Intermediate students of Polish at Stanford University in California correspond by e-mail with counterparts in Cracow, Poland to plan a bilingual Web site they will be jointly producing on the World Wide Web. The students work in international teams to plan, design, and edit the Web site, which consists of written and audio-visual information about their two universities (Barson & Debski, 1996).

Students in an advanced business French class at Case Western Reserve University in Ohio watch French television news via satellite TV. They then peruse French online news groups to follow how French students are discussing a proposed minimum wage cutback. This helps them learn background cultural information about current events and attitudes in France, as well as the precise methods used by native French speakers for argumentation, persuasion, and negotiation (Scinicariello, 1995).

Intermediate ESL writing students at the University of Hawai`i use real-time computer-assisted discussion to gain additional writing practice in class. The written interaction fosters greater student participation and collaboration. In addition, the students join e-mail discussion groups in their own fields and also learn how to conduct research on the Web (Warschauer, 1999).

The above examples are not atypical of what is occurring in language classrooms across the globe. With the advent of networked multimedia computing and the Internet, language teachers throughout the country have been warming up to using computers in the language classroom.

However, the recent enthusiasm for technology in language teaching witnessed, for example, by the large numbers of presentations at national conferences on this topic brings a sense of deja vu. Three decades ago, language programs were also enchanted by promises of magic through technology. That technology the audio-based language laboratory brought disappointing results (and, indeed, it is the audio-based labs which are often being replaced by computer labs today). Thus, before looking at the use of technology in language teaching today, it is worthwhile to take a brief historical look at technology in the language classroom.

A Brief History of Technology and Language Learning

Virtually every type of language teaching has had its own technologies to support it. Language teachers who followed the grammar-translation method (in which the teacher explained grammatical rules and students performed translations) relied on one of the most ubiquitous technologies in education, the blackboard. A perfect vehicle for the one-way transmission of information that method implied. The blackboard was later supplemented by the overhead projector, another excellent medium for the teacher-dominated classroom, as well as by early computer software programs which provided what were known as "drill-and-practice" (or, more pejoratively, "drill-and-kill") grammatical exercises.

In contrast, the audio-tape was the perfect medium for the audiolingual method (which emphasized learning through oral repetition). University language classes in the 1970s and ‘80s usually included obligatory sessions at the audio lab where students would perform the dreaded repetition drills.

By the late 1970s, the audiolingual method fell into disrepute, at least in part due to poor results achieved from expensive language laboratories. Whether in the lab or in the classroom, repetitive drills which focused only on language form and ignored communicative meaning achieved poor results.

The 1980s and 1990s saw a shift toward communicative language teaching, which emphasizes student engagement in authentic, meaningful interaction. Within this general communicative trend, we can note two distinct perspectives, both of which have their implications in terms of how to best integrate technology into the classroom. These can roughly be divided into cognitive approaches and socio-cognitive approaches.

Cognitive Approaches

Cognitive approaches to communicative language teaching are based on the view that learning a language is an individual psycholinguistic act. From this perspective, language learners construct a mental model of a language system, based not on habit formation but rather on innate cognitive knowledge in interaction with comprehensible, meaningful language (Chomsky, 1986). Errors are seen in a new light not as bad habits to be avoided, but as natural by-products of a creative learning process that involves rule simplification, generalization, transfer, and other cognitive strategies (see Chaudron, 1987). Learners' output (i.e., what they say or write), if relevant at all, is beneficial principally to the extent that it helps make input (i.e., what they hear or read) more comprehensible or salient so that the learners can construct their own cognitive models of the language.
Technologies which support a cognitive approach to language learning are those which allow learners maximum opportunity to be exposed to language in meaningful context and to construct their own individual knowledge. Examples of these types of technologies include text-reconstruction software, concordancing software, and multimedia simulation software.

Text-reconstruction software (e.g., NewReader from Hyperbole or Text Tanglers from Research Design Associates) allows teachers to provide students various texts in which letters or words are either missing or scrambled. Students work alone or in groups to complete or re-arrange the texts, thus supporting a process of mental construction of the linguistic system. While such activity could in theory be carried out with paper and pencil, the computer facilitates the process for both teachers and students. Teachers can quickly and easily create re-arranged texts or cloze exercises (i.e., texts with deleted words) from any original word-processed passage. Students can use hints provided by the computer to assist their learning process.

Concordancing software (e.g., Monoconc from Athelstan) allows teachers or students to search through small or large texts to look for instances of the actual use of particular words. Concordancers are thus supplements to dictionaries in that they help illustrate the usage of a word, rather than just its definition. Concordancers are also useful for investigating collocational meanings (e.g., "large box" vs. "big box," or "think about" vs. "think over") or grammatical features (e.g., "was going" vs. "used to go").

Multimedia simulation software allows learners to enter into computerized microworlds with exposure to language and culture in a meaningful audio-visual context. The best of these programs allow learners a good deal of control and interactivity so they can better manipulate their linguistic input. One excellent example of this is the multimedia videodisc program A la rencontre de Philippe developed by the Athena Language Learning Project at the M.I.T. Laboratory for Advanced Technology in the Humanities. Philippe is a game for intermediate and advanced French learners that incorporates full motion video, sound, graphics, and text, allowing learners to "walk around" and explore simulated environments by following street signs or floor plans. To help language learners understand the sometimes challenging French, the program provides optional comprehension tools, such as a glossary and transcriptions of audio segments, as well as a video album that includes samples of language functions. Students can also create their own custom video albums, which they store on their own computer diskettes.

While text-reconstruction programs, concordancers, and multimedia simulations are often used in pairs or groups, the software programs by themselves do not require human-to-human interaction.

*Socio-cognitive Approaches*

Socio-cognitive approaches, in contrast to cognitive approaches, emphasize the social aspect of language acquisition; learning a language is viewed as a process of apprenticeship or socialization into particular discourse communities (Schieffelin & Ochs, 1986; Gee, 1996). From this perspective, students need to be given maximum opportunity for authentic social interaction, not only to provide comprehensible input but also to give students practice in the kinds of communication they will later engage in outside the classroom. This can be achieved through student collaboration on authentic tasks and projects (see for example Breen, 1987; Candlin & Murphy, 1987; Long & Crookes, 1992; Prabhu, 1987) while simultaneously learning both content and language (see for example Flowerdew, 1993; Meskill, in press; Snow, 1991).

The Internet is a powerful tool for assisting a socio-cognitive approach to language teaching, and it is in fact this fit of the Internet with a socio-cognitive approach which largely accounts for the new-found enthusiasm for using computers in the language classroom. The Internet is a vast interactive medium which can be used in a myriad of ways, as will be illustrated below.

*Computer-Mediated Communication in a Classroom*

There are several different approaches for using the Internet to facilitate interaction within and across discourse communities. One way is to use online activities to foster increased opportunities for interaction within a single class. This takes place both through computer-assisted classroom discussion and through outside-of-class discussion.

Computer-assisted classroom discussion makes use of synchronous ("real-time") writing programs, such as Daedalus Interchange by Daedalus, Inc. The class meets in a networked computer lab, and students communicate through writing rather than through talking. Students type in their messages and hit a key to instantly send the message to the rest of the class. All the messages are listed chronologically on the top half of the screen and can be easily scrolled through and re-read. The entire session can later be saved and passed on to students, either in electronic form or hard copy.
Electronic communication within a single class might be viewed as an artificial substitute for face-to-face communication. However, it has been found to have a number of beneficial features which make it a good tool for language learning. First, computer-assisted discussion tends to feature more equal participation than face-to-face discussion; teachers or a few outspoken students are less likely to dominate the floor, resulting in class discussions which are more fully collaborative (Kelm, 1992; Kern, 1995; Meskill, Swan and Frazer, 1997; Warschauer, 1996; Warschauer, 1999). Second, computer-assisted discussion allows students to better notice the input from others' messages and incorporate that input into their own messages, thus expanding opportunities for learning of new linguistic chunks (e.g., collocations, common phrases; see St. John & Cash, 1995; Warschauer, 1999). Third, computer-assisted discussion, which takes place in writing and allows more planning time than does face-to-face talk, features language which is lexically and syntactically more complex than oral talk (Warschauer, 1996). Finally, since computer based discussion can take place outside of the classroom, it provides students increased opportunities to communicate in the target language. For all these reasons, language teachers (especially but not exclusively in courses which feature writing) have found single-class computer-mediated communication projects to be beneficial.

**Accessing Resources and Publishing on the World Wide Web**

The World Wide Web offers a vast array of resources from throughout the world. While the majority of Web pages are in English, increasing numbers exist in other commonly-taught (and some uncommonly-taught) languages, including Spanish, French, German, Japanese, and Chinese. Accessing and using these pages in language education supports a socio-cognitive approach by helping immerse students in discourses that extend well beyond the classroom, their immediate communities, and their language textbook. This is particularly critical for foreign language students who otherwise experience the target culture only through their instructor and select curricula. Students can use Web pages as authentic materials for conducting research on culture and current events (see for example Lix-Purcell, 1995; Osuna & Meskill, 1998) or for gathering material for class projects and simulations (see for example Deguchi, 1995; Rosen, 1995). Students can also publish their own work on the World Wide Web, thus enabling writing for a real audience. In some cases, teachers have created in-class online newsletters or magazines that their classes have produced (see for example Jor, 1995). In other cases, teachers help their students contribute to international Web magazines which include articles from many students around the world (see for example Shetzer, 1995). And in other situations, students work together in collaborative teams internationally and then publish the results of their projects on the Web (see for example Vlimi, 1995).

**Advantages and Disadvantages**

What then are the advantages and disadvantages of using new technologies in the language classroom? One question often asked by administrators is whether or not technologies truly "work," that is, if they promote language learning and do so in a cost-effective way. These types of questions motivated much research in the 1970s comparing use of computers to non-use of computers.

This type of research ignored two important factors. First of all, the computer is a machine, not a method. The world of online communication is a vast new medium, comparable in some ways to books, print, or libraries. To our knowledge, no one has ever attempted to conduct research on whether the book or the library is beneficial for language learning. Seeking similar sweeping conclusions on the effects of the computer or the Internet is equally futile.

Secondly, and even more importantly, new communications technologies are part of the broader ecology of life at the turn of the century. Much of our reading, writing, and communicating has migrated from other environments (print, telephone, etc.) to the screen. In such a context, we can no longer think only about how we use technologies to teach language. We also must think about what types of language students need to learn in order to communicate effectively via computer. Whereas a generation ago, we taught foreign language students to write essays and read magazine articles, we now must (also) teach them to write e-mail messages and conduct research on the Web. This realization has sparked an approach which emphasizes the importance of new information technologies as a legitimate medium of communication in their own right rather than simply as teaching tools.

In summary, then, the advantages of using new technologies in the language classroom can only be interpreted in light of the changing goals of language education and the changing conditions in postindustrial society. Language educators now seek not only (or even principally) to teach students the rules of grammar, but rather to help them gain apprenticeship into new discourse communities. This is accomplished through creating opportunities for authentic and meaningful interaction both within and outside the classroom, and providing students the tools for their own social, cultural, and linguistic exploration. The computer is a powerful tool for this process as it allows
students access to online environments of international communication. By using new technologies in the language classroom, we can better prepare students for the kinds of international cross-cultural interactions which are increasingly required for success in academic, vocational, or personal life.

What then are the potential disadvantages of using new technologies for language teaching? We focus on three aspects: investment of money, investment of time, and uncertainty of results.

**Investment of Money**

Uses of new technologies in the long run tend to result in higher productivity, at least in the economic sphere (see discussion in Castells, 1996). Productivity in education is certainly harder to measure, but it is not unreasonable to assume that over time new technologies will help create more effective education (bearing in mind the earlier point that the goals and nature of education are changing in the information age, thus making direct comparisons difficult). In any case, whatever results may be achieved over the long term, there are definite startup expenses related to implementing new technologies in education. For language learning programs such expenses usually entail hardware, software, staffing, and training in the use of such technologies.

**Investment of Time**

Just as technologies may save money over the long term, they also may save time. But, potential long-term benefits to an institution are little consolation to an individual teacher who is spending enormous amounts of time learning constantly-changing software programs and trying to figure out the best way to use them in the classroom.

Increased demands on time are due in part to the difficulty of using new online multimedia technologies in their still-early stages (comparable, perhaps, to the early days of tuning a radio or starting a car when those machines were first invented). However, time demands are caused not only from learning how to master the technology, but also from the changing dynamics of the online classroom. As indicated earlier, new technologies create excellent opportunities for long-distance exchanges, but such exchanges can be extremely complicated in terms of coordinating goals and schedules especially when involving teachers from different countries or educational systems. Also, another benefit of electronic communication that it provides opportunities for student-initiated communication can also create a time burden, as a teacher's e-mail box becomes flooded with messages from previously-reticent students.

**Uncertainty of Results**

As indicated earlier, there is no single predictable outcome for using computers, anymore than there is for using books or libraries. Thus teachers and institutions are expected to invest large amounts of time and money without any guarantee of achieving particular results.

As discussed earlier in this chapter, new online technologies match well with newer approaches to language teaching, in which students are viewed not as empty vessels to be filled but rather as active agents collaborating in their own learning process. Yet even in situations where instructors already adhere to such a perspective, teaching in an online environment can challenge teachers' epistemologies and practices. The online world presents important new challenges, and learning how to integrate new online technologies into the classroom will likely be as long and complicated a process as doing the same has been in the business world but made even more difficult in education by lack of dependable funding for equipment and support.

The following is an example of technologies being used well in a real context.

**Case Study: Foreign Language Instruction and Technology**

Yoko Koike teaches undergraduate courses in Japanese language at Haverford, a small Quaker college in Pennsylvania. Yoko views new technology as a means of supporting her pedagogical goals and processes and has been integrating telecommunications into her classrooms for the last several years.

Yoko sees technologies as potentially "noisy"; that is, learning to use them effectively can get in the way of and overshadow the true goals and processes of her communicative approach. Initially, she works hard with students to help "quiet down" the technology so that once the technology is mastered, the students can concentrate instead on communication. One of her main purposes in integrating a technology component is to expand opportunities for her students to interact with the language and culture. To these ends, she has effectively extended their conversational opportunities to include interaction with Japanese learners and native speakers from around the world.
Preliminary to students' international interchanges, Yoko trains students in the use of word processing in Japanese and in using an online Japanese-English dictionary. These training sessions and subsequent electronic communications sessions are held in the college's computer laboratory. The Japanese word processing program is particularly useful and time saving in that learners can type in a phonetic approximation and the software will supply an appropriate character. Students can then check that the desired character has been generated by comparing it to online dictionary entries. This speeds up an otherwise time-consuming process and thus facilitates communication. Yoko also notes that the process of trial and error with the phonetic approximations is a valuable language learning activity in and of itself.

Once learners are comfortable with word processing in Japanese, Yoko sets up in-class online chats using the Daedalus Interchange program. She posts questions for discussion and lets the class converse on the computer by typing in and immediately sending their messages to the rest of the class. Comparing these online discussions to face-to-face conversations in the class, Yoko has noticed that the computer allows more "reserved" students greater opportunity to actively participate and also seems to facilitate more open discussion of controversial subjects. For example, after her class viewed a disturbing documentary about forced prostitution of Japanese women during World War II, the students sat in stunned silence. A little later, though, on the Daedalus Interchange, they freely expressed their reactions. Another Interchange assignment that was particularly effective was in conjunction with the class reading of a Japanese novel. Students were assigned to take on the role of characters from the novel and conclude a conversation which had been begun, but not completed, in the novel.

Once students are comfortable communicating in Japanese via the computer, Yoko introduces her students to conversation partners in Japan. The students in Japan and Pennsylvania first "meet" each other through Internet-based audio-video conferencing.

**Evaluation.** Yoko reports that students write much more via computer than they otherwise would with pen and paper, and they also attend closely to the messages they read and write since they are part of meaningful communication. According to Yoko, the computer-based collaborative activities encourage a great deal of listening, speaking, reading, writing that are critical for students' mastery of Japanese, and they also help her students integrate issues of language and culture. As is true to her belief about learning, her students become active users of the language by virtue of her careful planning and implementation of these extensive and motivating communicative opportunities.

**Conclusions**

Computer technology is not a panacea for language teaching; using it demands substantial commitments of time and money and brings no guaranteed results.

Yet, when appropriately implemented, new technologies provide the means to help reshape both the content and processes of language education. As seen above, appropriate use of new technologies allows for a more thorough integration of language, content, and culture than ever before and provides students with unprecedented opportunities for autonomous learning. Computer technologies not only help teachers and students to transcend linguistic, geographical, and time barriers but also to build bridges between bilingual, ESL, and foreign language programs. The use of new technologies allows students to engage in the types of online communication and research which will be paramount for success in their academic and professional pursuits.

In conclusion, the key to successful use of technology in language teaching lies not in hardware or software but in "humanware". Our human capacity as teachers to plan, design, and implement effective educational activity. Language learning is an act of creativity, imagination, exploration, expression, construction, and profound social and cultural collaboration. If we use computers to fully humanize and enhance this act, rather than to try to automate it, we can help bring out the best that human and machine have to offer.

**References**


