



COMPUTER LEARNING NETWORKS AND STUDENT EMPOWERMENT

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A major development in computer-assisted language learning has been the expanded use of the computer as a medium of communication. This, in turn, allows for computer learning networks of students within a class or across classrooms who share information and documents, hold electronic discussions, do collaborative writing and organize cross-cultural exchanges. Proponents of computer learning networks claim that they are an excellent tool for fostering new social relations in the classroom, resulting in greater student empowerment. This paper examines whether computer networks are indeed an effective tool for empowering second-language learners, focusing on three aspects: autonomy, equality and learning skills. It concludes that computer learning networks do have the potential to empower students when they are used appropriately, and provides some pedagogical suggestions for the effective use of computer networking in the second- and foreign-language classroom. Copyright © 1996 Elsevier Science Ltd

A central goal of modern approaches to language teaching, including communicative language teaching, task-based learning, process approaches to writing and training in language learning strategies, is to enhance student autonomy and control over the language learning process.

Computer-assisted language learning (CALL), which in its early days was dominated by “drill and kill” instructional programs, has also embraced this goal. New multimedia programs allow students more choice and flexibility in working with instructional material. Programs such as word processing and desk-top publishing do not attempt to deliver instruction at all but instead provide an instrument for students to express their thoughts and ideas.

The most recent, and some believe revolutionary, application of the computer as an instrument for communication in the second-language classroom is the computer learning network. These networks take advantage of computer mediated communication (CMC) to bring together pairs and groups of students for collaborative learning projects in a single classroom or in various classrooms around the world.

Computer learning networks are based on several types of computer mediated communication:

E-mail messages can be composed directly in the telecommunications program (on-line) or first written on a word-processor (off-line) and then uploaded. E-mail messages generally take a few minutes to arrive. Since the recipient does not have to be on-line, but can read the messages at any time later, e-mail is considered asynchronous.

Asynchronous conferencing allows messages to be sent from one person to many people. Two types are: discussion lists, where one e-mail message can be sent simultaneously to thousands of e-mail addresses; and bulletin boards, where the same message is posted in a central place to be accessed and read by many people.

With synchronous conferencing, messages are sent instantly between one person and a group of people who are all on-line together. In educational settings, this often takes place in a classroom or laboratory with networked computers, and can be referred to as electronic discussion or electronic networking for interaction (ENFI, a term copyrighted by Gallaudet University). Synchronous conferencing can also occur at a distance, taking advantage of special telecommunication resources such as Internet Relay Chat (IRC) or MOOs (virtual environments on the internet for text-based discussion and simulation).

Both asynchronous and synchronous conferencing (referred to in general as computer conferencing) usually include some form of file sharing, which allows for paperless transfer of documents between individuals or within a group. This facilitates peer editing and collaborative writing.

So far the most popular forms of CMC for language teachers have been e-mail and asynchronous conferencing, because these facilitate cross-cultural exchanges such as pen pal writing, long-distance interviews, shared research projects, joint student publications and multi-class simulations. However, synchronous conferencing, which allows electronic discussion and collaborative writing among a whole class of students sitting together at the same time, is becoming popular with composition teachers and can be expected to become more common in the second-language classroom as well.

Proponents of both single classroom and cross-cultural networks tend to make dramatic claims for their educational potential, not least of which is their claimed effectiveness in fostering greater student autonomy and empowerment. "Computers joined in a network can be a means of liberation, particularly for those students who are often marginalized" (Faigley, 1990: p. 291). "Networks create an unusual opportunity to shift away from the traditional...because they create entirely new pedagogic dynamics" (Batson, 1988: p. 32). "The electronic mail system...permits a new type of relationship between students and teachers" (Barson, Frommer and Schwartz, 1993: p. 576).

Before examining whether these claims are supported by evidence, we will first briefly discuss some perspectives on student empowerment, particularly as it relates to collaborative learning and networking.

STUDENT EMPOWERMENT

From Paolo Freire (1970) on, numerous educators and psychologists have tied collaborative learning to a process of empowerment. Soviet psychologist L. S. Vygotsky claimed that social discourse between people gives rise to the growth of an inner voice which provides a person with a sense of control or mastery and which is especially important for language learning (Vygotsky, 1978; Bruner, 1987; Belmont, 1989; Cooper and Selfe, 1990).

Palmer (1990) likewise emphasized the empowering process of social discourse, adding that learners need a sense of community before there can be honest critique among them. Palmer calls for teachers to create a “community of seekers” (p. 12) and a “hospitable space” (p. 15) to foster a sense of belongingness and equality, which he believes essential to a critical learning environment.

French educator Celestin Freinet, little known in the English-speaking world but influential in Europe and Latin America, linked the empowering potential of social discourse to the issues of technology and networking (Cummins and Sayers, 1990). Freinet argued that balanced development for children is possible only through “direct engagement” with their peers, with adults, and with the environment, and that modern media could hinder this engagement by rendering children passive vessels (Freinet, 1963/1974: pp. 89–90). He urged educators to give youth control over as many audiovisual techniques as possible, including tape recorders, television, radio and movies, in order to achieve profound engagement with their social and physical worlds (Freinet, 1963/1974: p. 32).

Freinet and his followers implemented old-fashioned learning networks in which students printed their writing portfolios in “life books”, which were then shared by mail with students in other towns and countries. As children responded to “the inexhaustible curiosity of correspondents” they began to question more, explore more deeply and develop a consciousness of the conditions of their lives (Gervilliers, Bertellot and Lemery, 1977: p. 29–30, Cummins and Sayers, 1990).

The advent of personal computers and telecommunications makes student networking much easier to arrange. Does it also help facilitate student empowerment—particularly of second-language learners? To answer this question, we will examine three specific aspects of empowerment: student autonomy, equality, and learning skills.

STUDENT AUTONOMY

Many teachers believe that the mechanics alone of computer-mediated communication provide students a much better opportunity for control and initiative in language learning. The asynchronicity of e-mail, for example, frees students from time and distance limitations. They can initiate discussions with their teachers or with other students any time of day, and from a number of places, rather than only during class or office hours, resulting in greatly increased student–teacher and student–student interaction (Harasim, 1986; Phillips, Santoro and Kuehn, 1988; Hartman *et al.* 1991; McComb, 1993).

Furthermore, in contrast to classroom verbal discussion, a student using CMC does not need to wait for an instructor's permission to talk, giving students even more control over what topics to raise and when (Garrison and Baynton, 1987). They can also communicate their thoughts at their own pace, leading to further opportunities for self-expression (Kinkead, 1987).

The opportunity for students to communicate with each other, inside or outside of class, can create a new social dynamic, based on student-student collaboration, with the teacher as facilitator. For example, a dialogue journal between a student and teacher can easily be transformed into a collective class journal, with students sharing their thoughts, feelings, opinions and experiences with each other, and the teacher stepping in to facilitate discussion as appropriate. In this situation, student expression of ideas can take on a more natural and authentic communicative function, rather than just attempting to please the teacher (Cohen and Miyake, 1986).

Writing instructors are particularly enthusiastic about the potential of computer networks to facilitate new patterns of interaction in the classroom. They report that the use of computer conferencing can "prompt more discussion that is student-centered" (Selfe, 1990: p. 125), "foster a sense of community" (Eldred, 1991: p. 50), "encourage a sense of group knowledge" (Barker and Kemp, 1990: p. 15), and help students "become active learners seeking solutions for their problems" (Boiarsky, 1990: p. 59).

Several studies by foreign language teachers using synchronous conferencing have also reported a shift in authority from teacher to student. In a comparative study done in EFL classrooms at the University of Puerto Rico, Pratt and Sullivan (1994) found that 85% of the conversational turns were taken by the students in electronic discussions, compared to 35% in traditional oral discussions. In another comparative study, Kern (1993) found that university students of French produced 86–88% of the total sentences in electronic discussions, compared to 37–60% of the total t-units during oral discussions. Keln (1992) reports that the students made 92% of the comments in computer conferencing in a university Portuguese class. Chun (1994), analysing 14 computer conferencing sessions in university German classes, found that 88% of student statements and questions were directed to each other and only 12% were directed to the teacher.

The expansion of student autonomy takes on a broader dimension when long distance communication is added, giving students the independent opportunity to use the foreign or second language for authentic communication with other language learners or native speakers around the world, perhaps for the first time. The result is greater student enthusiasm, initiative, and personal commitment (Paramskas, 1993).

It also can result in students having increased control of the content of the course. Tella (1992a), based on a two-semester study of e-mail exchanges between eight high school classes in Finland and England, found that the Finnish students had much greater liberty to choose the topics they discussed and wrote about, as opposed to traditional foreign language teaching in Finland where the themes and topics are "designated almost exclusively by the teacher". Tella found that this increased student control and "brought more

up-to-date and topical issues into focus, which also meant a move towards autonomy in [foreign language] learning" (p. 244).

Finally, many suggest that joining together cross-cultural communication with task-based learning provides the most fruitful combination for fostering student autonomy (Soh and Soon, 1991; Barson, Frommer and Schwartz, 1993; Sayers, 1993). Whether doing comparative investigations, compiling folklore or producing joint publications, students who work on these projects rely on and develop their own resources and skills, as well as those of their partners around the world.

EQUALITY

Another claimed benefit of computer networking is that it allows more equal participation by those who are often excluded or discriminated against, including women, minorities, the disabled, shy students, students with unusual learning styles, and students who are apprehensive about writing.

There are a number of reasons why computer-mediated communication is believed to have this democratizing effect. Among the most important are:

- (1) It reduces static social context clues related to race, gender, handicap, and status, which sometimes reinforce unequal participation in other types of interaction (Sproull and Kiesler, 1991).
- (2) It reduces dynamic social context cues, such as frowning and hesitating, which can intimidate people (especially those with less power and authority) by reminding them their comments are being evaluated (Finholt, Kiesler and Sproull, 1986).
- (3) It allows students to contribute at their own time and pace, neutralizing the effect of traditional classroom dynamics, which favor those who speak up most quickly, most often, and are most willing to interrupt (Selfe and Meyer, 1991; Tella, 1992b).

Controlled experiments carried out to study the effect of CMC on group dynamics have found that:

- (1) Electronic discussion groups of people of different status showed twice as much equality (measured by quantity of participation) as face-to-face discussion groups (Sproull and Kiesler, 1991: pp. 59–60).
- (2) In discussions held electronically, women made the first proposal as often as men; in face-to-face discussions men made the first proposal five times more often (McGuire, Kiesler and Siegel, 1987).
- (3) Proposals by higher status people (graduate students compared to undergraduates) were invariably favored in face-to-face discussion groups; in electronic discussion groups proposals by lower status people were selected equally as often (Huff and King, 1988).

The results of these experiments have been supported by classroom studies which show that shy foreign language students participate much more frequently in electronic discussions.

Pratt and Sullivan (1994) found that 100% of students participated in electronic discussions compared to 52% in face-to-face ones. Kern (1993) likewise found that every student participated in electronic discussions, whereas the face-to-face discussions were dominated by five students with four students not participating at all.

Kroonenberg (1995) reports that “shy students who have refused to speak in class suddenly have fingers flying across the keyboard”. She also claims that, having expressed themselves electronically, the timid students then become more willing to join in subsequent oral discussions on the same topics. Keln (1992) explains that “it is nearly impossible for (a handful of students) to dominate the discussion. If their comments are too long, nobody will read them” (p. 444). One of Keln’s students adds: “I think I participated 100 times more during the (electronic discussion) interchange than (orally) in class. Believe it or not, I really do not like to speak up in class. I’ll bet my other professors think I’m a mute” (1992: p. 444).

Analysing the writing classroom, Hartman *et al.* (1991) and Mabrito (1991) found that less able and more apprehensive writing students not only communicate more during electronic discussions, they also make more useful peer editing comments and end up producing better papers.

Flores (1990) and Selfe (1990) suggest that computer networking serves to equalize women’s participation in classroom discussions compared to that of a men, who traditionally speak and interrupt more (Zimmerman and West, 1975; Spender, 1980). Tella (1992b) found that school e-mail projects, by giving play to Finnish girls’ writing and social skills, helped compensate for the girls’ more limited access to computers at home. At the same time though, Tella found that the Finnish boys, who are often intimidated by writing and who tend to do less well in foreign languages than girls, benefited from the more informal types of writing that e-mail allowed as well as from being able to choose their own topics. He hypothesizes that by providing more student control and choice, computer networks can empower students from a variety of backgrounds and learning styles.

Deaf students and students with speech impediments clearly benefit from computer-mediated communication; indeed, much of the pioneering work in this field has been carried out by teachers at Gallaudet University (Batson, 1988, 1993). Computer networks are also potentially helpful to people whose mobility is restricted due to handicap, age or economic factors, and thus have to learn from home (Selfe, 1990).

LEARNING SKILLS

Perhaps the most attractive claim regarding computer networking is that it develops students’ learning skills and critical learning perspective. This claim is based on several underlying assumptions:

- (1) Writing helps thinking. By getting students to write their ideas, we are getting them to develop their ideas.

- (2) Learning is a social activity and knowledge is socially produced. By teaching students to develop their ideas collectively, we teach them new and better ways of learning and producing knowledge.
- (3) With the information explosion, knowing how to find and interpret facts is more important than memorizing them.

Writing and thinking

The first assumption is discussed in depth by DiMatteo (1990, 1991), who critiques the view that writing is just a neutral instrument for communicating pre-formed ideas. DiMatteo explains what happens to his students when they write down in computer conferences thoughts which would ordinarily be spoken:

They create intensely visible language out of what they consider to be forgettable, facile words—their own talk and conversation. They develop a sense that when they talk, they are “drafting” themselves, composing their own identities through a speech that is also a writing made utterly tangible. Such a novel and important learning experience conflicts with their traditional assumption that learning is the ability to comment on and recall the teacher’s words (1990: pp. 76–77).

Nancy Kroonenberg (1995) reports on this phenomenon in her foreign language classrooms:

Thoughts and arguments first composed in writing on e-mail give students reflection time prior to engaging in oral work. Whenever we have a class discussion based on e-mail entries, I find the quality of the arguments is enhanced and thinking is more creative than without this kind of preparation.

Learning as a social activity

The second assumption, that learning is a social activity, is a central tenet of modern language teaching theories, and the ability of computer networks to facilitate the sharing of ideas and writing among students is difficult to dispute (Barker and Kemp, 1990; Barson, Frommer and Schwartz, 1993). Not only can documents be easily posted back and forth to the computer screens of all the other students (rather than continuously and laboriously cut, pasted, photocopied and perhaps even mailed out), but some studies suggest that students are more willing to comment on others’ writings via CMC than in face-to-face meetings (Hartman *et al.*, 1991) and that those comments are more substantive and result in more group-focused revision (Mabrito, 1991), resulting in a socially-produced “group knowledge” (Barker and Kemp, 1990: p. 15).

Increased collaboration can occur not only in joint writing and peer review of documents, but in more general electronic discussion, which combines the benefits of speech (one comment can be heard by all, there can be rapid back and forth response), and writing (more than one person can “speak” at the same time, and students can benefit from composing their ideas more deliberately if they wish). Furthermore, in electronic discussion, a record of all comments and responses (as well as drafts of documents) is usually easily accessible, facilitating a critical analysis of an entire collaborative discussion (McComb, 1993).

Finally, Barson *et al.* (1993) show that collaboration via computer does not have to come at the expense of face-to-face interaction. When they combined computer networking with a task-based approach to language teaching, it not only enhanced interaction via computer but resulted in very active verbal collaboration as well.

Learning in the age of information

The third assumption emphasizes the skills of finding, interpreting and creatively applying information over that of mastering received wisdom. Certainly in terms of language learning, skills of inquiry, interpretation and application are more important than simple memorizing.

Cummins and Sayers (1990) take this point further, stressing that we live in an age of information explosion—with more than 6000 scientific articles being written each day and information doubling every few years (Cross, 1984)—which renders rote learning totally ineffective. According to Cummins and Sayers, in North America minority students in particular are held back by society-wide educational reforms emphasizing an outmoded “top-down approach” of using new technologies simply for more efficient transmission of “the basics” (p. 3). They claim that this approach is out of step with the cultural, scientific and economic realities of the 21st century, which demand global education, global interdependence, and skill at accessing and interpreting information (pp. 4–6). Most importantly, they contend that because computer learning networks, when properly implemented, can help meet these demands, they believe that these networks are an important tool to “facilitate a process of student empowerment and ultimately social transformation” (p. 4).

POTENTIAL PROBLEMS

No discussion of computer learning networks and student empowerment would be complete without an examination of potential problems. What are the aspects of CMC which could hinder student empowerment rather than help bring it about?

First of all, although computer networks can result in more egalitarian participation, such results are by no means guaranteed (Susser, 1993; Eldred, 1991). Social inequalities that exist in the classroom can reproduce themselves on the computer network or even worsen as students or teachers with dominant personality traits (Hiltz, 1990), more computer knowledge (Eldred, 1991), or even better typing skills (Murray, 1991) take advantage of the network’s power to control discussions. Furthermore, the same lack of social context clues which encourages more free expression can also result in thoughtless, hostile, or even vicious comments known as “flaming” (Sproull and Kiesler, 1986; Janangelo, 1991).

Cooperation might also be weakened if students ignore the comments or writings of others due to language difficulties or information overload (Susser, 1993); on-line writing can then become “a set of asocial monologues” (Moran, 1991: p. 51). Teachers can subvert the process as well, not only by dominating discussions but also by using their access to computer files to make students more fearful of teacher evaluation or control (Janangelo, 1991). Finally, unequal access to computers at school or at home can leave students who are traditionally disadvantaged even more so (Tella, 1992b; Cummins and Sayers, 1990).

Differences in background and expectations between teacher and student can also cause problems. Students may not share with teachers “the reverence for speed and efficiency

which so identifies computer-literate cultures” (Le Mon, 1988: p. 38). They may also be confronting an unfamiliar “teaching/learning” metaphor in a student-centered classroom. Relationships encouraged by computer networks are generally embraced by “the facilitating teacher; a person who is an empathetic listener capable of and even expecting to have one-to-one relationships with learners” (Dubin and Olshtain, 1986: p. 78). Yet students who come from those “cultural contexts in which hierarchical relationships are seen as close and mutually, not unilaterally, empowering” (Tannen, 1993: pp. 169–170) may feel confused or disoriented.

Whereas “students who have been culturally programmed and disempowered for so long have a great deal of trouble knowing what to do with power once it is given to them” (George, 1990: p. 50), teachers may face their own frustrations as power is distributed away from them, leaving them “convinced that they could never teach successfully in so disruptive a classroom” (Kremers, 1990: p. 38).

One additional factor that students and teachers using e-mail can find daunting is the volume of information that flows into their electronic mailboxes. Whereas the increase in opportunities to communicate in the target language is clearly beneficial to the language learner, few students or teachers are adequately prepared to manage the dozens of messages that can appear daily.

We...face the possibility that we will be too well connected, and with too many people. If we do not find ways to structure the campus-side use of e-mail, ...instructors may not cope well with new demands added to already heavy workloads (Hawisher and Moran, 1993: p. 636).

In short, computer networking, like other forms of technology, is not a “magic wand” which can solve all problems just by being waved (Hiltz, 1990). The appropriate and effective use of computer networks to help empower students is partly a technical issue, but primarily a pedagogical one. Successful results require careful planning (Eldred, 1991), a balanced and critical perspective (Hawisher and Selfe, 1991) and “an interactive and experiential approach to pedagogy” (Cummins and Sayers, 1990: p. 22); in short, a pedagogy of empowerment.

SUGGESTIONS FOR THE PRACTITIONER

What are some steps that language teachers can take to help make sure that computer networking projects are empowering and not debilitating for their students? Whereas we do not pretend to offer a complete pedagogical guide, we do suggest some general principles for effective use of computer learning networks.

Computer training

One very important aspect of empowering students is that they should learn to use the computers, rather than feel used by them. Although it may be easier in the short run for the teacher alone to manipulate computer functions, such an approach would defeat the purpose of developing independent learners with important new skills. The goal should therefore be that the students have independent access to the computers and learn how to operate all important functions.

Sproull, Kiesler, and Zubrow (1984) compare first-time use of computers to entry into a new culture, complete with the reality shock that leads to confusion and, for some, a dropping out from the culture. For students already dealing with a foreign or second language, the addition of another foreign culture in the classroom may be especially difficult. Teachers need to be aware of this and ease their introduction to computers by providing a comfortable learning environment and readily-available resources for coping. This may mean spending several class sessions in a computer lab reserved just for those students, and taking them step-by-step through a set of instructions written in language the students can understand.

New teacher and student roles

Beyond training the students in computer use, the teacher is also responsible for handling the new teacher–student and student–student relationships in the networked classroom. To facilitate student involvement in the computer culture, teachers must be actively present in the networked project, for their involvement “...likely plays a direct role in how actively students participate” (Eastmond, 1993: p. 136). Fox (1990) notes that “...for a classroom to really be interactive, the teacher has to contribute actively, too” (p. 46). This is equally true for the networked classroom. Teacher involvement, however, does not necessarily mean teacher dominance. Instead, “...teachers’ effectiveness... depends on their ability to perceive and seize opportunities for sustaining the communication with minimal intrusions and directives” (Barson, Frommer and Schwartz, 1993: p. 569).

Given that in many computer-networked projects the teacher’s visibility decreases as students gain control of the communications, students may feel disoriented. In even the most task-oriented projects, some chaos can ensue. Berthoff (1981) points out that this chaos can be frightening, and that students must learn to tolerate ambiguity. This can work in a class where the teacher models that tolerance for ambiguity, but it is more important that students be given an opportunity to make the adjustment slowly rather than be expected to handle the chaos from the beginning.

Many students have educational backgrounds that cause them to be unaccustomed to having power in the classroom or taking responsibility for their own learning. The empowering nature of CMC and the demands that it makes on the individual learner may, paradoxically, be disheartening if care is not taken to facilitate the necessary cultural leap. Teachers need to spell out clearly the expectation that students will participate fully in computer-based coursework, acknowledge initial feelings of unease, and encourage continued involvement in the work until comfort levels are raised.

The teacher, then, successfully facilitates student participation in a networking project by acting as a coordinator for group planning (Riel and Levin, 1990), by encouraging student responsibility for learning, and by creating a space where egalitarian computer conferencing can take place. Towards this end, Janangelo (1991) suggests discussing possible abuses, training students not to abuse the forum, using role-playing techniques to teach lessons about harassment, and involving students in the creation of rules for online behavior.

Long-distance projects

Special considerations are involved when setting up long-distance team teaching projects. Sayers (1993) suggests that the first priority should be that teachers choose their partners

well, because “perhaps the most critical element in distance team teaching is the quality of the working relationship between the two partner teachers who are determined to meet their mutually predetermined goals” (p. 20). It may be appropriate for the teachers involved to have different goals, as long as those goals are articulated and understood.

Having found teaching partners and arranged a project, it is then important to help establish and maintain healthy communications between the two classrooms. Soh and Soon (1991) demonstrate that starting with personal introductions and informal exchanges can be an excellent way to prepare for more serious academic exchanges later on. It is also important for teachers to monitor communications to help watch out for special problems arising from cross-cultural communications.

Finally, Barson *et al.* (1993) suggest that whether in a single classroom or in a long-distance project, a task-based approach may be the best way to achieve excellent student–student cooperation in electronic communication. Beyond having the students just talk to each other, getting them to work together on challenging, meaningful projects can help maximize their sense of group involvement and collective accomplishment.

CONCLUSION

Computer networking attempts to build on earlier collaborative learning models, including cooperative and task-based learning, peer editing/review and cross-cultural exchanges. Whereas no technology can guarantee behavior “simply by its nature” (Foucalt, 1984: p. 245), computer networks, when appropriately used, do show potential to promote student autonomy, increase classroom equality, and help students develop a critical learning perspective. Further research is needed to learn more about computer learning networks, and in particular, to help develop a pedagogy that can unlock their promising potential.

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REFERENCES

- BARKER T. and KEMP, F. (1990) Network theory: A postmodern pedagogy for the writing classroom. In Handa, C. (ed.), *Computers and Community: Teaching Composition in the Twenty-first Century*, pp. 1–27. Portsmouth, NH: Heinemann.
- BARSON, J., FROMMER, J. and SCHWARTZ, M. (1993) Foreign language learning using e-mail in a task-oriented perspective: Interuniversity experiments in communication and collaboration. *J Sci Ed Technol* 4(2), 565–584.
- BATSON, T. (1988) The ENFI project: A networked classroom approach to writing instruction. *Acad Comput* 2(5), 32–33.
- BATSON, T. (1993) Historical barriers to intelligent classroom design. In Myers, L. (ed.), *Approaches to Computer Writing Classrooms: Learning from Practical Experience*. Albany, NY: State University of New York Press.
- BELMONT, J. (1989) Cognitive strategies and strategic learning: The socio instructional approach. *Am Psychol* 44, 142–148.

- BERTHOFF, A. E. (1981) *The Making of Meaning: Metaphors, Models, and Maxims for Writing Teachers*. Montclair, NJ: Boynton/Cook Publishers, Inc.
- BOIARSKY, C. (1990) Computers in the classroom: The instruction, the mess, the noise, the writing. In Handa, C. (ed.), *Computers and Community: Teaching Composition in the Twenty-first Century*, pp. 47–67. Portsmouth, NH: Heinemann.
- BRUNER, J. (1987) Prologue to the English edition. In Rieber, R. W. and Carton, A. S., (eds), *The Collected Works of L. S. Vygotsky*. New York: Plenum Press.
- CHUN, D. (1994) Using computer networking to facilitate the acquisition of interactive competence. *System* 22(1), 17–31.
- COHEN, M. and MIYAKE, N. (1986) A worldwide intercultural network: Exploring electronic messaging for instruction. *Instruct Sci* 15, 257–273.
- COOPER, M. and SELFE, C. (1990) Computer conferences and learning: Authority, resistance, and internally persuasive discourse. *College Engl* 52(8), 847–869.
- CROSS, K. P. (1984) The rising tide of school reform reports. *Phi Delta Kappan* 66, 167–172.
- CUMMINS, S. and SAYERS, D. (1990) Education 2001: Learning networks and educational reform. *Comps in Schools* 7(1/2), 1–29.
- DIMATTEO, A. (1990) Under erasure: A theory for interactive writing in real time. *Comps and Composit* 7(S.I.), 71–84.
- DIMATTEO, A. (1991) Communication, writing, learning: An anti-instrumentalist view of network writing. *Comps and Composit* 8(3), 5–19.
- DUBIN, F. and OLSHTAIN, E. (1986) *Course Design*. Cambridge: Cambridge University Press.
- EASTMOND, D. (1993) *Alone but Together: Adult Distance Study by Computer Conferencing*. Unpublished doctoral dissertation, Syracuse University, Syracuse, NY.
- ELDRED, J. (1991) Pedagogy in the Computer-Networked Classroom. *Comps and Composit* 8(2),
- FAIGLEY, L. (1990) Subverting the electronic workbook: Teaching writing using networked computers. In Baker, D. and Monenberg, M. (eds), *The Writing Teacher as Researcher: Essays in the Theory and Practice of Class-based Research*. Portsmouth, NH: Heinemann.
- FINHOLT, T., KIESLER, S. and SPROULL, L. (1986). *An Electronic Classroom*. Working paper, Carnegie Mellon University, Pittsburgh, PA.
- FOX, T. (1990) *The Social Uses of Writing: Politics and Pedagogy*. Norwood, NJ: Ablex.
- FOUCAULT, M. (1984) Space, knowledge and power. In Rabinow, P. (ed.), *The Foucault Reader*, pp. 239–256. New York: Pantheon.
- FLORES, M. (1990) Computer conferencing: Composing a feminist community of writers. In Handa, C., (ed.), *Computers and Community: Teaching Composition in the Twenty-first Century*, pp. 106–117. Portsmouth, NH: Heinemann.
- FREINET, C. (1974) *Las Técnicas Audio-visuales* (J. Colome, Trans.). Barcelona: Editorial Laia. (Original work published 1963 as *Les Techniques Audio-visuelles* [Audio-visual techniques]).
- FREIERE, P. (1970) *Pedagogy of the Oppressed*. New York: Seabury.
- GEORGE, E. L. (1990) Taking women professors seriously: female authority in the computerized classroom. *Comps and Composit* 7(S.I.), 45–52.
- GERVILLIERS, D., BERTELLOT, C. and LEMERY, J. (1977) *Las Correspondencias Escolares* (Editorial Laia, Trans.). Barcelona: Editorial Laia. (Original work published 1968 as *Les Correspondances Scolaires* [Interscholastic correspondence]).
- GARRISON, D. R. and BAYNTON, M. (1987) Beyond independence in distance education: The concept of control. *Am J Distance Ed* 1(3), 3–15.
- HARASIM, L. (1986) Computer learning networks: Educational applications of computer conferencing. *J Distance Ed* 1(1), 59–70.
- HARTMAN, K., NEUWIRTH, C., KIESLER, S., SPROULL, L., COCHRAN, C., PALMQUIST, M. and ZUBROW, D. (1991) Patterns of social interaction and learning to write: Some effects of network technologies. *Written Comm* 8(1), 79–113.
- HAWISHER, G. and MORAN, C. (1993) Electronic mail and the writing instructor. *College Engl* 55(6), 627–543.
- HAWISHER, G. and SELFE, C. (1991) The rhetoric of technology and the electronic writing class. *College Comp Comm* 42(1), 55–65.

- HILTZ, S. R. (1990) Collaborative learning: The virtual classroom approach. *THE J* June, 59–65.
- HUFF, C. and KING, R. (1988) An experiment in electronic collaboration. In Goodchilds J. D. (chair), *Interacting by Computer: Effects on Small Group Style and Structure*. Symposium conducted at the meeting of the American Psychological Association. Atlanta.
- JANANGELO, J. (1991) Technopower and technoppression: Some abuses of power and control in computer-assisted writing environments. *Comps and Composit* 9(1), 47–63.
- KELN, O. (1992) The use of synchronous computer networks in second language instruction: A preliminary report. *Foreign Lang Ann* 25(2), 441–454.
- KERN, R. (1993) *Restructuring Classroom Interaction with Networked Computers: Effects on Quality and Characteristics of Language Production*. Paper delivered at ACTFL, 1993, San Antonio, TX.
- KINKEAD, J. (1987) Computer conversations: E-mail and writing instruction. *College Comp Commun* 38(3), 337–341.
- KREMERS, M. (1990) Sharing authority on a synchronous network: the case for riding the beast. *Comps and Composit* 7(S.1), 33–44.
- KROONENBERG, N. (1995) Developing communicative and thinking skills via e mail, *TESOL J* 4(2), 24–27.
- LE MON, R. (1988) Cultural differences affecting the international transfer of computerized language learning. *System* 16(1), 37–40.
- MABRITO, M. (1991) Electronic mail as a vehicle for peer response. *Written Comm* 8(4), 509–532.
- MCCOMB, M. (1993) Augmenting a group discussion course with computer mediated communication in a small college setting. *Interpers Comput Technol* 1(3).
- MCGUIRE, T., KIESLER, S. and SIEGEL, J. (1987) Group and computer-mediated discussion effects in risk decision making. *J Pers Soc Psychol* 52(5), 917–930.
- MORAN, C. (1991) We write, but do we read? *Comps and Composit* 8(3), 51–61.
- MURRAY, D. (1991) The composing process for computer conversation. *Written Commun* 8, 35–55.
- PALMER, P. (1990) Good teaching: A matter of living the mystery. *Change* 22, 11–16.
- PARAMSKAS, D. (1993) Computer-assisted language learning (CALL): Increasingly into an ever more electronic world. *Can Mod Lang Rev* 50(1), 124–143.
- PHILLIPS, G., SANTORO, G. and KUEHN, S. (1988) The use of computer-mediated communication in training students in group problem-solving and decision-making techniques. *Am J Distance Ed* 2(1), 38–51.
- PRATT, E. and SULLIVAN, N. (1994) *Comparison of ESL writers in networked and regular classrooms*. Paper presented at TESOL '94, Baltimore, MD.
- RIEL, M. and LEVIN, J. (1990) Building electronic communities: success and failure in computer networking. *Instruct Sci* 19, 145–169.
- SAYERS, D. (1993) Distance team teaching and computer learning networks. *TESOL J* 3(1), 19–23.
- SELFE, C. (1990) Technology in the English classroom: Computers through the lens of feminist theory. In Handa, C. (ed.), *Computers and Community: Teaching Composition in the Twenty-first Century*, (pp. 118–139). Portsmouth, NH: Heinemann.
- SELFE, C. and MEYER, P. (1991) Testing claims for on-line conferences. *Written Commun* 8(2), 163–192.
- SOH, B. L. and SOON, Y. P. (1991) English by e-mail: creating a global classroom via the medium of computer technology. *ELT J* 45(4), 287–292.
- SPENDER, D. (1980) *Man Made Language*. London: Methuen.
- SPROULL, L. and KIESLER, S. (1986) Reducing social context cues: electronic mail in organizational communication. *Management Sci* 32(11), 1492–1512.
- SPROULL, L. and KIESLER, S. (1991) *Connections: New ways of working in the networked organization*. Cambridge, MA: The MIT Press.
- SPROULL, L., KIESLER, S. and ZUBROW, D. (1984) Encountering an alien culture. *J Soc Issues* 40(3).
- SUSSER, B. (1993) Networks and project work: Alternative pedagogies for writing with computers. *Comps and Composit* 10(3), 63–89.
- TANNEN, D. (1993) The relativity of linguistic strategies: Rethinking power and solidarity in gender and dominance. In Tannen, D. (ed.), *Gender and Conversational Interaction*, pp. 169–170. New York: Oxford University Press.
- TELLA, S. (1992a) *Talking Shop via e-mail: A Thematic and Linguistic Analysis of Electronic Mail Communication*. Research report no. 99, Helsinki: Dept. of Teacher Education, University of Helsinki.

- TELLA, S. (1992b) *Boys, Girls, and e-Mail: A Case Study in Finnish Senior Secondary Schools*. Research report no. 110, Helsinki: Dept. of Teacher Education, University of Helsinki.
- VYGOTSKY, L. S. (1978) *The Mind in Society: The Development of Psychological Processes*. Cole, M., John-Steiner, L., Scribner, S. and Souberman, E. (eds), Cambridge, MA: Harvard University Press.
- ZIMMERMAN, D. and WEST, C. (1975) Sex roles, interruptions and silences in conversation. In Thorne, B. and Henley, N. (eds), *Language and Sex: Difference and Dominance*, pp. 105–129. Rowley, MA: Newberry House Publishers.