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Chapter Ten
New Technologies, Basic Skills, and the Underside of Education: What's to be Done?[1]

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There is a rather disconcerting type of internationalism operating nowadays. Parallel to the trade deficit, there is a sense of information deficit signaled by perceived imbalances between countries and leading to a loss of power by the countries that are in arrears. Many believe that something should be done, but there is no unanimity about what is to be done. Responses to the perceived information deficit fall into these categories: (1) make sure the "other" fails to get further ahead; and (2) increase your own standing. Worries about technology transfer and brain drain are examples of the first; worries about the adequacy and efficacy of education are examples of the second. Those, like us, who are interested in improving education could take advantage of the second type of response and argue that, in order to be competitive internationally, more financial and human resources need to be expended on education in the United States.[2] We do not believe that this is

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[2] Roger Shuy (personal communication) reports on this strategy being used in a local arena where literacy was placed in competition with mathematics. A relatively rich and successful school district used discrepancies between standardized test scores in a creative way: One year the average math scores would be higher than the average reading scores and a reading crisis would be declared, funding would be supplied to the county educators and research and development on literacy education could proceed: since each year scores in one or the other domains would be lower, the "crisis" funding allowed the county to spend a great deal on educational research. Unfortunately, the most clear way to improve the test scores—to develop ways to teach to the tests—is not necessarily the way to improve literacy or mathematics education. The adoption of this competition strategy as a way to finance educational research can become so deeply involved in the research program that the real end is replaced by what started as a means to it.

the way to go. We believe that international cooperation rather than competition is a more productive approach. "A Nation at Risk" could be written about any of a number of countries, and an understanding of the risk in any one can profit from an understanding of the risk in all. In effect, our stand is that to accomplish the second response (increase our own standing), we must reframe the issue so that the first type of response does not arise as a possibility.[3]

Much of our thinking on the issues indexed by the title of this paper occurred during our interactions with colleagues from other nations. Often this work has been via new technologies for communication, so the contact with scholars from different traditions has been more casual, more sporadic and in some ways more communicatively complete than when we were limited to meetings at international conferences, reading published articles, exchanging visits, letters and phone calls. We have tried this sort of joint work with colleagues in Japan, the U.K., Spain, Canada, and the U.S.S.R. We find common cause with respect to education on two bases:

1. Part of our societies are not equitably educated. The people that different countries fail to educate are not too dissimilar: girls, members of the ethnic or language minorities, children of poor or less powerful families, communities, and regions.
2. Our education systems stop short of delivering on full education. We have worries about whether we know how to provide education that will result in creativity, flexibility, adaptability to a rapidly changing world.

In general, in spite of a great deal of effort expended on education in the different countries, we all have what we will call in this paper a *parts problem*, such that we suspect we are missing *part* of the population and *part* of the goal of a full education.

What we fear is that failing to accept the international nature of the problem will promote analyses of the problem based on epiphenomena and have us invest in pseudo-solutions that will not only fail but lose us credibility, reducing future chances for productive work on educational issues. Just as studies of the "old" technology of literacy have gained by examining a wide variety of cases (e.g., Scribner & Cole, 1981), so, too, should studies of the broader problems of education and the new technologies gain by the

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[3] There are two parallels to our strategy, one in psychology and one in current events. There is a too seldom recognized experiment, "Robbers Cave" (Sherif & Sherif, 1956, pp. 301–328), which is reflected in our stand; in that case, youngsters with some history of inter-group conflict were effectively organized when they faced an adverse situation in common. The recent Reagan and Gorbachev conversations evidently included a similar recognition of the advances that could be made in the face of a common problem; we believe, however, that the common problem is here, making it unnecessary to wait for an invasion from another planet.

study of many diverse cases. We have come to believe that, by making common cause through comparing and contrasting our problems, we can contribute to each of the national educational efforts. We do not believe that progress will come in the form of a single solution that can be imported everywhere effectively, but via the differences that will appear in the futures of solutions that we jointly devise; i.e., solutions with common histories (in problems and in theoretical interpretation) as they are embedded in educational action within the different national and cultural systems.

Consciously preparing for co-cultural comparative research and practice provides the impetus for a broader framing of the issues than psychologists and educators might otherwise provide. We need to attend explicitly to the analysis of the larger societal setting (i.e., to include both a longer time span as well as influences from institutions adjacent to education) in order to provide a context in which international collaborators can make sense of related efforts and contribute to each others' work. We believe that influences from the larger setting are always present in the conduct of educational research and practice; the call to attend to them explicitly and consciously in order to promote international cooperation has the side benefit of making more accessible to us the background considerations that subtly affect our work.

In this chapter, we first review descriptions of the changing situation in the United States relating new technology to education. We then consider the current use of computers in education and the role of "basics" in the situation. We conclude with some descriptions of computer use that we think fit well with our strategy of co-cultural work and that can be motivated within a framework that directly addresses the two goals implicated in the common cause we have with other nations: education for more members of the society and education for more functions in modern society. We hope that this approach can engineer profitable discourse with researchers from other traditions, who may be able to comment on our problems and proposed solutions with different viewpoints.

THE LARGER SETTING

The Conservation of Human Resources Project at Columbia University recently released a series of analyses of changes that have occurred in the United States. Noyelle's 1985 study deals with the "parts" problem—the parts of society we do not educate well and the parts of activity (social or cognitive) that we too often fail to educate. Noyelle (1985: pp. 38–39) summarizes the issue thus:

> Notwithstanding the fact that the economy will continue to produce large numbers of jobs demanding low-level skills, the general tendency to shift from manual to cognitive processes both in the workplace and in the sphere of daily

life and consumption makes better basic schooling more necessary than ever before. Not only has the high school diploma become the proof of basic socialization required by employers as a precondition of employment, but the move toward increasing use of teletex and televideo systems—whether for home banking, home shopping, or perhaps even electronic work at home—will place the less than fully literate person increasingly at a disadvantage.

As skill acquisition becomes increasingly externalized out of firms and out of the labor market, the role which vocational and higher educational systems play in employment opportunity and mobility becomes all the more critical...
Increasingly, workers' positions in the labor market are determined prior to their entry into the labor market, in the course of their access to the vocational and higher educational systems. This stands in sharp contrast with the way employment opportunities used to be determined in the "old economy."

It is [Noyelle's] impression that the vocational and higher educational systmes will need to undergo fundamental changes if they are to respond to these new pressures; in other words, if they are to provide both a more efficient and a fairer vehicle for upward mobility. Most likely, what is called for is an evolution toward a truly continuing educational system—one that is more equitable, more flexible, better adapted to shorter term passages, more ubiquitous, and perhaps less specialized in orientation than it has traditionally been.

The important implication for those concerned with education is the move toward "off-the-job training." It may have been true in the past that education outside of the workplace was largely simple credentialing (of the ability to stay in school or in particular courses rather than mastery of any content or skill domain), and thus it may have made sense for school achievement to be considered (by students [cf. Ogbu, this volume] as well as by social analysts and activists) largely irrelevant to making progress in the world of work. The new economy, however, appears to require that schooling provide education, not just credentials.

Just as new technologies raise new challenges for education, new technology is seen as a way to meet these challenges. A good example is the rush to increase computer use in schools, as a variety of reports show:

1. The Center for Social Organization of Schools (CSOS, 1983–1984) at the Johns Hopkins University: School districts are quickly adding computer literacy to educational programs.
2. Quality Education Data (1984) (Naval Materials Council): The number of school districts with microcomputers *doubled* from 1981 to 1984; the percentage of districts having computers rose from 38% to 75% in the same period; the number of schools with computers *tripled*—numbering 55,000.
3. The Center for Children and Technology at Bank Street College of Education: There are now "close to a half million microcomputers in schools"; parents are more involved with computers (even raising funds to get them) than with other educational innovations. (Sheingold, Martin, & Endreweit, 1985)

COMPUTER USE

Given the eager jump into computer technology, we ask whether the technology is actually helping with the "parts" problem; that is, is education more equally accessible to all and is it getting to the more open-ended, more challenging tasks? The evidence on computers is not encouraging. Maybe the introduction of computers is not making matters worse, but computers are certainly not a magic remedy. The CSOS reviews many studies that confirm this judgement (CSOS, 1983–1984, p. 56). Over and over, they find the following constellation of facts:

1. More computers are being placed in the hands of middle and upper class children than poor children.
2. Female students have less involvement with computers when they are found in schools, irrespective of class or ethnicity.
3. When computers are placed in the schools of poor children they are used for rote drill and practice instead of the "cognitive enrichment" that they provide for middle and upper class students.

The first two problems are not surprising. We can expect a relation between the socioeconomic status of the children and the availability of funds for computers in their neighborhood schools. The gender difference problem with respect to computer access can be related to prior problems: It has often been pointed out that girls are less likely than boys to have access to mathematics, science and machinery courses in schools; when computers are introduced, it is often in these settings which have been less welcoming to girls than to boys.

How to redress either or both of these imbalances is a complex issue: To argue for more equitable distribution, we need a more clear idea of what "good" distribution is. That is, we do not want to rob Peter to pay Pablo and Pauline; but rather to provide what is needed for all three. Yet, there is not sufficient information available for us to describe clearly what the goal is, nor to argue for cost-benefit advantages of making changes in current allocations. In particular, how many computers should we have available for those currently underserved, if we are to make educational use effective? The national average is one or two computers in classes that have any microcomputers at all (CSOS, 1983–1984). In most of the CSOS classrooms, only one child actively worked on a computer at a time, with some assistance from other children. The number of students at a computer at one time varied among the schools, however; the CSOS reports:

> Our data show that in schools where use is concentrated among above-average students, the primary computer-using teacher reports a more 'individual use' pattern than in schools where "average" students get a proportionate share of student computer time. Use by "average" students is instead associated with students using computers in pairs (CSOS, 1983–1984).

There is little information available about what is a "good" number for education or even about how much time each child should spend with the computer.

At one extreme, Papert (1984) recommends one computer per child for classroom use and one to take home. Considering the costs of such an undertaking, it is a good thing that existing research suggests that one computer per child is probably *not* an optimum number, as least at the elementary school level where the issue has been most extensively studied. There is growing evidence that *two* students working on a machine reduce low-level errors and create support for more sophisticated activities when compared with students working individually (Levin & Souviney, 1983; Laboratory of Comparative Human Cognition, 1982; Trowbridge & Durnan, 1984). Students are likely to have different skills. By working together and dividing the labor of the task, they can bring their separate strengths together to get the task accomplished. Trowbridge and Durnan's research points out that when group size is increased, the organization of work breaks down and students are observed to engage in less effective learning at the computer. These findings are *very* limited, considering the importance of the issue.

At present no systematic research exists on the interaction of student characteristics, number of machines per classroom, and curricular content. We may argue that there is a de facto "parts" problem: It must be the case that computer technology is not equitably serving poor children and girls, since they are less likely to use computers; however, we have little to say about how much of a change we should make so that it would matter.

The third problem area addresses both "parts" problems—are all parts of the population getting all parts of education? Shavelson, Winkler, Stasz, Fiebel, Robyn and Shaha (1984) point out that even "exemplary" programs suffer the "parts" problem. By means of interviews and observations, Shavelson's group studied the patterns of computer use of 60 elementary and secondary teachers who had been nominated as exemplary users in mathematics and science instruction. They found one pattern, which they labeled "orchestration," to be the most effective, in terms of the kinds of education that was promoted: "Orchestrators" fit the computer into the ongoing streams—the child's development, the curriculum sequence, the ordinary classroom day. Other patterns of use, which proved considerably less valuable than orchestration, were called enrichment, adjunct instruction, and drill and practice. In looking at the distribution of the four types of use, Shavelson et al. found that classrooms with students above average in ability and with a low percentage of minorities tended to be taught by orchestrators, while in the classrooms with a high percentage of minority students or with students rated low in ability, computers were used in the less effective ways.

In a detailed study of carefully guided introduction of computers into four classrooms, Mehan, Moll and Riel (1983, 1985) found some positive changes in the status quo in classrooms varying in ethnic composition and ability: Although microcomputers were assimilated to pre-existing classroom arrangements, they were associated with some beneficial changes in teacher–student relationships and curricula. Cooperative peer interaction emerged and teachers were able to achieve educational goals that could not have been achieved as readily had a microcomputer not been available for their use. However, the researchers' remarks at the end of the first year of work offer sobering thoughts for computer enthusiasts:

> The computer easily becomes an intruder whose potential benefits are outweighed by the inconveniences they create...: The strategy of choice then becomes, not by design but by necessity, to accommodate the machine to the prevailing constraints. This decision, although pragmatic in the short-run, is absolutely fatal, especially for language minority students, because it assumes, uncritically, that the status quo is the appropriate context for computer use. Inevitably, existing curricular practices become the "model" for computer use. Why should we expect that the same practices that have produced widespread academic failure will create propitious environments for computer use? (Mehan et al., 1983, p. 226)

The Mehan et al. project was able to provide the resources in the classrooms so that the status quo could change somewhat; Cazden, Michaels, and Watson-Gegeo (1984) provide a detailed study of two classrooms as computers are first introduced and complement the mixed notes sounded by the Mehan et al. study. Michaels (1985) describes how the classrooms differed in the way student interactions around the computers were organized and how text-editing procedures were introduced. She provides a provocative analysis of the consequence of the variations on the students' knowledge about computer text editing. On post-tests, more children evidenced more sophisticated knowledge in one of the classrooms than in the other classroom, where the children appeared to learn less and where the distribution of the knowledge favored boys over girls. In our terms, one classroom experienced the "parts" problems and the other did not.

Michaels makes it clear that the classrooms were similar in many respects: the entering ability of the children, the use of the computer in the "publishing" part of a process-oriented approach to writing instruction, the lack of direct formal lessons on the use of the text-editor, the age-expected homogeneous sex groupings whenever the children had power to select group or pair membership. The differences between the classrooms involved the media for the indirect teaching of the use of the computer and the personnel involved in teaching and use: In the classroom without the "parts" problem, the teacher became expert at using the computer, provid-

ing varying gradations of help to the children while they were using the computer and supplying them with successively more complete wall charts that summarized the text-editing procedures which could be used. In the other classroom, one of the boys became the expert and instead of wall charts, only copies of a standard manual were available for reference. Furthermore, in the "parts" problem classroom, children worked on the computer in same-sex groups of their own choosing, while in the classroom with the more extensive knowledge spread, children worked in pairs as assigned by the teacher, and the pairs were often mixed in terms of the sex of the children and the abilities they displayed with the computer and elsewhere in the classrooms.

Michael's study confirms both the pessimism and optimism of the Mehan group's study. Where they could, the structures supportive of sex-differentiation expanded into the use of the new technology and made the "part of the population" problem worse, at least to the extent that they found a new arena to operate in. On the other hand, when an expert teacher becomes an expert user of the new technology, old technology (e.g., a wall chart, and sequenced or "titrated" information supply) made more extensive knowledge available to the students, making inroads on the problem about restricting education to "part" of the domain of activity. Although limited to a few cases, these detailed studies give us reason to worry that a laissez faire attitude toward social organization or a "teacherless" instructional strategy during computer introduction may contribute to the recapitulation of the status quo, including less effective education for part of the population and limited education for all.

THE BASICS

Detailed studies of computer use in schools are few and far between, but those that use broader strokes to study patterns of diffusion of microcomputers into the schools indicate that pessimism should have the upper hand in our evaluation of current computer use. Impediments to equal and full education that already exist in schools are magnified. The distinctive impediment we will focus on here arises from widespread acceptance in educational practice of a "two-level" approach to curriculum sequencing which is often justified in terms of a "two-level" theory of mental abilities.

The two-level approach assumes that some groups have more "upper level" abilities, which can best be stimulated by "upper level" experiences, while the remaining groups can best be stimulated by "lower level" experiences. Likely candidates for the "lower level" experiences are children from families that are ethnically and economically in a different group than the theorists and educators, i.e., groups we call minorities. The computer adapts all too well to this approach, reflected by the fact that, even when

minority group schools obtain computers, the quality of usage is judged low (CSOS, 1983–1984; Shavelson et al., 1984). "Low quality usage" is variably defined: In the Shavelson et al. report, it refers to "non-orchestration" methods of organizing computer activities, which happens most often with minority group schools. In the CSOS report "low quality" refers to drill and practice programs in place of "enrichment activities."

The "drill and practice" emphasis in minority group schools implicitly adopts the recommendations of Arthur Jensen (1973), who has developed a two-level theory of mind and instruction that characterizes "level 1" as "rote learning" (which easily translates into "rote drill and practice") and "level 2" as "transformations on the input" (which easily translates into "more flexible and intelligent mental work"). Drill and practice computer use fits with level 1 curricular strategies that require, for example, mastery of speed and accuracy criteria at letter and word recognition before the student is allowed to engage in comprehension lessons, or that require automaticity of basic math facts as an entry requirement to other mathematics activities (e.g., word problems or the use of mathematic reasoning and concepts in science and other domains).

The widespread use of this educational strategy has, where proper management techniques are used, brought children up to grade level on "the basics" but failed to "boost" them into the higher order activity. Widely discussed as the 3rd–4th grade watershed, the heavy focus on level 1 skills seems to help children do only what they were trained to do in a rote way; There is no "transfer" of the achievement up into the "higher level" of learning. A number of minority group children get stuck at level 1: They are not exposed to practice with activities at "higher" levels of the curriculum when they do not demonstrate mastery of "the basics." This failing is then attributed to the children's own lack of ability for the "higher" skills, which they were neither tested on nor taught.

The circularity and incoherence of such pedagogical moves are apparent. There are empirical objections as well. Mandler (1977), for example, shows that there are excellent reasons to believe that the "level 1–level 2" theory is wrong, even for the experimental data that justified the distinction in the first place. Mandler's work displays that the complex integration and elaboration that characterize what might have been called "rote learning" make it impossible to dichotomize this activity from other "transformations on the input."

THE ALTERNATIVE

Essentially, the alternative position, and the one we prefer, is that *many roads can lead to excellence*. We can entertain a unified non-relativistic goal: flexible, creative use of mental and cultural tools. But, we can expect

that precise definition of excellence and new inventions of mental and cultural tools will be varied and enriched if we are able to overcome the gatekeeping established by level 1 type practices in education. In effect, we propose to admit many different "first" level activities into computer use in schools and to test whether our educational system can capitalize on them to serve our goal. This position provides a clear impetus for engaging seriously in work with members of other cultural groups that have different practices and different traditions. We are impelled to work with as much cultural and individual variation as we can find.

Many different, even contradictory, sets of activities are rote or routine at different times in different societies. In the socio-historical context of education and psychology, a certain set of activities (e.g., letter–sound decoding) came to be routinized along with a certain variant of approaching them (e.g., with speed and accuracy). A cursory view of the history of reading (Wolf, 1976), writing (Schmandt-Bessarat, 1978), and literacy pedagogy (Resnick & Resnick, 1977) shows it could have been otherwise—was in fact otherwise at different times, in different places. But, events ranging over time from the adaptation of an alphabetic system, the inventions allowing print to be a mass media, the use of written standardized tests for military selection, the appropriation of educational systems for selection devices in general—such events made appropriate particular activities performed in particular ways. Concurrently existing mechanistic theories and metaphors of mental activity provided a placement of these as reducible components of other activities which were not currently seen as routine. These same theories and metaphors also provided a rationale for sequencing these reducible components as prior in skill development to other skills, as well as a rationale, based on a zero sum notion, for the "automaticity" of these routines being linked to successful performance on the whole task including those parts not seen as routine. Hence, we, currently, have arrived at level 1 and level 2. Seeing some variation in the population with respect to the appropriate routine activities, social policy promotes a prosthetic device to make routine the activities which appear to be lacking in some members of the population. Hence, we have arrived at drill and practice.

We do not believe that we need or should arrive at these places. As Rohwer (1980) points out, or psychology and social policy provides treatment for children in difficulty based on what we assume the successful children have passed through. But those successful children, unburdened by our treatment, continue to achieve, while those we treat "get poorer." We can only assume that with rapid change in our technology and economy, we will get worse and worse at guessing which activities should be at a rote or routine level for future success and worse yet at guessing which variant of those activities will prove most valuable and most amenable to effective educational treatment.

In our understanding of the processes of change, we need not follow this course. We can, instead, support many courses of development of expertise around larger activities. In the course of these activities, we can appropriate whichever approach the child uses for subordinated parts of the activity, providing not only for practice at the kinds of routines that work for the child in the activity, but also providing for their integration into the larger activity system which makes it sensible to routinize them in the first place. Although we want to end with uniformity of access and contribution to the developing repertoire of cultural tools and activities, we must begin with the variety that is currently available.

Thus, our definition of an educational activity: a medium, constituted of and coordinating cultural tools, which provides for the invention and growth of routine and nonroutine flexible activities on the part of the child. Educational activity takes advantage of the variation within and among children to promote activity suitable to current and changing conditions. The bonus here is that even if our guesses at the larger activities valuable for the future are not very good, we will have preserved the variation needed to meet them when we have a better idea.

AN EXAMPLE OF THE ALTERNATIVE

We provide only one example of research/pedagogy that is motivated by our view. We do so in order to provide the extended narrative detail that is needed to present work which is outside the currently standard paradigm. The example involves writing, computers, and children whose school experience usually consists of writing and computer use experiences that are very restrictive, easily characterized as strict rote drill and practice.

Some years ago, we started doing our research with children who had been identified as being in the bottom 20% of their elementary school population, according to standardized tests and teacher report. We built "American style jukus" (see DeVos, 1978 for the Japanese origins of jukus) so that we could engage the children in activities and social structures not usually found in elementary schools, at least for those in the "low" group.[4] Jukus are after-school schools that meet somewhere in the community for a few hours a few times a week. The communities and the children in our projects are diverse in their cultural and language backgrounds but are mostly work-

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[4] The "we" involved in jukus include other members of the Laboratory of Comparative Human Cognition, especially, in addition to the authors, Catherine King, and members of the Community Educational Resource and Research Center, especially Alonzo B. Anderson, Esteban Diaz, and Luis Moll. By joining our research efforts with CERRC we were able to profit from the diverse expertise they bring to the enterprise by virtue of their history and affiliation with Hispanic and black communities.

ing class. While school-related tasks are involved in the jukus, neither the curriculum sequence nor the social relations common to schools need be involved. One visitor to one of our jukus, Marge Martus, an educational researcher, captured the flavor of the setting best when she commented that there was a great deal of movement and talk and a great variety of participants milling around, but, in the midst of the hubbub, it didn't seem that any child was "off task." Our response was that it would be like running through a rain storm trying to avoid the raindrops—there are so many tasks in the jukus that any child is bound to be "on" one of them. And so it is with writing in the jukus: the children can hardly fail to engage in some tasks that implicate writing of some sort.

The particular sort of writing in this example is quite unusual. If two parties are logged onto the same large computer via two different remote terminals, they can "write" or "chat" to each other in real time. The mode is like a phone conversation, but it uses the technologies of the written alphabet and the computer as well as telephones. The deaf community has a routinized practice involving this mode, using TTY's (teletypewriters). Our juku sites use microcomputers with telecommunications hardware (acoustic couplers or modems) and software, and ordinary telephones. The participants make a local phone call to connect with a large multi-user time-sharing computer on which we have established an account for use in the juku. The account can be used for electronic mail and a variety of other activities as well as for the "write" function. A record of the written conversation can be stored in a computer file for later analysis, editing, or revision.

Our interest in "write" is quite simple: It can be a part of a variety of activities in which writing is used; some of those activities may be of interest to children who might otherwise resist engaging in literacy. It has potential as a *means* for development of literacy and for microgenetic, ontogenetic and sociogenetic research on literacy development. Thus we are working to create activity systems that can serve the purposes of research and of teaching/learning.

In principle, we want a strong contrast to a level 1–level 2 system. We want to severely underspecify what counts as the initial writing acts by the children (in contrast to the heavily specified acts of a level 1 theory). Furthermore, we want to promote the accomplishment of an end state which is open-ended, creative, and flexible, and which allows access to the culturally elaborated processes and products of literacy in order to elicit inventions of new products and processes to be incorporated into the cultural store (in contrast to the current level 2 theory). To evaluate our success in these activities we judge whether the activity has elicited writing of various types from various children and whether we are able to elaborate on the children's initial activities so that a variety of sophisticated uses and functions of literacy are available to them, no matter how they started.

The chronological account which follows details the ups and downs in our progress: the plans, the accidents, the reflection and analysis, and the recalibration of our goals and plans. We end with new beginnings.

1. International Exchange

The very first appearance of real-time written communication in our work with children was in an unusual international event. It gave us ideas about trying to use the mode in a more systematic way. Children in Pistoia, Italy,[1] had exchanged electronic mail, ordinary postal service mail, newspapers and videotapes with children from our San Diego jukus. We arranged for a written conversation via computer between the two groups of children. The researchers primarily in charge (Diaz in the U.S. and Duranti in Italy) had quite modest goals for the half-hour event: They wanted to see how this mode of communication would further substantiate the exchange between the children. Four observations were made about the children from the U.S. jukus during the event:

1. *Audience.* At first the children's participation in the event was limited. They responded to adult questions and carried out adult initiatives. Although the children were interested and pleased to be involved, much of the control and direction of the activity resided in the adults. Then we brought in a newspaper article that had been sent from Italy. The headline mentioned San Diego; a large photograph of a child seated at a computer had an Italian child's name under it. In many respects, the children already "knew" that the communication was with peers in Italy, but the introduction of the newspaper article produced such changes in the children's behavior that it seemed as if the knowledge was new. Suddenly, the children came up with many topics to put on the floor (screen?): names, ages, sexes, favorite computer activities, favorite singing groups, school and home daily events, and, eventually, the issue of time differences.

    This more active involvement of the children following the introduction of the newspaper from Italy demonstrates the interrelatedness of different modes of communication as well as the effectiveness of the larger activity (in which the real-time written conversation was embedded) to motivate children's communication. It also points to the need to understand the concept "audience" and the mechanisms by which a potential audience becomes an effective audience for youngsters.

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[1] Our colleague, Alessandro Duranti, had participated in our jukus in San Diego and found Italian researchers and educators who had an interest in developing some related activities. He, Mary McGinnis, Sasha Cole, David Keenan and Elinor Ochs worked with Italian colleagues, including Laura Benigni, Patrizio Zini, and Sonia Iozzelli to set up a computer component of an educational effort in the town of Pistoia.

2. *Time*. The children "knew" in many ways that the time of day in Italy was different than the time of day in San Diego. Besides having school exposure to this, the children had their schedules disrupted, arising very early and coming to the computer room in order to communicate before the Pistoia children had gone home for the evening. Still, time differences were treated as an interesting and novel topic of the written conversation. That the Italian children already knew what happened in the afternoon, while it was still morning in San Diego, was a topic of conversation in the face-to-face setting among the American children and adults as well. The real-time nature of the written conversations gave substance to the rather abstract notion of time zones.

    In a sense, the telecommunication event functioned as a laboratory experiment for a study of time differences. While there is a movement to foster "writing across the curriculum," including writing in science classes, this experience suggests a somewhat different relationship, where science moves in on written communication activities.

3. *Language*. As bilinguals whose home language is considered a minority language, many of the San Diego children had experiences with interlingual successes and difficulties. They "knew" that the children in Pistoia spoke and wrote Italian and studied English as a foreign language. All three languages appeared on the computer screen during the written conversation. Bilinguals, available both in Pistoia and San Diego, played a very important role. In addition to the functional value of bilingualism, another observation about language was made by several of the children. Afterwards, while reflecting on the event, they puzzled over their ability to understand some of the written Italian without the assistance of the Italian bilingual or the bilingual dictionary. This expertise contrasted with their experiences with written English and Spanish. Quite often, they could ignore some of the Italian spelling and look at the middles (roots) of the words in order to get the gist of the meaning in the context. The ability was lacking on the part of the English monolinguals or monoliterates present, even the adults. The children concluded on a note of comparative linguistics: To say that Italian and Spanish are different languages is not the same as to say that Spanish and English are different languages.

    The telecommunication provided an opportunity for the recontextualization of the children's bilingualism, including an opportunity to engage in sophisticated analytic activity about this everyday fact of the children's lives.

4. *Initiative*. Each "breakthrough," about time, audience, and language was associated with (and noticeable because of) disruptions in the orderliness of the face-to-face interactions. As the children became

more active subjects, they jostled to get nearer to the keyboard or screen, spoke in overlapping turns and code-switched between English and Spanish, complained about the slowness of the current typist or translator, and worried that the latency preceding an answer from Italy was due to some infelicity in what the last turn-taker had written. As the children found motives for composing, typing, reading and rereading, there were reverberations in the social ordering of the event. Some of the children became upset about their own perceived lack of ability. Some became upset about the inability of adults to help. Each "wave" of disruption settled down in the flow of the demands of real-time communication with the Italian interlocutors, but each settled period had more children physically positioned in the forefront of the activity and more "authoritatively" in control of the direction of topics and distribution of turns.

These observations compel us to reconsider two notions related to studying literacy: a) the role of social discord in processes of change in contrast to assumptions underlying current practices that focus on classroom management techniques designed to minimize discord; b) the active development of "authorship" or ownership in contrast to assumptions underlying current practices which arrange for ownership of literacy products merely by guarding against the possibility of some other "owner" being introduced into the writing event.

Overall, the "computer chat" with children in Italy showed us the value of real-time written conversations for fulfilling our goals: Children who were stuck with simple rote writing in their ordinary school experience could become very active participants in literacy events that involved interesting topics in some depth. We brought this lesson home and started engaging the children in our jukus with "writing" in real time on a regular basis.

2. Children's Written Phone Calls

The children first used "write" among themselves: children from one neighborhood juku contacted children from a distant neighborhood. The content was about names, ages, grades and "favorites" in sports, music, colors. The typical pen-pal routines were broken only by two sorts of discussions, both peculiar to the jukus. First, there was some discussion about computers and particular programs. For example, a math game (Levin, 1979) with an authoring system was used by the children to make up games that were fiendishly clever, and the "write" system was used to issue challenges, negotiate rules and make other arrangements. Second, there was some discussion of the individual child's ability with respect to using the computer; for example, a dispute arose about the trade-offs involved in the mechanics

of writing: the trade-off between speed and accuracy in real-time communication was one part, and the trade-off between a child typing independently or having a speedy adult helper was another.)

This use of "write" appealed to some children. We collected information about the interest and capability of the children to use alphabetic literacy that seemed beyond them when they engaged in standard academic tasks. But, there were four drawbacks: First, some children were not interested in this as a literacy activity or did not maintain an interest in it. For instance, when Adriana and Martha finally came to grips with the fact that the computer was using an ordinary telephone line, they wanted to stop doing the computer "write" and call by voice phone to their electronic pals. Second, some children seemed interested and content to maintain a great deal of adult control of the activity by the "helpers" with whom they were face-to-face in their juku setting. Third, changes in the time schedules for the jukus made child–child sessions difficult. Finally, when the communication was child-to-child, there were few chances to develop topics that would stretch the children's writing skills. The usual content was quite stereotyped and a far cry from creative writing or problem solving writing that would be useful in a variety of other ways in the children's lives.

In summary, the "parts" problem was not addressed to our satisfaction. We were still missing some of the children and we were still missing some highly valued uses of literacy.

3. Low Performance in the New Mode

Trying to overcome these problems, we switched to discourse between adults and children, still using the "write" mode. The participants were children at the jukus and adults at the University. The discourse consisted of questions and short answers, with little disjunction between social role and discourse role. The only thing the children asked about was the adult's name. This was quite a setback. We had session after session of monosyllabic responses from the children, the sort of language use that is common in stressful testing situations and the very sort that Labov (1972) criticized as a poor representation of children's true language ability. We did get them in writing; but monosyllables they were nonetheless. According to field notes taken at the juku sites, the children's "yes," "no," one-word, and "I-don't-know" responses were enthusiastic and optimistic in contrast to the stress exhibited in test situations. However, we were not able to reduce the effect of the asymmetry between researcher and children enough to get written language that was any better than the sorts of language use the children experienced in their "level 1" ordinary classroom practice. We had a visitor well versed in interviewing children, Charles Crook from the University of Durham, try his hand at it; it seemed that the adult–child asymmetry combined with the literacy mode was too difficult to overcome.

Two indicators of what might help were apparent in the record of these exchanges: Playing with the keyboard and screen elicited long exchanges from the children; that is, when the adult made designs by using nonalphabetic symbols (* : ¦ % $ #), the children entered the activity with great fluency and verve and invented some non-modeled strings. They also initiated this kind of play without invitation or instruction or request from the adults. The second indicator involved an adult deficiency: when the children used a Spanish word, the adult asked for information about it and the children proceeded to "run" a series of exchanges, carefully including some Spanish that would have to be asked about in each bit of information that was given. This, too, had a playful character, but, more importantly, it broke into the asymmetry by reversing the social power relations and discourse roles. Nothing of substance was developed as a topic in either of these kinds of exchanges however, and so we sought for other solutions that could build on these.

4. The Birth of the Electronic Written Rap

A clear potential in computer communication was our first ally. It is difficult to tell much about who the interlocutor is when communicating on the computer. We could ward off the monosyllables by not assuming personas that supported the asymmetry between adult and child. Our second ally was the liberating effect of play, but using full verbal means (not asterisks and percent signs, not the adult's deficient language skills). When we engineered the written conversations to take advantage of these potentials, we found that the discourse roles were reorganized, that the children's fluency in writing was unleashed, and that a genre that is effective for many of the children, the "rap," made an appearance in written form.

Here and in the next sections we will provide some transcripts of the "write" sessions. To read the data, some aspects of the situation must be kept in mind:

1. The "speakers" are separated by many miles but are communicating in real time. In a public room in a working class neighborhood, there is a dyad or group that constitutes one "side" of the discourse; the participants there include one or more elementary age children who are low performers and a university undergrad (often one who shares the ethnic and class background of the children). In an office at the university, the other "side" of the discourse is carried on by an adult researcher or a group of them.
2. The "speakers" are actually typing and reading on a computer hooked to a telephone line.
3. The ubiquitous "ga" in the data records means "go ahead". It is necessary to signal turn completion in this mode. "ga" is similarly used over Citizen Band radio and with teletypewriters in the deaf community.

4. We have added the name identifiers to indicate who is the "writer" for each turn. These names do not show up during the written conversation. Field notes and interviews with the undergraduate participant observer were used to identify the speakers. For this presentation of the data, we have omitted some of the elements that are introduced by interference from the telephone lines or the computer systems. Any other discontinuities in the discourse are remarked upon in the transcripts. The line length as transmitted during the event is preserved in this presentation of the record. Since the listener/reader does not receive anything until the return key is hit, short lines help to signal that the speaker/writer is still there.

5. Everything after the colon (:) shows up on each party's computer screen, line by line, as the sending party hits the return key. New lines are added to the screen at the bottom; eventually earlier parts of the message scroll past the top of the screen. The discourse is simultaneously saved in a computer file and interpreted with reference to participant observation field notes.

Example 1 illustrates the change in the discourse that preceded the emergence of the "written rap." Teresa has an opportunity to question and challenge in this discourse; the adult still has information ("-csh" and "control-d") that indicates asymmetry, but the child introduces and pursues the topics.

Example 1	(Teresa and Aida are on a terminal connected to a phone downtown at the Mt. Erie juku; Teresa is a fifth grader and Aida is a college undergraduate; the adult is a researcher on a terminal on the UCSD campus.)
Teresa:	hi who is this ga
Adult:	who wants to know ga
Teresa:	teresa
	what does -csh stand for? ga
Adult:	csh? csh? maybe csh stands for
	cash
	ga
Teresa:	well, it is what you were doing before we wrote to you. ga
Adult:	how did you find that out ga
Teresa & Aida:	because we used "w" to find out who was on
	and that's what you were doing. -csh ga
Adult:	so, are you guys spys or something?
	How do you know so much about this machine? ga
Teresa:	I learned it from Aida ga
Adult:	So, you are a spy for Aida! ah hah!!!!!! ga
Teresa:	you never told me who you are
	and i am not asa spy ga
Adult:	well, I'll tell you the other thing you asked about—
	if you remember what it is you asked AND
	if you promise not to tell Aida. ga
Teresa:	I'm going to make Aida close her eyes,

(The connection between the parties is temporarily lost. The Adult screen shows "EOF" [for end of file]; the child's screen shows a "%" that indicates the "write" function was terminated and that something new can be done. Teresa and Aida "write" to the adult again; so that a "Message from..." shows on the adult screen and then Teresa resumes:)

Teresa: what happened? ga
Adult: I don't know -- seems like the
               computer thinks that you or the telephone
               line is sending a <control-d> because that sign off
               is what happens when there is a <control-d>
               Now do you remember the thing you asked
               me about that wasn"t the bi secret of my name?
               ga
Teresa: yes, what is -csh
               ?ga
Adult: -csh means this:
               sh is for shell a c is the name of the language that
               this computer system understands so -csh means hat I
               was sitting there at the shell level and
               about ready to do some fancy work. Now don't tell Aida. ga

This seems to us to be the trick: have the child be an active subject as indicated by discourse roles while not pretending that the adult fails to have information and experience advantages that are useful for the child's pursuit of learning. There is a certain involuted nature to the topics in this discourse: They are about the computer being used, but the discourse holds promise.

Later on the same day, Teresa went about other activities at the juku and Renee and Veronica (sixth graders) joined Aida to have a written conversation with the adult at UCSD. Again, in response to the children's request for identification, the adult responded by asking who they were. The identified themselves as a group, using the name of their juku, the Computer Breakers. Example 2 picks up the discourse at the adult turn. The ease with which the children are controlling the situation here is apparent. Veronica's complaint ("we going to tell you just wait") is fully justified: there had been no "ga" and the adult was jumping the gun, not being responsive to the turn change at the remote site when Vernoica took over from Renee.

This disruption in Veronica's turn nicely displays the hybrid nature of this written conversation: The complaint part sounds like an oral exchange, but the clauses that follow appear "written." According to the field notes, no notice was taken of the copula absence in the complaint (we going to) as is appropriate for the dialect of oral language spoken in the neighborhood; but the other clauses were monitored in ways appropriate for written language. There was monitoring for meaning ("iwe" was an imperfectly executed attempt to change from I to we), for written language mechanics (the

Example 2
Adult: why do you call yourselves the computer breakers? ga
Renee: But Veronica has been here longer than I have
              so she will tellyou why we call
              ourselves the computer breakers.
              (There was a lengthy pause.)
Adult: hello hello ga
Veronica: WE call ourselfs computer brwe going to tell you just
              wait
              iwe are called computer breakers because
              we know how to break and we are like a
              club and use computers. we are a o.g.
              team so we wanted a o.g. club
                              ga

change from the reflexive "WE call ourselfs" to the passive construction "we are called" solved a spelling problem that Veronica commented on as a problem) and for written language syntax (the appearance of the "are" form of the copula and the use of periods was discussed by Veronica).

Example 3 illustrates the preconditions for the emergence of the rap. First, the adult was taking full advantage of the vague identity afforded by this mode so that some activities would not be ruled out based on her actual identity as an white adult university researcher. At one point there is a "bluff" about "O.G." lest the children dismiss her as a lame for not knowing what it stood for ("only girls" as Veronica later subtly reveals); at another point there is "gossip" (I heard...) and a comment on the usual gender patterns for raps which suggest that the interlocutor is in a social network with the children.

Very important for the future developments of our enterprise, this exchange named a language genre, the *rap* and provided some material for use in a rap, namely, the girls' prowess at double dutch jump-rope. The rap had recently developed as a nationally recognized form of verbal art: it is a form of discourse with complex rhythm and rhyme characteristics that had gained prominence as an accompaniment to the popular "break dancing" performances/contests that had entered popular culture. It is an oral discourse form. In addition to being recently highlighted in records and movies throughout the country, raps have a special significance and history in the black community of which these children are members. Rap discourse not only promulgates information but is an entertainment and a means of establishing social ranking in the community. It is most often and most artfully used by adolescent males. Very important for our purposes, the rap is a genre that affords monitoring of performance, evaluation of performance, and the notion of improvement of performance over time. It is a cultural tool with great promise as an element in educational activity.

Example 3

Adult:	O G you are an O G team? I don't believe that! Do you mean to tell me that you think that I will believe that you are an OG team Humph!!! If I believed that I would believe just about anything!! prove it. ga
Veronica & Renee:	come over to m.t. and we'll tell something to prove it! we'll even tell you a rap we made by our selfs! ga
Adult:	girls made a rap? now I know you don't expect me to believe that! ga
Veronica:	aha thats why we made a video but we let the boys do the breaking because we had on dredresses. i hope you saw it so you can see what the boys did and the girls said ga
Adult:	I heard about a video but I heard that the girls moved more thantheir mouths I heard that they did some things with a jump rope that would make everybody sit up and pay attention. Are you those girls? ga
Veronica & Renee:	yes we played a little double doutch and jump rope. we have another club but it is only girls and no boys no grown ups eather

While raps had been mentioned and we can see the potential of using them, there was still the problem of their mode: they were oral language tools, not written language, not computer communication. The attempt to make a transition to another mode turned out to be very simple, a fact no doubt related to the oral/written hybrid nature of the "write" mode. Immediately following Veronica's turn concerning double dutch and her reinstitution of the O.G. topic, the adult attempted to construct a rap (Example 4). Our response to this example, even now nearly a year later as we engage with it as an object of study, is amazement. There was a virtual explosion of language. It was fast—word-finding and key-finding were so subordinated in the written raps that it seemed as if the raps jumped from the mind of one interlocutor to the other's computer screen!

The interruption in the third line of the adult's turn (of Message from...) indexes this significant moment: When the children saw the first couplet (a little double dutch/that ain't such much—last line courtesy of Dave Van Ronk, a musician who bridges traditions of black and white

Example 4

Adult: a little double dutch
                                that ain't such much
                                but a lot of Message from......
                                oops you interrupted me want to see the rest of my rap?
Veronica & Renee: yes
Adult: a little double dutch
                                that ain't such much
                                but a lot of double dutch jump rope?
                                then all the rest better give up hope.
                                ga
Renee: you think you are cute
                                and you think you are
                                live you need to cut
                                it out cause its all
                                in your mind.
                                ga
Adult: you know I am cute
                                and that's double to boot
                                and you gotta mind because you
                                got not mind !!!
                                ga
Renee: you wis you were cute
                                you wish you were cute
                                but you are a mute
                                ga
Adult: I don't mind
                                cuz I can sign
                                ga
Veronica: you got no sence in your head
                                cause your rap is dead ga

American music), they jumped toward their computer screen, accidentally closing off part of the communication channel as they leaned on the keyboard; with no assistance or prompting from the undergraduate, Aida, they executed the "write" function again, causing the system to print "Message from..." on the adult's terminal. It is very important to know that their accident did not cut them off as listeners/readers; it just cut off their opportunity to respond. To be the recipient of a rap is to be ready to respond; the children demonstrated their status as active subjects of the rap event, as well as knowledgeable users of both the computer and the rap as cultural tools.

Renee, who earlier (Example 2) had contributed only an explanation of non-contribution, found her voice/fingers in this genre. Her first rap is not just a mimic, having a different rhyme scheme than the adult's prior turn (a quatrain, not two couplets). The hybrid oral-written nature of the "write" mode and, consequently, of the written rap is clear in Renee's turns:

Although the "live" and "mind" rhyme depend on Renee's oral language dialect, the spelling is standard for written English; In her second turn, she noticed the missing "h" on wish only after she had hit the return key and transmitted it; The only way to act on this monitoring and evaluation, at this point in the "write" mode, was to retype the line. Notice also Veronica's "cause" following the adult nonwritten standard spelling of "cuz." Again, it is not a mimic and it demonstrates the writing in "write."

At the time of the rap, and now, Veronica's Vygotsky-esque message is especially appreciated by our research group: The relation between thinking (sense in your head) and speech (rap) is brought to the forefront (cf. Vygotsky, 1962). Unfortunately, the adult, in ignorance of the rules for ending a rap, complimented Veronica's turn, unwittingly signaling the end of the rap in Example 5. Renee properly interprets the ending the adult didn't intend (but that the rap genre determines) suggesting that to the winners should go the spoils of the adult's "big secret"—the name. The adult lamely tries to carry on, ignoring the closure that had been invoked, but both children reject this anarchy. They provide appropriate closings by the "winners:" ones that demonstrate their superior control of the rap genre. Veronica responds, now adding social relations (forget you then) and affect (you are mean) to her Vygotskian comment about raps, moving to a quatrain rhyme scheme. Meanwhile, Renee enlisted Aida's help to fashion a closing of some com-

Example 5

Adult:	I like your style
	you beat my by a mile
	ga
Renee:	now that we finished
	our game
	what is your name?
	ga
Adult:	my name is mine but I'll give you a sign
	for every letter in my name
	there"s a number in this game
	ga
Veronica:	forget you then you are mean
	thats why your rap is a bean
Renee and Aida:	take it slow cause
	i've got to go
	carla going to run this show
	ga
Adult:	16 5 and 7
	that's my name and it's heaven.
	ga,Carla, ga
Veronica:	your name is peg and your rap is dead
	ga

plexity: a couplet with an internal rhyme in the first line and with a complex rhythm pattern: /uuu/u(u)/. At the same time, Renee and Aida perform another part of the rap ritual, turning the floor over to the next rapper who is waiting in the "wings." The adult, incoherently for the rap genre, tries to reinstitute the name and number game topic but does accept the change in speakers. Veronica beats the adult at her own game and delivers the final end to the rap among these interlocutors.

Word of what was going on in the telecommunications center of the juku spread. First, in the middle of Example 4, the word spread among the children attending the juku that day. Many people arrived along with Carla; they jostled for turns to do written raps, made alliances to share turns, discussed issues if equity and excellence as a means to decide who should have turns and eventually had to be cajoled to go home and stop writing. Second, in the university, the researchers looked for aids to work with this genre: A member of the University community, Billy Vaughn, who is also a member of the black community was enlisted to help out; A writer, Sheila Cole, provided a rhyming dictionary to help out the non-native users of the rap. Third, in the seven following days, the word spread through the neighborhood of the juku and older children not previously involved in computer communication started to come by and "check it out."

5. Untoward Consequences of Written Raps

In the next meeting of the juku, two days later, the written raps continued. The artistry and fluency of the children, their speed and flexibility with the "write" mode in the rap genre, was truly impressive. All of the children were intrigued, involved and active; some were recognizable and lauded as more expert practicioners. Then, a weekend intervened and seven days after the birth of the written rap, a truly dismal experience occurred.

Important background knowledge to interpret Example 6 is the role of the rap in the schooling in the neighborhood. It was outlawed. Raps were not done on computers, they were not written, they were not supposed to be engaged in on school grounds, not even in the playground. Raps were classified, along with other verbal genres native to the community, as not permissible in polite educated company. There has been enough said and written about the problems engendered when the school requires that children give up their cultural and language heritage in order to succeed at literate activity. It is clear that the fluency with language displayed by the children in raps was not available for educators to appropriate in the language tasks that were allowed in school. It is also clear that their implicit familiarity with the mechanics of poetics as demonstrated in the written raps would be good entry points for advanced literature courses that most of the children would never be allowed to take, since they would fail to meet the existing entry requirements for them.

We could know all this in a theoretic sense and argue against such stultifying policies. But the brute force experience of the consequences in this concrete case is more enlightening, and more depressing. The children had time and opportunity to discuss the sudden appearance of the rap in writing and on the computer in the juku setting which involved school-like tasks. Example 6 shows that they did not remove raps from the category "inappropriate" because of their experience the week before. Rather, the analysis appears to be "anything goes: if raps are allowed, talk about bums and fools and wiping butts and shutups are also allowed."

Example 6   (Many children are present, including some that do not usually attend the juku. They are older and have heard the news of the written raps around the neighborhood.)

Children: weare computer breaker and
we are live
we are rapping on the
mike from 9 to 5
ga

Adult: rapping on the mike
What's that like?
This is a comcomputer
and I'm a straight shooter!
ga

Children: you dont know you must
be dum cause you can't
afford no gum you bum
ga

Adult: Sure
Sure I inow know
My mind is HARD
I dop do my business
With the main WizARD!
ga

Children: your group is mad
your brothers sad
cause we are going
yo wipe your little
butt
ga

Adult: come on folks
no more jokes
we have a fine time
when we all rhyme
but you lost your stroke
and your broke
so what will you do?
Go to thje zoo?

(The rhyme and rhythm are not re-instituted; only the challenging nature of the discourse remains as an indicator of the rap. The turns continue but there is disarray in the discourse; only the conventions of the mode ("ga" and "o" for over or out) are available for coordinating the discourse partners. The children name an alternate genre "basing" that appears to be emerging in the place of the rap but the adult does not/ will not engage in this genre. The following excerpts are samples:)

Children:	we dont answer you nowe dont answer you kno
Adult:	ga??ga??
Children:	says og funky fresh
	ga
Children:	areyouareyou basing
	ga
Adult:	heavy duty dont get snooty
Children:	aretyouareyou are YOU BASING?
	ga
Adult:	well, you yes
	ga

(The adult, unable to regain coordination with the children, finally terminates the session:)

Adult:	have a fine holiday
	see yhou soon
	time we headed
	rouhd the moon
	when we get back
	we'll check the slack
	see you on line
	have a fine time
	˄ doln't feel bad, you guy are fine!
	ga
Children:	xd}i}iyou think your cool
	but your a fool
	ga
Children:	shetup
	ga
Adult:	get down
Children:	oao
	ga
Adult:	o&o
System:	%EOF (% consequence of Adult <control-d> and EOF consequence of children's <control-d>)

The rhyme, the rhythm, the intricacy, the fluency—it all disappears. The historical relation of raps to broadcasted oral language (rapping on the mike) is in the opening turn. The adult attempt to indicate the computer mediation of the current rap is not taken up, nor is his attempt to change topics

to involve the computer wizard with whom the juku members are familiar. The confused typing of single line turns in Example 6 are only excerpts from a long chain that betrayed no rhythm, rhyme, evaluation, monitoring, or coordination among interlocutors, but did contain various bits of "bathroom talk." To borrow from Veronica's earlier comment, there was no sense when the rap was dead.

The social organization around the telecommunication center at the juku was chaotic. Aida, the undergraduate, could barely function as an assistant to the children or as an observer. The overall impression is that the children had not maintained their respect for the artistry of the rap genre; instead they had accepted the implicit message of the school that it was just another part of "street stuff" or "bathroom talk." The merciful closing of the channel, indicated by the System turn, was the only successful element. There was no need to cajole the children to go home—nothing was happening.

6. Content Transformation in Written Raps

We were intent on reclaiming the rap genre and the "write" mode from the categorization that seemed to be operating in Example 6. We wanted to take advantage of the children's evident ability to write while rapping (Examples 4 and 5) so the children could take advantage of a fuller range of literacy activities. We wanted to introduce a range of topics that were worthy of extended thought and discussion and that could profit from literate activity. From work with children on electronic mail, computer-produced newsletters, and reading groups, we know they could have a lot to say and reason about on topics of current events and social justice. We reasoned that some "content" focus during the rap could prevent the kind of disintegration found in Example 6. The combined activity of "written raps" and discussions of importance would interact to support each other and leave no room for testing the appropriateness of other aspects of oral language in this setting. Substantive topics could be, in Luria's term (1932), "functional barriers" that would help to regulate the responses.

This indirect approach to the problem worked to reclaim the written raps that we and the children admired. Example 7 features a child from a different juku; he is not that much of an active participant in oral rapping, but the genre still does some work for him.

The adult uses a slogan promulgated throughout California over television and on posters, and suggests that child abusers like gun users should suffer dire consequences, using the word "bail." Pablo initiates the minilesson on the lexicon. In this juku setting, it is commonly the case that the children grapple with the problem, rather than attempting to "pass," when confronted with a word or language structure that is unfamiliar to them. Pablo's involvement in the rap and the topic of child abusers is indicated by his interest in the word "bail." It is clearly a side-sequence, firmly related to

Example 7   (Pablo is a sixth grader whose home and neighborhood language is
            Spanish. Pablo is being assisted by undergraduates; they report that he
            was not interested in participating initially, but changed to be actively
            in charge by the time the following excerpt occurred. The lead in to this
            topic was a claim (in rhyme) by Pablo that he wanted to communicate
            with Spain because he wanted to know if they thought about the same
            things that we did, this topic being an example.)

Adult: Hey thast''s not nonsense,
            that's no bluff
            let's get on a rap
            about serious stuff
            There's a war going on
            and there's no truce
            it's the war against child abuse
            ga

Pablo: that/s very sad
            and very bad
            it makes me very mad
            and I hope that we could have
            some peace ga

Adult: yeah -- use a gun and go to jail?
            huh! hurt a kid and there''s no bail
            ga

Pablo: i don/t understand the word bail
            could you lead me on the trail? ga

Adult: no bail?
            without money, without greens,
            you ain't never gonna get o}iut of jail!
            that''s what it means
            and that's how it seems
            ga

Pablo: so even if you are rich
            you don/t have to stay stiff
            and can stay out if it if you wish
            but if you are poor that/s it? ga

Adult: if they let you have bail that's true
            so for a child abuser what should we do?
            ga

Pablo: stick themj stick theml rich or poor
            leave them in there and close the door ga

Adult: that's a rap and you got style
            you'll beat those bad guys by a mile
            ga

Pablo: now we played your game
            will you tell us your name
            it/s been fun have this rap
            and I hope we have another chat ga

the topic, as demonstrated by his ability to integrate the sequence into the topic with his suggestion about what to do with child abusers, rich or poor.

Even in this short example, it is clear that a literacy device is being effectively used. Pablo has a chance to delve into his second language (English) and into topics of social concern. We had similar "content written raps" about apartheid, Ethiopian famine, and children born drug addicted. In general, the raps were faster, longer and more sophisticated with the children from the juku in the black neighborhood than with the children in the Hispanic neighborhood. It became common that the rap on a given day would be "about something," and that the first order of business was to negotiate the topic for the content filled written rap.

WHAT'S TO BE DONE?

The answer to this query has two parts. One aspect is the continuation of the narrative about our work with the children in the jukus; the other is the more general development of research that can grapple more productively with new technologies, basic skills, and the "parts problems" in education.

In our own work, we are focusing on two different developments from the use of the "write" mode on the computers with the children. One keeps the "content rap," but not the telecommunication; the other keeps the telecommunication and the content, but not the "rap." In one juku, the "content written rap" has become a genre to be included in the group's newsletter. Two young boys published the one shown in Example 8 in a recent issue of their newsletter. The joint activity of the "write" mode remains; but the

Example 8   Why I Don't Use Drugs
              Drugs are dangerous to your health
              You do them anyway and see your death
              Drugs ain't good they make you die,
              then your whole family will start to cry.
              Baseball and drugs are very silly,
              If you use them anyway you'll do a willy!
              Chuck Muncie is good, but he used drugs,
              if he keeps on doing it he will pull the plug!
              People who use drugs and go to school,
              keep on doin' it, they are a fool!
              We were walking down the street and saw this drug addict,
              He asked us for some drugs and we started to panic!
              We said, "NO WAY be on your way
              or else we'll kick you into the next day!"
              So that's what we think about using drugs,
              We don't do it because we don't want to pull our plug!

              Darell S & Atim S

composition was done outside of any telecomminication activity. The "write" mode in this juku sometimes functions like the initial phases of a process approach to teaching writing: a topic is discussed in a "write" and then, after this brainstorming, the children compose pieces on the topic or a related one, which can later be revised and published.

In another juku, the "content written raps" turned into what we call "composations." As the word suggests, the activity is an amalgam of a conversation and a composition. The conversation from the "write" mode is stored in a computer file and later edited and revised into a composition with a word processor. The "first draft" of the composition is a joint activity. The adult interlocutors can, in a natural way, provide the audience constraints that a child would have to imagine in more ordinary writing activities. Furthermore, the adult interlocutor can conversationally request the "more concrete detail" or "more explicit organization" that the child's writing might need. As the child edits the "written conversation" with the goal of producing an essay, a newspaper article or a letter, there are some unusual opportunities for thinking about writing and computers. The differences between dialogic real-time language use and language used in more usual kinds of writing are there to be reflected on, if only because the child needs to edit out the infelicities. The adult's preoccupation with details or organizational issues can be noticed and used by the children before they have independent ability to manipulate their writing based on such concerns. Since the written conversations produce quite a large computer file, the children get a chance to use the parts of a computerized word processor that their usual slender compositions would not encourage them to use. Instead of concentrating on "inserting" and "deleting," the children can work with the features that truly distinguish between a computer and a typewriter: global substitutions, cutting and pasting, spelling checkers, etc.

We do not believe that computers themselves, telecommunication itself, the "write" function itself, "written raps" themselves or "composations" will work automatically to make children better writers. We believe that each can, however, play an important role in organizing a system of activities that allow us to elicit more variable beginning points among the diverse children in our classrooms, beginning points that can be appropriated for the development of writing. By not insisting on uniform starting points or uniform roads to progress, and by capitalizing on the unity of joint activity, we think we can make progress toward more equitable and successful education. In the opening part of this section, we emphasized the importance of underspecifying the beginning point of a writing curriculum and working toward an open-ended, creative and flexible end state. We wanted to evaluate our work relative to the variation we could elicit and the use we could make of that. So far, our work on computer communication in writing development suggests that we have found an opening for productive work on the "underside of education."

The potential suggested by our first experience with the children in Italy has held up over time. We have a reasonable vehicle for research and teaching, one that brings out writing on issues of substance, effectively engages "audience" constraints in the teaching/learning of writing, promotes the inclusion of abstract concerns about language *qua* language, and allows for child initiatives where discord may be harnessed for growth. We see, too, that computers can be used in systems which have the properties that genres like "raps" in the black community provide for developing expertise—notions of monitoring, evaluation and improvement of performance over time.

A theoretical stance underlies the narrative that we have provided in this chapter. It influenced our observations and judgements about what to modify and what to take advantage of as we explored the educational potential of real-time computer-mediated written conversations. Set in a framework developed in the 1920's by Vygotsky (1962, 1978), Luria (1932a, 1932b), and Leont'ev (1981), this viewpoint on psychological research requires that attention be paid to the role of cultural tools in learning and development. By cultural tools are meant material artifacts (e.g., computers and telephones), materialized systems (e.g., alphabetic literacy), social interactions among people (especially those between novices and those more expert in a domain), and the historically elaborated techniques, genres and strategies (e.g., raps or essays) that sometimes differentiate among, but sometimes unify, cultural groups.

Clearly, then, our general orientation places particular value on our continuing to learn from investigations that involve cultural variability. This applies to domestic co-cultural work with researchers whose involvement with children from nonmajority cultural backgrounds allows us to see the ways around inadequate theories and practices that rely on a level 1-level 2 theory of cognitive change. It also applies to concern with the temporal variations in our domestic culture, with the changes that are beginning in what Noyelle (1985) calls the "new economy" and the consequent changing articulations with educational institutions. And, very clearly, it motivates us to find out what happens with new modes like "written computer mediated conversations" and unusual genres like "written raps" and "composations" as they interact with the theories and practices developed in cultures different from ours around the world.

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