellis, 1994), iCALL deserves an honored niche in the L2 learner's learning strategies. Garrett (1991), once again, was correct when she said that "to reject all drill-and-practice materials would be to overact" (p. 92), and iCALL materials are much more than just drill-and-kill. As more parser-based systems and linguistic corpora become available for a larger array of languages, the goals of iCALL still hold considerable promise as a useful tool for L2 learning and, consequently, stand to enrich the DL learning environments as well, but without detracting from using the power of social computing (i.e., CMC) in service of learning languages. Accordingly, the term "interactive" will have to be employed by the DL field in a context-sensitive manner, allowing for the differences in its application to social computing versus tutorial CALL.

EVALUATION OF THE EFFECTIVENESS OF DL FOR LANGUAGES

Carrying out research on DL for languages is difficult for many reasons, some of which we have briefly alluded to already. To start, the myriad of DL formats and environment circumstances differ from course to course and institution to institution, along with other confounding factors such as different DL teacher styles, attitudes, and individual learner variables (i.e., learner attitudes and aptitudes). Trying to isolate and discretely control for these independent variables, to be able to compare student outcomes for different modalities—such as F2F classrooms versus DL courses—seems doubtful, if not doomed from the start. Obviously, there are limits to what researchers can or cannot subject their students, as well. Completely virtual DL students are difficult to pin down for extracurricular testing, given that they have no requirement to physically show up at a specific time and place (Blake, Wilson, Pardo Ballester, & Cetto, 2008). Finally, online DL courses regularly suffer from usually high dropout rates (Carr, 2000) because they require students to be self-disciplined and self-motivated. DL learners are frequently older than classroom learners. By the time the dust has settled, then, DL researchers are dealing with a skewed learner population compared to classroom students. Finally, the chances of conducting a longitudinal study with DL learners, which is the most desirable type of study for L1 or L2 developmental research, seems even more difficult to pull off than working with classroom students.

With these considerations, the following findings (discussed below) provide a good beginning for assessing the linguistic progress of DL learners, as long as one concedes the existence of many uncontrolled variables that continue to stand in the way of arriving at definite conclusions for the DL field.

White (2006), in her thorough review of four decades of research in the DL language field, pointed to the progress and promise that this learning environment holds for the foreign language profession. She also cautioned the field that small-scale studies need to be converted into fully implemented DL courses:

> The innovations reported in the literature owe much to the work of early adopters—who pursue those innovations, usually in small-scale pilot studies, find ways through the barriers that emerge, and report their findings. An important area for inquiry and critical reflection concerns the process of migrating these innovations to contexts for mainstream course delivery. (p. 259)

Blake and Delforge (2007) have reported on several fully implemented DL foreign language courses (Cahill & Catanzaro, 1997; Chenoweth & Murday, 2003; Cziko & Park, 2003; Soo & Ngeow, 1998), but none of these studies assessed the effects that the DL format itself might have had on fostering oral proficiency, a major concern of the FL field with its current emphasis on assessing communicative competence.

Blake et al. (2008) employed an automated phone test to assess oral proficiency with F2F, hybrid, and DL students and found that both

hybrid and DL learners hold their own vis-à-vis the classroom students. They attributed this achievement, at least in part, to the creative use of CMC tools.

Researchers at the Open University have also tried to assess oral proficiency and determine the effect of the DL format for French, German, and Spanish (Hampel, 2003; Hampel & Hauck, 2004; Lamy, 2004). Lamy, in particular, has tried to define what constitutes conversational (if not oral) proficiency in an online learning context.

Only Volle (2005), in her implementation of a DL course in central Texas, has actually attempted to measure online articulation (with drills, free conversation, and reading), grammatical accuracy (adapted from Weir's, 1990, protocol), and conversational competence or *proficiency* in response to a series of modified oral proficiency interview (OPI) prompts (e.g., "greet someone, answer questions about school or routines, talk about the past, describe specific items about family or clothes"). Her study was designed to gauge student improvement in these three areas after having completed a one-semester online course. According to her rubrics, no significant improvement occurred with respect to articulation or accuracy, but proficiency showed a significant improvement from the pretest to the posttest results. Volle offered no explanation for these apparently conflicting results (i.e., how can proficiency increase when accuracy does not?), bringing into question her definition of what constitutes proficiency. Likewise, many of the audio recording assignments were asynchronous and allowed the students to record and re-record their samples. Volle admitted that there was little control exerted over the materials that formed the basis of her measurements, with some students benefiting from extra practice. The attrition rate for her online course was also high: The study began with 38 participants and finished with only 19. These types of design problems are endemic to doing research in the DL field, where retention rates average about 50% (Blake, 2008).

The relative dearth of mainstream DL language course offerings means relatively fewer students to sample from and, consequently, more difficulties in comparing DL student outcomes with those of students found in more traditional classroom formats. Not only are there fewer fully implemented DL classes—and, therefore, fewer students to sample from—but also DL students, in our experience, tend to respond only to emails that directly relate to their own academic progress or grade. By way of contrast, classroom students can be cajoled in person to complete research questionnaires. At every turn, the burden of isolating the experimental treatment so as to enable comparisons between DL and classroom student outcomes raises its ugly head. Not all of these issues can be resolved at once, but the need to provide more data on oral proficiency in the DL context looms first and foremost and must be addressed more fully in future CALL studies.

In agreement with Garrett's (1991) advice to focus CALL research more on the process as opposed to the product, Oskoz (2005) evaluated the linguistic progress of CMC users using a five-level, Vygotskyan-inspired, dynamic assessment scale adapted from Ohta's (2000) work with F2F learners: Levels 1–3 described what learners can do with a tutor's help and corrective feedback, whereas levels 4 and 5 dealt with learners who can self-generate their own feedback and corrections. Participants who needed more explicit feedback were classified as less advanced (Oskoz, 2005). This shift to a language assessment approach based more on the learning process, including teacher intervention, provides a fruitful direction for future CALL research.

IMPORTANCE OF TEACHER TRAINING

The CALL field has recently demonstrated a notable desire to discuss issues of training teachers to use technology in service of the L2 curriculum, as evidenced by the spate of new publications, to name only a few: Beatty (2003); Colpaert (2006); Donaldson and Haggstrom (2006); Egbert (2005); Egbert, Paulus, and Nakamichi (2002); Felix (2003); Hauck and Stickler (2006); Hubbard and Levy (2006); Kassen, Lavine, Murphy-Judy, and Peters (2007); Lai and Zhao (2005); and Lomicka and Cooke-Plagwitz (2004).

Concerns that deal with teacher training and technology fall into five broadly defined categories: (a) national frameworks (e.g., National Standards, European Common Framework of Reference for Languages, No Child Left Behind); (b) specific contexts (e.g., retraining faculty to teach in e-learning environments, graduate student training); (c) e-communities or communities of practice; (d) toolboxes (authoring tools); and (e) critical reflections (Kassen et al., 2007). Hubbard and Levy (2006) defined four possible roles for teachers with respect to CALL: practitioner, developer, researcher, and trainer. Although teachers minimally were asked to perform in the classroom as practitioners, they should aspire to assume the other roles as well. Hubbard (2004) also counseled teachers to experience

CALL themselves so that they can better understand the challenges and frustrations that students face.

Egbert et al. (2002) observed that language teachers frequently only incorporate into the curriculum those technologies that they use outside of the school environment in their own personal lives, despite whatever preservice and in-service training course they have received on CALL. The tendency is to use new technologies to fit current practice rather than transform practice through the application of a new technology (Egbert et al., 2002). Lam's (2000) study showed that teachers' decisions regarding technology depend crucially on whether the teacher was personally convinced of the benefits of using technology for L2 instruction. Given the rapid pace of change in the CALL field, DL teachers will have to accept that much of their training and retraining will have to come from self-directed learning (Robb, 2006) and their own will to shift toward a more student-centered approach fully supported by CALL in several different learning formats.

Even the dynamics of student-centered learning are changing, too, from when Garrett (1991) was advocating it. Today's classroom, and, most certainly, the DL one, is a much more porous learning environment because students are constantly consulting Web sources, entries in a blog or wiki, text messages from Facebook, Twitter, or their iPhone as they simultaneously complete their coursework or online discussions.[2] This means that students are relentlessly mining information and evaluating it against what the teacher says. On the one hand, DL teachers must learn how to construct collaborative tasks and operate within this new set of learning circumstances that most certainly diminish the instructor's importance as the definitive word on any given cultural topic. On the other, student agency is increasing significantly under this state of affairs, along with their levels of engagement, which is a good thing for student outcomes and for the success of the curriculum. However, not all DL teachers will feel comfortable with these new teaching routines. The point is that training for teachers that want to use CALL and teach DL courses now needs to include these aspects brought about by the phenomenon of social computing.

CONCLUSIONS

Rapid changes in CALL technology along with new, and still unimagined, educational affordances should be expected in the years to come, which will, in turn, shape the language DL field. For instance, in 1991, Garrett had no way of predicting the massive impact of the Internet nor the new fascination with social computing on the part of both students and instructor (Lomicka & Lord, 2009), and neither will we be able to foretell what lies ahead. However, the present reexamination of Garrett's earlier overview of CALL should also make it clear that certain pedagogical concerns will remain constant and continue to guide our practice and research in the DL field. She identified key concerns that should form the basis of any curricular implementation of CALL, including the various DL formats (i.e., authenticity, interactivity, agency [learner-centeredness], expert guidance, and focus on process). Current CALL researchers have most properly reinterpreted these themes by adding new insights and highlighting particular aspects according to the needs of the times.

For example, authenticity is no longer defined solely in terms of a single native speaker's voice but also as a function of the developing bilingual voice and identity of the L2 learner (Kramsch, A'Ness, & Lam, 2000). Likewise, the central concept of interactivity is now understood to be intimately related to agency and entails students also becoming producers of their own digital materials, if only in the form of digital texts such as blogs (Blake, 2008). New technologies have engendered innovative forms of expression that challenge traditional notions of authorship, authenticity, and literary standards. Chat exchanges, blogs, and wikis tend to blur the distinctions between oral and written genres and grayed the traditional borders of authority between teacher and student. Students are now charged not only with negotiating meaning in the L2 but also trying to make intercultural sense of both their L1 and L2 worlds (Kramsch, 2000). All of this is part of fostering student agency, whose full meaning may not now be captured by the older term *student-centered classroom*, despite the intended similarities. More attention in future CALL work will be needed to explain how culture and identity are negotiated online, especially in a multicultural setting (Goodfellow & Lamy, 2009).

Fortunately, new efforts to define *interactivity* have stimulated another look at discrete tutorial CALL programs, now circumscribed within a more realistic iCALL framework, to appreciate better the role of CALL exercises in contrast to earlier cries to eliminate all drill-and-kill practice unilaterally (Hubbard & Bradin Siskin, 2004). In other words, the CALL field is maturing and less prone to knee-jerk reactions.

With respect to the role of the teacher in this new digital learning environment, Ware and O'Dowd's (2008) findings have made it abundantly clear that e-tutoring is superior to e-partnering, sound advice that has been previously voiced by many CALL researchers, including Garrett herself, albeit with a different phraseology. The debate no longer hinges on either teacher-centered or learner-centered, but rather on student agency with well-thought-out and well-planned expert assistance. This approach to implementing CALL and the teacher's role in the process is entirely consistent with the SLA research dealing with focus on form (Doughty & Long, 2003). New ways of assessment, such as the dynamic process advocated by Oskoz (2005), will also put the research focus more on process rather than product and heighten the role of the teacher in guiding student interactions. Whereas comparative CALL studies (e.g., "Which is better: DL or classroom instruction?") are misguided or fraught with difficulties, as previously discussed, future CALL research has an important role in fully documenting the dynamics of language learning in a DL context, which, in turn, will inform teachers as to its affordances and, perhaps, incite them to include a DL component in the curriculum.

To reap the promise of these new technologies, teachers will be challenged not merely to replicate what they are accustomed to doing in their classrooms, now with the aid of digital tools, but rather to maximize the benefits unleashed in this new learning environment. The "sage on the stage" should give way to the highly effective chat workgroups of three or four that often include the instructor, ever willing to help, prod, and encourage in ways that provide a degree of interactivity unattainable in the crowded traditional classroom. This new way of teaching is not intuitive and must be learned by even the most seasoned instructors. However, for teachers to take a chance on participating in this new type of learning environment, departments and administrations must overtly and academically value and reward teachers who teach online, rather than simply use DL as a budgetary solution or bypass to meet pressing enrollment demands in a time of shrinking resources. DL is rarely less expensive but rather a means for extending access beyond the limitations of time and space and, as we have argued here, a technique for increasing interactivity by chatting in work groups, which often include students from distinct institutions. Realizing this type of cooperation will require each institution to relinquish some of its academic turf and pool resources in order to create a richer curriculum for everyone, assisted by DL offerings.

In agreement with Garrett, CALL researchers who examine DL formats should now be more interested in the learning process and less fixated on proving the superiority of any given modality (i.e., the search for the proverbial silver bullet—the single best methodology). The technological tools discussed are not restricted to any given format and the benefits apply to the curriculum as a whole. With that said, CALL researchers need to devote more attention to the higher or more advanced levels where little is known about L2 learner behaviors.

In light of the discussion here, the profession will need to rethink current best teaching practices and integrate CALL advances fully into the language curriculum along with DL options, in the same spirit advocated by Garrett two decades ago. Understandably, this retraining implies a slow process that is tied to the overall acceptance of CALL as a legitimate research field with tangible career benefits for those working in the trenches, both in theory and practice. Rewarding work done in applied linguistics will prove as important as having language professionals stay abreast of the latest technological affordances, a stance that Garrett, no doubt, would have corroborated then as well as now.

NOTES

[1] For a comparison of asynchronous and synchronous CMC, see Johnson (2006) and Schweinhorst (2007).
[2] The author wishes to thank Leo van Lier for this notion of "porous" classrooms.

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