Microcomputers

For College Teaching of Agriculture

George Mozes and Jack Everly

Abstract

The objective is to provide basic tips and sources of information on microcomputers for the instructor in college level agriculture who considers him/herself a beginner in this rapid-growing technology.

Computer-Based Instruction (CBI) and its two components — Computer Assisted Instruction (CAI) and Computer Managed Instruction (CMI) have been with us for more than a decade. In all this time, though, the computer has not "swept" the education scene as predicted earlier. High cost and limited availability have discouraged instructional use.

The current evolution of the microcomputer is changing the instructional cost for this Technology. Inexpensive computers and simple programing languages are making the computor accessible for countless applications, including teaching and learning.

Along with *Time* magazine, most educators will agree that the *age of the computer* is here. Already the microcomputer is considered a common appliance in the American household. Predictions show that over one million microcomputers will be operating by 1980. If they become as available as the portable typewriter to our students, the microcomputer may become a common teaching tool required for instructional strategies in college-level agriculture.

What Is A Microcomputer?

The microcomputer is also known as the home computer, personal computer, or desktop computer. It is a small, low cost computer which is nowadays manufactured on a silicone chip about one-tenth of an inch square. Of course the computer, as we see it, is packaged in a larger format (the size of a typewriter), but the "brain" of the computer, called the Central Processing Unit (CPU) is just a little larger than the head of a common pin. Computers are sometimes categorized by their price. A

fully operational microcomputer costs between $400-$3,000, as opposed to $10,000-$30,000 one must pay for a minicomputer or the hundreds of thousands of dollars for a main frame or large computer.

For too long computers have been shrouded in mystery, with computer specialists talking a strange language and acting as some kinds of wizards. But more and more people have come to "see the light," to realize that there is nothing mysterious about computers, and that working and even programing one can be a simple and rewarding activity, particularily if you get the student response, "Prof. — because of your computer lesson I now understand Concept X."

Getting Started In Microcomputers

Even if you are not convinced of the need or the wisdom of getting involved in microcomputers for teaching college level agriculture, you still should do a little reading, to see if this is or isn't for you. Two books might well help you to make this decision. One is Ted Nelson's *Computer Lib/Dream Machine;* the other is *Home Computers.* by the editors of *Consumer Guide.* Nelson's book is unique; some people like it and some hate it. But almost all newcomers to computers like it since the book gives "a simple, soup-to-nuts overview of what computers are really about, without technical or mathematical mumbo-jumbo, complicated examples, or talking down." The book builds one's confidence in the computer and starts something which could well be the beginning of a longlasting relationship. (127 pages, $7.00 for paperback; order from the author or from Creative Computing, 800-631-8112).

The second book, *Home Computers*, is specifically dedicated to microcomputers and to the beginner trying to find out what they are all about. It explains what personal computers are, how they work, what they can do, where to buy them, etc. It even has a glossary of terms and a directory of manufacturers.

Reading

Suppose you have read these books and decided to get involved with microcomputers for instruction, what next? The one activity most beneficial at this point is reading. You should read as much as possible. With the overflow of books, journals, manufacturer's literature and the like, you should have no problem in finding what to read. The only difficulty is to select the best or most relevant sources for your own application.

A valuable tool in locating articles on various topics is the *Periodical Guide for Computerists*. This is an index of articles, letters from readers, book reviews, and editorials from magazines in the microcomputing field. Published yearly, $5.00, E. Berg Publications, 1360 SW 199th Ct., Aloha, OR 97005.

Bibliographies on Computer-Assisted Instruction (CAI) can be developed by using two major databases: ERIC (Educational Resources Information Center, 1200 19th St. NW, Washington, DC 20208) or NTIS (National Technical Information Service, Springfield, VA 22161). Relatively few citations retrieved from these databases reflect microcomputer applications, but they do provide information on many theoretical and practical questions of CAI in general, which could well apply to microcomputers.

Listed in the Appendix are a few sources selected on the basis of readability and relevancy to beginners in this field.

Joining An Organization

The second best activity for finding out more about computers and for getting really involved is to join an organization created for people with similar interests. Such organizations are local or regional clubs and professional organizations or associations at national, state, or local level. The types of objectives, activities, and services offered by these organizations vary, but almost all were created to facilitate communication among members.

Communication is the name of the game! Attending meetings, seminars, visiting exhibits, and just plain talking with people having similar interests and problems, can be very productive activities indeed. You learn the jargon, make contacts and friends, and find out about the nitty-gritty, which is seldom published in books or journals.

The best advice is to join at the beginning as many of these organizationas as your time and pocketbook will allow. Ask questions, ask for help and advice, get involved in group activities. Above all, don't be shy! You'll find that computerniks are a friendly bunch, always ready to talk if you're willing to listen.

A similar activity is attending one or more computer conferences organized in many parts of the country. Besides interesting exhibits and a chance to meet people, at many conferences you can participate in lectures and seminars, including introductory classes for novices.

Computer shops can also offer valuable help and advice. Most of these shops are used by computerniks as a meeting place, to exchange ideas or to try out new equipment. Everybody is welcomed to browse, handle various systems, ask questions. Dealers and salespeople are usually very friendly; after all they want you as a permanent customer.

The Appendix provides you with a partial list of associations, clubs, and computer shops, as well as some conferences you could attend.

Learning How to Program

Knowing how to write your own programs is not essential, but it can be very helpful. There are literally hundreds of programs sold by commercial outfits, and many more available on a sharing basis, when you join a club or an association. But when it comes to educational applications, the situation changes. There are not many programs written for CAI, and those which are available are mostly written for main frame computers, not microcomputers. Here is when your knowledge of programing comes in very handy. There is nothing like an in-house produced program tailormade to suit your particular needs.

The most common language used to program microcomputers is BASIC (Beginners All-purpose Symbolic Instruction Code). It can be learned very quickly and easily by anyone; no math background or other special skills are needed. (Computer clubs are notorious for the heterogenity of their members: from teenagers to grandfathers and people from all walks of life. Yet everybody has managed to learn BASIC, at least in its elementary form).

There are many ways to learn the BASIC language. You can take a course at a nearby community college or university. Some larger institutions, such as hospitals, offer courses in BASIC given by their own programers to employees interested in various computer applications.

Another way of learning BASIC is by reading a book or two on the subject. (A list of books and other sources on BASIC is provided in the Appendix). If you combine this reading with actual exercises at a terminal or a computer, you could become proficient in writing simple programs in less than fifteen to twenty hours of study and exercise. Forty to fifty hours of study and exercise will undoubtedly make you a professional.

There are, of course, some self-instructional packages in the form of textbooks and audiocassettes, as well as CAI programs, which teach BASIC right at the terminal.

Buying A Microcomputer

You can get involved in microcomputer without actually owning one. In fact, it is not advisable to buy a system before doing some extensive reading, talking with others, and trying out various systems at computer shops, exhibits, and computer clubs. There are many sources which can aid you in making the decision to buy or not, and, in case you want to buy, they can help you decide on a particular system. Some of these sources are listed in the Appendix.

Conclusion

Microcomputers are powerful enough to be considered for many instructional applications in college level agriculture. Low cost and availability will make them useful for instruction in school and at home; entertainment through games and simulations; business applications such as record-keeping and mailing lists; household

management applications such as balancing the checkbook, calculating taxes, controlling various appliances, and many more activities. These relatively inexpensive computers have brought computing within the reach of millions. The popularity of these computers is bound to increase and their powers be better known and used. As instructors, we should be challenged by the vast possibilities of this new techology and use it when appropriate.

Appendix

Books on Microcomputers

Grosswirth, Marvin. 1978. *Beginners Guide to Home Computers.* Garden City, N.Y., Doubleday and Co. 128 pages. $3.95. Subtitled "A comprehensive introduction to understanding, operating, and selecting a personal computer." This book is indeed aimed at the nontechnical person and it is easy to read. It has a good list of computer societies and dealers throughout U.S. and Canada.

Miller, Merl K. and Sippl, Charles J. 1978. *Home Computers Glossary and Guide.* Portland, OR: Dilithium Press, 147 pages. $6.95.

This book presents a general introduction to microcomputers and has a fairly well-developed (and accurate) glossary of terms.

Osborn, Adam. 1976, 1977. *An Introduction to Microcomputers.* Vol. 0 — The Beginner's Book, Vol. 1 — Basic Concepts. Berkeley, CA: Osborn and Associates. Vol. 0, 220 pages. $7.95; Vol. 1, 350 pages. $8.50.

This is a thorough work, accepted very well by computer hobbyists, but a little too technical for the novice. It can be an excellent source to read as a second or third book.

Books On Basic Language

Dwyer, Thomas A. and Kaufman, Michael S. 1973. *A Guided Tour of Computer Programing in BASIC.* Boston, MA: Houghton Mifflin, 156 pages. $3.60 (paperback).

Well suited for self-study, this is one of the best introductory books on BASIC. Includes sample programs for many simulations, games, and other applications.

Kemeny, John G. and Kurtz, Thomas E. 1971. *BASIC Programing* 2nd ed., New York: John Wiley and Sons, 150 pages. $7.75 (paperback).

Most everybody agrees that this is the best book on BASIC (from a field of over 50 other books). Special care is taken to take the readers "by the hand" and introduce him/her gently to this language.

Murrill, Paul W. and Smith, Cecil W. 1971. *BASIC Programing.* Scranton, PA. Intext Educational Publishers. 154 pages. $6.00 (paperback).

This book has many good exercises from various fields and employs a simple, straight-forward approach.

Smith, Robert E. 1970. *Discovering BASIC: A Problem Solving Approach.* New York: Hayden Book Co., 203 pages. $7.95 (hardcover), $5.95 (paperback).

One should read this book only after Kemeny's book or after an introductory course in BASIC. Very good for learning various applications and for working problems at the terminal.

Step-by-Step is a cassette course that teaches how to program a microcomputer in BASIC language. $29.95. Program Design, Inc., 11 Idar Ct., Greenwich, CT. 06830.

Learn Microcomputers is another multimedia package made of a text and cassette. Explains the fundamentals in microcomputers and has key review questions, even gives tips on how to buy a microcomputer. $14.95. Scelbi Publications, P.O. Box 133 PP STN, Milford, CT 06460.

The *Computer Data Directory* is a comprehensive catalogue for small computer users. Includes manufacturers, equipment, software by languages and applications, information on books and magazines, computer stores and clubs, etc., $4.98. The Computer Data Directory, P.O. Box 598, Cleveland, OH 44107.

Academic Computing Directory. This source subtitled "A search for exemplary institutions using computers for learning and teaching." lists the ways in which schools, colleges and universities have used the computer in learning and teaching. Although few applications here are for microcomputers, this is still a very good source for ideas and contacts. Alexandria, VA: Human Resources Research Organization, 1977. 114 pages, $3.95.

Spencer, Donald D. 1977. *Microcomputers at a Glance.* 1977. Ormond Beach, Fla.: Camelot Publishing Co. 192 pages. $11.95 (hardcover), $7.95 (paperback).

This is a dictionary of technical terms containing about 2,500 words. Good reference book.

Schreier Software Index (SSI) is an index to hundreds of microcomputer programs published in microcomputer books and magazines since 1975. SSI, 4327 East Grove St., Phoenix, Arizona 85040.

Periodicals (Journals, Magazines)

Byte, the small systems journal. This monthly publication is devoted mainly to hardware. If you intend to buy a system, or to upgrade an existing one, this journal can be of real help. $12/year or $32/3 years. BYTE Publications, Inc., 70 Main St., Peterborough, NH 03458 or call 603-924-7217.

Creative Computing. Calling itself "the #1 magazine of computer applications and software," it is published bimonthly and offers a little bit of everything: programing techniques, description of hardware, programs for games, and articles on various computer applications including, of course, education. $2.00 single issue, $8/year, $21/3 year subscription. The first two volumes of this periodical are available in a book form: *The Best of Creative Computing.* Volumes 1 and 2, edited by David H. Ahl, and selling for $8.95 each. Creative Computing, P.O. Box 789-M, Morristown, NJ 07960, or call 800-631-8112.

The Software Exchange. This is a bimonthly publication devoted to the exchange of ready-to-use software for business and the home. If you need a special program, for example, you can place a "Wanted" ad in this periodical. $1.50/issue or $8.00/one year subscription (6 issues). The Software Exchange, Box 55056, Valencia, CA 91355.

Several small publications are tailored to the needs of specific microcomputer owners.

Pet User Notes is a bimonthly periodical. $5/year, P.O. Box 371, Montgomeryville, PA 18936.

MICRO, The 6502 Journal, also bimonthly, $6/year intended for owners of APPLE, CHALLENGER, PET and other 6502 systems.

TRS-80 Computing, issued monthly, $10/year.

Associations

The Association for Computing Machinery (ACM) has a Special Interest Group on Personal Computing (SIGPC) operated exclusively for educational and scientific purposes in the design and applications of computer systems for personal uses, membership-$5/year for CM members, $13 for non-members, ACM, P.O. Box 12105, Church Street Station, New York, N.Y. 10249. ACM has another SIG of interest - the Special Interest Group on Computer Uses in Education (SIGCUE).

The Association for Development of Computer-Based Institutional Systems (ADCIS) is an international not-for-profit organization. The purposes of this organization are to 1) advance the investigation and utilization of CAI and CMI; 2) promote and facilitate the interchange of information, programs and materials in the best professional and scientific tradition; 3) reduce redundant effort among developers; and 4) specify requirements and priorities for hardware and software development, and encourage and facilitate their realization. The Association publishes a Newsletter and the *Journal of Computer-Based Instruction.* Membership dues for individuals: $30/year. For further information, contact Joan Lauer Hayes, Secretary-Treasurer, ADVIS, Computer Center, Western Washington State College, Bellingham, Washington 98225, 206-676-2860.

The Association of Small Computer Users (ASCU) intends to provide members with selected publications at a reduced cost, a bimonthly newsletter and comparisons of competing small computer systems. Membership $25/year. For information write to: ASCU, 75 Manhattan Drive, Boulder, Colorado 80303.

Small organizations, societies, or users groups are often organized for owners of various microcomputer systems. Among the goals of such organizations are to facilitate communication among members, to facilitate exchange of software, to obtain feedback from users regarding the hardware. Manufacturers and dealers can provide details on such organizations. Two examples are provided below:

Sol Users Society (SOLUS) is an organization for owners of Processor Technology Sol Computers and owners of similar computers (8080 and Z-80 Microcomputers). SOLUX, Box 23471, San Jose, CA 95153.

Compucolor Users Group - for the owners of the 8001 system. Membership/$10. Compucolor Users Group, c/o C.P. Electronics, 5250 Van Nuys Blvd., Van Nuys, CA 91401.

Clubs

There are many computer clubs or societies throughout the country, but space does not permit us to list them all. As mentioned previously, the Grosswirth's book lists 125 of them. Some of the periodicals also contain information about the activities of these clubs. The same source (Grosswirth) lists 262 dealers and computer stores in U.S. and Canada. You can also look them up in the yellow pages.

Another source providing a list of computer clubs and computer stores is: Bunnel, David. 1978. *Personal Computing: A Beginner's Guide.* New York: Hawthorn. 208 pages. $11.95.

Conferences

National Educational Computing Conference. University of Iowa, Iowa City, June 25-27, 1979.

The 1979 National Computer Conference organizes Personal Computing Festival - New York City, June 4-7, 1979.

Graduate Study in Agriculture At Non-Land Grant, State Supported Universities

Elmer Gray

Abstract

During the 1978-79 academic year agricultural graduate programs at non-Land Grant universities were reviewed. Graduate programs were identified at 31 universities in 11 states. Graduate enrollments have averaged approximately 1500 during the past three years. Approximately 450 graduate degrees are awarded annually. Most agricultural graduate degrees offered by non-Land Grant universities are at the master's level. The most common degree is the Master of Science with a major in agriculture. Although the programs vary among universities, the typical graduate program is offered by a department of agriculture within a college of science; is based upon general agriculture; includes a thesis option; serves graduates of the same as well as other institutions; is not unique when compared with other degree programs within the state; is supported by fewer than six assistantships; and is reported to be growing. The outlook for development of agricultural graduate programs at non-Land Grant universities was described as fair to excellent by most survey respondents.

The Morrill, or Land-Grant, Act of 1862 provided the original financial support for the creation and maintenance of colleges of agriculture and mechanical arts. This Act and subsequent federal enactments have provided each state with annual federal grants to support a Land Grant institution and its tripartite function of teaching, research, and extension.[1] In addition, several states have provided public financial support for agricultural and related programs through one or more non-Land Grant institutions. The non-Land Grant, state supported programs have been directed more toward teaching than toward either of the other two functions of the Land Grant institution. Since the non-Land Grant institutions have received less support for research, their primary emphasis has been on undergraduate rather than graduate teaching, where research training is more critical.

The objective of the present study was to ascertain the extent of the development of graduate agricultural programs at the non-Land Grant, state supported universities.

Procedure

Universities offering graduate study in agriculture were identified from the NACTA 1978 **Directory of Post-Secondary U.S. Institutions with Programs in Agriculture**[2] and from NACTA published[3], [4] and unpublished[5] enrollment reports. Statistical data on graduate enrollment and degrees awarded were obtained from unpublished reports by J. C. Dollahon.[5] Information on program characteristics was obtained from each university's graduate bulletin and from results of a survey of administrative heads of units offering graduate programs. Below is a copy of the survey.

SURVEY
Agricultural Graduate Programs
at
Non-Land Grant Colleges and Universities

Institution _____ State _____
Number of different graduate degree programs in Agriculture_____
The following information is needed for each graduate agricultural program.
1.   Name of degree: (Examples: M.S., Ph.D.) _____
2.   Program area options: (Examples: animal science, plant science)
     _____
3.   Program orientation: _____ Teaching, _____ Research, _____ Public Service,
     _____ Other (please explain) _____
4.   Breadth of program:
     _____ Single discipline within agriculture
     _____ Two or three disciplines within agriculture
     _____ General agriculture (several disciplines within agriculture)
     _____ Interdisciplinary (involving disciplines outside agriculture)
5.   Thesis: _____ Required, _____ Optional, _____ None
6.   Degree is considered as: _____ Intermediate, _____ Terminal

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