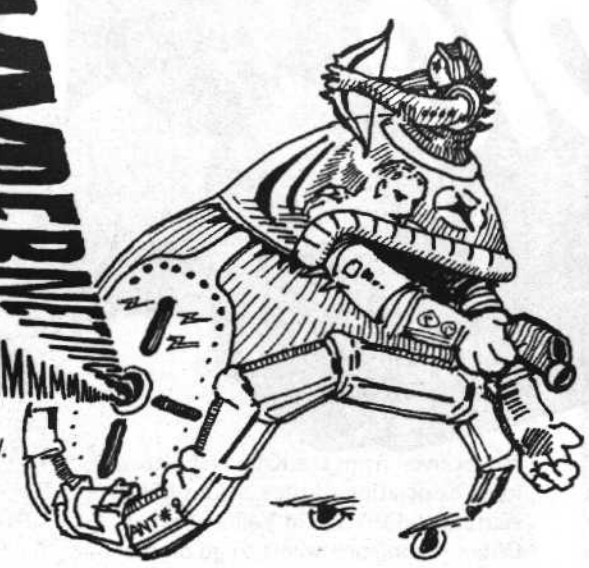
CYBERNETIC KLASSROOMMMMMM



A question is priceless, like a fine pearl.
An answer would dissolve it.
Rather, it should be admired
and polished and given back.

High tech gadgetry just keeps rolling off the line – its salesmen, like the deodorant kings, keep looking for another hole to fill. And sooner or later they all converge inside the schoolhouse door, dazzling the uninitiated with their magic paraphernalia.

But there is danger here. Computers can be big guns but with low aim they are just expensive drill instructors. Performance conscious school chiefs will program to fit their rigid, fact-oriented curricula – taking advantage of the hardware's efficiency but ignoring its meta function as a partner in the learning process.

Fortunately some settlers on this frontier have mapped out a man/machine interface bearing fruit for personal growth in school and beyond.

I culled the following information from reports and projects developed by Dean Brown at SRI with Adrienne Kennedy and Janet Lederman, Palo Alto teachers and gestalt trainers, and a host of others.

The two projects mentioned here include an experimental summer school session with first through sixth graders and a second project somewhat larger in scope – the revamping of the educational system in Spain.

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Education is the realization and the unfolding of the limitless potential of the mind. The teacher is a creative artist, a sculptor who helps the student to release his person from rough-hewn formless potential. The computer can be a chisel in his hands – one tool among many of his kit of tools, to be sure, but one which is quite different from all the others, one which can serve him in a way that no other can.

The mind functions at many levels; each level responding to and influencing all of the others. We might view these functions in a certain hierarchy: sensory-motor, cognitive (including contrastive sets and technical and socio-cultural facts), techniques, world views, self-images, and self-knowledge. Everyone can remember from personal experience some gifted teacher who possessed the art of teaching at all of these levels simultaneously. Sometimes these levels were taught explicitly. More often, perhaps, they were communicated implicitly from innate wisdom. The truly great teachers succeed in conveying the process of human development in its essence and thereby pass on the art of self-education to their students for each to develop independently toward his own goals. Much of this same spirit can be conveyed in computer teaching programs and the computer can thus become a valuable tool for the teacher. It can serve as a medium for the creativity of the teacher and for communication between teachers and students in the *total* educational process.

When computers are considered within this broader concept of education, we immediately discover a multitude of applications beyond the conventional drill and practice, tutorial, rote learning programs that have occupied the major part of research to date. Indeed, the term "computer-aided or assisted instruction" contains two concepts that betray this larger goal. The computer can do more than "aid" and "instruct". It can teach directly, just as a good book can teach.

I am a machine
I am not magic
You bring what you are
who you are
how you work, play, see, feel, imagine.
You bring your fears
your expectations
your enthusiasm
. . . and maybe something special can happen
between us.
I am a machine
I won't tell you:
"Stop it," "Be quiet," "Sit still,"
I won't say
"You're wrong"
I won't say
"You must do things to please me or
I won't like you."
I am a machine
I won't leave when you want me;
I won't force myself on you
when you want to be without me.
Our relationship is open, closed,
empty
full
– whatever you want it to be
– whatever you can make it be for you.
(Our relationship exists
only as a relationship with yourself.)

IN THE END
WHØS YOUR FRIEND?
•A KITTEN WEARING MITTENS

DØ YØU KNØW THE SEA
WHERE IT'S FUN TØ BE?
•WITH THE SAND UNDER YØUR HAND

CØNNIE FELL
AND FØUND A SHELL.
•SHE RANG A BELL BUT DID NØT YELL

LØØKED AN HØUR
FØUND A FLØWER
SPILLED THE FLØUR
TØØK A SHØWER.
•LET'S GØ SEE DEAN BRØWN BEFORE
JENNIFER TURNS INTØ A CLØWN

The summer project emphasized developing the student's internal self-sufficiency and inner-directedness. One of the researchers participating in the project suggested three reasons for using the computer in education:

- The computer can provide a nonverbal experience; thinking, concepts, and ideas can be approached without that intermediate level of communication called language.
- The machine is nonjudgmental; it neither approves nor disapproves of a student's decisions; reinforcement for the student's effort lies in the experience itself, the process of learning.
- The computer makes possible activities for which the child has not yet developed the mechanical skills, coordination, or information necessary for independent participation; with the machine performing these mechanics, the child is freed in the use of creative energy, making possible, for example, the writing and performance of a symphony composed by a six-year old.

The underlying motif of the summer program, both in the computer component and the classroom component, was discovery. The children were encouraged to try what they liked, discover what they could, and proceed on an undirected course through their thoughts, following their curiosity. This imposed a requirement in the structuring of the computer software to make the material stimulating and encouraging to maximum discovery.

The CDC 3300 system was used, comprising the CDC operating system and the DD1 display console. The languages used were EUCLID, NLT, FORTRAN, and COMPASS. EUCLID is an SRI ALGOL-like compiler with commands to operate the display console. It is a language that requires little computer technology and can be learned in several hours. The programs written to operate on the CDC 3300 allowed the students to define the parameters controlling the machine's response. The student observed the machine's response and then introduced new demands on the machine, progressively probing deeper into the nature of the program, into the man-machine interaction, into the stimulus-response relationship underlining the project, into the methods of inductive reasoning.

The programs merely provided the framework and allowed the student to build around this structure. He could write a story, describe the mountains, write a poem, describe his environment. It was possible to create many stories from the same framework or program. The framework was typed by program control in PILOT language; when a student was asked for input, the Teletype would start a new line of print, wait for the student to fill the structure, then continue to provide more of the framework.

Programming material for (this) open-format teaching is simpler because no particular emphasis is placed on "right" answers nor the logging and analysis of student responses with reference to the teacher's expectations. "Wrong" answers are encouraged so that the student can pursue blind alleys and test "unreal" situations that allow him to place "correct" results in broad context. It took twenty centuries for man to reject some of the axioms of Euclid and develop Riemannian geometry!