Computer Center

Computers At NABT '83

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Department Editor

The 1983 NABT meeting in Philadelphia will be remembered as the year that computers became a major part of our annual assembly. Indicators included an all-day workshop on the field trip day, six one- or two-hour workshops, many individual papers, a three-hour symposium on computers in bioeducation, and demonstration of programs and equipment by many of the commercial exhibitors.

I could not attend every talk and workshop on computers (I have other interests, too!), but let me give you a taste of the diversity of educomputing available at the meeting.

The all-day Computers In Bioeducation Workshop presented on the field trip day began an hour late due to a bus breakdown (a city bus, not a computer multiplexer bus!). Drexel University provided the room, 15 Apples, two wonderful, capable assistants (graduate students Melanie Hoag and Simon Edkins), and coordinator Professor Allen Smith. Participants spent several hours playing "musical computers." Each computer had a different bioeducation program, and participants spent eight minutes at each (like a big lab exam!). Ric Garcia (Clemson University) discussed important concepts of drill and practice such as graphics, degree and sequence of interaction types, stimulus variation, immediate corrective feedback, and queuing. Queuing is the ordering of questions. They might be random or structured; they may appear only once or several times in a certain pattern if the student should answer it incorrectly. Bob Kosinksi (Texas A & M) described the steps involved in creating a program for education. It involves many stages, many people, and a lot of time! He used his program, ALIEN, as an example. One of his general suggestions was not to use computers to replace a laboratory exercise that is working well economically and pedogogically. Rather, focus on your weakest exercises and see if computers can enhance learning in those topics. I led discussions of evaluation of the 47 biology programs available at the workshop, of concepts related to educational systems with and without computers, interactive strategies, and computer personalities. The workshop's overall goal was to help each participant to be his or her own best consultant, which would assure wise, effective use of computers in their courses. To make up for the hour missed in the morning, and to allow some of the 100 people who were unable to be accommodated into the all-day workshop, a special overview lecture of computers in bioeducation was given that evening. My colleagues and I enjoyed giving the workshop because our fellow (and sister!) educators who took it were so very genuinely highly motivated too. What a delight!

During the regular meeting days the following one- or two-hour workshops were given: "Fundamentals of Computer Programming and Class Use—For Absolute Beginners," by Joseph Cifelli and Daryl Biser, Cheltenham High School; "Microcomputers and Concept Mapping—Using an Interactive Microcomputer Program and Concept Mapping to Learn Plant or Animal Classification," by Edward Donovan, Moorestown High School; "Shape Tables (Graphics) and Sound Generation in the Apple Computer—For Persons With Some Programming Background," by Clifford Little and John Parnell, The Hill School; "The Microcom-

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For use in The Computer Center, Ted welcomes suggestions on what subjects should and should not be treated, summaries of educational computing centers, innovative uses of computers, and information about relevant books and events.

puter/Biology Interface," by Salvatore Tocci, East Hampton High School; "Microcomputers and Biology," by Dennis Gathmann, Lake Land College, and Earl Creutzburg, Parkland College; and "Using the Computer in the Biology Laboratory," by James Ellis, the Biological Sciences Curriculum Study. The demand for all of these workshops greatly exceeded the capacity due to the number of available machines. Next year we hope to offer a workshop several times to alleviate this problem. The level of workshop topics (from beginning to advanced specialties) reflects both the growing computer sophistication of some and for others their increasing eagerness to learn fundamentals. A healthy situation for bioeducation!

Individual educomputing papers included one by Terry Peard (Avoca Central School). He used CATLAB (available from CONDUIT, The University of Iowa, P.O. Box C, Oakdale, IA 52319) to assess cognitive development in Mendelian genetics. He tallied the misconceptions about genetic principles that students had, and the effect of using CATLAB to reduce them. He finished with eight advantages of using the microcomputer, including increased ease of in-depth examination of levels of knowledge and reasoning rationale, increased pressure on students to think, and an increased positive affective attitude toward learning.

Don Streubel and Steve Cox (Idaho State University) discussed their analysis of cognitive ability and achievement via CAI. They constructed a computer bank of test questions on their Hewlett Packard Model 3000 minicomputer. Each was classified according to Bloom's cognitive taxonomy. Among other statistically significant correlations was that between mean student response time and students English ACT scores, implying a relation between reading ability and student response time. This is a clear example of the value of competence in one discipline affecting that in another (at least during tests!).

Jeffrey Lehman (SUNY at Albany) summarized two of 99 studies of the effects of microcomputers on learning. Some found significant differences between students using microcomputers and those not using them, while others found no differences. Specific findings for specific classroom situations included that CAI reduced the time needed for instruction, that microcomputers have diagnosed learning problems, and that tutorial CAI tended to benefit only low ability students. Lehman ended with a four-part research model to serve in subsequent studies of the effects of computer based education.

Jim Ellis described educomputing activities of the Biological Sciences Curriculum Study in the first paper of the symposium organized by myself entitled "Computers In Biological Education." Michael Collins (Memorial University of Newfoundland) described how computer administered tests improved students' learning. Some of his conclusions were that computer administered tests can increase test scores, but the amount of increase varies greatly, that students' attitudes improve with computer testing, and that such testing allows students to see the exact areas which require further study. Ric Garcia discussed seven advantages of using microcomputers in education, including making independent study more effective. It helps to overcome the problem that students frequently don't know what it is they don't know! Stephen Alessi (University of Iowa) gave a concept-filled description of how to design effective computer based material from an educational psychologist's viewpoint. Jane Heinze-Fry (Cornell University) discussed possible ways to use computers and concept mapping to enhance learning. Finally, I discussed the evolution and evaluation of software.

My visit to the commercial exhibits at the NABT meeting revealed increases in the number, diversity, and quality of computer software and hardware on display. Classroom Consortia Media (57 Bay Street, Staten Island, NY 10301) exhibited several programs for grades 6-12 for the IBM Personal Computer (leaf structure and function, cell growth, etc.). Utility programs included SUPERDRAW, which allows you to create graphics, store them on disk, and use them in your own BASIC program later. Students respond to questions by typing the proper word or phrase, and not by simple multiple choice format. These are the first commercially available programs for the IBM to my knowledge, and they are off to a good start.

Bio Learning Systems (420 Lexington Ave., Suite 2735, New York, NY 10017) introduced five excellent animated drill and practice tutorials (proteins, nucleic acids, life functions, etc.) and a biochemistry test disk. The programs were created using the team approach (written by teachers, edited and programmed by computer professionals, and school tested and modified). A welcome, educationally sound innovation is that a student makes a choice not by just typing a reference number or letter for the choice. Rather they must actually type the meaningful term (e.g., hydrolysis). This reinforces their visual input and eliminates superficial "screen turning."

HRM Science (Pleasantville, NY 10570) demonstrated several health awareness games as well as Heredity Dog and Gene Machine, all suitable for General Biology courses. But in addition they and a second vendor displayed a program and special hardware for automated laboratory data accumulation. HRM's Experiments In Human Physiology includes a 75-page teaching guide and allows

students to perform ten experiments (skin temperature, heart rate, biofeedback, etc.). The second vendor, Quantum Technology (P.O. Box 1396, Englewood, CO 80150) demonstrated their LEAP System for science education. Educators can purchase a system with just two input channels or add more versatility by purchasing one with eight or 16 more. Both the HRM and Quantum Technology systems include programs that allow you to control data accumulation and to analyze the data. Such vendors now allow educators with no programming knowledge to use computers in the laboratory segments of their courses.

Videodiscovery, Inc. (P.O. Box 85878, Seattle, WA 98145-1878) caused a sensation and heralded in a new era with what is the first extensive biology slide library on a videodisc. Subjects in the 6,000 slide images range from biochemistry to plant and animal diversity. The slides and sections of films stored on the disc are fantastic (having been selected from 300,000 submissions), and they are as clear and sharp on the monitor as the pictures in high quality "coffee table" books. The videodisc plus a hierarchial arranged "image directory" cost $495, quite a bargain when you consider that 2 x 2 slides of equal quality often cost $1 each or more. But more importantly, the 6,000 slides on the videodisc are always at your fingertips. You can use the videodisc in several ways: 1) for lecture support, which requires the videodisc and directory, a videodisc player, and a color monitor which could be a regular television; 2) for lecture support or individualized instruction, add a regular audio (not video) cassette recorder and you can have a preprogrammed slide show; and 3) for interactive computer based education add a microcomputer, interface hardware, and software. The interface hardware today costs several hundred dollars. The Bio Sci Video Disc is compatible with any laser-system videodisc player such as Pioneer, Sony and Hitachi; such players also plug into large screen projection systems for simultaneous viewing by your entire class. The image directory is also available on a set of menu-driven floppy disks. Welcome to the next step of integrated, computer-based technology! And we still are just at the beginning!

The only other videodisc in bioeducation known to me is part of the Interactive Videodisc Science Instruction Project for teaching laboratories. It is a joint venture of the Nebraska Videodisc group at Lincoln, Nebraska Educational TV, the Annenberg Communications Foundation and the Corporation for Public Broadcasting. It is at the field test stage. For recent articles on videodiscs in education see *Creative Computing*, January 1982 and *The Computing Teacher*, September 1983.

While other important events happened that did not involve computers, NABT '83 will be remembered as the meeting where computers became a major part of our annual get together. And everyone in attendance contributed by their eagerness to learn and to explore how the *wise* use of computers can enhance education of their own students. Bring on more at NABT'84!

Review of Biology Software YOU CAN HELP!

As the number of available bioeducation programs increases, so does the need to evaluate them. Several organizations evaluate software now, but many readers may not have access to them. Also, since they deal with all disciplines the number of biology reviews can be quite small.

You can help yourself and fellow bioeducators by participating in the *ABT* Biology Software Review. This ongoing project will work like this:

1) Any bioeducator familiar with a particular program is encouraged to send me (double-spaced) the program name, author if known, the source of the program, and a paragraph of about 100 words summarizing the pros and cons of the program. If you have used it in the classroom, describe your use and student reaction. Be specific in all of your comments. Include your name and address, since I may have to contact you, and because your name will appear in the published review. I am sorry but neither I nor NABT can provide you with copies of any programs, nor are you officially authorized to solicit a copy either on behalf of NABT or of me.

2) I will add the basic information to the review (current price, etc.), and perhaps my own 100-word review.

3) When I have received reviews of the same program from at least TWO bioeducators, all reviews will be sent to the program's publisher. They will be invited to provide 100 words of response.

4) Finally, all of the above information will be published in *ABT*.

I believe this is a fair and efficient

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