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Chapter 2: Technological Change and the Future of CALL

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The future of computer-assisted language learning (CALL) will depend on many factors, including research in applied linguistics, change in the status of languages and language learning, and sociological changes in schools and education. One important factor that will influence the future of CALL is technological change. In order to discuss this point, it is first necessary to clarify the relationship between technology change and other

Technological determinism refers to the idea that the introduction of new technology automatically brings certain results (see discussion in Chandler, 1995; Feenberg, 1991). Deterministic outlooks underlie many common beliefs about educational technology; note, for example, the frequent discussion of the alleged impact of computers on learning without regard to how the computers are actually used. Chris Dede (1995, 1997) has described this as based on a fire metaphor, i.e., the notion that computers generate learning the way that a fire generates warmth.

Technological determinism does have a certain logic, since there is sometimes a correlation between the presence or use of particular technologies and other outcomes. But correlation does not imply causation. Paul Levinson (1997) makes a useful distinction between *hard determinism* and *soft determinism*. The former implies strict causation, and it is a concept rejected by most scholars. The latter more sensibly suggests that while technological development does not automatically

cause outcomes, it does *enable* new processes and outcomes. For example, in the realm of teaching and learning, there are obviously many types of classroom (or distant) interaction that are enabled by computers and the Internet that simply couldn't have occurred previously.

Furthermore, in thinking about the possible pedagogical changes enabled by new technologies, it is important to look broader than the classroom itself. Rather technology can create new social contexts that shape how learning takes place. For example, the earlier development of the printing press had a profound effect on Europe, thus contributing to a process by which notions of teaching and learning were dramatically altered (1979). This was not so much an "impact," with the printing press causing change (and, indeed, the earlier invention of movable type in Asia brought little change at all). Rather, there was a co-constitutive shaping of technology and society, as social conditions in Europe provided a ripe context for emergence of the printing press as an important factor in further societal change. There is thus a broad *ecological* effect; as Postman has noted, 50 years after the introduction of the printing press, there was not a Europe plus a printing press, but a transformed Europe (1993). Today, information and communication technologies are poised to have a similarly strong ecological effect on society, especially taking into consideration Castells's (1998) observation that "information technology, and the ability to use it and adapt it, is the critical factor in generating and accessing wealth, power, and knowledge in our time" (p. 92).

The role of ICTs in enabling change must also be examined at the individual level. Vygotsky's work (e.g., 1962) clarifying the mediating role of any tool or technology at the level of human activity, ultimately reshaping how we communicate and even think. Ong (1982), who has studied the relationship between orality and literacy, similarly noted the relationship between technology and human consciousness, especially with technologies of the word.

With this as a backdrop, let us examine ten developments that will take place—and indeed, are already taking place at a rapid pace—in the area of information and communication

technologies. I will briefly review ten developments underway and then discuss the types of changes these may enable in the field of computer-assisted language learning.

Developments in Information and Communications Technology

The first important change is from phone-based to wireless communication because of improved technology and telephone/Internet relay facilities. It has been suggested that low-weight solar-powered electric planes (like those pictured at <http://www.aerovironment.com/area-telecom/telecom.html>) will serve as communications relay platforms facilitating low-cost wireless communication from anywhere on earth.

A second change will be a move from dial-up Internet connections to permanent, direct online connections. For example, according to Telecommunications Research International (see http://cyberatlas.Internet.com/big_picture/geographics/article/0,1323,5911_352761,00.html#table), cable modem access in the US grew by some 44% in the first quarter of 2000, while high speed digital forms of access using existing phone lines grew by 183%.

A third change will be from the use of mainly personal computers to the use of portable computing and online devices. One step in this process is the likely convergence of the laptop computer, personal digital assistant, and cellular telephone into powerful handheld computing and (tele)communication devices.

A fourth change will be from narrowband (referring to the speed at which information passes over communication lines) to broadband. Cable modem connections currently deliver 10 Megabits per second, shared among many users. The next version of broadband ("broaderband") is expected to provide up to 40 megabits per second for each user, or 26 times the bandwidth of the fast T1 connections used by most institutions today, facilitating extremely rapid Internet connection.

A fifth change will be from expensive personal computing systems to widely affordable computers and other hardware, first in the developed countries and then in the developing countries. In Egypt, for example, both the cost of purchasing a personal computer has fallen by half in recent years, and Internet access is now free.

Related to this, a sixth development is that the Internet will change from being an exclusive form of communication and information, mostly limited to people in developed countries, to becoming a mass form of communication accessible to most of the planet. Recent statistics indicate that more than 10% of the world's population is online.

A seventh development will be a movement from text-based information and communication to audiovisual forms of information and communication, as exemplified by the growing popularity of digital photography and home video production facilitated by new technology and the increasing trend for Internet news sites to offer multimedia presentations of news.

An eighth change will be from use of English as the main online language to multilingual Internet use. By 2005, the number of Web pages in English is expected to drop to 41% of the world's total (Computer Economics, 1999). At the same time, however, it is suggested that a much higher percentage of the commercial Web pages will be in English. A present indication of this trend is the large percentage of English language secure servers used for Internet commerce (see the discussion in *The Default Language*, 1999). This will create a situation of diglossia, where people using their native languages for local or regional communication and commerce and use English for international communication and commerce on the Internet.

A ninth change will be from "non-native" to "native" users of information technology. This concept does not refer to language use, but rather to comfort and skill in using computers. Children who grow up with computers and the Internet will be able to access information and communicate

online with “native-like” fluency, as opposed to older generations, many of whom have had difficulty making the transition from print to screen.

A tenth change will be the movement of CALL from the language laboratory to the classroom. Computers and other online devices will be found in every classroom in developed countries, not only in computer laboratories. For example, the Maine Department of Education has made computers available to all 7th grade students in the state, together with wireless access points in most schools.

Technology and English Teaching

What is the expected effect on English teaching of these likely future developments? Five areas will be examined: new contexts, new literacies, new genres, new identities, and new pedagogies.

New Contexts

The projected developments of ICT will have a profound influence on the context in which English is taught. Largely because of the increased use of English in new globalized media and commerce there has been a major expansion in the number of second-language English speakers around the world. According to recent estimates (see Crystal, 1997), there are now over 375 million native speakers of English (i.e., the “inner circle” of English speaking countries such as the U.S., Australia and England [Kachru, 1986]), an equal number of second language speakers of English (ESL speakers in Kachru’s “outer circle” of countries such as India and Nigeria), and some 750 million English as a Foreign Language (EFL) speakers in countries such as China, Japan, Egypt, and Israel. This represents a significant growth in the number of non-native speakers of English and suggests that there will be a fundamental change in the relationship between native- and non-native speaker. Extrapolating from the work of Graddol (1999), it can be estimated that a century ago there were about three native speakers of English for every proficient non-native

speaker of the language. However, a century from now this proportion will be reversed. Indeed, the very distinction between native English speaker, ESL speaker, and EFL speaker will change as millions of people throughout the world use English to communicate globally and access international media. For example, according to a recent study (Warschauer, El Said, & Zohry, 2002), Egyptian colloquial Arabic is used in most informal e-mail. However, nearly all formal communication by e-mail—even between one Egyptian and another—is conducted in English.

Continuing to examine the impact of improved ICT and the changed context of English use, one U.S. study suggests that e-mail is now the main form of business communication in many US industries, surpassing both face-to-face and telephone communication (American Management Association International, as cited in Warschauer, 2000a). This fact necessitates a re-consideration of the relationship of computers and the Internet to ESL/EFL teaching. Just ten years ago, for example, it was very common for teachers involved in CALL to say that “A computer is just a tool; it is not an end in itself but a means for learning English.” Yet recently one EFL teacher in Egypt noted “English is not an end in itself; it’s just a tool for being able to use computers and get information on the Internet.” The juxtaposition of these two very different views of CALL illustrates how teachers' concepts about English teaching and the Internet are evolving now and will change in the future. Effective CALL is no longer a matter of using e-mail and the Internet to help teach English but is increasingly directed at teaching English to help people learn to write e-mail and use the Internet.

New Literacies

This leads to another likely result of ICT developments, the emergence of important new literacies (see discussion in Warschauer, 1999, 2003). In the era of print, the act of reading consisted of an attempt to understand the meaning of a single author. In contrast, reading in the

online era has become an attempt to interpret information and create knowledge from a variety of sources. Although all reading and research skills include selecting the right questions, choosing the right tools, finding information, archiving and saving information, interpreting information, and using and citing information, there is a great difference between reading a book in the library and assuming that the information in it is reliable because it has been vetted twice--once by the publisher and again by the librarian who purchased the book--and conducting research online, where the very act of reading cannot be done without making critical decisions at every step. Online readers must constantly determine whether to scroll down a page, pursue an internal link, try an external link, or quit the page and conduct a new search. In the past, "critical literacy" was presented as a special category of language education; however, in the online future, virtually all literacy will necessitate critical judgment.

New Genres

Similar changes are occurring with respect to writing. It has been suggested that the essay will increasingly become a marked form. Although essays may still be studied as a literary form, it has been suggested (Faigley, 1997) that few people will actually write them since they will be replaced by multimedia presenting concepts through multiple technologies. This impacts upon the way English writing must be taught in the future. For examples of possible types of student writing of the future, teachers should consider some of the educational Web sites being developed by students in the ThinkQuest competition (<http://www.thinkquest.org>). In these sites, students demonstrate mastery not only of multimedia but also electronic communication, which may represent the future of writing instruction.

The importance of teaching new types of writing through electronic communication can also be illustrated by a situation that occurred in an ESL writing course (Warschauer, 1999). A graduate student from China had previously conducted research with co-researchers from Sweden

and agreements had been reached about the rights of authorship using the data collected. However the student was surprised to learn by e-mail that his Swedish co-researchers were going to publish the data under their own authorship. He attempted to write them an e-mail message protesting the situation:

Dear Svet:

How about your decision for your mothers treatment. I am sorry I can not give advice. . . Zhongshan hospital has special wards for foreign guests. If you can tell me and Hengjin in detail, we can supply more information about hospital and doctors. . .

The first draft of his e-mail message failed to convey his point since it focused principally on the health of the Swedish colleague's mother and only discussed the disagreement in a vague manner at the end of the message. The students worked with his teacher intensively by e-mail to complete two more drafts of the message until it effectively communicated what he wanted to say:

Dear Svet:

When I received your email message of Nov 4, I was very surprised to see that you went ahead with your paper on maternal health care. As you must be aware after our discussion in Shanghai last September-October, when we distributed all the topics among us, the topic of maternal health care was incumbent on me for analysis and publication....

In conclusion, I am afraid the only satisfactory solution I can see is to publish my paper with me as the first author.

This problem was resolved in a satisfactory manner through the speed of electronic communication and a needs-based collaborative approach to writing instruction.

Although most ESL/EFL students do not perform sociological research with international scholars, many will find that they need to carry out some form of collaborative long-distance inquiry and problem-solving as part of their jobs and community activities. It is thus incumbent on ESL/EFL teachers to help these students develop the online writing skills necessary for these tasks. Such instruction includes both the pragmatics of written online interaction as well as the hypermedia authoring and publishing skills needed for effective presentation of material (see discussion in Shetzer & Warschauer, 2000; Warschauer, 1999).

New Identities

The increased importance of online communication is also contributing to new kinds of identities. As an example, let us consider the case of Almon, a Hong Kong immigrant to the United States (discussed in Lam, 2000). Though Almon had lived in the US for several years, he performed poorly in English class and had little confidence in his academic English ability. Yet he developed his own “J-Pop” Web site about a Japanese popular singer and spent several hours each day e-mailing and chatting with other J-Pop fans around the world who were attracted to his site. Although most of the fans were Chinese or Japanese, all communication, as well as the site itself, was in English. Through this process Almon developed self-confidence in his English communication ability as part of a global youth movement that uses English and new media to share ideas. This case does not suggest that teachers should downplay academic literacies, but it does imply that students who use new media can develop a wide range of literacies and identities, and these skills must be taken into account in English teaching.

New Pedagogies

We must now consider the new pedagogies that these changes will elicit. The progress of CALL has been based on evolution from the mainframe computer to the personal computer to the networked, multimedia computer, and corresponding changes have occurred in CALL-based pedagogy. Table 1 illustrates some of the changes that have occurred and are occurring in CALL since its inception in the 1960s. The stages have not occurred in a rigid sequence, with one following the other, from “bad CALL” to “good CALL” since any of these may be combined for different purposes. However, there has been a general transformation in CALL over the years, with new ideas and uses of computers being introduced.

The first phase of CALL development was Structural CALL, an approach used during the 1960s and 1970s that followed the teaching techniques of structural linguistics. Here CALL primarily took the form of drill and practice programs. However, by the end of the 1970s, such behavioristic approaches to language learning had given way to communicative approaches focusing on the meaning of language in use rather than on its form, and this was reflected the changed nature of CALL activities.

Following a cognitive view of language learning which held that learners develop language as an internal mental system primarily through interaction, Communicative CALL took the form of communicative exercises performed as a way of practicing English. The content of the interaction was not seen as important, nor was the learners’ own speech or output. Rather the provision of input was seen as essential for learners to develop their mental linguistic systems. In contrast, the current paradigm of integrative CALL is based on a socio-cognitive view of language learning. From this viewpoint, learning a second or foreign language involves apprenticing into new discourse communities. The purpose of interaction is seen as helping students enter these new communities and familiarize themselves with new genres and discourses, so the content of the

interaction and the nature of the community are extremely important. It is no longer sufficient to engage in communication merely to practice language skills.

Table 1: The Three Stages of CALL

| | | | |
|---------------------------------------|---|--|---|
| <i>Stage</i> | 1970s-1980s: Structural CALL | 1980s-1990s: Communicative CALL | 21st Century: Integrative CALL |
| <i>Technology</i> | Mainframe | PCs | Multimedia and Internet |
| <i>English-Teaching Paradigm</i> | Grammar- Translation & Audio- Lingual | Communicate Language Teaching | Content-Based, ESP/EAP |
| <i>View of Language</i> | Structural (a formal structural system) | Cognitive (a mentally- constructed system) | Socio-cognitive (developed in social interaction) |
| <i>Principal Use of Computers</i> | Drill and Practice | Communicative Exercises | Authentic Discourse |
| <i>Principal Objective</i> | Accuracy | Fluency | Agency |

(Based on Kern & Warschauer, 2000; Warschauer, 1996; Warschauer, 2000a)

The following example illustrates the primary difference between Communicative CALL and Integrative CALL. An English teacher was frustrated because although his students used the Internet once a week to practice English, they tended to waste time chatting in their own language and did not engage in meaningful English usage. This situation highlights a critical limitation of the communicative approach to CALL, that is, viewing Internet only as a medium of simple (and perhaps purposeless) communication practice. It was suggested that the students should perform real-life tasks on the Internet and solve real-life problems in a community of peers or mentors. For example, the students could conduct an international research project on an issue they were interested in (see Warschauer, Shetzer, & Meloni, 2000), or perform a service for their

communities such as creating an English Web site for a local organization (Warschauer & Cook, 1999). Here the use of English for communication would be incidental to the main task but, as a result of carrying out the activity, the students would be learning important new English genres and engaging in new discourses.

Agency

Performance of meaningful activities online is related to the objectives of integrative CALL and, indeed, to the general goals of second/foreign language learning which have evolved from a primary focus on *accuracy* to a focus on *accuracy plus fluency*. In the 21st century, however, it is necessary to add a new objective: *accuracy plus fluency plus agency*. Agency has been defined as “the satisfying power to take meaningful action and see the results of our decisions and choices” (Murray, 1997, p. 126), and “the power to construct a representation of reality, a writing of history, and to ‘impose reception of it’ by others” (Kramsch, A’Ness, & Lam, 2000, p. 97, quoting Bourdieu). Incorporating the objective of agency in CALL activities enables the computer to provide students with a powerful means to make their mark on the world. As an example, we should consider the difference between authoring a paper (i.e., writing a text for the teacher), and authoring a multimedia document which will be displayed on the Internet. In the latter, students are involved in creatively bringing together several media to share with a wide international audience—and perhaps even helping to author the very rules by which multimedia is created, given the current creative explosion of new forms of online expression. By assisting their students to carry out such authoring—fulfilling a meaningful purpose for a real audience—teachers are helping them exercise their agency. The purpose of studying English thus becomes not just to acquire it as an internal system, but to be able to use English to have a real impact on the world.

Conclusion

In the late 1970s a computer-assisted instructional manual (Patrikis, 1997, p. 171) suggested that the advantage of computer-based instruction was that it was completely removed from “real life.” Students could therefore learn English without having to participate in the real world—although, of course, they had to come back to the real world to use what they had learned.

In contrast, let us consider a more current expression of the value of computers in instruction, that of Shneiderman (1997), who said “we must do more than teach students to ‘surf the net,’ we must also teach them how to make waves” (p. vii). Thus, teachers will make the best use of computers in the classroom when students are encouraged to perform the most real tasks possible, taking advantage of the power of modern information and communication technologies to try to change the world in ways that suit students’ own critical values and the interests of humankind.

Of course, this is not a new idea. Freire and Macedo (1987) expressed the same perspective when they noted that literacy is not only about “reading the word,” but also about “reading the world,” and not only about reading the world but also *writing* it and *rewriting* it (p. 37). These concepts have been an important part of critical pedagogy throughout the 20th century, but today new forms of information and communication technologies provide a powerful new means of achieving them.

Technology changes in ICT can thus enable students to read, write, and rewrite the world in their English classes as never before, but only if we too enable our students to use the full power of these technologies. As Pimienta (2002) suggests, we need to view our students as being “in front of a keyboard” rather than “behind a screen.” In the end, the most important developments may not be those that occur in the technological realm, but rather those that take place in our own conceptions of teaching and learning.

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