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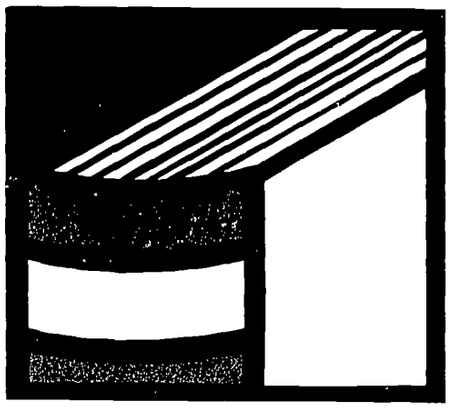
ABSTRACT

This article describes the development and use of a new delivery system for education services based on the concepts of mobility and individualized instruction. The system consists of a mobile van equipped with a central IBM computer and 15 student terminals. Traveling through rural Pennsylvania, it offers local teachers a course in special education that will enable them to recognize and help children in regular classrooms who have handicaps that often go undetected. Teachers can schedule their own instructional time after school or during their free periods. Upon completion of the course, they receive three academic credits from the Pennsylvania State University. The course averages 30 hours per student, with 100-150 teachers enrolled at each stop and about seven stops made per year. The cost of a year's operation is approximately $250,000. The project, called Computer-Assisted Remedial Education (CARE), is operated by Penn State under a USOE grant which runs til mid-1973. The success of the program has led to plans for more such vans, for instance, one which would visit hospitals to update the skills of health workers. (RT)

Teacher Training Takes to The Road



This article describes the development and use of a new delivery system for educational services based on the concepts of mobility and individualized instruction. Obviously, a mobile instruction unit has to be reasonably small to be transportable on highways; at the same time, it has to be efficient to warrant investment in its construction. A mobile van which houses a computer-based individualized instruction program fulfills both these requirements. In addition, because students schedule computer time individually at their convenience, utilization of time and space is maximized. Although this article describes the application of mobility and individualization to a course in special education for in-service teachers, we believe the program is a prototype for filling a large number of unmet educational needs.

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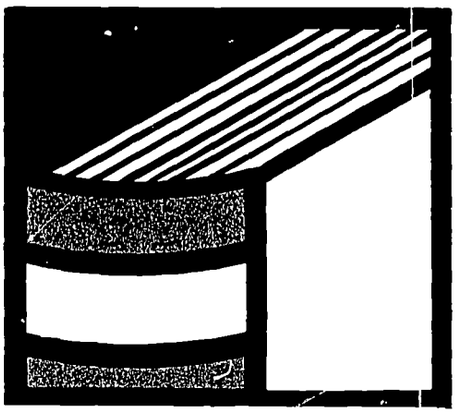


Mobile Van, Computers Add Convenience And Quality to Continuing Education

By PHYLLIS E. LEHMANN

There are bookmobiles, cribmobiles, and heartmobiles. Now even the college classroom has been put on wheels to bring updated instruction to teachers in Appalachia who cannot conveniently return to campus.

This traveling classroom is a far cry from the typical lecture hall. It offers private tutoring for every student at hours convenient to his personal schedule. Furthermore, the teacher never tires, even though over an 8-week period some 150 students are guided through a course at their own individual paces.

A unique innovation that combines traditional education with new technology, the classroom on wheels is actually a mobile van equipped for computer-assisted instruction (CAI). Operated by The Pennsylvania State University under a grant from the U.S. Office of Education, the van is traveling through rural Pennsylvania, parking in schoolyards, and offering local teachers a course in special education that will enable them to recognize and help children in regular classrooms who have handicaps that often go undetected.

By July 1972, more than 2,100 teachers in 12 Pennsylvania towns will have completed the course, known appropriately as CARE (Computer-Assisted Remedial Education). In addition to updating their skills, the teachers will receive three academic credits from Penn State, which for many will count toward a permanent teaching certificate and an advanced degree.

The van is equipped with a central IBM computer instructional system with 15 student terminals. When the student signs on at his terminal, he is confronted with a multimedia happening. The computer "lectures" by displaying information on a cathode ray screen directly in front of him. At the same time, the student sees additional information projected on a small screen to the left of the central one and hears recorded explanations through earphones.

He can also refer to his course handbook which contains a glossary and reference material to supplement what he sees and hears. At frequent intervals, the computer asks questions which the student answers by touching the appropriate place on the screen with a special light sensitive pen or by typing out responses on a typewriter-like keyboard.

With all this going on, the student has little time to daydream or doze off. And the computer is a patient teacher. When

Mrs. Lehmann is a freelance writer.

questions are answered incorrectly, it reviews the information until the student has mastered it. Thus, the course can take from 20 to 70 hours to complete, depending on individual capability, although the average is about 30 hours.

Teachers feel they learn as well as or better than they do from a human instructor in the traditional classroom setting. Said one first-grade teacher, who admitted this was quite a new-fangled device "for an old lady like me":

"You see it, you read it, you hear it, and it's all reviewed. You should learn something! Also, your attention doesn't wander."

Van Has Great Possibilities

Dr. Harold E. Mitzel, head of the project and associate dean for research in Penn State's College of Eduction, points out that the middle-aged group of teachers at whom the project is aimed often feels more comfortable with the computer than in the regular classroom. "Some people who have been teaching for many years are shy of showing their ignorance to their peers in a classroom setting," he said. "With this setup, there is a welcome anonymity."

A pioneer in the relatively new field of computer-assisted instruction research (it dates from about 1959), Dr. Mitzel, with the help of colleagues in Penn State's Computer-Assisted Instruction Laboratory, has already applied the new teaching method in training Navy men to detect malaria, in teaching math to inner-city youngsters in Pittsburgh and Philadelphia, and in helping young people choose an occupation.

Many other universities are investigating the practical applications of CAI, but so far no one else has put it on wheels. This is an innovation which the Penn State group sees as having almost limitless possibilities—ranging from education for American Indian children in isolated western schools to courses in scientific methods of firefighting for volunteer firemen in the Nation's small towns.

The idea of mobile computer-assisted instruction came to Dr. Mitzel in 1967 when he was unable to get reduced telephone rates for transmitting information from a central computer to remote locations. At the time he was vice president of the board of the Appalachian Educational Laboratory, so he consulted AEL's director, Dr. Benjamin Carmichael, about putting his idea into practice.

The Appalachian Educational Laboratory is one of an original 20 regional laboratories established by Congress through the Elementary and Secondary Education Act to transform research information into new educational methods, practices, or equipment. Currently, there are 11 such labs across the country, with AEL serving the Appalachian area that extends from lower New York through northeastern Mississippi.

Course in New Math

It was the task of Dr. Carmichael and the AEL staff to sell the computer-assisted instruction idea to public school people in Appalachia and to pool State and Federal funds for an initial project. Meanwhile, the staff of Penn State's CAI Lab was devising a computer-taught course in modern math—often called the new math—for elementary school teachers.

By March 1969, teachers in Dryden, Va., a mining town of 400, were trying out computer-assisted instruction. Because project developers were unable to find sufficient funds to build a mobile van, the IBM instructional system was installed in private data processing facilities in Dryden.

After 8 weeks, the system was packed up and moved to an elementary school in Gladeville, a slightly larger Virginia town some 250 miles away. In the summer, the system was transferred to a school in California, Pa., where another group of teachers took the course. At the

Teacher *continued*

three sites, the project served a total of 387 teachers, three-quarters of them wives and mothers who could not conveniently leave their homes and families to attend college classes or summer institutes.

There are countless isolated areas throughout Appalachia where the need for quality education for in-service teachers is acute. In the southwestern part of Virginia around Dryden and Gladeville, for example, some one-room schools are still in use and school officials faced with teacher shortages are forced to hire some people who do not have college degrees. In many cases, preservice teacher education is not the best, and there is a serious lack of qualified instructors to teach extension courses.

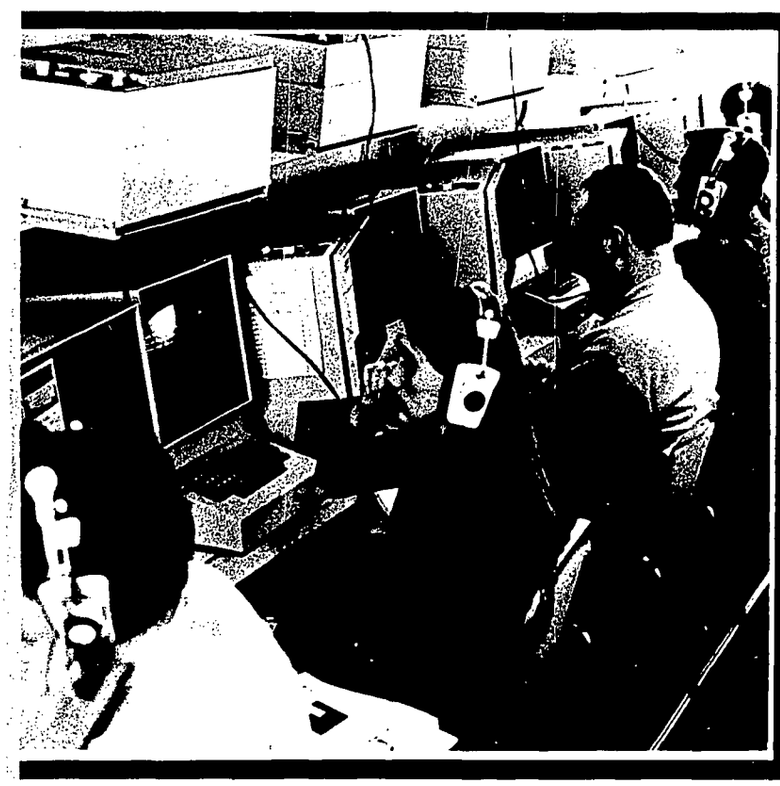
As Dr. Carmichael of AEL says, "Under any scheme I know there is no adequate way of meeting the needs of all the teachers. It is fiscally impossible to get enough college courses and enough college instructors to reach elementary school teachers and especially to get enough to provide specialized training in things like the new math." He believes, however, that mobile computer-assisted instruction could be one important answer to the problem.

Dryden High School principal, Charle Cox, credits the CAI project with awa ening both teachers and parents to th need for updating teachers' skills. He al points out that the project was instru mental in dispelling people's fear an mistrust of automation, and he believe that such technological teaching metho could play a large role in his area fo training not only teachers but also scho dropouts and the 80 percent of hig school graduates who do not go on to co lege.

Unit Requires Small Staff

Assured by the pilot project that mo bile computer-assisted instruction coul work well, the Penn State team set abou developing the special education course this time for teachers in their home Stat The university provided funds to build van 40 feet long and 8 feet wide tha could easily be moved from one locatio to another and expanded to a width o 18 feet when set up for business. Th van itself could run for some 30 year Dr. Mitzel believes, although the sophis ticated equipment inside would have t be replaced more frequently.

Considering the number of teacher who can be served, the unit requires a small staff. A systems manager trave around the State with the van and at eac



Parked in front of Ridgway Hig the van is available to teacher any time they find time to use. are folded in when the vehicle

Computer-assisted instruction happening for these Ridgway

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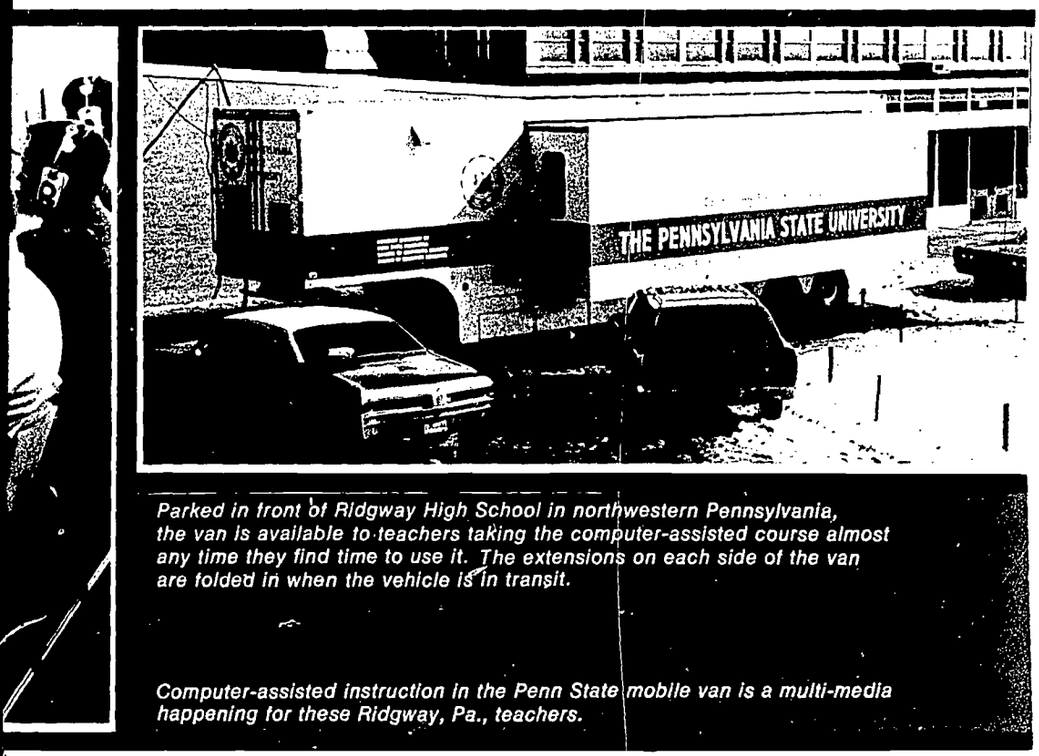
The cost of a year's operation is approximately $250,000. This may sound like prohibitively expensive teacher training, but Penn State experts stress that the computer course is less costly than other methods of quality, instruction. Dr. Keith Hall, assistant project director and head of Penn State's CAI Lab pointed out:

"We're actually providing a private tutor for each of the people enrolled. The course averages 30 hours per student, and with 145 persons enrolled, this would amount to some 4,350 clock hours of tutor time. Tutors often get $10 an hour, so the cost for the course taught by private tutors would be $43,500 for just one location. Multiply that by seven locations, which is the number we plan to schedule after the first year, and you come out with more than $300,000 a year."

According to Dr. Mitzel, the most comparable way of training teachers is in 6-week summer Federal institutes, which bring teachers to college campuses and pay them stipends. The mobile CAI project, he maintains, is considerably cheaper.



Parked in front of Ridgway High School in northwestern Pennsylvania, the van is available to teachers taking the computer-assisted course almost any time they find time to use it. The extensions on each side of the van are folded in when the vehicle is in transit.

Computer-assisted instruction in the Penn State mobile van is a multi-media happening for these Ridgway, Pa., teachers.

Institute costs run to some $200 per credit, twice as much as the cost per credit for the CAI course.

Funding for the current project, which will run until mid-1973, comes from the U.S. Office of Education. Development of the special education course itself was financed by the Bureau of Education for the Handicapped. Actual operation of the project is funded by the Bureau of Educational Personnel Development, whose Special Education Branch was the first Federal office established specifically to fund projects which train teachers to identify and teach handicapped children in regular classrooms.

Project developers believe their classroom on wheels is as innovative for the quality of instruction it provides as for its teaching methods. The caliber of professionals who prepared the course is far higher than that of the average instructor teaching evening classes in small towns, simply because it is difficult to attract top-notch faculty members to outlying areas. Furthermore, while only 15 or 20 teachers can enroll in a traditional 16-week continuing education class, some 300 teachers can complete the course offered in the mobile van during the same period.

Flexibility is the key, both in terms of efficiency and convenience. Instead of being tied to a rigid schedule of a 2- or 3-hour class 1 night a week, teachers can schedule their lessons from immediately after school till 11 p.m. on weekdays and nearly all day Saturdays and Sundays. Two school superintendents have allowed teachers to use their free period during the day to visit the van for a lesson. Such flexibility, of course, is a boon to teachers who are working wives and mothers and whose schedules are normally hectic. To assure that each teacher will have time to complete the course at his own speed, the staff closely monitors scheduling.

The Pennsylvania project got underway in October 1970, in Clearfield, a town about 40 miles from the University, where 101 of 115 enrolled teachers completed the course. The mobile van was not ready until the system was moved in January to Ridgway, located in a mining area, where 138 of 145 enrollees completed the course.

Handicaps Go Unnoticed

From Ridgway, the van is moving across the State, and will stop at three more towns in the northern tier counties before winding up its first school year in August. On the second leg of its journey in 1971-72, the van will stop at seven locations in the coal regions of southwestern Pennsylvania. The third year's sched-

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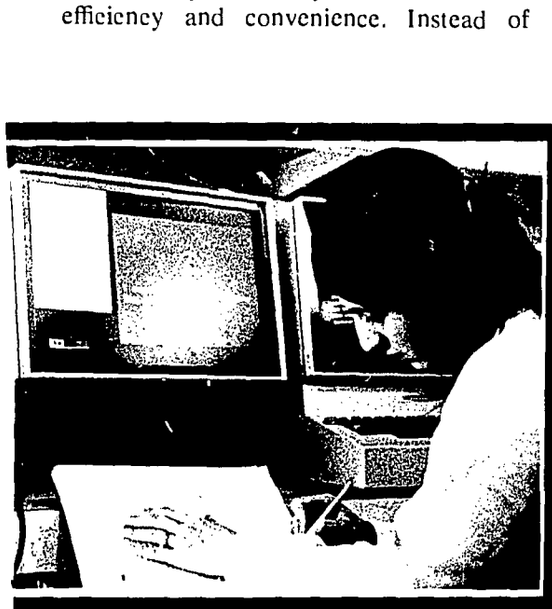
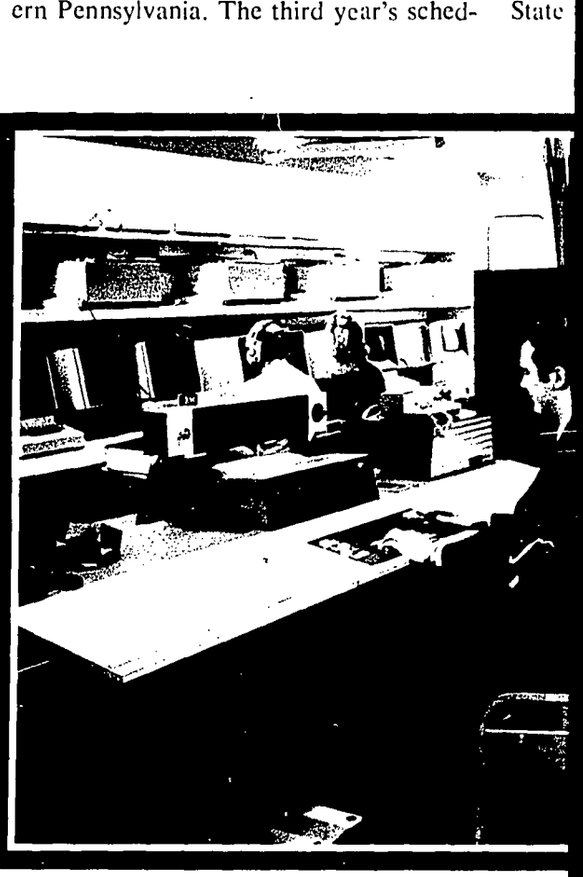


A link with traditional teaching techniques, a course handbook supplements the computer's "lectures" on how to recognize and help handicapped children.



Proctors hired at each stop help teachers get set up at their terminals.

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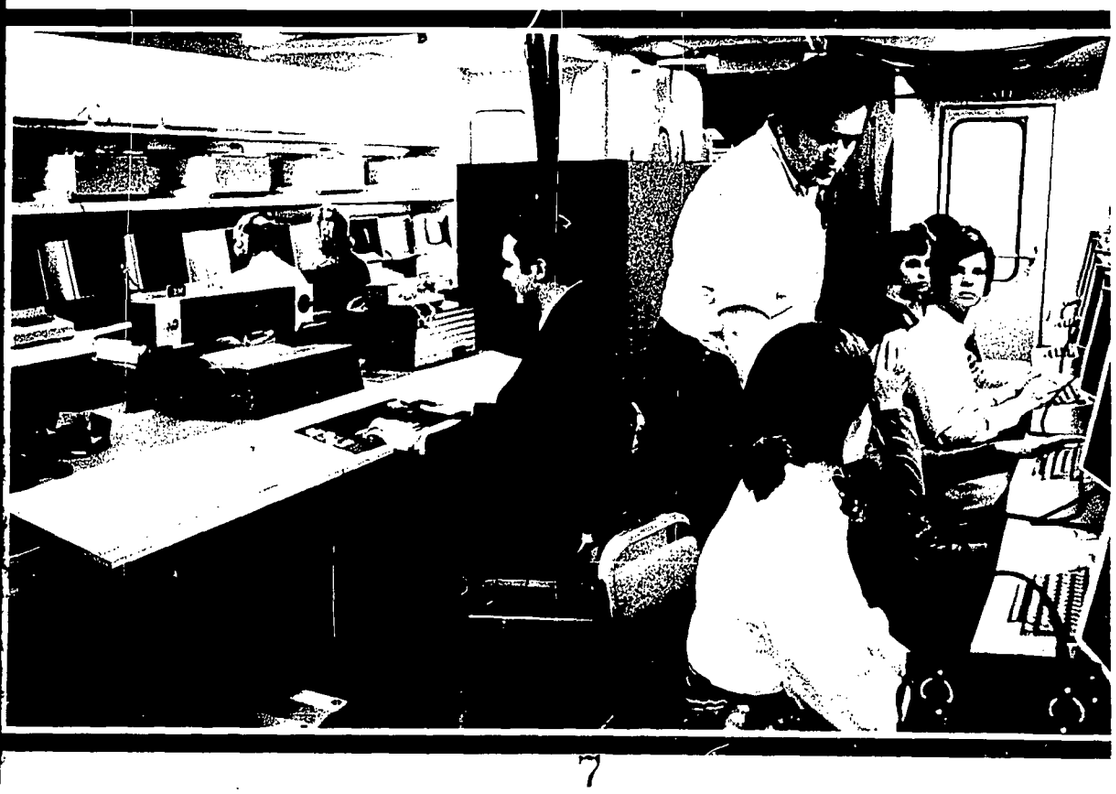
Enthusiasm runs high in towns along the van's route. Not only elementary school teachers, but also vocational school teachers and school administrators are signing up to take the special education course. Some drive as long as 1 hour each way to attend a session. At Ridgway, the teacher of a high school class in problems of democracy was so impressed with the course that he scheduled his seniors for the chapter on the culturally disadvantaged.

The special education course was chosen over other subjects as the van's first offering because it can help bridge a crucial training gap. Dr. G. Phillip Cartwright, a Penn State associate professor of special education who developed the course, points out that the Nation is lagging seriously in preparing people to aid the handicapped. He cites U.S. Department of Health, Education, and Welfare (HEW) estimates showing some 3.7 million handicapped children who are not getting the education services they need. There are 200,000 handicapped children in Pennsylvania alone.

Although HEW has cited a need for almost 300,000 more specially trained people to work with the handicapped, Dr. Cartwright notes that the United States produces only 2,000 to 4,000 new



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specialists each year. He believes the CAI course may represent a new approach to training—one that focuses on an existing professional group rather than on training new specialists.

Nationwide, at least 60 percent of all handicapped children are in regular classrooms, according to HEW. Many of them have handicaps which are not easily recognized and consequently they receive no special help. They may be children who are mildly retarded, emotionally disturbed, hyperactive, culturally disadvantaged, and those with speech, hearing, and vision problems which can hinder learning.

The severely handicapped and retarded are recognized easily enough, but what about the unusually quiet boy in the corner of the classroom or the one who always seems to be daydreaming. Such behavior could be signs that these children cannot hear well. Or the girl who seems especially awkward may be bumping into the furniture because she cannot see well. The child who appears to be of low intelligence may simply have been slowed down by a culturally disadvantaged background.

The CAI course is designed to help teachers spot such problems by teaching them specific behavioral clues. The information is taught in separate chapters, as it would be in a college textbook, but the advantage of the CAI course is t material can be presented in several d ferent ways. Through the audio equi ment, for example, teachers actually h examples of a handicapped child's spe and listen to a sample dialogue betw a teacher and the parents of a han capped child.

The very method of teaching used the course may also have far-reach effects. It is possible that the individ instruction the teachers get will encour them to use the one-to-one appro more frequently with their students, p ticularly with handicapped children.

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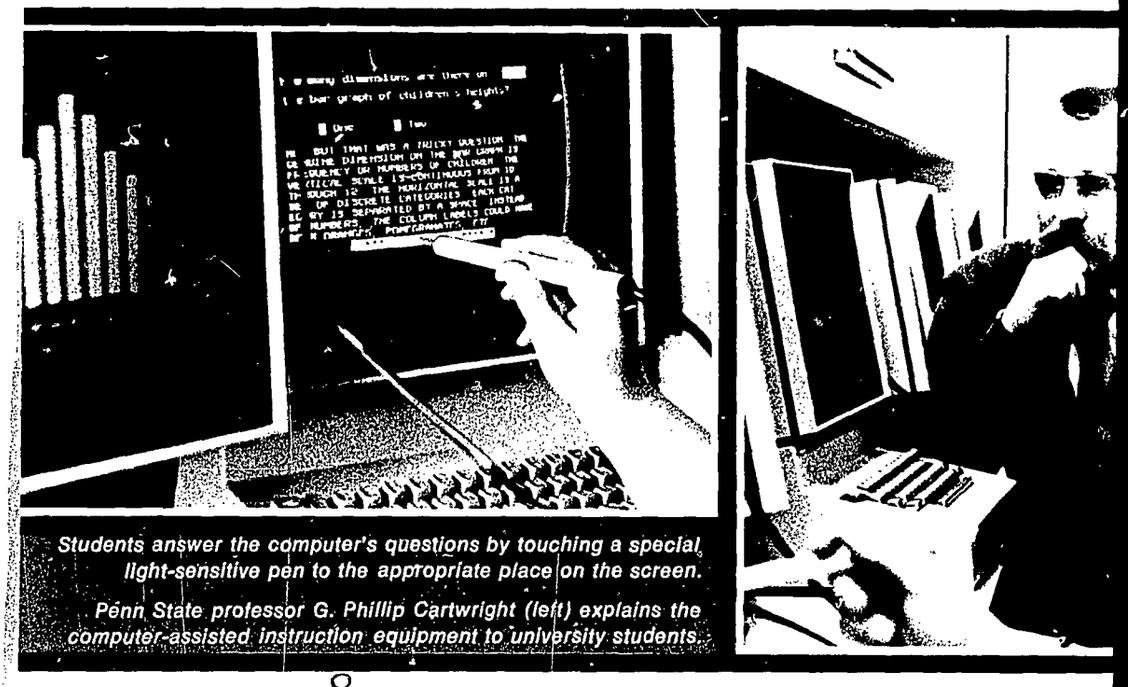

Students answer the computer's questions by touching a special, light-sensitive pen to the appropriate place on the screen.

Penn State professor G. Phillip Cartwright (left) explains the computer-assisted instruction equipment to university students.

the advantage of the CAI course is that material can be presented in several different ways. Through the audio equipment, for example, teachers actually hear examples of a handicapped child's speech and listen to a sample dialogue between a teacher and the parents of a handicapped child.

The very method of teaching used in the course may also have far-reaching effects. It is possible that the individual instruction the teachers get will encourage them to use the one-to-one approach more frequently with their students, particularly with handicapped children.

Because of CAI's flexibility and adaptability to so many fields and the growing demand for continuing education, the Penn State team is looking to the future. The van concept obviously works; now the problem is to develop courses to make full use of its potential. Already in the talking stage is another van that would visit hospitals to update the skills of health workers. Ultimately, assistant project director Hall envisions a fleet of 10 to 12 vans touring the State, offering courses to widely varying groups—borough officials, law enforcement and corrections personnel, prison inmates, adults preparing for high school equivalency examinations.

In education alone there is a tremendous need for continuing education. Dr. Mitzel recalls one teacher in the computer course who had not taken a college course since she graduated from a 2-year normal school (forerunner of the 4-year teachers' college) in 1922. He noted that while her case may be somewhat extreme, she is far from unique.

Teachers in Pennsylvania today must get a permanent certificate within 6 years after they begin teaching. To obtain it they must teach 3 years and acquire 24 credits beyond the bachelor's degree. Most teachers depend on evening extension classes for at least some of these additional credits. Of the 106,000 elementary school teachers now in Pennsylvania classrooms, about 40 percent have been teaching 5 years or less, and the majority of them are probably still working toward a permanent certificate. Mobile computer-assisted instruction could help meet this demand, especially in areas where there are not enough qualified instructors.

From all indications, any apprehensions about "machine teaching" are quickly dispelled after a brief encounter with the computer teacher. However, even though teachers may accept the mechanical wonder, they can still be baffled by it. Systems manager Bill Matson tells of one lady who was told when her teaching terminal broke down that she could move to another station. When the second terminal flashed the same part of the lesson on the screen, she stared at it in amazement. "Why, imagine that," she marveled, "this computer knows where I am, too!" □

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