OF CHAMELEONS AND WOULD-BE HUMANS

Françoise Herrmann

Many metaphors for the role of the computer in education have been proposed. Among these are:

- *the Magister/Pedagogue (Higgins, 1988);*
- *the Felicitous tool (Cochran-Smith, Kahn and Paris, 1990);*
- *the Lively stylus (Daiute, 1983);*
- *the Proteus of Machines (Papert, 1980);*
- *the "Partner/Tutee/Adviser" (Ng and Olivier, 1987);*
- *the "Stimulus/Knower-of-all-the-right answers/Workhorse" (Jones and Fortescue, 1987);*
- *the "independent/dependent" variable (Michaels, 1990);*
- *the "Library" (Barlow, 1987).*

Each of these metaphors reflects an understanding of educational computing informed by varying backgrounds and situated praxis. Thus, if we are to take the metaphorical process seriously (as Lakoff and Johnson have described it in their book *The Metaphors We Live By*), each of these metaphors also offers different conceptualizations for the role of the computer in education.

As cognitive processes employed to make sense of phenomena, each of these metaphors both structures experience and expands it, illuminating some aspects while remaining blind to others. This article offers a conceptualization for the role of the computer in the contexts of first, second, and foreign language education.

Background: Dual Uses

Current uses of the computer in education may be seen as dual. Designed as Tutors, TaskMasters and DrillMasters, some programs are agents in learning and teaching contexts, hence the reference to their *agentivity* (Dretske, 1985; Winograd and Flores, 1986). They supply a subject matter, paths of knowledge acquisition, a pedagogy deemed effective to impart knowledge, and ways of determining what constitutes successful performance in the form of right/wrong, correct/incorrect binary evaluations and answer feedback routines. With their varying degrees of textual, visual and audio contextualization, these programs constitute self-contained learning and teaching environments that tend to function independently of the classroom in remedial and adjunct modes.

Arising in a tradition of programmed learning, this design of educational computer tools reveals an endeavor to emulate human behavior and cognition, in particular human communication. Philosophers (e.g., Dreyfus, 1972) and scientists (Weizenbaum, 1972; Winograd, 1984) have argued and acknowledged the existence of irreducible differences between human beings and their tools; still, human-machine communication is at the heart of the Turing Test.[1]

There is great interest in the possibility of harnessing those contextual properties of language use which depend on the individual's unique experience. This interest translates itself in an attempt, for example, to program Socrates (the caring philosopher) in the tutorial dialogue of a new

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There is great interest in the possibility of harnessing those contextual properties of language use which depend on the individual's unique experience. This interest translates itself in an attempt, for example, to program Socrates (the caring philosopher) in the tutorial dialogue of a new

generation of Intelligent Masters (e.g., Sleeman and Brown, 1982; Wenger, 1987).

Programmed contextualization, then, depends on the set of assumptions one is willing to adopt about meaning in language use. When there is a belief that meaning is objective and external to the individual (i.e., contained in the linguistic system), programs that manipulate language in textual, visual and audio strings may be seen as interactive. Laserdisc technology, for example, combines the use of videos with branching and parsing in ways that enable the user to make linguistic choices.

In contrast, when there is a belief that contextualization of language is at least partially internal and subjective, then it is not possible to program human communication. Thus, for example, when the laserdisc program branches the user to a supermarket rather than to an airport because the user has picked that string of symbols, the program and the user have not entered into a negotiation of meaning resulting in some understanding of personal, affective, developmental, and circumstantial reasons that might have motivated the action (i.e., choice of linguistic symbols). It is this dimension that eludes representation and manipulation in objective form.

A well-known example from Artificial Intelligence is Weizenbaum's ELIZA program which emulates a psychiatrist. When the patient types in "I'm swallowing poison," the computer responds "For how long have you been swallowing poison?" Thus, we may fool and be fooled both by the program's language parser and our manipulations of linguistic symbols.

In contrast to the "would-be human" tradition of educational computer artifacts, though benefiting from the unquestionably formidable build-up of knowledge gained from it, there is another design tradition in education. In this design tradition programs are *empty*. Devoid of a pre-determined subject matter and the dictates of an explicit pedagogical method, these instruments are open-ended and *chameleon-like* (the term is from Turkle, 1984). Designed, for example, as HyperCard stacks, hypermedia, word processors, communication networks and databases, these programs depend on usage to define their educational function, just as their users depend on these tools for productivity and support in the envisioning and development of innovative collaborative classroom activities.

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Several of these programs, for example, have been used to support and create such collaborative classroom activity systems as the production of newspapers both within a single classroom and among classrooms located at geographically distant sites (Barson, 1991; The Copen Family Fund Inc., 1991); human simulations of international diplomatic activity on a cross-disciplinary and inter-departmental level (ICONS, 1993); international conversations focused on social and ecological responsibility (KIDS-91, 1991; KIDS-92, 1992); keyboard-pal letter writing (Apple Global Education Network-AGE referenced in Kurshan, 1991); a yearbook (Thornburg and Allen, 1991); a local tourist brochure (Bruce and Rubin, 1984); intra-school surveys (Martinelli-Zaun, 1993); and the creation of a classroom problem-solving center (Reissmann, 1990). Thus, when the chameleons are "in," deep changes tend to occur in educational contexts: tasks,

student and teacher roles, and language use are re-shuffled in major ways.

In this tradition, then, it matters both what programs can do and cannot do; and, it matters what their users do with them beyond and including program manipulations because there is an important inter-dependency between the two that is mutually transformative. Thus, for example, a HyperCard stack becomes a beautiful yearbook as it enters a context where every aspect of learning, teaching and administration subsumed by it are transformed. Examples from first, second and foreign language learning and teaching contexts are presented here as an examination of this process (i.e., what changes, how it changes, and tentatively, why it changed).

Producing a Newspaper

In this context, a group of foreign language students enrolled in the third quarter of their first year of French study at the academic level used the computer to produce a classroom newspaper (Herrmann, 1992). They used the computer to draft and revise their articles, to edit and format the articles into a whole newspaper, and to communicate with each other beyond the classroom context and for managerial purposes as everyone's work was stored in a shared directory for easy access, commenting and retrieval.

In this context the role of the computer initially arose as a tension between an existing curricular framework and the newspaper producing activity system that was to be integrated within it. Thus, two agendas and two sets of instructional responsibilities appeared to run co-currently: a computer-mediated newspaper production enterprise and the necessity to cover the contents of the last eight chapters of the departmental textbook methodology which included such major grammatical components as the future tense, the conditional, and subjunctive moods.

This tension was resolved in a number of ways, the most significant of which was in language use. Chiefly as a result of the teacher's *activating* the language structures of the textbook methodology rather than *presenting* them, the teacher was able to create formal and functional correspondences between the language use invoked by the tasks of newspaper production and the structures of the textbook methodology. These were *timely* correspondences. The future tense, for example, was activated by requesting students to commit to an activity of their choice within the newspaper activity. Similarly, the subjunctive mood was activated as part of the many updates and action-plan sessions for the newspaper production enterprise. Finally, modifiers of all sorts were activated during a wine-tasting experiment involving the whole class.[2]

This activation of language use enabled the computer-mediated newspaper production activity (and the diversity of personally meaningful tasks and actions that were subsumed by it) to become a part of the textbook methodological framework. As a result, the whole experience of learning and teaching French was transformed. As one student noted:

> *Doing the newspaper puts French in a more realistic context. We did something that was neither a paper, nor an exam but that gave us a French experience.*

Perhaps one of the most memorable instances of that experience was when the title of the newspaper was found (The Shrimp Plate)[3] and the whole class began debating in a literary mood the acoustic qualities of the adverb "carefully" over those of the prepositional phrase "with care" for the subtitle, "A feast of neat words carefully pre-

pared by the third quarter French students at U."[4]

A Database of Book Reviews

A group of 25 third/fourth graders at a public alternative[5] elementary school used one computer, one printer, and *The Bank Street Writer* to create a database of book reviews. This project was part of a larger language arts project where the children were also creating video book reviews in the television broadcast style of *The Reading Rainbow* and for which the computer reviews could be used as script prompts. It was envisioned that this database of book reviews could be used by the next class of third and fourth graders for browsing and appending and that the database could even be loaned to the local public library for consultation and appending there, too.

The children read books of their choice each day during Quiet Book Time (QBT). They worked at the computer to draft, enter, revise, browse, and print their reviews. In all 35 reviews were stored on a data disk—the database. The role of the computer here was most clearly visible in the context that was created for the acquisition of a computer literacy in the language arts that was different from programming and the "typing arts." Thus, while the computer functioned as a cohesive device in a language arts project, 14 out of 22 children responded to the question "What did you learn?"at the conclusion of the project with statements such as "delete, printing, typing, typing with two hands, capitalizing with shift key, how to do the computer, how to use the space bar."

The effort to harness both the operation of the machine and the program opened up another learning and teaching dimension in the language arts context. This was apparent in two ways. First, the children were slowed in all of their goals by the mechanics of computer use—the keyboard and the language of the interface. Secondly, once operating the computer was mastered, the children enjoyed the new mediational potential and they also performed better in their reading and writing skills.

The children did experience difficulty finding keys and positioning their fingers to perform such manipulations as booting and shifting. The children also had trouble reading interface terminology such as "character" and "retrieve.". Alternatively, when they could read such instructions as "Clear file" and "Enter date" they could not understand what they were supposed to do. Once these intial obstacles were mastered, however, the children had fun. For example, they enjoyed watching all the characters disappearing off screen when they used the delete key and they enjoyed zooming up and down files when they used the arrow keys.

As a result, they changed their texts without hesitation at both substantial and surface levels of language use. They retrieved files to read and comment on. They read their work on-line, correcting what they had missed off-line. They even requested more access to do their homework. Five of the children became tutors to others.

Database activities such as these make the interdependency of computer use and activity apparent in several ways. The computer made it possible to create a database of book reviews. The reading and writing tasks subsumed by the activity of book reviewing invoked computer operations. In turn, both book reviewing and computer use changed. Book reviewing at the computer allowed collaborative work, with reviews read and commented on by other children. This possibility tended both to channel the child's desire to communicate and to invoke conversational writing where the children disclosed themselves, addressed each other directly, and responded to each other's reading in writing.

Similarly, computer use to create a database of book reviews became clearly different from programming and the typing arts as it functioned to mediate an activity system and all of its subsumed tasks. A keyboard skill such as using the shift keys acquired its meaning naturally, as children wanted to make capital letters and to insert punctuation. Similarly, toggling in and out of edit menus became meaningful when there was a reason to print, save, and retrieve files. An alternative emerged to the telling situation expressed in: "I want to be a computer engineer when I grow up. If not, I want to be a typist."

An After School Program

Computer use here was designed to provide increased access and an enriched educational experience to elementary school children who were limited- or non-English proficient speakers (LEP/NEP). Coming mainly from Asian backgrounds and disadvantaged socio-economic situations, the children were still in the process of learning English as a second language. The program ran two hours a week after school for each group of about 10 children, most of whom were in grades three through five.

During that time the children engaged in diverse language experiences that they discussed in class with their teachers and wrote about at the computer using The Learning Company's *Children's Writing and Publishing Center*. The writing produced at the computer was then collected and pasted into a book, giving each of the NCC children a book containing a record of their educational experience at the centers.

The language experiences that the children engaged in were very diverse. They visited local museums, television stations, and the theater. They collected garbage in the neighborhood. They heard talks by professional members of the community (e.g., policemen, social workers, and doll makers). They engaged in seasonal activities such as trick or treating for Halloween and having a party for Christmas.

The graduates of the program (i.e., the children who had attended the program for one year) were enrolled in one of two level-two classes: science and cultural journalism . In these classes, activities were structured in the same way with children "doing" science (making batteries, burglar alarms, and dodecahedrons) and "being" reporters (reviewing restaurants). They talked about these experiences, wrote about them at the computer, and compiled the writing in their books.

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Here, the instructional and methodological vacuum of the computer instrument was the precisely the impetus of the staff needed to develop the highly innovative NCC program. Since the program in use did not supply subject matter for the children to manipulate, efforts were geared towards creating motivating and fun experiences for the children to engage in. From the staff's perspective this was also perceived as an asset because of the opportunities it presented to try out new ideas.

The computer with its pedagogical vacuum functioned as a catalyst for the development of an inter-disciplinary curriculum. Underlying this effort there was also a firm belief that basic and discrete reading and writing skills would be invoked in timely ways in the holistic experiences that the children engaged in.

The process of second language learning was transformed. From the staff's perspective there was a genuine shared concern and effort to offer a rich educational experience that would be motivating enough for the children to want to write about. From the children's perspective, the centers provided opportunities for new friendships to develop. They enjoyed the educational experiences they engaged in, and their hunger for more and diversified computer access was far from satiated. Computer use was also transformed from an electronic quill (the term is from Bruce and Rubin, 1992) to a gateway for socialization and engaging activities that spanned the curriculum.

Conclusion

The above examples were presesented to provide insight into what happens when the computer is used in an instrumental mode—what I choose to call transformative processes. It may resolve tension in an existing educational framework; it may add a new and interdependent dimension to teaching and learning in the language arts; it may serve as a catalyst for curriculum development; or it may be a gateway for socialization and engaging educational experience.

What these examples have in common is a recursive dynamic where the instrumentality of the computer is harnessed as users discover and create instrumentalities of their own. In each of the contexts shown, word processing was the computer application used. Yet in each of these contexts, very different projects were envisioned, developed, and realized. Perhaps then, these examples could lead to a re-thinking of agency—who it belongs to and what can be done with it—in a micro-world furnished with chameleons and would-be humans.

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Notes

[1] The Turing Test was designed by Alan Turing in the 1950s as a way to determine whether the computer can respond like a human being. To conduct the test an investigator questions A and B, where one of the interlocutors is a machine. When the investigator cannot tell which interlocutor is a machine, it is possible, according to the test, to conclude that the machine can respond and think like a human being.

[2] The wine tasting experiment was organized at the request of one of the students, who was writing an article to demonstrate that price was not necessarily an indicator of taste. With the teacher's caring intervention the experiment also included soft drinks.

[3] The French title of the newspaper was *L'Assiette de Crevettes.*

[4] The French subtitle was "Une fête de mots chouettes soigneusement préparée par les étudiants de troisième trimestre de français à U."

[5] The alternative status of this school resided in the fact that the children who attended had not been assigned to the school on the basis of their home address and bussing legislation. For different reasons, the parents of these children had petitioned for their enrollment through an Optional Enrollment Request (OER) process.

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