THEME: Using Microcomputers in Agricultural Education
The Unfinished Agenda, The Role of Vocational Education in the High School” was released at the 1984 AEA Convention under the aegis of the National Commission on Secondary Vocational Education. The Commission was comprised of a prestigious group of persons who have commendably provided insight into the criticality of vocational education.

This editorial will not recite the content or recommendations made by the commissioners. Every vocational agriculture teacher should procure a copy of the report, however, and carefully study its contents. The report provides a fresh perspective on vocational education and edifies the numerous other reports which seem to propose a philosophy of “educate the best and forget the rest.”

The report proposes a humanistic approach to education that focuses upon the needs of the individual. It proposes no simple solution or narrow-minded plea, but speaks to permitting student access to high quality vocational education programs. The commission is to be commended for its scholarly and thoughtful efforts. They have described the parameters of an educational philosophy that should predominate; the needs of the individuals.

Room to Grow

Agricultural education is a part of vocational education. Yet, we may be, in many respects, as different from our sister vocational programs as vocational education is from the rest of education.

As you study the report and consider the recommendations, consider their implications to practice in vocational agriculture. How can we improve the quality of our programs? Granted, we may be doing some of these things now, and perhaps are unique in certain aspects of our sister vocational programs, but we still have much room for growth and improvement.

We are unique in many ways. We have a program of high quality which has helped innumerable people. We all know, however, that many programs have much room for improvement. Like the adage about the short statue in the barrel, we may not measure our quality line above the capacity of our shortest statue. The profession may be described by its shortest statue. Therefore, we must concurantly lengthen that statute as we increase our total volume for high quality. Reports on the quality of education should serve to open a window to new frontiers which will enable us to better serve our clientele. Let us not be reticent to change, but carefully assure that with change we preserve the unique components of our programs which have proven successful.

A Case in Point

This issue aptly illustrates the concern of the profession for high quality programs for our clientele. When it became evident that people needed skill in using microcomputers, teachers of vocational agriculture were trained and they responded by providing the needed education.

You should benefit by the articles as they provide the viewpoints of some of the persons at the forefront of this endeavor. Our agenda is to continue to provide the best education using the best methods of delivery we can devise.

Correction: The January issue erroneously listed the correct address for Associate Professor and Head, Agricultural Education, 431 Hills House North, University of Massachusetts, Amherst, MA 01003.

The Cover

Barry Hines (Kentucky Winner) and Tammie Miller (Louisiana Winner) acquiring skills during the 1984 National Seminar on Computers in Agriculture. (Photograph courtesy of Dwight Holtekin, FAA Computers in Agriculture Coordinator.)
A Cut Above Literacy: Using Microcomputers in Agricultural Education

By Blaine E. Sweeney, Theme Editor

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Practical Problems

When microcomputers were introduced during the late 1970s, teachers were mainly concerned with the notion of "How do I secure one for my program?" After the system had been secured, questions were quite prevalent about how to use the system. Unfortunately, in the rush to stay current, many vocational agriculture teachers were successful in securing microcomputers without the benefit of related inservice training about (1) how to operate the new technology and (2) what tasks and roles should be filled by microcomputers. It is encouraging to see that this situation is being corrected as the profession develops materials and provides the needed inservice activities. These materials and the inservice activities must continue if students in local vocational agriculture programs are to receive maximum benefits from this technology.

The cost of microcomputers and the public demand for computer education are such that no microcomputer should be collecting dust in a distant corner of a vocational agriculture classroom or laboratory. This same expectation is true for classrooms in elementary or high schools, junior or community colleges, and even more so for our universities.

Moving Forward

Several positive steps are being taken to enhance efficient and proper use of microcomputers by the profession. The American Association of Teacher Educators in Agriculture (AATE) and the National FFA Organization in 1980 set up a committee to develop standards for microcomputers. The committee is still active and has had both direct and indirect input into actions the profession has taken.

Another indicator of how much popularity this technology enjoys can be seen through the "Computers in Agriculture" program sponsored by the National FFA Organization started in 1984. Through this program, the outstanding computer-using vocational agriculture student from each state was invited to participate in a seminar and national competition last August in Arlington, Virginia. This writer chaired the judging panel for that competition and it was the consensus of the judges that the students were indeed making excellent applications of computer technology.

The computer industry representatives present for the seminar also commented quite frequently about how proficient and creative the students were in applying this technology to vocational agriculture.

A sponsor of the seminar, Agridata Resources, Inc., of Milwaukee, Wisconsin, has further committed its resources to an innovative communications/computing medium termed "The AgLink Network." This will tie all vocational agriculture client groups together by computer when it is fully operational.

These actions suggest that agricultural education is moving at a cut above the awareness and literacy stages in adopting a microcomputer technology. This issue contains several articles on documentation and development stages. These works have been successfully used not only in vocational agriculture, but in the Cooperative Extension Service as well.

Summary

As the technology is further integrated into local programs, a word of caution is warranted. All efforts should be made to keep vocational agriculture in the forefront without compounding new terms to describe our profession. Terms such as "My FFA Computer Teacher" or "My Ag Computer Teacher" are to be avoided. Although this new technology is quite effective and exceedingly popular, it must be kept in perspective.

Microcomputers should be viewed as tools for improving the delivery of vocational-technical education in agriculture. Applications contrary to this mission must be carefully scrutinized because microcomputer uses in agricultural education are now a cut above the awareness and literacy stage.

Using Microcomputers for Instruction and Management

By John T. Giesemann

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So, they finally delivered your computer! You have already decided that your students need to know how to use computers in agriculture. You have probably attended workshops that taught you how to operate the computer, run a few programs, and select hardware and software. Now the most difficult question must be answered: How will you use the computer for instruction and management?

If you have an answer already worked out, congratulations! If not, this article will provide suggestions for possible uses based on ideas collected while teaching high school, college, and adult students how to use computers, and based on items and ideas written by agricultural educators and others.

These suggestions will be organized around the roles identified by Dr. Norman Bell of Michigan State University. He said that the computer has three roles in instruction: (1) as the object of instruction, (2) as the medium of instruction, and (3) as the manager of instruction. This article will look at each of these roles in providing vocational agriculture instruction.

Object of Instruction

The computer as object of instruction simply means teaching about the computer. This includes topics such as types of computers available, advantages and disadvantages of using computers, identifying the types of jobs for which computers are best suited, selecting hardware and software, and understanding necessary topics of how the computer works and how to operate it. Instruction of this type is very important to first three of the three roles. The user can understand what the computer can and should play. When these topics are taught, using activities related to computers or incorporating computer applications into the class makes the instruction more interesting and concrete.

Some suggested learning activities for teaching the computer as object of instruction are:

1. Show pictures of early computers such as ENIAC and compare them to the desk top computers of today.

2. Have students compare and contrast a calculator and a computer.

3. Write a short program that calculates and displays 100 addition problems and their answers. Time the students as they perform ten addition problems. Compare the time of the fastest student with that of the computer. Have the students check the accuracy of their work and compare it with the computer.

4. Have students discuss the uses of computers with which they are familiar. Develop reasons for using computers to perform these tasks.

5. Have four pairs of students calculate payment value and total interest on a loan for a piece of agricultural equipment using varied interest rates and lengths of loan using the computer. Write their results on the board and compare them. Discuss the role of the computer in providing information for decision making.

6. Take a field trip to a farm or agribusiness that uses computers extensively. Discuss the uses observed.

7. Discuss computerized equipment such as tractors, spray equipment, and planters.

8. Have an agricultural computing day with several salespeople demonstrating products to all the vocational agriculture classes. Develop question sheets for students which require them to determine uses of the products and discuss these at the next class meeting.

Instruction about the computer should be concentrated on first three uses to develop a thorough understanding of its uses and operation. This area of instruction should not be overlooked because a well developed understanding will lead to easier learning during later topics.

Medium of Instruction

The second role of the computer is as a medium of instruction. This means using the computer to provide the instruction or as an aid to instruction. This is probably the most difficult role to develop in vocational agriculture classes for three reasons. One is the lack of equipment. Many vocational agriculture programs have only one computer which makes it difficult to provide instruction to all students. Scheduling problems will arise with only one computer available.

A second reason is software. Software may not be available that teaches the concepts you wish to teach. Software that does teach what you want may be expensive.

The third difficulty lies in the amount of effort required to use the computer as an aid in instruction. Problems such as task sheets, learning activity packages, or other suitable activities must be developed. Time may have to be spent developing and refining computer programs.

Even with these problems, computers can be used as a medium of instruction in many ways. The most obvious way is through the use of predeveloped programs. Many programs have been developed that teach certain concepts or... (Continued on Page 6)
Using Microcomputers for Instruction and Management

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skills. Examples are programs that teach how to calculate board feet for a project, how to determine feed rations using a macro nutrients method, or how to read a ruler.

These types of programs can be used in individualized instruction or in group instruction. Slower students or those who have not had much exposure to programs to develop their skill without slowing the rest of the class. One suggestion for using tutorials is to divide the class into small groups that tend to perform instructional activities. One of these groups should utilize the computer.

Drill and practice programs fit under the computer as education functions. These programs practice instruction which has already been presented. Examples are quiz programs which can be developed on topics such as the development of parliamentary procedure, or breads of cattle. Programs that practice specific skills such as calculating feed rations, fertilizer application rates, or determining harvest losses also can be used. Some programs can be used individually or in the classroom to reinforce learning. One method that seems to motivate students is to divide the students into groups and let them compete against each other using these quizzes.

Another approach in this role is to utilize the computer to perform operations related to the instruction. After students have learned how to balance a check, allow them to use the computer program which does the same. Use the computer to reinforce recording instructions.

Problems can be developed which utilize the computer to perform some tasks. Examples are calculating sprayer calibration settings, determining harvest losses, developing commodity budgets. These problems are then assigned to various groups in the classroom. As students work at different rates and the problems require computer use at various phases, time on the computer will automatically be scheduled. In the same manner, problems could be assigned to groups and the computer utilized to allow students to check their answers as they finish the problems. Utilizing the computer in this way is the closest resemblance to the actual use of the computer in agriculture.

A fourth use of the computer in this role is in simulation. Simulation is using the computer to determine what the results of taking some action would be. Simulations can be simple or complex. A simple simulation is running the same type of operation on production several times while varying factors such as interest rates and length of loan.

The effect on payment and total interest paid on the loan can be determined and the most economically feasible loan identified.

A more complicated simulation example is a production model. An example is a model developed for a spread sheet package where production is limited by crop, percentage, rate of gain, and other factors which are used in calculations to determine net profit of a beef operation. Changes in the factors and their related calculations will automatically be recalculated and the effect on net profit can be determined.

Reproduction in any area where simulations can be used. A farm recordkeeping system can be set up on a month by month basis. The student would make decisions which would be rewarded with a penalty for making bad decisions. Simulations represent one of the most advanced uses of this computer in instruction and have tremendous potential for use in vocational agriculture classrooms.

Other areas for which the computer has promise is in the agriculture information networks. These networks provide access to a wealth of up-to-date information that can be used in many subject areas. It helps make instruction more relevant and interesting as well as demonstrating a source of information which is being used more and more in the field of agriculture.

The following are suggestions for using the computer as the medium of instruction:

1. Determine the areas of instruction for which you can utilize the computer with the software you now have and develop these first.
2. Determine areas of instruction for which the computer could best be used, identify the software needed, and make plans to acquire or develop that software.
3. Make a time schedule for students to use the computer. This work should be scheduled with advanced students available to be sure to block out time for yourself.
4. During agricultural mechanics laboratory instruction, make operating the computer one of the skills to be developed. This works well with freshmen. Other skills such as calculation board feet for a project, determining sprayer calibration rates, or calculation field capacity for machinery could be substituted for advanced students.
5. Assign more experienced students to tutor inexperienced students in a laboratory situation.
6. Use simulation in computer to determine what the results of taking some action would be. Simulations can be simple or complex. A simple simulation is running the same type of operation on production several times while varying factors such as interest rates and length of loan. The effect on payment and total interest paid on the loan can be determined and the most economically feasible loan identified.

The computer can be used to manage other tasks related to the instruction. Some examples of these are: developing, storing, printing, administering, or grading tests, developing, storing, printing, and grading tasks files for students; keeping records of student grades; storing SOEP records; storing and analyzing records for FFA proficiency awards; and maintaining permanent student records; answering letters to parents; and many others.

Other concerns include:

1. Question is always: What software should I buy? Four types of software that are very useful are: electronic spreadsheet, word processing, database management, and authoring programs. These four programs can be adopted to many situations and makes the computer a much more flexible tool.

2. Another issue is: How do I manage FFA activities? Is your public speaking contest almost to tears because that speech will have to be revised and rewritten at least three more times? Are your file cabinets bursting at the seams with stacks of information? If so, FFA offers a way to organize and address lists for FFA members and alumni! Or, are you in need of a new method to encourage members to update their mailing addresses? If the answer to any of these questions is "yes," then perhaps it is time to consider the applicability of a microcomputer in managing FFA records as well as its capability for activities teachers and students in other tasks pertinent to the FFA.

Microcomputers are instructional and management tools for the FFA officers. A FFA advisor may be a need to teach about the FFA; to organize a mailing list, or to correspond with others. In such cases, one may use the conventional modes to get the job done. However, once the capabilities of the microcomputer are discovered, it is rare that any other means will suffice.

One word of caution needs to be issued. The benefits of using microcomputers are not instantaneous or magical. As is the case for the adoption of any new piece of equipment, time is required for learning the systems involved. Converting materials from the filing cabinet to the floppy disk, and for integrating the computer into the established routine will require an impossible one, and the benefits are soon realized.

FFA Computer Instruction

A popular use of computers is computer assisted instruction (CAI). The computer and the software are not intended to replace the instructor, but rather are intended to complement the instruction. For example, following instruction which includes the history of the FFA, the FFA's structural organization, or components of the program of activities; students may review the information using one of the commercially produced FFA quiz packages.

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Using Microcomputers to Manage FFA Activities

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Several tutorial packages which focus on parliamentary procedure are also available. For years, students have quizzed each other using books, they have used paper and pencil to complete self-study modules, and now they may use the microcomputer to review parliamentary procedure.

Safety instruction is common to vocational agriculture and the FFA. Tractor safety packages produced by Agri-Quiz and a mechanics program by John Deere have found their way to the classroom. Because of the nature of the packages, they may be used as computer assisted instruction. Students review the various areas of tractor safety.

The teacher may elect to use the program to provide a graded quiz for each student. This use of the program, referred to as computer managed instruction, provides students with randomly selected questions, elicits their responses, indicates if they have answered correctly, and records their scores for later reference. The feature of selecting students in this manner is questionable although it is done.

Creative Uses for Teacher Utilities Packages

Teacher utilities packages, like the one produced by the Minnesota Education Computing Consortium, assist FFA advisors and members in producing a variety of materials.

Utility packages: Most computer programs which include several different program options all contained on one diskette. The available programs range from quiz writer programs to complete accounting programs. The user can select the utility program to develop postcards which announce the next meeting or special events. Bamers for displays can be created.

Word searches and crossword puzzles can be produced with several purposes in mind. They may be used to assist members in their teaching about the FFA. Members who participate in the Food for America program can easily create agricultural crossword puzzles or word searches for the elementary school children they are visiting.

FFA advisors find the utilities packages helpful as a way to generate quizzes for their contest teams. Once a bank of questions is developed, team members may drill and practice or take several different tests over the material which the questions include.

Utilities packages do not require individuals to be computer programmers. They do permit FFA advisors and members to use computer skills and materials relevant to their local needs.

Word Processing and the FFA

A word processing package is a wise investment for the FFA chapter. Packages which are frequently used in the vocational agriculture departments include: Bank Street Writer, Easy Writer, Apple Writer II, SuperScript, SCRIPTSIT, Word Star, and most recently, Format II. The particular package selected will depend on the department's computer brand, memory capacity, and, inevitably, the available funds. Many of the clerical tasks which are performed on typewriters can be performed on the computer with word processing packages.

Word processing packages are often used to develop and revise the FFA program of activities. Several of the chapter's activities may remain the same from year to year. Rather than retyping the entire document, names, dates, or other items may be deleted from the previous year's document and revised prior to the new year. The FFA reporter could use the word processor to write and edit news releases. The secretary could use the word processor to prepare meeting agendas, final copies of the minutes, and other written correspondence. Public speaking contestants would find word processing helpful for revising several drafts of prepared speeches.

Managing FFA Records

FFA chapters maintain two major categories of data: (1) personal and descriptive information, such as names, addresses, and telephone numbers of members and alumni, and (2) accounting information such as student project data, fund raising data, budgets, and inventories. To manage these data, two types of general software packages are available. Personal and descriptive information are usually stored using a database management system, often counting, financial records, and many enterprise records are usually maintained on spreadsheet programs.

Camp and Heath (1984) explained a data management program allows the user to maintain and retrieve information that would normally be kept on a form or in a file. Consider for a moment the number of times an FFA advisor must and wish to record their names, address, telephone number, type of enterprise, high school, classes, etc. Data management packages like dBASE II, dBASE III, VAX/4, or Oracle allow the advisor or FFA member to create a blank form. After saving the blank form on a diskette, it may be used as many times as is necessary.

Just as one would enter information for each person on a file card, data can be entered for each person on the computer using a form. An example of a form is displayed in Figure 1.

Figure 1. FFA Members Data Management Form

- Name: School:
- Address: State: Zip:
- Phone: School Year: Age:
- Parents' Name:
- SOE Enterprise:
- FFA Office Held: Highest Degree Held:

It is not necessary to hand sort index cards and write down the names of all students who had a beef enterprise or a lawn service. The computer will sort each form, select the ones requested, print the forms, and summarize the data.

Many of the programs also have the capability to generate mailing labels which can be alphabetized or sorted by zip code. This is particularly convenient for making membership directories or alumni notices. It can also inform them of summer meetings and special events, or to parents and members of the community inviting them to the local banquet and other functions.

Many FFA chapters are now maintaining computerized mailing lists of their special customers who support the various fund raising projects. Prior to the sale, mailing labels for the preferred customers are printed and post cards are sent to these individuals notifying them of the sale. FFA chapters which sell limited quantities of vegetable and bedding plants have found that their customers appreciate the notice.

Spreadsheet applications

To perform accounting procedures with data related to student projects, occupational experience, and other FFA recordkeeping activities, electronic spreadsheets are desirable. The general spreadsheet program results in a grid of rows and columns which can be set up to handle basically any accounting purposes the user desires. Camp and Heath (1984) explained that industry leaders in this area are: VisiCalc, MacCalc, Lotus 1-2-3, Multiplan, and SuperCalc II (p. 20). It does not require one to spend much more than a couple of weekend to learn the commands necessary to effectively operate a spreadsheet program.

General spreadsheet programs permit the user to develop templates pertinent to the local situation. For example, SEOP record books greatly vary from state to state. If the state has not already computerized the record book, the FFA advisor and/or members could develop templates which resemble the accounting pages of the record book. Once the rows and columns are labeled and the appropriate equations set up, a data template has been created. After saving the template on a diskette, it can be duplicated for each student's use. Creating the template is a learner's best way to learn the program. The number of feeder calves, acres of Christmas trees, or dollars earned are entered; the totals are calculated automatically.

Not only is it being kept good records an essential agricultural occupational skill, keeping high quality records is necessary for those FFA members who expect to earn the FFA degrees and competition awards. Creating award application templates and maintaining up-to-date records using spreadsheet programs provide FFA members another tool for maintaining records. It is a tool which can be used in addition to the practical application of their accounting skills.

FFA chapters are also using spreadsheet programs for maintaining the chapter budget and for accounting purposes related to various fund raising projects. For example, a record of the chapter's citrus sales project could be maintained with a spreadsheet program. A row is created for each FFA member and the column headings include the member, number of citrus trees sold per kind of citrus, and the total dollars collected. The citrus sales chairperson could enter new data each day and efficiently update the sales report.

While commercial accounting packages are available that will permit members to do this, many prefer the flexibility and ability of developing their own spreadsheet programs. It is often less time consuming and less expensive to use the general spreadsheet programs than to adapt those programs for use in the commercial software industry.

Integrated software application

Word processing, data management, and spreadsheet software packages are valuable management tools for FFA advisors and members. Each type of software was mentioned separately to facilitate citing application examples. Integrated software packages such as Lotus 1-2-3, Symphony, Lotus Assistant, and the software included in the integrated software packages are designed to handle word processing, data management and spreadsheet programs.

The major problem faced by many FFA chapters desiring to use the more sophisticated software is the memory capacity of their computer. Industry representatives recommend that the computer needs a minimum of 128K of memory for the effective use of integrated software.

Most commands used for word processing, data management, and spreadsheets are the same for operations found in all three programs within an integrated package. The integrated software programs are also designed to communicate; the information stored through one program while using another. The FFA secretary would find it convenient to retrieve budget information from the spreadsheet file while drafting a letter, thus not having to load two separate programs or having to cut and paste from two different printouts.

Computers and the National FFA

The National FFA Organization has made a concerted effort to promote the use of computers in vocational agriculture. In April 1984, the computer was first recognized by the National FFA Organization for their computer activities through the computers in (Continued on Page 10)
Teaching With Agricultural Computer Networks

Computers have revolutionized the ways information is generated, stored, and transmitted. The ability to search out and use the information is as important as the ability to know information. To seek out information is a computer database takes skills that are not currently a part of the traditional school curriculum.

In 1986, only 21 percent of all high schools owned one or more computers for student use. By the fall of 1983, that figure had risen to 86 percent with some 325,000 computers installed.

Today, state agricultural education supervisors indicate that 90 percent of local high school agriculture departments have one or more computers available for use. For the end of the 1985 school year, they indicate this figure will be over 80 percent.

There is strong evidence that the influx of equipment is spurring ideas about how to put it to use. No one dispute the need for making children computer literate as they need to cope with the rapid technological changes in our world. The questions now revolve around how to do it. Schools will be able to make a successful transition into the electronic information age once they recognize just where they are and what they would like computers to do for them.

Curriculum in the Information Age

If there has been one major gap or weakness in the high school vocational agriculture curriculum, it has been in the area of agricultural marketing and farm business management. Vocational agriculture for the most part has placed a greater emphasis upon the instruction of production oriented agriculture. Vocational agriculture has done an excellent job of training students about agriculture as it relates to production tasks in order to measure and increase productivity. However, with more farms having to cope with financial stress, it is imperative that vocational agriculture begins to cultivate the instructional areas of agricultural management and marketing.

After teaching high school vocational agriculture for eighteen years, I can remember going to the textbook shelves only to find old and outdated materials. Teaching students about agricultural marketing demands keeping abreast of current market prices, trends, and information. It is very easy to find that student motivation declines with the use of old information and materials, whether they relate to marketing or production agriculture. Newspapers, magazines, USDA publications, and the like helped alleviate some of the time barrier. Yet, these sources were not always as thorough or complete as needed.

The alternatives to teaching agricultural marketing and farm management came down to either reducing the amount of time spent on the subject, using outdated information, or acquiring newer, updated materials. Replacement can be expensive and relative expensive and became a never ending job. Hence, an electronic form of this information, which can be updated daily, can prove to be a more reliable and affordable alternative.

Being able to dial-in to an agricultural computer network to access market information placed on the system the very same day can prove to be a very educational and motivating experience for the computer skills and computer logistics to something that can be easily learned from a series of lectures and readings. Vocational agriculture prides itself with exposing students to real life, everyday activities for learning experiences. Remote computers and agricultural databases assist in providing that real life exposure. It will not be long before the farm computer provide a real life simulation which is more than a simple test, page turning program. This program should combine interactive video, graphics, text, sound, and speech.

In addition to agricultural marketing; farm management, news, information reports, and telecommunications provide for electronic mail communications. Bulletin boards can provide for public posting of information as the name implies. True electronic mail provides for actual delivery of mail and information from one user to another via the computer network. A teacher can type a letter offline using a word processor, connect into the network, mail the letter, and in a matter of seconds, it is placed in the receiver's mail box. The computer can mail that same letter to 100 different people at the same time. No licking of envelopes or stamps required.

By Dwight Horsheimer
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The Electronic Universe

Today's online information industry evolved from the remote data processing services that began in the late 1950's as a low cost alternative to buying or leasing a mainframe computer. On-Line computer services available today include general and topical databases, encyclopedia databases, information utilities, news services, electronic mail and communications, along with computer software uploading/downloading, to name a few.

The 1982 Directory of On-Line Databases listed 919 as commercially available. There were 1,596 databases, marketed by over 400 companies listed in the 1983 edition. The directory's publisher, Cuadra Associates, estimates that nearly 2,000 databases were available by the end of 1984. In addition, by 1979 there were less than a dozen major on-line bulletin boards in the United States. Today, there are more than a thousand.

Granted, computer networks and telecommunications may still be considered in their infancy and they are not free. However, with agricultural profit margins narrowing, the need exists for finding information faster and to obtain useful and reliable data that effectively to maximize profits. Educational telecommunications allows you, the teacher, to become an innovator and pioneer like those first used by FluCalc in the late 1970's who discovered untold power in their new machines. Microcomputer telecommunications is still very strange for most people, including the most experienced practitioners.

Network Computers

A computer network is actually the linking of a number of remote computers (including mainframes, minis, micro-computers, and dumb terminals or a combination of all four) through telecommunication lines. A computer network can be as small as the connection of a few computers found in a single school or classroom. Or it might consist of thousands of computers located all across the United States or world on individual farms, agricultural businesses, and classrooms. The network is formed by connecting the computers through the telecommunications line with special devices called modems. Only through these computer networks do you have the primary means of accessing the available databases and services.

Most any brand or model of microcomputer can be used for telecommunications, and is real to a computer network. To expand your microcomputer with the equivalents of speech and hearing, you will need to acquire the following components: a modem, a cable to connect the two, a communications software package, and a telephone/telephone line. The total cost for these components can be as low as $300 or as high as $2000 or more. It all depends upon your preferences and your budget.

The most important peripheral, and sometimes the most confusing, is the modem. The modem is the black box that converts the computer's faint electrical signals into sounds that can be sent over telephone lines. Vastly oversimplified, a modem is a digital to analog converter from a computer, all zeros and ones, and converts it into audible tones. At the receiving end, the telephone line, the tones are changed back to digital zeros and ones. Since the device modulated the signal at one end and then undid the modulation at the other, it was called a modem, for modulation-demodulation.

The major distinction among modems is the transmission speeds. Transmission speed is measured in bauds and referred to as baud rate. What is important about baud rate is that there basically are two of them (300 baud and 1200 baud) used in most microcomputer communications, and one of them is four times faster than the other. Some modems can send and receive at just 300 baud, others can do 0 to 300, and some can handle any rate from 0 to 1200 baud. For our purposes, we will consider the standard. Recently, there has been a strong
trend to higher speeds. Many communications networks were originally capable of communicating at only a 300 baud rate. Today, nearly all major networks can communicate at either 300 or 1200 baud with some now expanding to 2400 baud rates.

It is pointed out that medium speeds modems are more expensive to purchase and connect time charges are often slightly higher with faster transmission speeds. On the other hand, however, remember that at higher speeds you can transmit and/or receive faster which immediately reduces your total connect time bill. In addition, when communicating at higher speeds you can reduce the demand for your time to search and obtain the information. Clearly, if the budget can afford it, a 1200 baud modem will prove to be more economical over time.

### Agricultural Networks and Databases

A small number of specialized agricultural news and information databases are available for use throughout the United States and Canada. The majority of current market news and information with the USDA as their major source of information. Others offer some on-line decision aid and agriculture management programs.

Four major agricultural information databases are available through various universities: AGNET at the University of Nebraska; TELPLAN at Michigan State University; and the Agricultural Management Network at Virginia Polytechnic Institute and State University, and FACTS at Purdue University.

In addition, several of the dozens of commercial agricultural networks are available. Commercial database networks may provide a more extensive collection and variety of agricultural information. Furthermore, they may include information from a number of supplementary agricultural and non-agricultural sources. These include the AP (Associated Press) UPI (United Press International) on Doanes Agricultural Reports, regional, and area markets, etc., to name a few.

These agricultural computer networks provide daily market quotes; future market reports; USDA reports and commentaries; local, national and international weather information; market reports; commodity reports; economists' analysis and recommendations; electronic mail capabilities; and some special on-line problem solving and simulation programs. The type and amount of information will vary with each computer database.

Agricultural networks will generally charge an annual subscription fee to connect to the time frame. For example, AGNET has an annual membership fee of $50, and AgriData $399. This fee includes annual subscription, user manual, monthly price report, and a human-resource services/support number to call if you have problems. Others such as SMN, may charge a monthly minimum ($25) fee.

Connect time rates will vary with an average for most users around $15 to $20 per hour. The average length of time for connecting will range from five to 20 minutes per session. The difference in cost being the type of telecommunications system used. A lower connect time rate may be more expensive since you pay a long distance telephone charge. Others with a higher connect time can be accessed via the United, Telenet, or Tymnet communications systems, with only a local or toll free telephone call being made.

Nearly all databases charge a report access fee. This report access fee may be as little as five cents or as much as $5. It varies depending upon the nature of the report, the amount of information, and the source of the information. The number of paid out of the cost of the variables the network.

### Summary

Agricultural computer networks have only scratched the surface of the potential they hold for agricultural education and agriculture as a whole. Agriculture is definitely becoming part of the information age. Computers and telecommunications are not just another passing fad. The 1988 report by the U.S. Commission on Excellence in Education, A Nation at Risk, identified computer studies as a fifth basic course of study to accompany the traditional core of English, math, science, and social studies.

Vocational agriculture and the FAA have taken a bold stop forward by laying the groundwork for the first of its kind, an agricultural education database. Other academic and vocational areas are just beginning to study the possibilities of developing an educational database similar to the FAA educational network.

We must remember that the computer is simply an educational tool. Through the use of a computer network, we are able to help quickly expand its use in an educational setting. Everyone entering the computer world becomes a pioneer and charts unexplored ground. Agricultural education will see great advances in telecommunications as we progress through the coming years.

### Selected Agriculture and General Databases

- **AGNET** - Agricultural News
  - **Source**: U.S. Department of Agriculture specialists at several land grant universities.
  - **AGNET, University of Nebraska**
    - Lincoln, NE 68588-0132
    - phone: 402-472-1892
    - $50 annual membership fee; $10 per hour connect time.
  - **CNI** - Computerized Management Network:
    - **Source**: CNMI, Phone 315-786-5500
    - Building D, Extension Division
    - Virginia Tech, Blacksburg, VA 24061
    - phone: 703-961-5384
  - **TELPLAN** - Michigan State University:
    - phone: 517-353-4033

- **Facts**

- **Agricultural Marketing News Service**
  - **Source**: USDA
  - **USDA**
    - 16th and Independence Avenue, S.W.
    - Washington, D.C. 20250
    - phone: 202-475-7077
  - **Director**
    - Agricultural Marketing Service Phone line

- **GRABOOTS** - Informaton
  - **Source**: USDA, Marketing and Marketing Service
  - **USDA**
    - Rm. 225, Agricultural Marketing
    - West Lafayette, IN 47907
    - phone: 317-464-6564

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- AGRICULTURAL INFORMATION Source: Department of Agriculture specialists at several land grant universities.
- AGNET, University of Nebraska
  - Lincoln, NE 68588-0132
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  - Virginia Tech, Blacksburg, VA 24061
  - phone: 703-961-5384
- TELPLAN - Michigan State University:
  - phone: 517-353-4033

- **FACTS** - Agriculture
  - **Source**: U.S. Department of Agriculture specialists at several land grant universities.
  - **FACTS, Purdue University**
    - Rm. 225, Agriculture
    - West Lafayette, IN 47907
    - phone: 317-464-6564

### Coming in June...

### FFA Contests and Conventions

APRIL, 1985
Getting Teachers To Adopt and Use Microcomputer Technology

We have seen many changes in agriculture during the last two decades. We have gone from a large tractor of 60 to 70 horsepower to one of over 300 horsepower. We have seen the disappearance of the rural "hand crank, party line" telephone to a push button model that will allow you to converse with someone who is miles away almost as if they were in the same room, and you make that connection in a matter of minutes, if not seconds! We have seen astronauts not only walk in space, but also go to the moon, walk on it, and return home safely. We have seen the ability to travel increase dramatically. We are able to gain information concerning events occurring in remote parts of the world in a matter of hours rather than days as well as many other improvements in areas too numerous to mention.

Microcomputer technology as well has evolved dramatically in the last 20 years. The speed at which improvements and new hardware is appearing is almost frightening. Twenty years ago, a computer that contained four kilobytes (K) of Random Access Memory (RAM) might have cost $100,000 or more. Today, we can easily assemble computers costing from $32 to $72 or more of RAM on our desks in virtually any room in a building. These computers cost from $1,000 to $10,000 depending upon the model and capabilities.

The software and computer programs that are available today have improved dramatically as well. Large and complex calculations are performed in a matter of seconds rather than hours. Data can be moved from one program to another, to a computer in another room, or even to another city in a matter of minutes.

Preparations

Many vocational agriculture teachers depend upon a very common computer (the calculator) and think nothing of it, but feel fright, anxiety, and numerous other apprehensions when confronted with a desk top computer.

Why is it that this machine has such power over us at first? Young people are not afraid to "give it a try." Children will start playing with it almost at first sight, but, universally adults seem to be afraid of the computer.

I have found that teaching adults to use the computer can be successful only if they are willing to adapt to the new technology. I believe that this is true for vocational agriculture teachers as well as farmers, housekeepers, or business persons.

As with any new item of equipment, teachers have to feel comfortable and confident that they have enough knowledge to use the item. This seems to be one of the major problems with vocational agriculture teachers. Some teachers have students who actually know more about the computer than they do. If this is the case, a special problem then develops. Unless teachers become proficient with the computer, they are not going to be able to assist their students in using it. If teachers develop a fairly good working knowledge of a few programs that can be used in their departments, they will be on their way. They will not have to worry about the student who has a computer at home and may know more about it than they do.

Since we all learn from experience, the computer should not be any different than any other new experience. Most people do not get too excited when someone tries to teach them a new card game or dance step. If we teach current topics, vocational agriculture teachers must be willing to learn new information almost daily. In agriculture, new information concerning nutrition, genetics, pesticides, machinery, livestock, and many other areas confront us each day. The computer should not provide an unpleasant experience in our quest to help students.

Types of Users

If we assume that everyone is going to learn to use the computer at some time, we need to look at some different people in society. There seems to be at least three levels of computer users. The first level includes those teachers who are willing to become proficient enough to use a certain group of programs they acquire.

The second level includes teachers who want to make minor changes in BASIC programs or to configure programs to allow different parameters to be created.

The third level includes teachers who wish to learn as much as their time and ability will allow. Some of these folk may actually write programs or develop usable software using programmable micros such as the Data Base Manager.

In general, we all start at the first level and then progress upward as our desires and abilities allow. I have found that to get teachers to adopt microcomputer technology certain steps almost invariably must be followed.

Teaching Teachers

First and foremost, is that teachers must be willing to try to change. They must be willing to recognize that microcomputers are machines which do not have minds and cannot hurt the operator.

In a class, after discussing general information such as terminology, how the computer is constructed, and how it operates in general terms, I suggest that everyone get in front of the computer. From there, I give everyone the opportunity to turn on the computer, insert a diskette, and try some of the various commands that are most often used.

After we have gone through that procedure and since practically all of us are a good teacher, all computers are turned off and each individual is given the opportunity to get back to the same place without any assistance. This may have to be done several times during the session to allow the development of the confident attitude of "I CAN" rather than "I CAN'T!"

A good confidence developer is to use a spreadsheet program to create a simple activity such as the calculation of one's age in days or the cost of a number of cups of coffee consumed in a day. I have a few people who I know find that they can do something with the computer. From here I believe that the operators (teachers) should be moved to software that they can find useful in their own situations. This may include additional work with the spreadsheet since it is useful in a variety of applications. I believe that a good word processing program should also be included because everyone uses a typewriter to some degree. Teachers will also be able to use the word processed program as a means of creating tests, study guides, information sheets, and many other uses.

These activities help overcome the fear associated with the computer and allow teachers to gain confidence that they "Can Do!"

The next step, selecting software (that will fit their own situations), can be a real key to helping teachers become proficient in the use of computer technology. We advertise the software packages so that they are available only as fast as necessary, remembering that our students (teachers) are somewhat like freshman vocational agriculture students. On the one hand we are not sure what is happening and on the other hand some tend to adapt at a slower rate.

If I am using commercial programs, I select ones that are easy to use. They may be programs that either have very good documentation or that show most of the prompts on the computer screen. Hopefully, both of these items will be present in the software package. Unfortunately, most computer hardware manuals are not very well written. Therefore, I like to make a printed list of the commands that are most commonly used and give a copy to each person as we go through the program.

The third phase is the realization that we need to develop the "I Can" attitude. Perhaps this means admitting that we do not know everything and that we can get some help from someone else. New users should try to develop a good working relationship with someone who is more experienced computer user. They cannot be afraid to ask for help when they have a problem. Most people will be more than willing to help if people show them a little respect and goodwill in return for their help. Likewise, a teacher cannot be afraid to get help from a student if there is one who is knowledgeable about computers.

Those who wish to advance to the second level, that of learning some programming or learning how to configure some of the more complex commercial programs, probably need to have additional classes.

I believe that vocational agriculture teachers would be (Continued on Page 16)
Getting Teachers To Adopt
and Use Microcomputer Technology

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much better off learning how to use some of the better commercial spreadsheet, data base management, word processing, and special purpose programs than taking a complete course on programming. Many of these general programs are so powerful today that they will do many of the applications that required a special BASIC program only a couple of years ago. Also, I do not think that we have seen the end of the new multipurpose program developments.

THEME

From Barn Doors to Printouts:
Teaching Adults to Use Computers

Grandpa kept his records on the inside of the barn door. Planting rates, drill gear settings, and crop yields were mostly penciled on the unpainted wood. The information was next to his work, with a pencil close for updates and easily accessible when needed. His recordkeeping system fulfilled the farm's business needs.

Dad used an updated version of Grandpa's system. A notebook with pencil hangs in the shop available for important figures which will later be transported to the house. At the desk, the notes undergo the scrutiny of pencil and calculator. Dad learned the importance of records and a proven method of keeping information from his father. I am sure that Dad had relearned Grandpa's barn door method except that those were "the good old days." Management was simpler then, hence the improvement in a proven system.

The business of farming has become increasingly complex in recent years. Product changes occur daily. New equipment, new chemical, new marketing trends for the farmer's dollar interest...all factors constantly fluctuate. Decisions must be made quickly. At the same time, these decisions must be based on a thorough analysis of the information at hand. In order to accomplish this, many farmers see the microcomputer as the machine which they need to master and add to their current farm machinery.

Vocational agriculture has historically met the educational needs of the agriculture community. We are doing it today with microcomputers for adult farmers. The program which I coordinate is one among many opening the computer world to farmers. These programs may vary in methodology, but they all strive to provide farmers with useful knowledge. Most importantly, the participants share a common desire: they want to make a transition from hand record keeping to computerized records; from barn doors to printouts.

Reassuring Adults
Education occurs when useful skills are learned. The transfer of knowledge may be through speaking, demonstrating, or reading. This transfer can only successfully happen when the needs of the students are recognized. Teaching adults to use microcomputers involves an understanding of their fears. Adult education shares the same concerns: fear of getting lost and forgetting; fear of breaking the computer. These fears can give way to learning if microcomputer courses are built on three basic premises: honesty, self-esteem, and success.

An honest expression combines the enthusiasm of knowing what computers can do with a sharing of the unavoidable: learning can be fun, but it still takes time and "stick-to-itiveness." Once exposed to the potential of a computer, it is all too easy for educators to over-simplify the learning curve: "Piece of cake!" "That's easy!" You can do that in three minutes and have time to smoke a cigarette?" The first applications done on a computer will require two to three times as many hours more doing it with pencil and paper. A farm newsletter writer related a story about his grandfather's experience with cars. The grandfather purchased a Model T shortly after it became popular. He bought the weekly groceries before driving his new acquisition home. As he reached over to catch the groceries when crossing a set of railroad tracks, the Model T drove itself into a ditch. The fellow left it there and never bought another car, stating, "No horse would go into a ditch!"

How many farmers have purchased computer systems on a salesperson's or a friend's promise of what the machine can do only have a bad experience which resigns the computer system to collect dust instead of data? Be honest with adults. Tell them that using a computer is not as easy as writing on a barn door. Computers do not think. They handle numbers and information very quickly and efficiently. Computers improve on current recordkeeping systems. Machines cannot make up for work that has not been done by hand.

Encourage Success
Adults often turn to computers with a feeling of inadequacy. Work with them to build their self-image. The classroom is all too often turf for educators instead of students. One adult summed it up well, saying, "I feel out of place sitting in this classroom." Successful adult computer courses should consist of sharing information which relates to the everyday experiences of the participants. One teacher passes computer micro-chips and expansion boards around the classroom to break the mystique of the computer.

Learning to use computers puts adults at a double disadvantage. It is a machine which most of them did not grow up with, and computers have been the source of new words that strike many as a foreign language. To help an adult feel at home in front of a computer, the educator has to build bridges between barn doors and printouts. The process involves examples and educational experiences which enable the adult participants to make connections between their current manual systems and computer systems.

Computer terms should not be bullied nor avoided. At the same time, courses taught in "computer-ese" may as well be taught in Greek or Latin. Choose and use terms which are essential. Build the vocabulary from class to class. Eventually terms such as "DOE" will become as useful to adults as the "CT" ever was.

Finally, the educator needs to capitalize on the successes made by the adult students. Imagine the experience of farmers in the early 1950s learning to plow with tractors. They knew the appearance of a nicely plowed field; stopping and starting horses was second nature. Flow direction and draft could be controlled while looking at the cat- tle in an adjacent field. Picture then the tense arm and leg muscles that first time on the tractor. Feel the awkwardness and frustration. In spite of it all, tractors replaced horses. Farmers had and continue to have successes using tractors. Setting the stage for successes can make the difference between a smile of accomplishment and the long face of frustration. Whenever possible, have a computer for each participant. When class members exceed available computers, institute a regular rotation. It is pretty hard to learn how to milk a cow if you watch from the other side of the fence.

Choose software and examples with "successes" in mind. The use of a simplified crop or livestock budget to introduce spreadsheet work will often be followed by, "I could do this." Once the participants are on the road of "successes," the educator can take a position next them as a playcoach. A word of caution to the educator: Keep your hands off those keys! How many farmers use typewriters regularly? It is too easy to do it for them. "Successes" involve more than neat printouts. Inserting a diskette into the disk drive, locating the switch, understanding commands, saving files, etc. is a learning-by-doing process, just as the introduction of tractors was such a process.

Summary
Teaching adults to use computers necessitates techniques and ideas which go beyond methodologies employed at the secondary, post secondary and college levels. Farm adults seek improved recordkeeping systems and alternative decisions making tools. In short, a better barn door. Overing and operating a farm is very different from preparing to enter into farming. Careful preparation of curriculum and course must be based on the needs of the adults.

It would be nice to write a formula which would work for all adult farm computer classes. The good news is that barn doors are great for keeping records. The best news is that there are no two barn doors alike. An educator undertakes the task of facilitating the learning process. Facilitation sometimes takes adults with useful knowledge and personal successes will make the transition from barn doors to printouts possible.

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1Robert B. Harris, "What will you do with your farm computer?," The California Farmer, October 15, 1983.
Technology is constantly changing, and agricultural educators must stay abreast of these changes in order to be effective in teaching students marketable skills. Microcomputers are firmly entrenched as a vital part of our lives. They have reached from science and business into agriculture and even into education. Vocational agriculture teachers and teacher educators have the opportunity to be leaders in incorporating microcomputer education into existing curricula.

Computer use has been for several years in mathematics classes to perform repetitive calculations and in science classes for graphics demonstrations. A more far-reaching consideration, however, may be the career aspect.

Computer literacy is especially important for students in vocational agriculture programs, since computers are used throughout the agricultural sector from small family farms to international agricultural corporations. Computer literacy is important not only for those students seeking vocational careers, but also for those students planning to obtain a college education.

Most agricultural college curricula, regardless of major, include at least one computer course. The student who learned the basics of computer operation in high school will have the advantage of approaching college classes with introductory level computer skills.

Limiting Factors

Several limiting factors exist which hinder the use of microcomputers in vocational agriculture. One major drawback has been the limited availability of microcomputers to vocational agriculture programs. A second problem has been the lack of high quality, applicable software packages which have been available for use in vocational agriculture courses. A third factor has been vocational agriculture teachers' lack of knowledge concerning the use of microcomputers in their classrooms.

As vocational agriculture teachers begin to accept computers as beneficial instructional aids and begin to request microcomputers for use in their programs, the problem of computer availability should be reduced. However, only when teachers become computer literate and begin assisting in the development of software specially designed for use in vocational agriculture will the problem of limited software availability be solved.

Modes of Instruction

The success or failure of any Computer Assisted Instruction (CAI) depends primarily upon the instructor. CAI has been categorized into four classifications or modes. Each mode employs a different method students must use to complete a program or problem.

The strategy of the drill and practice mode is to simulate interaction between the student and the teacher in a homework assignment manner. Drill and practice exercises have been used to evaluate a student's comprehension of a specific learning situation resulting from classroom instruction. Although the mode does not formally teach, it does provide a means of measuring the results of instruction performed by the teacher. The drill and practice mode is particularly adaptable to objective type, multiple-choice or true-false questions.

Another form of individualized study is the tutorial mode. Under this mode, the student actually receives instruction from the computer. The teacher is relieved of instructional tasks and, while acting as the director and troubleshooter for the student, has more opportunity to interact with the students on an interpersonal basis.

The dialogue mode is sometimes called the problem solving mode. A typical program presents a problem to the student and asks the student to solve the problem, perform calculations, and then evaluates the student's efforts in logically solving the problem. An example of a dialogue mode program is determining the amount of fertilizer needed to realize a rate of diminishing return on a certain crop.

The fourth mode of CAI is the simulation mode. Operating under this mode, the computer replicates a real situation or problem and the student is required to make management decisions to solve the problem. The simulation mode has proven effective in actually teaching students. Vocational agriculture instructors may use the simulation mode to bring into the classroom a situation which could not normally be presented due to time or other restraints.

Educational Roles

Microcomputers may best be used three ways in education. The most common role is as a software package as curriculum. The second most popular role is as a supplementary instructional tool for the student. The third role is as a professional tool for the instructor.

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Working Smarter, Not Harder
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3. Before purchasing microcomputer equipment, be sure it is compatible with existing equipment. Insist on observing the operation before agreeing to purchase separate components.

4. Determine the availability of quality educational software for appropriate vocational agriculture topics and make certain that the compatibility with the computer you are planning to purchase. Available software should be a primary consideration when selecting microcomputers for vocational agriculture. A list of software for quality software for vocational agriculture programs is available.

As vocational agriculture teachers learn to program and begin to develop software, they should be willing to share software with colleagues in the profession. Students can then benefit from using software developed especially for vocational agriculture and teachers benefit from not wasting departmental money on expensive software which may not be applicable to the state or agricultural area.

The adoption of any new innovation requires important decisions. Vocational agriculture teachers must have instructional resources available to prepare students with skills necessary to gain entry-level agricultural employment. Those skills are not only limited to agricultural laborer type skills, but also include basic technological skills. The impact of technology and the need for computer related instruction have been expressed through numerous sources in industry and education. Are they existing? They will not break when you touch them, they are not that difficult to use, and endless possibilities exist for their use. Vocational agriculture teachers have traditionally been leaders in adopting new innovations. Reports indicate the adoption of microcomputers in vocational agriculture will be another asset to the strong program which now exists.

Microcomputers in Cooperative Extension

By GRAYDON EDWARD ELLIOTT

The University of Minnesota Cooperative Extension Service has distributed microcomputer software to 35 other state extension services, including the widespread use of microcomputers by Extension's agriculture and home economics programs. These programs are readily available to vocational agriculture teachers who contact their State Extension office.

Extension recognizes the microcomputer as a new tool for conducting educational programs and improving office management. When Extension Services began using the microcomputer as a tool for conducting educational programs, it became apparent that specialists and agents could use the microcomputer to assist in conducting their programs. Microcomputer software was written to tabulate 4-H judging contests, keep records at shows, maintain records at Extension sponsored pig sales, calculate performance records at central bull test stations, and many more. A few states such as Texas, Oklahoma, Minnesota, South Carolina, and North Carolina developed early in developing microcomputer software for clientele. The Mississippi Agricultural and Forestry Experiment Station (MAFES) and MCES developed microcomputer programs for clientele use, including vocational agriculture teachers.

The adoption of any new innovation requires important decisions. Vocational agriculture teachers must have instructional resources available to prepare students with skills necessary to gain entry-level agricultural employment. Those skills are not only limited to agricultural laborer type skills, but also include basic technological skills. The impact of technology and the need for computer related instruction have been expressed through numerous sources in industry and education. Are they existing? They will not break when you touch them, they are not that difficult to use, and endless possibilities exist for their use. Vocational agriculture teachers have traditionally been leaders in adopting new innovations. Reports indicate the adoption of microcomputers in vocational agriculture will be another asset to the strong program which now exists.

Data Bases

Another approach to serving the educational needs of clientele through the use of computers involves large central databases of programs and information which can be accessed through remote terminals. The more common ones are AGNET from Nebraska, CNIN in Virginia, and FACTS in Indiana. To use one of these systems requires a terminal or a microcomputer to serve as a terminal, a telephone line, necessary communication hardware and software, and a subscription. The content of programs on these systems covers most of the disciplines represented by Extension and vocational agriculture and involve decision aids, information storage and retrieval, and instructional programs.

Educational programs associated with microcomputers are growing in importance. Home economics, 4-H, and community resource development are also represented. Microcomputer programs in home economics include such areas as home budgeting, nutrition, and meal planning, health, and family living. Kentucky has developed a set of materials for a statewide 4-H computer program. The Extension Community Resource Department is entering its second year of a special project to introduce microcomputer technology into small towns and rural county governments.

Extension Services conduct seminars, workshops, and field days to give clientele an opportunity to explore and learn more about microcomputer technology. Computer specialists advise clientele how to analyze their situation, determine needs, and decide whether they need a computer. Microcomputer programs also include software and hardware evaluation and selection. Subject matter specialists conduct training sessions in the use of application software relative to their subject matter area. Vocational agriculture teachers should make the appropriate contacts to participate in these sessions.

Management

The other major application of microcomputers in Extension is in the area of office efficiency equivalent to or more than that of the telephone, electric typewriter, or electronic calculator. It can be used as a word processor to rapidly input, edit, and output documents, prepare form letters, handle mail and recall, and reproduce periodic materials and mailings. A data base management package with the microcomputer will allow the management and print of mailing labels, print and edit mailing lists, club enrollment, fair and livestock show entries, and publication inventories. The electronic spreadsheet package is helpful to office management in the area of budgets and other applications that require the manipulation and recalculation of numbers.

Electronic mail is another office management application in many of the extension programs. South Carolina's Extension Service is using electronic mail to transport messages among state, district, and county offices. Other state service while still others are exploring the possibilities. The Ag Ed Network now serves a similar role for vocational agriculture teachers.

Administration

The use of microcomputers in Extension requires some adjustment by the management. Some states have formed a separate computer services department to handle all affairs related to computers. Other states have assigned that responsibility to the information department as the information department. In still other states, existing subject matter departments who took the lead in working with microcomputers found themselves handling all microcomputer work for the organization. In most cases, this was the agricultural economics department or the agriculture experiment station.

Most states seem to be moving toward a separate computer services department. Personnel in these departments have varied backgrounds. In most cases, the personnel are staffed with experienced extension professionals from other disciplines who have been heavily involved in using microcomputers. One or more computer science experts trained individuals are also on staff to handle the technical aspects of the work. Programmers may be full-time professionals or part-time employees or members of the extension service's computer science oriented work.

These computer service departments are responsible for working with subject matter specialists in software development and maintenance, evaluation of software from other states, software distribution to clientele and other Extension offices, coordinating hardware and software purchase, and general consulting work with Extension personnel and clientele.

The Future

All the experts seem to agree that the microcomputer is here to stay. Right now it is receiving maximum exposure through the advertising media. This will eventually stabilize as the microcomputer finds its place in society. What will be the future relationship of the microcomputer? Here are a few thoughts.

All county Extension offices will have at least one microcomputer. Those with one, want another. Eventually one microcomputer will be needed for educational programs and another one for office management. All subject matter departments and administrative departments will have either microcomputers or terminals connected to a central computer system. In some departments, each staff member will have a microcomputer or terminal. Within a state organization, the state, district, area, and

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county offices will be networked together by computer for data exchange, electronic mail, and reporting. State offices are now linked nationwide through USDA and a central computer.

All publications will be stored on a central computer in the state office. Specialists will update publications via their microcomputers, which will be sent electronically to the publications department for electronic typesetting. All graphics for publications will be generated electronically. Field offices will have the capability of accessing publications electronically and producing a printed copy of all or part of the publications.

Microcomputer technology is here to stay. Five years ago Extension was asking if it would adopt the technology. That question is now no longer relevant. The question now being asked is, 'What new and exciting things will we be doing with microcomputers in 1990?'

The Cooperative Extension Service perceives the microcomputer as an opportunity rather than a problem to be solved or a situation to be ignored. We also recognize that it is not an electronic god destined to solve all our problems. But it is a new method for delivering our educational programs. It is new technology for us to aid our clientele in adopting. And finally, as educators, it is a new challenge to what our professional apprentices.

The first step to effectively teach the use of microcomputers is to provide the class with a demonstration of the program used. Demonstrations are a traditional method of teaching for vocational agriculture teachers. The same is true when teaching how to use a microcomputer, the monitor must be set up so it is visible to all students. Additional monitors can be located throughout the room. The use of a student to operate the keyboard is helpful when demonstrating. This frees the teacher more easily explain what is happening on the monitor. It also brings out the typical errors a student might make while operating the keyboard. When the demonstration is complete, at least one student is familiar with the keyboard operation for that particular program. This student can then be used as a resource person to help other students during assigned work. The teacher should go over an example during the demonstration of the assignment the students will be expected to complete.

Ideas for Use

Even though a vocational agriculture teacher may have only one microcomputer to a class of many students, it is a good idea to limit the number of students using the microcomputer to three. One student per computer is great if you have enough computers. Two students per computer may be better than one because the interaction between them may aid in the learning process. With three students to a computer, one can operate the computer while the other two observe. The discussion of the two observers should center around the action of the computer and the operator. When four or more students are placed on a computer, the observers begin to form small social groups independent of the computer operation. The discussion often centers around things other than what is happening at the computer.

Another way of effectively using a limited number of computers in a large class is by using a rotational assignment system. Assignments should be given in three parts: 1) hand calculation problems; 2) computer problems, and 3) written summary. Divide the class into two groups. Group A can work first on the computer problems while group B works on written problems. As students complete computer work, they switch with students in group B. When individuals complete both the written and computer problems, they may work on the summary. The summary should include a written evaluation of the two assignments. Students will often learn how to approach problems by themselves to the conclusion and may be helped to see that students are not hurrying through the work to get extra time on the computer.

The "buddy system" may be used as a method of using a limited number of computers. As class begins, the teacher might select one of the advanced students in the class and quickly have him/her go through the computer assignment.

By Vernon D. Lupt and Mark Zidun
(Editors Note: Dr. Lupt is a Professor and Mr. Zidun is a Graduate Assistant in the Department of Agricultural Education at North Dakota State University, Fargo, North Dakota 58102.)

Microcomputer stations permit students to use application software to aid learning. (Photograph courtesy of Ken Kaghas, Vocational Agriculture Instructor, Weyburn High School, Weyburn, Kanata, Hawaii 96797.)

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Utility of Microcomputers

Students in the Classroom

Mobile Units in the Field

Adults in the Home

Competition and Recognition

(Photographs courtesy of Dennis Scanlon, The Pennsylvania State University; and the National FFA Center.)