Educational software for computers:
very pretty, but can it teach?
Dennis Gendron

Breathes there a harried WPA with soul so dead who never to him- or herself hath said, "If we can put a man on the moon, why can't we invent a machine to make this job more bearable-and produce more quantifiable results?" Well, current pedagogical literature assures us that such a machine has indeed been invented and that, if we humanists would only use it, the computer could relieve us of many dully repetitive hours of tutoring, could assume efficient-and quantifiable-control of our class records, could conduct meaningful educational relationships with students, and could generally enable us to become the teachers we all dream of being. In 1962, R. B. Fuller envisioned an automated future for education, and even the title of his book captures the dream: *Education Automation: Freeing the Scholar to Return to His Studies* (Southern Illinois University Press). However, in addition to representing crass self-interest, computers represent the press of progress. One information scientist has observed that the computer will be the "dominant device in teaching in higher education during the next twenty-five years, "' and others are already envisioning educational programs mating the computer with the video disk.

Granting computers the future-and we might as well grant them the present-how do we WPAs free the technological genie to do our bidding? After all, our background is in *belles lettres,* not BASIC; and we, and all our teachers, are overworked. Unfortunately, for teachers and administrators in writing programs the answer to that question is neither simple nor really satisfactory.

Computers only do what we want them to because we give them very detailed instructions in a language they can process. These detailed instructions constitute application software, and producing application software for microcomputers (e.g., Apple, Pet, TRS-80) has become one of America's most profitable cottage industries. Sifting through this software to find reliable, effective programs complementing an English course has become one of America's most frustrating campus duties. The alternative to sifting is writing our own programs, a prohibitively costly activity; so WPAs who are incorporating computer-assisted instruction (CAI) or computer-managed instruction (CMI) into the curriculum must be skilled judges of software claims and capabilities.

Whatever the claims of the producer, software capabilities depend ultimately on what the computer itself can and cannot do. It can count, calculate, compare, and print prepared statements, figures, and graphics. It cannot make value judgments, understand, appreciate, grade a theme, or answer questions. These capabilities and limitations fairly define the roles of computers and computer software as:

- drill-and-practice master
- tutor
- simulator
- record-keeper

As a drill-and-practice master, the computer provides the kind of repetitive practice traditionally used to teach vocabulary or multiplication tables. On the college level, this application has limited use except in remedial classes, and even for these classes the effectiveness of drill and practice is questionable. Most canned educational programs today are of the drill-and-practice variety and are aimed at precollege students.

As a tutor, the computer supplies information and questions the student on his or her grasp of the information, moving the student backward or forward in the program according to the student's response. Tutorial programs are effective because they require the student to respond constantly to new information and because they provide a constant measure of the student's understanding of that information. One of my own programs on sentence structure supplies definitions and examples and then calls for the student to answer a series of questions. If the student answers incorrectly, he or she is sent to a subroutine which supplies additional information and asks more questions. Continued incorrect responses prompt the message that the student should see me before continuing the program. The program also maintains a file of students who are taking the tutorial; it lists their scores, noting how long each run took, and it provides an item analysis of their responses. Obviously, such programs can become quite complex and are limited only by the programmer's time and imagination-and by the student's ability to ask questions.

As simulator, the computer creates a controlled model that the student affects by changing any of a number of variables; the computer then reflects the student's changes by altering the model. Although simulations can be exciting as educational programs, I have never seen one with an application to composition courses.

Finally, as a record-keeper, the computer can be invaluable to teachers and to students. It can maintain current grades and rankings for all students, as well as class averages and comparisons of one class with another. It can also analyze the tests themselves and provide files of effective test items. And it can monitor progress of students using CAI for self-paced learning. Software that facilitates record keeping is especially effective and adaptable to composition courses.

Behind these operational capabilities of computers and software stands their motivational effect on students. The look and feel of the hardware, the stimulation of graphics produced by effective software, the need for the student to take direct action to make the program run, the immediate response to his or her entries-all of these can be powerful inducements for learning, especially in a remedial or developmental setting. I have seen freshmen in remedial composition courses repeatedly refuse human help with their work but spend hours daily in the computer center. Therefore, computer software can significantly enrich our courses, engage students in worthwhile learning activities, and assist us in the management of our classes. However, as we rush over to our requisition forms to begin inundating the dean with orders for appealing software, we must also keep in mind at least three harsh realities of life with educational software:

1. No software, however exciting and sophisticated, has any real value unless it serves the special goals and philosophies of our institutions ordepartments. If we do not have remedial students or if we do not believe in the transferability of drills to the writing process, drill-and-practice programs would not contribute much to our courses.

2. Most educational software is poorly conceived and organized. Vicki Blum Cohen reviewed six curriculum packages produced by national publishers and, in her report to the Educational Product Information Exchange in New York City, concluded that "software did little more than aid memorization of previously examined facts." [2] Another reviewer noted that "About 95 % of all educational software is ... simple tutorials, games designed to improve skills, and some less sophisticated simulations. "[3]

Moreover, producers and committed users alike frequently claim more for their software than it can deliver. One such claim is that a software package can grade students' themes; it can if we are willing to accept fluency as a total numbers of words used, diction as word length, and so on. [a] Another advocate sees a new frontier in the use of Socratic-dialogue software to generate thoughtful essays. In this program, the computer responds as follows, regardless of the student's comments:

> "Yes, that seems okay."
> "Go on."
> `Super. "[5]

This is hardly the Socrates of the *Phaedo*.

The point is to be skeptical when considering a software purchase. Before buying a program, make sure it does what you want it to do as effectively as you want it to. Also, call the supplier if you have questions, and only buy software that you can return if it fails to satisfy. The most helpful sources of information on software are other users and the associations and publications listed at the end of this article; many of these provide reviews and detailed descriptions of software packages.

3. Many of the *objectives* that software is designed to *achieve can be* achieved *more* easily and less expensively by resources already present on the campus. For example, colleges with fully equipped reading centers probably do not need software to teach reading. As an aid to memorization, computerized packages are *terribly* expensive substitutes for flash cards. The list of misapplications is endless.

Having in mind what educational software can and cannot do and boldly recognizing the realities of the marketplace, we can begin to review specific software with application to the teaching of language skills. The following review is by no means complete and it is heavily weighted towards programs for use with the Apple, but it can provide some insight into the kinds of software currently available.

CAI

"Canned" software that requires no modifications by the instructor

Compu-Read (Edu-ware, $30) is essentially a developmental-reading package aimed at students from elementary to college levels. It is useful for increasing reading speed and memorization skills. The program is well-documented and easy to use.

Language/Reading Development (Unicorn, $30) is another developmental reading package. It builds perceptual and concentration skills, provides controlled readability *files* in basic vocabulary, synonyms, antonyms, and analogies, helps students prepare for standardized tests, and produces item analyses of students' achievement.

Senior *High* Vocabulary (Educational Audio Visual, $200) can also be used with the TRS-80. These programs present multiple-choice vocabulary drills. On the college level, they are obviously only for developmental use.

Alexander the Great (Krell Software, $40) is an interesting fantasy game requiring students to answer vocabulary questions quickly and accurately, with the assistance of Aristotle, to conquer Ra, master of evil. Version II is suitable for college students.

Minicrossword (Program Design, $15) is an easy-to-use, well-documented program that sharpens students' vocabulary and spelling skills by presenting a standard crossword format in one game and by calling for students to guess words in ten tries in a second game.

Sentence Diagramming (Avant-Garde Creations, $25) provides drill in diagramming, parts of speech, types of sentences, and word usage in four sets of related exercises. It also keeps a file of student performance and allows the instructor to specify grades necessary to move the student up in the program.

Spelling *Builder* (Program Design, $27) is for students who have mastered spelling rules; it teaches rules that apply to difficult words through drill and tutorial.

Graduate Record Exams (Krell Software. $289) is a series of twenty-eight programs that provides students with a limitless selection of questions based on past GREs. It includes sections on vocabulary, word relationships, logic, analytical reasoning, sentence completion, and reading comprehension.

Author Programs

Software that provides a frame for instructors to construct their own packages

Aristotle's Apple (Stoneware, $35), despite its lack of documentation, is an easy-to-use. reliable program that accepts instructors' test questions and "formats" them into multiple-choice, fill-in-the-blanks, or matching quizzes. This is an especially effective "frame" program.

Create Your Own (Educational Audio Visuals, $30) is another very useful frame program, requiring no knowledge of computers but allowing teachers to use their own examples and questions to create multiple-choice tests, reading comprehension exercises. and vocabulary lessons.

ZE.S. (Avant-Garde Creations, $250), a completely menu-driven system, is a complex program allowing teachers to create tutorial lessons, graphics and animations, multiple-choice tests with hints and alternate answers, and branches to provide additional instruction when students respond incorrectly. Z. E. S. also includes an elaborate and useful records system. Unfortunately, the program is prone to bugs, poorly documented, and requires some programming capability in order to use it effectively. It is, however, an example of software potential and could be invaluable if the limitations to its use were corrected.

Testing *Group* (Educational Courseware, $32) is a useful program that allows non-programmers to create infinitely variable multiple-choice, true-false, completion, or matching tests. It also keeps a record of student progress.

CMI

Software that keeps records and analyzes results of instructional strategies

Apple-Statistics (Ed-Sci Development, $95) is a complete statistics and data-management package that calculates the mean, standard deviation, frequency of distribution, paired and unpaired t-tests, Mann-Whitney U-Test, Wilcoxan Paired-Sample Test, Chi-Square Test, linear regression, and other statistics-an extremely useful program.

permits additions and deletions, ranks the class for each grade set, and produces updated class lists with grade scores, total weighted scores, and letter grades assigned.

Apple Gradebook (Creative Computing Software. $25) accepts up to thirty-five sets of grade scores for a class and generates class rosters, lists of scores, amended rosters and scores, individual student records, class statistics, and a catalog of disk contents.

Software Suppliers

Avant-Garde Creations
P.O. Box 30160
Eugene, OR 97403

ComPress
P.O. Box 102
Wentworth, NH 03282

Creative Computing Software
39 East Hanover Avenue
Morris Plains, NJ 07960

Educational Courseware
3 Nappa Lane
Westport, CT 06880

Educational Audio Visuals
Pleasantville. NY 10570

Ed-Sci Development
460 Beacon Street
San Francisco, CA 94131

Edu-Ware Services
22222 Sherman Way, Ste 203
Canoga Park, CA 91303

Krell Software
21 Millbrook Drive
Stony Brook, NY 11790

Program Design
11 Idar Court
Greenwich, CT 06830

Stoneware
50 Belvedere Street
San Rafael. CA 94901

Unicom
297 Elmwood Avenue
Providence, RI 02907

Although CAI software is largely unsatisfactory, the representative selection of author-program and CMI software demonstrates the availability of excellent programs for generating specific, class-related learning activities and for maintaining accurate statistical analyses ordinarily beyond all but the leisured instructor. As with most activities in life, the computer programs we design ourselves-with the help of appropriate software-are most likely the best. I have intentionally not included the technical specifications of programs, the hardware and disk operating systems required to operate them. Prospective buyers must actively investigate the software they intend to buy. Remember my second harsh reality. The following list of books, associations, and periodicals should provide a beginning for WPAs seriously interested in developing a "library" of software. However. implicit in this general introduction to educational computing is the obvious need for software users to form a reviewing network specifically for language-composition programs on the university level. If WPAs had such a network, we could significantly improve the educational computing packages students are subjected to, we could minimize our number of purchasing mistakes, and we would achieve the ultimate goal of all university administrators: genuine cost-effectiveness.

Books

The following is an annotated list of selected books that survey the role of computers in education or provide descriptions of educational software.

Apple Computer Education Software Directory (Visual Materials, Gurnee, II, 1982). The directory describes over 1000 available programs for kindergarten through college-level instruction, supplying names and addresses of producers.

CAI Sourcebook by Robert L. Burke (Prentice-Hall, Englewood Cliffs, NJ, 1982). Designed as a reference for experienced programmers and as a source for novices, it provides instructions for de ve loping CAI programs and provides twenty sample-program frames as guides. Also includes criteria for evaluating software and a glossary for making sense of CAI terminology.

Computers in Education, Bob Lewis and Donovan Tagg, editors (Elsevier North-Holland, New York, NY, 1981). Contains papers from the first world conference on computer education. Broad overview of computer-aided learning. Describes the impact of informatics on teaching, CAL techniques, and needs as well as successes of CAL.

School Administrator's Introduction to Instructional Use of Computers by David Moursund (ICCE, University of Oregon, Eugene, OR, 1980).

Reference Manualforthe Use of Microcomputers (Jem Research, University of Victoria, Victoria, BC, 1981, $7S). Volume includes an index of educational software by subject and level. Lists distributors, evaluates more than 200 representative programs, provides a bibliography of books, magazines., and journals, and suggests criteria for evaluating software.

The Book of Apple Computer Software, 1982, Jeffrey Stanton and John Dickey, editors (The Book Company, Lawndale, CA, 1982). Describes in detail ¯ the majority of known Apple software on the market." The authors explain what each program does, rate the program for reliability, documentation, ease of use, and other pertinent criteria.

Nonprofit Organizations

The following organizations provide services and publications supporting educational computing.

Computertown
USAI, POB E
Menlo Park, CA 94925

Conduit
POB 388
Iowa City, IA 52244

CUE (Computer Using Educators)
c/o Independence High School
San Jose, CA 95133

HumRRO (Human Resources
 Research Organization)
300 North Washington Street
Alexandria, VA 22314

MECC (Minnesota Educational
 Computing Consortium)
2520 Broadway Drive
St. Paul, MN 55113

Microsift
Northwest Regional Educational
 Laboratory
300 S.W. Sixth Avenue
Portland, OR 97204

TERC (Technical Education
 Research Centers)
8 Eliot Street
Cambridge, MA 02138

Professional Associations

The following professional associations support educational computing in their national meetings and publications.

Association for Computing Machinery (ACM), 1133 Avenue of the Americas, New York, NY 10036. This organization has several subgroups related to educational computing:

> Special Interest Group on Computers in Education (SIGCUE)
> Special Interest Group on Computer Science Education (SIGCSE)
> Elementary and Secondary Schools Subcommittee (ESSS, pronounced "ES-cubed")

Association for the Development of Computer-Based Instructional Systems (ADCIS), c/o Computer Center, Western Washington University, Bellingham, WA 98225.

Association for Educational Data Systems (AEDS), 1201 16 Street, N.W., Washington, D.C. 20036.

National Educational Computing Conference, c/o Gerald L. Engel, Computer Science Department, Christopher Newport College, 50 Shoe Lane, Newport News, VA 23606.

National Council of Teachers of Mathematics (NCTM), 1906 Association Drive, Reston, VA 22091.

Periodicals

T.H.E. Journal, P.O. Box 992, Acton, MA 01720, surveys technological horizons in education by presenting discussions of current issues in the area, reviewing books, hardware, and software, and previewing relevant professional meetings. (Best of all, it is free.) A list of periodicals available to educators follows.

Byte
70 Main Street
Peterborough, NH 03458

Classroom Computer News
51 Spring Street
Watertown, MA 02172

Computers and Programming
380 Lexington Avenue
New York, NY 10017

Educational Technology
140 Sylvan Avenue
Englewood Cliffs, NJ 07632

Electronic Learning
902 Sylvan Avenue
Englewood Cliffs, NJ 07632

Popular Computing
70 Main Street
Peterborough, NH 03458

Softalk
11021 Magnolia Boulevard
North Hollywood, CA 91601

The Computing Teacher
ICCE
Department of Computer
 and Information Sciences
University of Oregon
Eugene, OR 97403

Software Catalogs

The following is only a sampling of the many software catalogs currently available. Their listings include general programs and are not limited to educational programs.

Commodore Software Encyclopedia,
(Commodore)
Commodore Business Systems
300 Valley Forge Square
King of Prussia, PA 19406

K-12 MicroMedia
(Apple, Pet, TRS-80)
P.O. Box 17
Valley Cottage, NY 10989

Purser's Magazine (Atari)
P.O.B. 466
El Dorado, CA 95623

Skarbecks Software Directory
(Apple)
Skarbecks
11990 Doresti Road
Maryland Heights, MO 63043

The Book of Apple Software
(Apple)
The Book Company
6720 Hawthorne Boulevard
Lawndale, CA 90260

TRS-80 Applications Sourcebook
(TRS-80)
Catalog #26-2113
Any Radio Shack Outlet

Vanlove's Software Directory
(Apple)
Vital Information Company
350 Union Station
Kansas City, MO 64103

Notes

[1] Alfred Bark, "Computers in the Classroom", in *On College Teaching*, eds. Ohmer Milton et al. (San Francisco: Jossey-Bass, 1978), pp. 184–5.

[2] David Grady, "A Hard Look at the World of Educational Computing," *Personal Computing*, 6 (August 1982), 42.

[3] Daniel Watt, "Close Encounters with Software," *Popular Computing*, 1 (August 1982), 36.

[4] Martha Maxwell, *Improving Student Learning Skills* (San Francisco, Jossey-Bass, 1979), p. 251.

[5] William Wresch, "Computers in English Class: Finally Beyond Grammar and Spelling Drills," *College English*, 44 (September 1982), 489.