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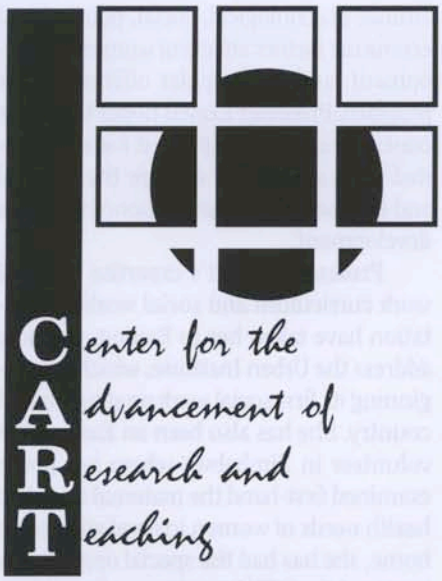


Using Computer Technology for Teaching and Learning

by Barbara Apstein

Back in the early 1970's, only a few people knew about computers. For most of us, in those days, "menus" were found in restaurants, "hardware" referred to items like screw-drivers and wrenches, a "platform" was a place to stand and "default" meant failing to meet the payments on a loan. Yet a few inquisitive souls, most of them mathematicians, had already become fascinated by computers and were aware of their enormous potential. One of these was Professor Robert Sutherland of Bridgewater's Department of Mathematics and Computer Science.

In 1972, Professor Sutherland signed up to study BASIC and FORTRAN at a National Science Foundation-sponsored summer institute held at the University of Illinois. During the academic year that followed, 1973-74, he offered a course called *Introduction to Programming in BASIC,* thereby becoming the first Bridgewater faculty member to teach a credit course using the computer. Since computer science was in its infancy, Professor Sutherland had no course outlines, syllabi or textbooks to work with. Fortunately, he had the assistance of two faculty colleagues who had also become interested in computers: Professors Henry Daley of the Chemistry Department and Murray Abramson of Mathematics, both of whom had attended training sessions offered by the Digital Equipment Corporation.

The computer Professor Sutherland used to teach his course — the only one the College had for academic purposes at the time — was a Digital PDP-8/I machine. It was about the size of a large refrigerator and had 8,000 bytes of memory (by way of comparison, a modest 1997 desktop computer has 16 million bytes). It was also exasperatingly slow, printing 10 characters per second (compared with hundreds in today's machines). Programs were loaded by paper tape.

Problems arose. The paper tapes upon which the programs were encoded were coated with a thin layer of wax, which melted in very warm weather. Students who left the tapes in desk drawers occasionally returned to find their rolls of tape sitting in puddles of wax.

In preparing for the class, Professor Sutherland remembers spending many hours trying to anticipate the programming mistakes his students were likely to make. "I spent lots of time generating crazy mistakes," he recalls. "Then the first student who came in had a problem I had never seen before. So I gave up trying to figure out what might go wrong ahead of time."

Several of the students who enrolled in the *Introduction to BASIC* course went on to pursue careers involving computer science. Joseph Martin, for example, a 1970 graduate who was teaching mathematics at Taunton High School, returned to Bridgewater to pursue an M. A. T. in mathematics. Building on the foundation of Professor Sutherland's BASIC course, Joe enrolled in additional computer-related courses and workshops and, as a result, moved into a series of administrative positions involving increasing levels of responsibility within the Taunton School System: he was named Computer Specialist for grades K-12, then Director of Information Services, and in 1991 was appointed to his current post, Assistant Superintendent for Administration and Finance.

The *Introduction to BASIC* course attracted growing numbers of students, especially those majoring in the sciences, and eventually the College hired additional instructors who had formal training in computers.

Professor Sutherland drew on his experiences teaching computer programming to write a textbook, *This is BASIC*, as well as co-authoring a trade text, *This is VIC-20 BASIC*, both published by Macmillan in 1984. (The VIC-20, one of the earliest personal computers, made by Commodore, was the first personal computer to sell one million units). In 1988, having mastered a newer programming language, he co-authored *Problem Solving with Pascal.*

Professor Sutherland has been generous about sharing his expertise with other faculty members, both informally and in CART-sponsored training sessions. Under the auspices of CART, he has offered introductory workshops in Wordperfect, Authorware, and in WEB page design. These workshops are always conducted with a certain wit and style, as well as with enormous patience. At the same time, Professor Sutherland continues to develop his own expertise by taking multimedia courses in graphic design and WEB page design at UMASS-Lowell.

One of Professor Sutherland's current projects is to build a multimedia application for a GER course he teaches, *Math 105: Selected Topics in Mathematics*. During his recent sabbatical, he developed two new courses, *Introduction to Multimedia,* which should be of particular interest to students majoring in Education, Management Science and Art who wish to learn techniques of making presentations electronically, and *The Internet and the WORLD WIDE WEB.* Both courses will be offered in the Fall, 1997 semester.

The twenty years since Professor

Sutherland began experimenting with computers, and particularly the past five years, have seen explosive growth in electronic teaching and learning at Bridgewater. The opening of the Moakley Center in 1995 made a state-of-the-art technological resource available to students and faculty. CART, which had previously been housed in a tiny office in a remote corner of the library, moved into spacious new quarters in the Moakley Center. CART continued to increase and upgrade the inventory of hardware, software, and self-training and reference manuals which it made available for faculty to investigate. The decision of then-Provost John Bardo to provide desktop computers to all faculty members led to increased demand for the workshops, training sessions and tutorials offered by Information Services and Academic Computing. All students were provided with e-mail accounts. A survey conducted in the fall of 1996 by Professor John Marvelle of the Department of Elementary Education and Early Childhood revealed that faculty and librarians have discovered a wide variety of ways in which computers can enhance teaching and learning. Some examples:

(1) E-MAIL has become a routine way of keeping in touch with students, easier and more convenient than the telephone for responding to their individual problems and questions about course assignments.

(2) ELECTRONIC BULLETIN BOARDS: Like their real-world counterparts which hang on the walls of corridors, electronic bulletin boards are places where professors and students can leave messages meant for the entire class to read. Faculty may post specific assignments or use the board to encourage informal academic conversations. Students who are uncomfortable speaking before a classroom group often enjoy being able to express their ideas on-line.

(3) SOFTWARE PROGRAMS such as the spreadsheet EXCEL and SPSS statistical software are widely used in a variety of courses, especially the social and natural sciences. Chemistry students use molecular modeling and chemical analysis programs; geology students analyze their data using G. I. S. (Geographic Information System) mapping software. In the Art Department, Professor Joan Hausrath's Weaving class uses SWIFT WEAVE, a program which enables students to design woven fabric structures and patterns in color, a process previously performed using graph paper and colored pencils.

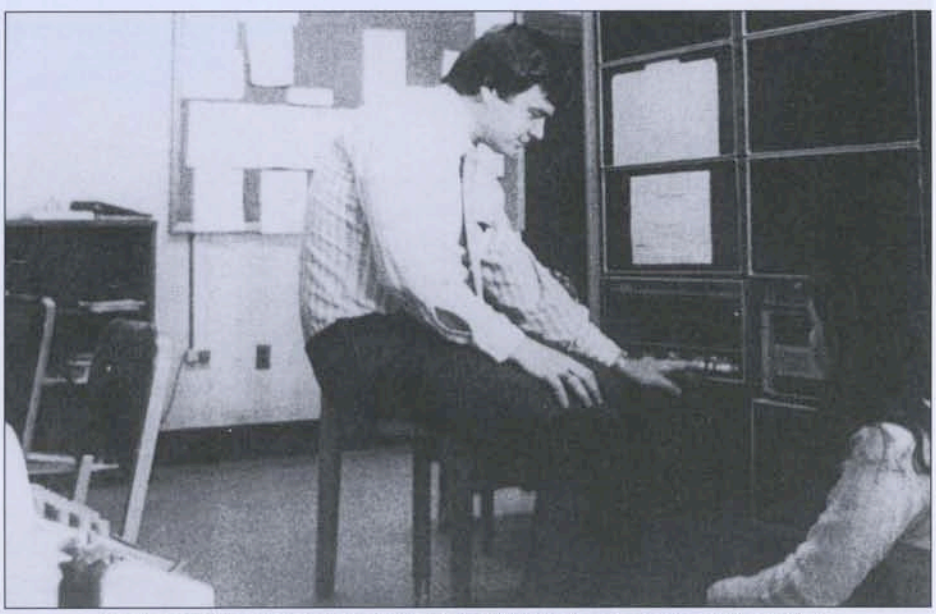
(4) CD-ROMS and DISKS: Many new textbooks now offer companion CD-ROMS and disks. In addition, faculty members use CD-ROMs which are commercially available. For example, Professor Harold Silverman of the Department of Management Science has acquired an electronic law library on federal taxes which students in AF 365, Federal Income Tax I, utilize to answer research questions.

(5) INTERNET AND WORLD WIDE WEB: Many faculty have designed research projects using the internet. Just prior to the 1996 Presidential election, the students in Political Science Professor Victor DeSantis' American Government class were assigned a paper analyzing the presidential candidates' Web sites.

(6) NETWORKED CLASSROOMS provide an ideal setting for collaborative work and encourage the de-centering of instruction. English Professor Karl Schnapp pioneered the use of networked classrooms to teach composition; currently, Professors Judy Stanton and William Smith are working with Dedalus software in the freshman writing course.

(7) LIBRARY: No part of the College has been more thoroughly transformed during the past five years than the library. The card catalogue has disappeared; instead, students log onto the On-line Public Access Catalogue (OPAC), which helps them locate books at UMass Dartmouth as well as Bridgewater. Instead of leafing through hefty published volumes of reference sources like the *Reader's Guide to Periodical Literature*, students search CD-ROM databases which can mark and print citations and, in some cases, the entire text of articles.

To point out that computer technology is changing the way we teach and learn is, in 1997, to state the obvious. In addition to using computers to enhance their teaching, however, many Bridgewater faculty members have clearly become convinced that part of their responsibility as college educators is helping students develop confidence and expertise in using the new technology.



Professor Sutherland at work on the Digital PDP-8/I, the first computer the College acquired for academic purposes, in the 1970's.