Computer -Assisted Instruction: For $.35 An Hour?

a **Journal** staffer's day with **Catherine Breen, Eleanor Rud and PLATO**

I "programmed" a computer the other day.

That may not be too astounding, but the fact is, I don't know a "cobol" from a "byte." It all became possible because of PLATO's "author mode."

But that's getting ahead of the story. It unfolds at the Chicago headquarters of Montgomery Ward & Co. The scene: a narrow room housing circular carrels. Nested in each carrel is a black box, twice the size of a bread box. This is the PLATO terminal. (PLATO IV, to be precise.)

The acronym stands for "programmed logic and automatic teaching operations." It is the name the Computer-based Education Research Laboratory at the University of Illinois has for its computer-assisted instruction (CAI) system. The PLATO terminal is connected to a Control Data Corp. 6500 computer at the University of Illinois via a voice grade telephone line.

A screen, about 12 inches square, sits above a keyboard which has the standard typewriter keys, plus several specialized control keys.

Plasma Display Panel

The major reason for the minimal anticipated per-hour trainee cost (as low as $.35 per hour), I was told, is the screen called a *Plasma Display panel.* Developed by University of Illinois Computer-based Education Research Laboratory Director Dr. Donald L. Bitzer, the Plasma Display panel is seen as a vast improvement over the commonly-used cathode ray tube (CRT), because it overcomes the CRT's needs for continual image regeneration and for transmission from computer to terminal via video rates through special conversion circuits.

Neon-nitrogen filled cells, which comprise the transparent glass Plasma Display panel, feature heretofore unachieved brightness, memory and display characteristics. Each gas-filled cell can be excited by a signal to a pair of electrodes on the glass surface that intersect at each cell. Each of the 512 digitally addressable cells can be activiated to form part of a word, drawing, diagram or graph.

The dynamic combinations achieved by the transparent panel can be supplanted with static slides flashed from a mini-projector inside the PLATO terminal. A computer-assisted training session on how to repair a trash compactor, for example, can be flashed on the Plasma Display panel while an exploded view of the compactor's innards can be shown simultaneously via slide. Specific locations on the slide image could be highlighted, in sequence, by the computer program.

Reflects Human Personality

My initital experience with PLATO showed me something I had not thought possible with computer-assisted instruction: the machine actually reflected a *human personality.* While in Chicago, we gained access to the Control Data Corp. computer at the Champaign-Urbana campus, 125 miles away, by typing a name and the code for a lesson the computer had been programmed to accept. The computer responded, after checking its memory and confirmed that it knew us by responding with a code of its own that permitted training to commence.

The computer is mechanized, yes, but the way it interchanged with me during my "lesson" was as warm and *human* as the person who programmed it. Our lesson was for Ward's retail department managers. It was designed to show the effects of sales on inventory,

inventory on sales, and to show their effect on merchandise turnover. The computer and I determined we should start at the beginning of the lesson. (If I had been working on the lesson previously and had left off, the computer and I could have picked up at *that* point, too.)

As the lesson developed, I knew I would be "fishing in the dark" for answers. The moment of truth was at hand. The lesson's narrative flashed across the screen, and I feebly "bluffed" my way along. When the moment of truth came and PLATO asked me for my answer, I indicated that I needed a calculator to help me figure the answers. Immediately, PLATO responded with an instant "calculator" on the Plasma Display panel.

No Way Out

There was no way out for me now. I made a feeble attempt to do some quick cypherings on the calculator (after all, I couldn't ask for a calculator and then not use it). The computer did all the factoring I asked for, efficiently and accurately. I seized the bottom-line figure and presented it to PLATO as my answer.

I knew it was wrong, and I expected the Plasma Display panel to flash "DUMMY" in three-inch high letters when it, too, determined my answer was wrong.

But it didn't. With almost human compassion, *it gave me another chance.* I was so charmed by my personal tutor that I grabbed another answer out of nowhere and submitted it. This time, PLATO suggested that I terminate the lesson for the time being. But, like any good tutor, it gave me a list of references to study before I attempted the turnover lesson again.

Positive Reinforcement

Even though I was obviously ill-prepared to handle the retail turnover problem, the computer gave me *positive reinforcement* by telling me where I stood and what I could do to improve my situation.

It was comforting to know that I didn't have to worry about an impatient supervisor or an autocratic instructor (either of whom, on the basis of my performance, could have "written me off"). My one-to-one computer-trainer was much more patient with me.

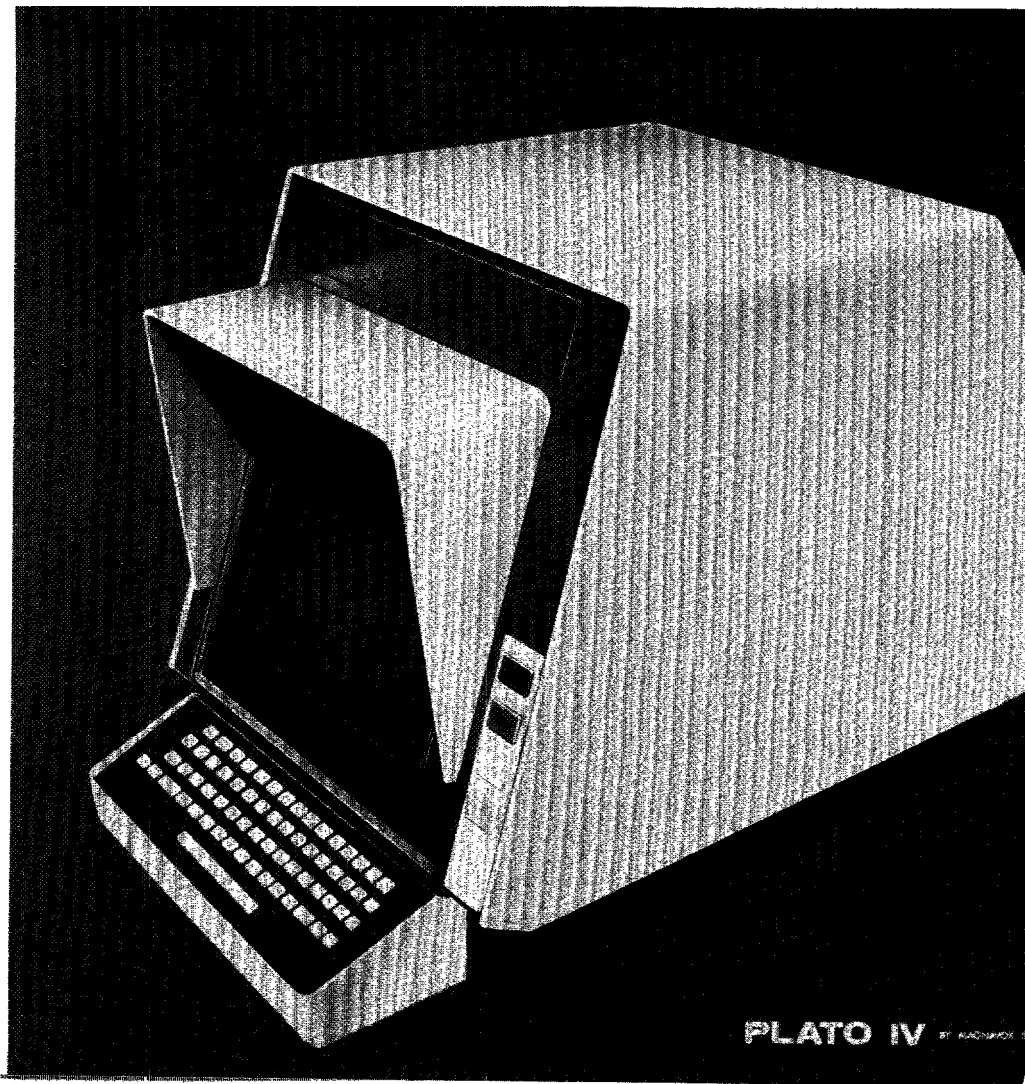
If I were a regular Wards trainee, the computer could have scored my answers (including my spelling, if it was critical to the lesson at hand) and stored this information for comparison with other trainees.

Obviously, the things that PLATO is doing are ideally suited for computer-assisted instruction. Not everything is. Ms. Catherine P. Breen, Wards corporate training director, says that *after* training needs have been determined and short and long term objectives have been established, as well as target population and initial behavior, one must decide whether material to be presented is appropriate for CAI.

CAI Criteria

Following are the principal criteria that Ms. Breen suggests be used in determining whether a training program can be best taught by the computer:

- Is the information vital to the job or is it just "nice to know"?
- Is it information that must be learned by a large population?
- Can the information be programmed to teach critical job skills quickly and in a uniform manner?
- If the target population is small, is the subject matter so



important and so complicated that it requires the talents of many qualified instructors who are not available at the same time or not available at all?

- Is the subject best learned on a one-to-one basis?

After determining that a program is suitable for CAI, the program designer must be sure to come up with a selective, versatile and self-pacing adaptation.

TUTOR Programming Language

That's where TUTOR comes in. And TUTOR is what enabled me, a novice at everything, to "program" PLATO. In half an hour, with the help of Ms. Eleanor Rud, Ward's special projects training manager, I was able to learn enough of the 40 basic pseudo-English TUTOR commands, to "type" a sort of lesson into the computer directly from the terminal.

If I were an instructor who knew my subject "cold," I could go directly to the computer without aid of a computer program or systems programmer. Before dubbing PLATO as a panacea, it is important to remember that the program designer is the *real* teacher in computer-assisted instruction. The program designer must know how to apply teaching strategies.

For example, it was no accident that in my attempt at the turnover lesson that I was given the opportunity to use a calculator to solve the problem. It was also no accident that the computer gave me two chances to solve it. A program author must decide whether to provide the option of a "help" sequence in a lesson. If it is to be provided, the instructor must also decide whether the help sequence will be automatically provided, or whether the student has the option of requesting it.

An instructor must have the skill as an educator to approximate the interchange, on a computer, that a patient tutor would have with an individual learner. The instructor must also have extreme tact to help the learner avoid the experience of "failure." It's a tall order to pass all of these feelings through a black box, but very rewarding when it's done correctly.

The Wards training staffers find that the "inquiry mode" of CAI is CAI in one of its best and most efficient forms. When Ms. Breen unveiled PLATO at the First International Training and Development Conference in Geneva, Switzerland, she described the inquiry mode this way: "The computer presents the learner with a problem, requires him to specify what information he needs to solve that problem, and then provides the information.

"When the learner has solved the problem, he asks the computer to judge his answer. Rarely will two people ask for the same information to solve the problem. This makes it necessary for the program author to anticipate what facts the learner requires, and to build a comprehensive information bank in the computer."

"Spontaneous" Programming

Such learner-controlled instruction should be designed to unfold in an apparently spontaneous way. The instructor must plan *possibilities* rather than specific paths.

Slide films, educational television and audio tapes, when used as instruction media, all have fixed instructional sequences and timing. Text books and programmed instruction materials have fixed instructional sequences but their time limits are not fixed. These could be considered an improvement over the former, but the material texts and PI present is still not personalized, since all trainees or students receive the same instruction.

Computer-assisted instruction can provide instruction with both sequences and timing that are not fixed. Thus, CAI comes closer to fulfilling "ideal" instructor/trainee objectives than the aforementioned tools.

In her Geneva presentation, Ms. Breen called CAI *another* training tool, because "there is *no one panacea* for total training – no universal training technology."

That puts CAI in proper perspective, alright, but PLATO brings us a lot closer to the panacea.