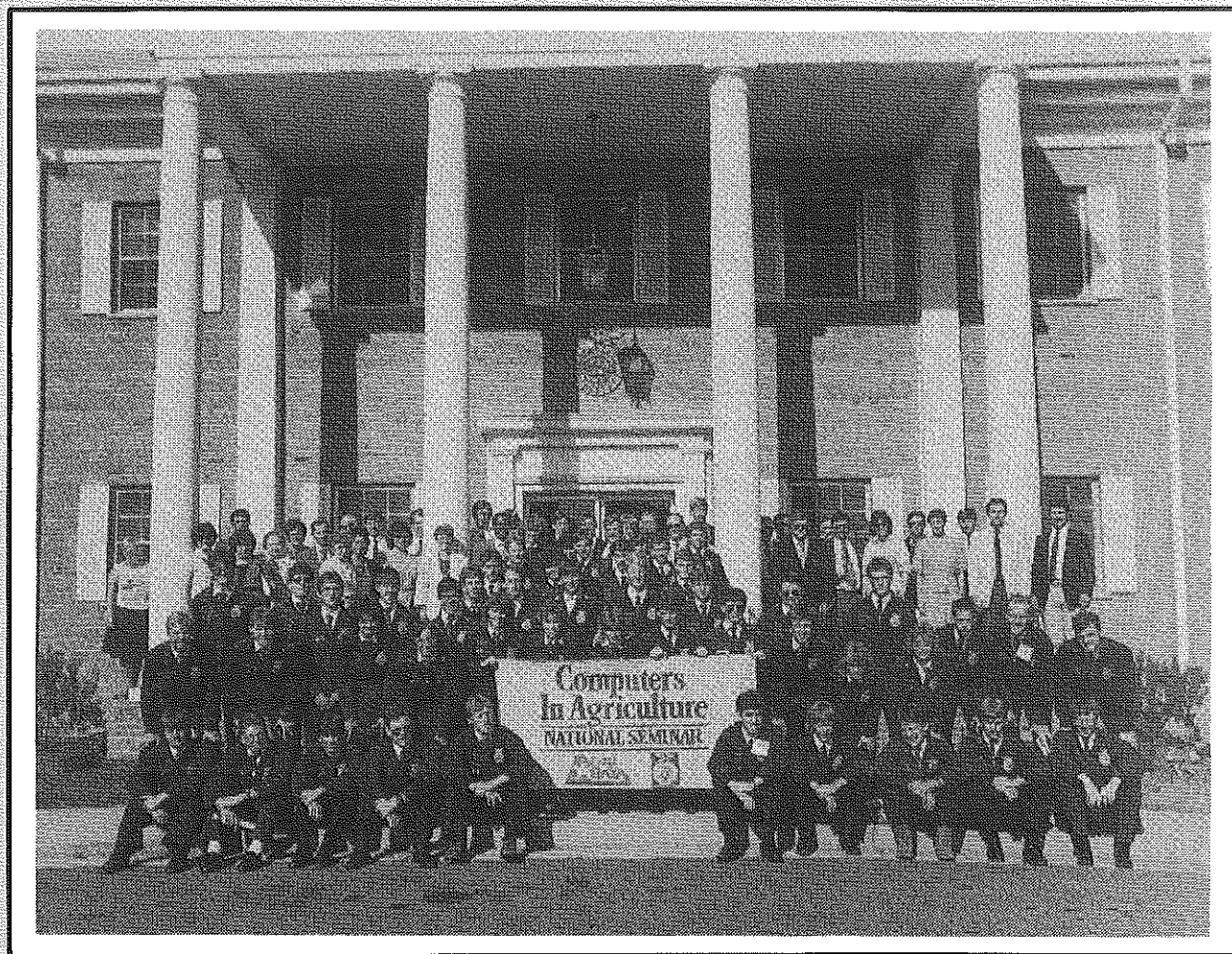


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THEME: The Electronic Classroom

THE AGRICULTURAL EDUCATION MAGAZINE



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Articles and photographs should be submitted to the Editor, Regional Editors, or Special Editors. Items to be considered for publication should be submitted at least 90 days prior to the date of issue intended for the article or photograph. All submissions will be acknowledged by the Editor. No items are returned unless accompanied by a written request. Articles should be typed, double-spaced, and include information about the author(s). Two copies of articles should be submitted. A recent photograph should accompany an article unless one is on file with the Editor.

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The Electronic Vocational Agriculture Classroom

An electronic vocational agriculture classroom will probably include microcomputers, laser technology, interactive video, and robotics. These media will revolutionize vocational agriculture — if you believe computer scientists, agricultural engineers, entrepreneurs, and commercial interests. A small number of equally confident agricultural educators make similar predictions.

For many in the profession, however, a wait-and-see attitude is best. Lionberger and Gwin (1982) call such folks late adopters or laggards because of their speed in adopting innovations. They say laggards tend to doubt learning that is supposedly the result of electronic media being used in the classroom. This conflicts with what an innovator believes. In fact, the innovator-laggard debate over instructional media seems endless.

Radio and Visual Media

The debate began with radio in the 1940s and 1950s. Innovators of that period were sure radio, an audio ONLY medium, would work wonders. Rave reviews were also given to the visual oriented media such as opaque, overhead, and slide projectors. Optimistic views about audio only or visual only electronic media predominated in spite of countless studies that found students learn best when they use a combination of senses. When the hoopla subsided, a new wonder child was waiting.

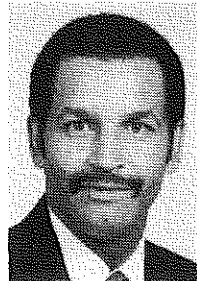
Educational Television

During the 1960s and early 1970s, the electronic classroom brought forth the world's best idiot box — the television. As expected, television had its share of supporters and limelight. Teachers were to serve a reduced role in the classroom. They would provide students a brief introduction to a lesson, simply stick the youngsters in front of the idiot box, and then give them a quiz to measure the vast learning this saviour would produce.

Fond memories linger from the television era. Some of my teachers experimented with television. During the experiments, a few teachers called me and my friends, slow learners, thugs, incorrigibles, and a few unprintables. I believe we were normal teenagers. Our hell-raising increased only when the boredom did likewise. In many respects, my teachers gave me the right label. When I became a teacher, I also tried television. Cable, VCRs, and videocassettes had surely eliminated the problems my teachers encountered. As a stand-alone medium, television was short-lived. But it did turn my normal teenagers, into slow learners, thugs, incorrigibles, and similar unprintables.

Microcomputer Technology

When television faded, a new kid was waiting. Because



BY BLANNIE E. BOWEN, EDITOR

(Dr. Bowen is an Associate Professor in the Department of Agricultural Education at The Ohio State University.)

pre-1980s teachers had limited access to computers, microcomputers were hailed the great equalizer. Teachers on all levels gobbled-up microcomputers. Scare tactics commercial interests used said students who did not use computers were headed to purgatory. Commodore provided my favorite scare commercial. If you believed this commercial, a sad student could not catch a train leaving for his college because the student didn't have a Commodore. His educational opportunity was lost; Hades was next!

Such myths died slowly in the mid-1980s. Vendors had incorrectly assumed that educators would buy new wonders without questioning the educational benefits of earlier models. Few instructional packages were available. Students had little to do other than write BASIC programs. However, when hardware sales slowed, worthwhile software was developed. Test construction, grading, word processing, database management, and graphics are uses teachers now make of microcomputers. In classrooms, teachers can enliven their instruction using simulations, games, graphics, tutorials, and other self-paced activities.

Effectiveness of Instructional Media

But, do computers and other electronic media result in learning? Clark (1983, p. 450) said, "Five decades of research

(Continued on page 4)

About the Cover

Participants in the 1987 National FFA Computers in Agriculture Seminar were exposed to various aspects of the electronic classroom. Speakers, training sessions, and various activities were conducted last summer to enrich the CIA state winners, their vocational agriculture instructors, and the other individuals participating in the Seminar. (Photo courtesy of Dwight Horkheimer of the National FFA Center.)

The Electronic Vocational Agriculture Classroom

(Continued from page 3)

suggest that there are no learning benefits to be gained from employing different media in instruction regardless of their obviously attractive features or advertised superiority." Bangert, Kulik, and Kulik (1983) echoed a similar theme after reviewing 51 studies about individualized teaching systems used in secondary schools. They say such systems have a small effect on student achievement. "In addition, individualized teaching systems did not contribute significantly to student self-esteem, critical thinking ability, or attitudes toward the subject matter being taught" (1983, p. 143).

Summary

Computers and other inanimate gadgets can't explain, ra-

tionalize, think, or handle WHY questions. On the contrary, teachers can be probed endlessly yet not be turned-off with the flick of a switch. Electronic media simply cannot handle the human element. Such media can, however, be vehicles to deliver instruction.

Authors writing in this issue discuss instructional applications that should be effective in an electronic vocational agriculture classroom. Dwight Horkheimer of the National FFA Center secured authors to address this month's theme.

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Editor-Elect

Zurbrick Named Editor-Elect

Phillip R. Zurbrick, Professor of Agricultural Education at the University of Arizona, has been named Editor-Elect of *The Agricultural Education Magazine* by the Editing-Managing Board. The Board named Zurbrick during its annual meeting last December in Las Vegas. Zurbrick will serve as Editor-Elect during 1988 and Editor during the three-year period of 1989-1991.

Dr. Zurbrick has been a faculty member at the University of Arizona since 1971 when he accepted an assistant professor position. He completed his Ph.D. at The Ohio State University, his master's at the University of Arizona, and his B.S. degree at Oregon State University. All three of his degrees are in agricultural education.

An Oregon native, Dr. Zurbrick taught vocational agriculture at Elgin High School in Oregon for three years after completing his B.S. degree. He also taught vocational agriculture at Tempe Union High School in Arizona for three years after completing his master's degree. From 1968-1970, he was an instructor of agriculture at Mesa Community College in Mesa, Arizona.

His professional activities are numerous. He is completing a three-year term as the Western Region Editor for *The Agricultural Education Magazine*. Dr. Zurbrick is President-Elect of the American Association of Teacher Educators in Agriculture (AATEA). In 1985, he was Chairman of the Editing-Managing Board for *The Journal of the American Association of Teacher Educators in Agriculture*.

Dr. Zurbrick has received numerous honors and awards. In 1987, he received the Honorary American Farmer Degree. He received an Outstanding Citation Award from the NVATA in 1985. In 1982, he was named a Teaching Fellow by the National Association of Colleges and Teachers of



Agriculture (NACTA). The *NACTA Journal* honored him in 1979 with its E.B. Knight Award for authoring the Outstanding Journal article.

During his term as Editor, Dr. Zurbrick said that he wishes to accomplish the following goals: (1) to maintain the quality of the *Magazine*, (2) to make the publication the unofficial publication for the agricultural education profession, and (3) to enhance readership and subscriptions.

Using Technology to Address the Changing Agricultural Education Environment

Agriculture is an industry of great change. The last three decades have dramatically illustrated this as we've witnessed the very deliberate transition from a labor-intensive to a capital-intensive agricultural economy.

But never have the changes been so dramatic as in the last five years. The new agricultural structure, the erosion of foreign markets, and the severe credit situation have created a volatility unprecedented in the annals of American agricultural history. Today's agricultural events remind us daily that we are operating in a global economy.

The environment created by this tremendous volatility demands up-to-the-minute information. Survival (not prosperity, but survival) requires that business decisions be made rapidly and accurately. To make these crucial decisions, accurate and reliable information sources are essential.

Agricultural education plays a crucial role in helping agriculturists operate in this evolutionary environment. Agricultural education must be prepared to meet the challenges of the new agriculture by training present and future producers and agribusinessmen and women to understand and work within today's "information age." In addition, the new agriculture has created new fields of endeavor. Science and technology have spawned challenging agricultural careers that require basic and advanced instruction in those fields. Agricultural education must be prepared to offer instruction that will appeal to the best and brightest.

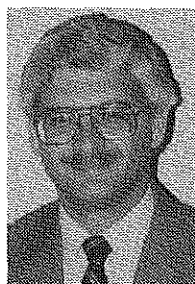
The Ag Ed Network, a joint project of the National FFA Organization and Agri-Data Resources, Inc., Milwaukee, WI, has endeavored to bring the world "information age" to classrooms across the country. By accessing the Ag Ed Network, instructors are able to infuse current information into their traditional classroom instruction. News items just minutes old can be used to highlight key agricultural issues that have an impact on today's farmers and those in agribusiness.

The Ag Ed Network is the first on-line educational network for agriculture. A dial-up, interactive information and communication service, the Network offers over 850 single-topic teaching units to support the vocational agriculture curriculum. In addition, the Network features FFA news, FFA information, an idea exchange, and software reviews.

The Network's teaching units address the skills necessary for success in agriculture: business planning and decision making, management, marketing expertise, and knowledge of current economic issues. The Network also lets teachers harness immediate agricultural industry information that makes agricultural education an exciting learning experience.

Formed in 1984, the Network has two purposes:

- to supplement agricultural curriculum with teaching materials based on current information.



By BRUCE HERZ

(Mr. Herz is Vice President, Special Markets and Manager of Ag Ed Network, AgriData Resources, Inc., 330 East Kilbourn Avenue, Milwaukee, Wisconsin 53202.)

- to increase awareness of the volatile agricultural economy.

The Network's teaching objectives are:

- to teach the principles of farm and agricultural business management.

- to teach the relationship between current economic issues and the decision-making process.

- to teach information management as a survival skill.

Through its three year history, the Network has grown to where there are schools on the system in every state. A trend, however, has been toward a "state networking" or the organization of centrally funded projects linking groups of schools from across a state. There has been significant growth in this area for many reasons, namely:

- To identify funding for technical support and curriculum improvement in secondary education.

- To monitor progress and performance in the area of new technology.

- To provide inservice training for individuals in the areas of computer use and information management.

- To generate exposure for agriculture programs in the state by showing their commitment to new technology.

Many outside our industry look at agriculture as a declining industry. Agricultural education is simply perpetuating a dying industry, they say. However, new technology and the use of current information contradicts these assumptions. They show that agricultural education is on the cutting edge of new technology. Instructional programs are alive, up-to-date, and poised for the future. Agricultural educators have the capability to train students for the diverse new fields of agriculture.

Yes, the changes in agriculture have been dramatic and they will continue to be. The challenges ahead are many. But, fortunately, we are at a time when the technology is in place that will enable us to meet these challenges. State networking via the Ag Ed Network is one way states are bringing technology and the vital information of today's agriculture into the classroom.

Computer Simulations and Expert Systems

When introduced in agricultural classrooms, computers were widely hailed as revolutionary new learning tools. But in many cases, the subject of computer-aided instruction was the computer itself — which keys to press, which disks to use — in short, how to be “computer literate.” Traditional agricultural subjects did not participate in the “computer revolution” as much as some other subjects.

This is changing, not because of new computer hardware, but because of new software. It is now possible to place students in realistic learning situations and to show them expert agricultural practices with a computer. The software techniques to do this are called “simulations” and “expert systems.” In this article, we will examine both from an agricultural teaching perspective.

Computer Simulations

A computer simulation is often presented as a game. The player is placed in a certain situation and asked to make decisions which affect the outcome. Some of these situations are more realistic than others. Pac-Man is, no doubt, a way to find out how to elude strange creatures. When more realistic situations are simulated on microcomputers, the prospect of combining the fun of a game with serious learning appears.

An engineering professor at Mississippi State University summed up the philosophy of simulation as “Try it and see what happens.” This is the overriding appeal of a simulation — the user is allowed to learn from mistakes. Mistakes don’t cost anything when done on computers. In the real world, however, the lessons gained from “learning by doing” can be valuable if the simulations are realistic. Outside of agriculture, the Flight Simulator program has been very successful. Within agriculture, the same principles of learning through experience are applied in Trade Simulator.

Trade Simulator is a computerized simulation of the experiences of an international soybean trader. It is designed to teach economic and marketing concepts of international trade in an interesting, game-like way. The player is given information in short news flashes and is asked to make decisions regarding buying, selling, shipping, insurance, and financing.

The game involves five plays, each representing one month. The objective is to maximize profits by buying and selling soybeans. At the end of the game, the player is given a score and a rating. If his or her score is high enough, the player’s name is entered into the Trader’s Hall of Fame, a permanent file on the playing disk.

Trade Simulator contains a large database on the disk which allows it to be played many times without duplication of learning situations. The program is available as a complete educational package which includes an instructor’s manual and student texts. The student text covers use of the software and basic principles of international trade.

By RICHARD A. LEVINS AND EARL H. BROWN

(Dr. Levins and Dr. Brown are Associate Professor and Professor, respectively, in the Department of Agricultural and Resource Economics, University of Maryland, College Park, Maryland 20742.)

Expert Systems

Artificial Intelligence is currently in such fashion that it has been called the “designer jeans of computer science.” Long the stock-in-trade of science fiction writers, computers that simulate human thought are now a reality in many fields. Expert systems, a branch of artificial intelligence research, has shown the most potential for professional and educational applications.

An expert system is a computer program made in two stages. In the first stage, a problem and a human expert who can solve the problem are identified. The way the expert goes about solving the problem is carefully studied and logically defined. Then, in the second stage, the expert’s decision process is translated into computer code. BASIC, Pascal, or more sophisticated “shell” programs can be used to write expert systems that can be run on computers ranging in size from mainframes to micros.

Many expert systems are used in problems requiring either diagnosis or classification. The medical profession offers many good examples. In agriculture, diagnosing diseases and classifying (identifying) plants and animals are among the oldest problems. Expert systems, therefore, receive a lot of attention in agriculture. Diagnosing soybean diseases, identifying weeds, and recommending pesticides are a few of the many problems which have been addressed with expert system technology.

The expert system can be a powerful teaching tool. It is possible to make a case problem for students to study, show them the “answer”, and then show them how the answer was obtained. One good example of an expert system for agricultural education which does these three things is Dairy Expert. Dairy Expert is designed to help students learn about reproductive management in dairy herds. The subject is traditional, but the approach of using an expert system is entirely new.


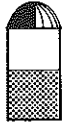
Dairy Expert asks a series of questions about the reproductive status of a dairy herd and then makes a diagnosis of that herd. The diagnosis gives suspected problems, recommended treatments, and the reasons the treatments were recommended. As the student answers each question asked by the computer, messages on the screen tell the student why the question is being asked and what was learned from the answer. This shows students how an expert reproductive specialist makes a logical diagnosis.

While expert systems are normally thought of as reasoning from problem to diagnosis or other "answers", they can also be run "backwards" to generate problems that match certain diagnoses. This is very helpful in working with students. The result of these computer runs are case problems. Dairy Expert can generate a large number of case studies which show a wide variety of problems for students to study and solve. This adds realism to class exercises, which, as with computer simulations, makes learning more interesting and effective.

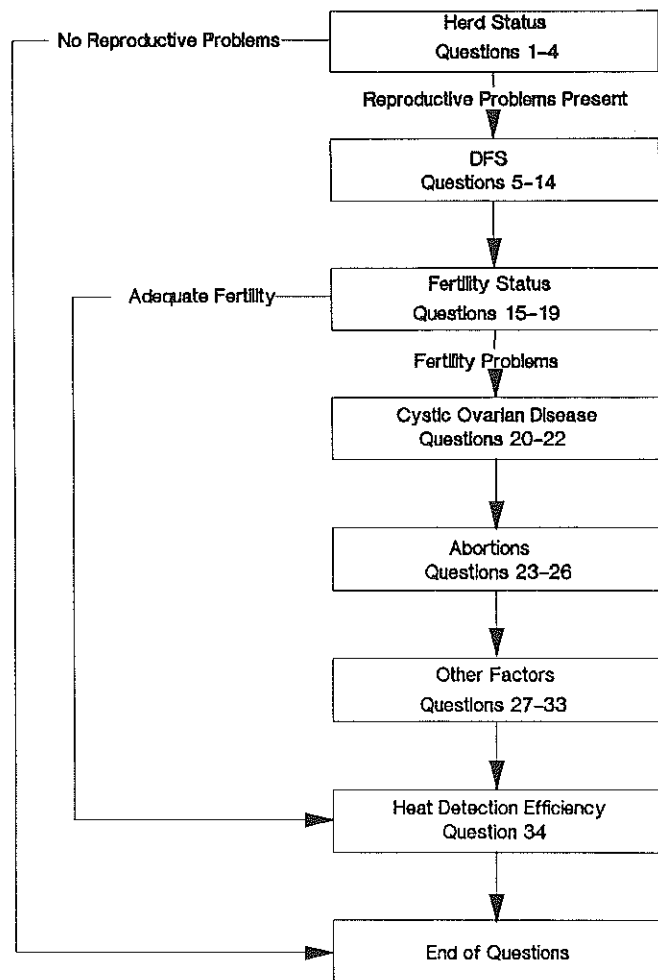
Conclusion

Computer simulations and expert systems both have tremendous potential in agricultural education. We all strive for interesting, effective teaching methods, and these computer approaches offer both. Students enjoy the realism both approaches can provide. Students who are more motivated and interested will more likely take full advantage of educational opportunities in all subjects.

Trade Simulator and Dairy Expert are available for IBM-PC and Apple II computers from Lumen Software, Inc., P.O. Box 778, Adelphi, MD 20783. Telephone (301) 434-4316.

Profit \$000,000,000		Press F9 for News, F10 for Help
Cash	Stock	F1 Buy
		F2 Sell
Cash (\$) 1000000	Stock (T) 5000	F3 Do Nothing
Your avg. Cost/ton	220	Press an FN Key
5 Plays Left		

Trade Simulator puts students in a realistic learning situation in which they learn basic principles of international trade.



Dairy Expert contains a series of questions which a student answers in a systematic way while diagnosing dairy reproductive problems.

RESOURCES

Increasing the Relevance of Vocational Programs: A Data-Based Approach, a new release from the National Center for Research in Vocational Education, describes a method for meeting employment needs of students, employers, and labor market areas.

Persons involved in data-based planning and evaluation may experience difficulty comparing different kinds of useful data, but this new publication provides a relatively simple way to compare data by using two data-normalizing procedures. These procedures rely on the application of quantitative rather than qualitative data; the method is explained in detail.

Order *Increasing the Relevance of Vocational Programs: A Data-Based Approach* (RD264—\$10.50), 117 pp.,

1987, from the National Center for Research in Vocational Education, The Ohio State University, Publications Office, Box N, 1960 Kenny Road, Columbus, Ohio 43210-1090; or call toll free 1-800-848-4815 or 614-486-3655 inside Ohio and outside the continental United States.

The development of this publication was sponsored by the Office of Vocational and Adult Education, U.S. Department of Education.

Questions Frequently Asked About Vocational Education contains the best available answers to questions frequently asked about vocational education. The questions were selected by research specialists at the National Center for Research in Vocational Education and state administrators of vocational education. The answers were obtained

from all relevant work conducted at the National Center, other studies completed using large databases, and journal articles and other original research.

This new publication was prepared for policymakers and others who are often asked to provide clear evidence of vocational education effects and practices and who do not have the time to review all the studies relevant to the problems they are addressing.

Order *Questions Frequently Asked About Vocational Education* (SN57—\$14.75), 33 pp., 1987, from the National Center for Research in Vocational Education, The Ohio State University, Publications Office, Box N, 1960 Kenny Road, Columbus, Ohio 43210-1090; or call 1-800-848-4815 or 614-486-3655 inside Ohio and outside the continental United States.

Using Video Simulation For Computer Instruction

Computers! At one time, mentioning the word brought questions to mind. What do they do? How can they be used in the educational program? Why should they be incorporated into the curriculum? Today most of us are aware of the potential benefits of the computer. We can agree that computers not only should, but must be incorporated into the vocational agriculture curriculum. One problem remains, however: How can we teach students to use computers when we have limited access to computers and software?

Perhaps the most common approach to teaching computer applications in the classroom is supervised laboratory instruction. Supervised laboratory instruction is the process of explaining and/or demonstrating a practice and then allowing the students to practice the process under supervision. There are two major advantages to this instructional technique. First, all students receive the same information at the same time; it is consistent. Second, all students will receive practice which reinforces learning. The primary disadvantage of supervised laboratory instruction is that it requires a computer for every two or three students — a luxury few of us have.

One solution is the use of a simulation activity. Simulation has been defined as "the creation of a realistic environment using lifelike problem solving activities which are related to present or future real occupational experiences" (Hamilton, 1977, p. 3). By combining a simulation activity with a prerecorded video of computer software we have "video simulation." By definition, video simulation is the "use of a teacher prepared prerecorded video display in combination with a dummy keyboard to represent actual use of a computer" (Atherton, 1987, p.10).

An Example

Let's use an example of teaching spreadsheets to a class of 15 students with three computers in the classroom. If we try to teach these students using supervised laboratory instruction, we can handle only three to six students at a time. By incorporating video simulation, we can have the same three to six students using the available computers, and the remaining nine to 12 using video simulation activities. The students taught using the video simulation activities actually work through the same exercises except they watch the process on a television monitor and perform the keystrokes on a simulated keyboard. The students are then provided practice using the computer. By rotating students through both instructional methods, all students receive maximum practice. By providing for practice using the computer, the students are also given the opportunity to experiment with the software.

By JONATHAN C. ATHERTON

(Mr. Atherton is a Farm Business Planning and Analysis Instructor at Trumbull County JVS, 528 Educational Highway, Warren, Ohio 44483.)

Video simulation is a direct video recording of the same process used in supervised laboratory instruction. The video recording has audio instructions dubbed that explain each step. The students are provided a simulated keyboard and instructed to perform the keystroke indicated by the dubbed instructions.

Creating Video Simulations

How are video simulation activities constructed? There are five steps in developing video simulation activities.

The first step involves developing your objectives and procedures. Your objectives are the instructional objectives for the activity. Procedures are the step-by-step procedures used to meet each objective.

The second step is making a preliminary recording of the procedures onto a video cassette. This preliminary recording should be recorded with minimal delays between steps. The purpose of this step is to check for instructional content and flow. The procedure used to record the video is relatively simple, assuming the computer video card has an RCA type jack. Otherwise, an adapter will be required. To make the recording, simply connect the video cable from the computer to the "video in" jack on the VCR and a second cable from the "video out" jack to the monitor or to a TV. Then boot the software, start the VCR, and you are off.

The third step is to review the video recording and develop a script for the audio portion. Initially, one should take the time to develop a complete script for the audio, but as you gain experience, a detailed outline of the procedures will be sufficient.

The fourth step is to record the video a second time. With this second recording, pauses should be left between each step so the audio instructions can be dubbed.

The final step is to dub the audio onto the video. This is done using a VCR with an audio dub feature. The video cassette should be placed in the VCR and a microphone used to record the audio. The microphone should be connected to the "audio in" jack of the VCR. The script should be followed and the audio matched with the proper portion of the video. At this point, instructions are carefully sequenced before and after each step but not during the process on the video portion. If the audio and video portions overlap, learning will be impaired by forcing the student

to either listen or watch; most students are unable to do both simultaneously.

When the video and audio portions are completed develop a simulated keyboard so the students will receive practice. A simple simulated keyboard can be made by making a photocopy of an actual keyboard. This photocopy can be laminated and placed on a piece of plywood or scrap wood and angled so it is as close as possible to the angle of an actual keyboard. It may also be possible to use an old keyboard from another computer. The point is to provide practice that reinforces learning.

Costs vs. Benefits

Using video simulation holds several advantages over supervised laboratory instruction. The most obvious advantage is cost. With a computer from a major manufacturer costing from \$700 to \$1,000 and software costing from \$75 to \$700, an instructor could quickly drain an operating budget and not have sufficient equipment for supervised laboratory instruction.

For the price of two computers, the same instructor could buy one computer and video recording equipment, and have the capability of providing instruction to an entire class. This same instructor would then only have to buy software for a single machine.

There are other benefits that may result from using video simulation. Video simulation is consistent in instructional content. If the video recording is properly planned, recorded, and validated, the instructor can be sure that the students receive accurate and consistent information every time. The video may also include built-in errors. Common errors associated with a specific software package can be anticipated and placed in the video so that these problems can be experienced by the student.

A second advantage is the video simulation may save the instructor's time. Prerecorded video allows the student to review specific parts of a process. Using the rewind and fast forward capabilities of the VCR, a student can quickly review a process or sequence that was missed the first time through. Allowing the students to review on their own may reduce the number of repetitions required of the instructor, thus allowing the instructor to spend more time with other concerns.

Video recordings developed by teachers can be problem specific. Separate video recordings could be developed for different activities. A recording could be made for developing enterprise budgets, calculating depreciation, or other important activities. Another use of video simulation activities involves remediation and enrichment of students.

Summary

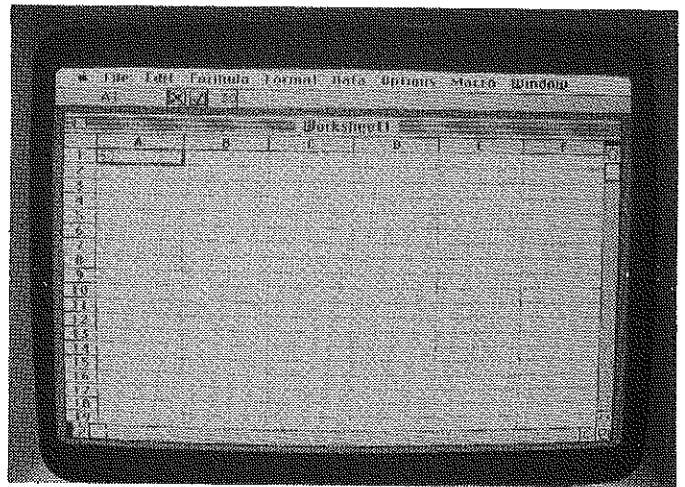
Video simulation has been shown to be as effective as supervised laboratory instruction in teaching computer ap-

plications (Atherton, 1987). The only difference was the time required for students to achieve mastery when they were instructed using only video simulation.

Video simulation can be an effective alternative to supervised laboratory instruction when adequate numbers of machines or software are not available. The quality, diversity, and effectiveness of video simulation is limited only by the teacher's imagination.

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Electronic spreadsheet concepts (Photo 1) to word processing application (Photo 2) can be simulated via a dummy keyboard and a videocassette recorder. (Photo courtesy of the National FFA Center.)



Coming in April . . .

Stress Management

Being Able To See It All

No matter what subject you teach, or what computer operation you are trying to demonstrate, all of us have had the same problem: *Too few computers to go around, only a 12 inch monitor to demonstrate on, and everyone squinting.* Everyone is crowded around one monitor and you try to show something that is very good, but only to the front row. Therefore, you teach with the idea that only half will see, half will be pushed and shoved around, and a third will get nothing from the day. If this sounds familiar, read on.

One solution, and we lived with this for many years, was to hook up a very large TV and use it as your monitor. Two problems persist for everyone out there who is using this method. First, the clarity is just not there with a large television. The normal TV is not made for an 80 column display computer, so the fuzzy look makes for a poor showing. The second problem is that hooking more than one monitor on the computer can burn out the video IC on the computer motherboard.

The only other solution was to purchase a large screen projector unit. The reason schools could not use this idea was the cost. We already have a shortage of hands-on equipment and cannot afford to spend \$4000 or more for a heavy-weight system. Instead we would purchase a few more computers and refer to the first solution.

Liquid Crystal Displays

The technology of the mid 80s has finally made it possible on a small budget to produce a clear picture to a large group. The latest idea that has turned into an educational hopeful is the new LCD, liquid crystal display, projection system. This innovative concept provides the expensive overhead projection with a fourth of the cost. The best way to describe the unit is to compare it to an oversized LCD watch without a back. The unit is a panel, no more than a couple inches thick and around 12 to 18 inches across. The unit weighs less than six pounds and depending on the model, is simple to carry around for a show.

The basic system is easy to set up and use. Anything you put on your monitor's screen you can put on the overhead. It will fit over most overhead projectors without any adapters or hitches. I know of no software that will not work on the system. Depending on the system, it may require a board in the computer and may be set up for IBM or Apple brands. The cost is also inexpensive (compared to the price tag of a large screen projector). Depending on the model you buy, expect to pay between \$950 to \$1400. I do expect the price to come down in the next year, but not by a great deal. The LCD system comes with all the parts included; all you add are the computer and overhead projector.

Before Purchasing

Be sure to check your product before you buy. Most people with PCs have a color graphic adapter for instant hookup. If you have an IBM clone, try the computer with

By MIKE BRIGGS

(Mr. Briggs is Director of Computer and Educational Technology at Plymouth High School, Plymouth, Wisconsin 53703.)

the LCD unit of your choice. Some units will not allow you to view on your monitor as you view on the overhead at the same time. You must in those cases purchase a "T" adapter and hook it up along with the overhead. The best bet is to try some out at a "demo" and pick out the best one for you.

The best can get better. I have not seen a color LCD unit, yet I know that Telex Communications, Inc. has recently announced a color unit. Until I get a price tag and see one, I will live with a green screen. The units also vary on clarity and fadeout. Some units will fade as they get warm and must be cooled by turning off the overhead for a few minutes. This fadeout is not a problem if they will cool off quickly and allow a reasonable work time between fades.

Summary

New technology can provide a bright future to education and allow new and innovative teaching techniques — if used correctly. You must try out units on worksheets, animation, and programming. After you have worked on many of them, you will then be able to choose one that will be the best for your classroom and the future of your educational environment.

Manufacturers that produce LCD projection systems are listed below. Units which specify IBM-PC and compatibles and Apple II family indicate that the same unit should work on both computers, potentially saving money if both IBMs and Apples are used in your school.

REFERENCES AND SOURCES

Magnabyte

Telex Communications, Inc.
9600 Aldrich Avenue South
Minneapolis, MN 55420
IBM PC and compatibles or Apple II family

Datashow Projection Pad

Eastman Kodak Co.
343 State Street
Rochester, NY 14650
IBM PC and compatibles or Apple II family (\$159 extra)

Data Display

Computer Accessories, Inc.
6610 Nancy Ridge Drive
San Diego, CA 92121
IBM PC and compatibles and Apple II family

QA-25 LCD Computer Projection Pad

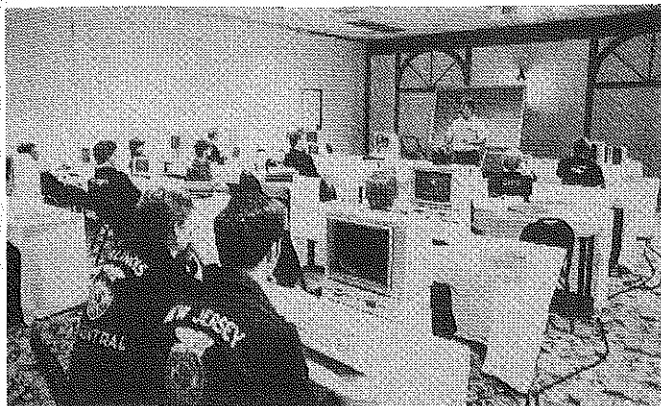
Sharp Electronics Corp.
Sharp Plaza
Mahwah, NJ 07430
IBM PC and compatibles or Apple II Family (\$119 extra)

Apollo PC-9100
Apollo Audio Visual
60 Trade Zone Court
Ronkonkoma, NY 11779
IBM PC and compatibles or Apple II Family

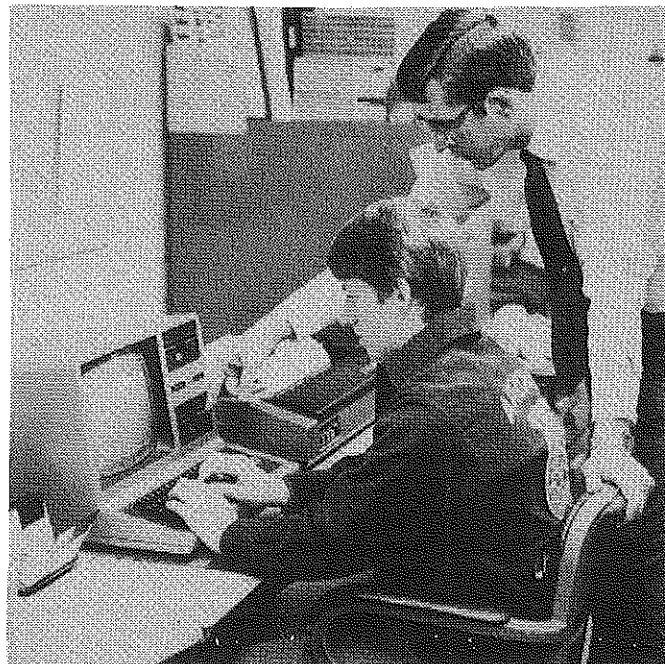
Eiki Model DD-1000
Eiki International, Inc.
27882 Camino Capistrano
Laguana Niguel, CA 92677
IBM PC and compatibles or Apple II Family

MagniView 200
Dukane Corporation
2900 Dukane Drive
St. Charles, IL 60174
IBM PC and compatibles and Apple II Family

Vivid LCD
Vivid Systems, Inc.
41752 Christy Street
Fremont, CA 94538
IBM PC and compatibles and Apple II family



Liquid Crystal Display (LCD) projection systems are needed when all students can't see a monitor. (Photo courtesy of the National FFA Center.)



Electronic spreadsheet concepts can easily be presented to large groups using Liquid Crystal Display (LCD) projection systems. (Photo courtesy of the National FFA Center.)

LETTERS

Dr. Mr. Bowen:

I enjoyed reading the articles in your December issue of *Agricultural Education Magazine*. Since I teach in a school district that is about 75% minority, the articles were very relevant.

I am especially interested in the pictures on the back cover concerning the Natural Resources workshop for academically talented minority students. I would appreciate you passing my name and address on to the people responsible for the conference so I may learn more about it.

Thank you for your time and consideration.

Sincerely,
John E. Davis
Agribusiness Teacher
CHSAS
3807 West 111th Street
Chicago, IL 60655

Dear Mr. Bowen:

I am writing to thank you for sending me copies of *The Agricultural Education Magazine* throughout my year as a National Officer. Our team realized the tremendous importance of teachers and the need for continued quality teacher education. In fact, we identified it as a priority in our final report to the FFA Board of Directors this month. I appreciated the chance to read the thoughts of prominent agricultural educators across the nation; those articles proved useful throughout the year.

On behalf of the team and all of our members, thank you for your continued dedication to providing well-equipped teachers of contemporary agriculture.

Sincerely,
Daren Coppock
Past National FFA Vice President,
Western Region

Dear Blannie:

I appreciated the opportunity to read your editorial in the December issue of *The Agricultural Education Magazine*. As we move ahead to increase the number of black students, faculty and staff in this college, this kind of perspective is very helpful. I would hope that you will continue to give us your insights as we proceed with that initiative.

Sincerely,

Frederick E. Hutchinson
Vice President for
Agricultural Administration
The Ohio State University

Toeing The Line

"You had better toe the line." This warning has often been issued by teachers to get a student or a classroom of students to behave. Even though teachers often tell students to "toe the line," most may not know the origin of this phrase or its original meaning.

In the 1800s a major teaching technique was recitation. The student would stand erect and recite information that had been memorized. It was believed that standing erect was an essential part of the learning process. In discussing the importance of standing erect while reciting or reading, Hughes (1881, p.13) indicated that "politeness would require this" and the vocal organs worked better if the student stood. As an aid in getting students to stand properly, teachers would draw a chalk line on the floor. Students were then told to stand erect with their toes on the chalk line. If the student was properly toeing the line, the teacher could be assured that education was occurring correctly.

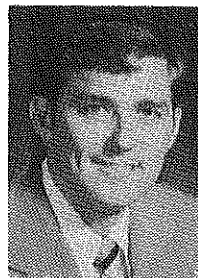
In the agricultural classroom of the future, the phrase "toeing the line" will have a different meaning. Students will be toeing the line when they "get on-line" via the computer. Getting on-line means to connect a computer with a source of information via the telephone line. There is a vast amount of current agricultural information that can be accessed via the computer and telephone lines. The progressive agriculturalists of the future will be aware of these on-line information sources and know how to retrieve information from them.

On-Line Information Systems

In 1982, there were 919 commercial on-line information systems listed in the *Directory of On-Line Databases*. Today there are more than 2,000 (Camp, Moore, Foster, & Moore, 1988). These on-line information systems can be viewed as an electronic library. Virtually any type of information a person wants to find can be found in one of the on-line information systems. See Figure 1 for a sample of the types of information that can be assessed. The agriculture student can sit at the computer in the vocational agriculture classroom and retrieve a vast array of information. Of course, there is generally a charge for this service but the timeliness, currency, and importance of the information will probably offset the cost. The more progressive agricultural leaders are on-line. There are a number of on-line information systems just for agriculturists.

AgriData. The AgriData Network is a commercial on-line information system that specializes in agricultural business and market information. The information is accurate and constantly updated. It contains "today's" market information. There is also extensive worldwide weather information and market reports along with information impacting agriculture from the government.

AgEd Network. An information system designed specifically for vocational agriculture describes the AgEd Network. This system was jointly developed by AgriData



BY GARY E. MOORE AND WILLIAM G. CAMP

(Dr. Moore is a Professor of Agricultural Education at Louisiana State University, Baton Rouge, Louisiana 70803; and Dr. Camp is an Associate Professor of Agricultural Education at Virginia Polytechnic Institute and State University, Blacksburg, Virginia 24061.)

Resources, Inc. and the National FFA Organization. In addition to all the information that can be accessed through AgriData, this service also has FFA news and information, an FFA supply ordering service, hundreds of agricultural lessons, and an idea exchange.

AgriCola. The National Agricultural Library of the USDA operates this information service. AgriCola contains listings of journal articles, published and unpublished papers of all sorts, books, magazines, research reports, and other sources of information. You can search for any of thousands of different key words (such as rice varieties, swine vitamin A deficiency, etc.) and locate any information available on the subject. AgriCola contains over 1.5 million citations on agriculture published since 1970.

AGNET. An agricultural business network for farmers and ranchers is how one would describe AGNET. It was developed and operated by the Cooperative Extension Services of Montana, Nebraska, North Dakota, South Dakota, and Washington. AGNET provides management decision-making programs. It includes current market information and state, regional, national, and international news that relates to agriculture. The network also provides an electronic mail service. Farmers, ranchers, and agribusiness persons across the country use AGNET's services.

COIN. The Computerized Outlook and Information Network (COIN) is operated by the Extension Service of the USDA. Reports on COIN include those from various USDA agencies including the Statistical Reporting Service, Crop Reporting Board, Economic Research Service, World Agricultural Outlook Board, Foreign Agricultural Service, and Agricultural Marketing Service. Also provided are USDA news releases.

USDA Online. The USDA's Office of Information operates this network to provide news and other current information of interest to agriculturists. COIN is accessed through this system.

Farm Bureau ACRES. The American Farm Bureau Federation operates this network as a service to members. It provides current market information and advice to users. Farm Bureau members can access the network to retrieve information or to send electronic mail.

Doane's Agricultural Computing. Doane's Publishing established this network as a commercial operation specialized in farm management information. Included in the subscription cost are decision-making software and numerous publications.

NPIRS. The National Pesticide Information Retrieval System (NPIRS) provides access to information about all pesticides registered with the Environmental Protection Agency. It indicates which pesticides are registered for use against specific pests and in which states.

Teleplan. Michigan State University designed and operates Teleplan through its Department of Agricultural Economics. It includes decision-making and agribusiness management programs. Farm finance, livestock management, and crop planning programs are included. Also provided are family finance and human nutrition programs.

For more information about these on-line data services, write to these services at the addresses listed in Figure 2.

Summary

In the electronic agricultural classroom, students will toe the line by getting on-line. There are a variety of on-line agricultural information sources students can access. The ability to utilize these information sources will be an important skill for agriculturists in the future.

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FIGURE 1
INFORMATION THAT CAN BE RETRIEVED
FROM ON-LINE INFORMATION SYSTEMS

Registered Patents	Medical Articles
Medicine descriptions	Encyclopedias
Military and Federal Specifications	Dissertation Abstracts
Catalog of Government Publications	Books in Print
Education Articles (including articles from <i>The Agricultural Education Magazine</i>)	Religious articles
Newspapers and Magazines	Airline Schedules
Games	A.P. News Wire
Movie Reviews	Commodity Reports
Electronic Yellow Pages	Weather Reports
Chemical information	Dow Jones Quotes
Who's Who	Government Reports
Aquaculture	UPI News
Welding	School Statistics
Drug Abuse	Congressional Record
	Child Abuse
	Energy information

FIGURE 2
ADDRESSES FOR AGRICULTURAL
ON-LINE INFORMATION SERVICES

AgriData Resources, Inc. 330 East Kilbourn Avenue Milwaukee, WI 53203	AgriCola National Agricultural Library Room 1402 Beltsville, MD 20705
AGNET 205 Miller Hall University of Nebraska Lincoln, NE 68583	COIN and USDA Online News Division, Room 404A Office of Information U. S. Dept. of Agriculture Washington, DC 20250
Farm Bureau ACRES Contact your local Farm Bureau Office	Doanes Publications 11701 Borman Drive St. Louis, MO 63146
NPIRS Entomology Department Purdue University West Lafayette, IN 47907	Teleplan Department of Agricultural Economics Michigan State University East Lansing, MI 48824-1039

THEME

Electronic Problem Solving: Tomorrow Is Here Today

"Expert systems are a class of computer programs that utilize the problem solving approach and the knowledge of experts to solve a problem or arrive at a conclusion" (Palmer, 1986, p. 28). With the substitution of only a few words we would say, vocational agriculture is a class of instruction that utilizes the problem solving approach and the knowledge of experts to solve a problem or arrive at a conclusion. This premise is a cornerstone of our profession.

In the past, the vocational agriculture instructor has possessed the knowledge of an expert for most phases of production management. The agriculture teacher knew agriculture. The knowledge base was relatively finite. Not so



By PHIL BURIAK

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(Continued on page 14)

could be brought into the classroom if an instructor had at his/her fingertips the accumulated knowledge of experts in soils, physiology, hydrology, entomology, chemistry, engineering, marketing, economics, and other areas. This instructor could effectively apply this knowledge to specific questions and problems in agriculture. Students could design varying scenarios, play them out, and later evaluate the alternatives. Instruction would be current and learning would be active.

The vocational agriculture instructor can still return to the past and be the content expert. This is possible, not because he/she knows the total accumulated information

and knowledge related to agriculture, but because he/she know the process of problem solving and the mechanics of expert systems.

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- Norris, W.C. (1987, July/Aug.). Expert systems pegged for rapid growth *AGRICULTURAL ENGINEERING*, p. 44.
- Palmer, R.C. (1986, Sept./Oct.). How expert systems can improve crop production. *AGRICULTURAL ENGINEERING*, p. 28-29.

THEME

Statewide Network: The California Project

Agricultural education programs in California began using the Ag Ed Network in October, 1986. This pilot program was designed to assess the feasibility and value of computer networking in California's agricultural education programs. Participants in the pilot test included secondary teachers (74), community college teacher (1), State Department of Education supervisor officers (6), teacher educator institutions (5), and the California Agricultural Teachers Association Executive Director. A total of 96 sites participated in the pilot study.

Results of the pilot indicate that teachers and state staff personnel perceived computer networking was valuable to them in improving their ability to communicate, obtain timely and up-to-date information for instructional purposes, and enhanced the general image of their agricultural programs.

As a result of the successful pilot study, the California Agricultural Education State Staff developed a goal of linking all California Agricultural programs by 1989.

Inservice education is one of the major challenges faced by the California computer networking project. The initial group of users were generally teachers who were computer literate and highly motivated to learn new ways of making better use of their computers. However, as the second group of users joined the network, it was apparent that many had little or no computer skills and the amount and kind of inservice needed changed. To meet this need, a cadre of 17 teachers who had demonstrated outstanding understanding and use of computer networking was formed. These "teacher-trainers" of computer networking were given advanced instruction and asked to conduct a series of workshops for new users. As a result of using peer group teaching, teachers are not only learning the mechanics of computer networking but developing an interpersonal network of continuing support. In addition, teachers are taking more ownership in the network.

California Database

The Ag Ed Network has a wide range of useful informa-



BY JAMES LEISING

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tion for agriculture teachers to use as a resource for improving instruction. However, from the beginning of the California project, teachers and state staff identified the need for a California-specific database of information that would facilitate statewide communication and disseminate new curriculum materials. Working with the project advisory committee, the following reports were developed and are available on the Ag Ed Network.

CLF1	Superior Region Calendar
CLF2	North Coast Region Calendar
CLF3	Central Region Calendar
CLF4	San Joaquin Region Calendar
CLF5	South Coast Region Calendar
CLF6	Southern Region Calendar
CLF7	Southwestern Region Calendar
CLF8	State Supervisor's Newsletter
CLF9	State FFA Newsletter
CLF10	Community College Newsletter
CLF11	Inservice Education News
CLF12	Curriculum Project News
CLF13	Teaching Resource
CLF14	CATA News
CLF15	Computer Networking Project News
CLF16	ATAC and Consultants
CLF17	Teaching Ideas
CLF18	CA Young Farmer News
CLF19	Post-Secondary News
CLF100-199	Core Curriculum

Who's Doing The Training In Agribusinesses?

Trainers help employees gain knowledge and skill to do their job. Agribusiness trainers, like agricultural instructors, assess needs, design curriculum, plan lessons, teach classes, and evaluate programs. Who actually does the training in today's agribusinesses may be of interest to "would-be trainers" seeking to learn more about the training profession and their chances of being employed.

In the past, little was known about agribusiness training. Two journals, *Training* and *The Training and Development Journal*, reported several studies on trainers and training as a profession, but none of these studies focused on the agricultural industry.

A survey of agribusiness trainers in Minnesota was conducted at the University of Minnesota and funded by Northern States Power through the Training and Development Research Center. The survey sought to determine the extent of agribusiness training done, backgrounds of those who did the training, and what they did on the job.

The survey questions, taken from instruments developed by Green (1985) and McLagan (1983), asked respondents about their job, educational background, work experience, age, and other demographic information.

Training in Agribusinesses

About two-thirds of the agribusinesses surveyed conducted training programs within their organizations. One-third employed full-time trainers and over one-half employed part-time trainers. The number of trainers varied due to seasonal work and summer student employment.

The size of the agribusinesses varied also. Many businesses were very small, often with fewer than 20 employees. The smaller the company, the more likely that training was accomplished on-the-job by a supervisor. Smaller companies also were more likely to hire consultants to develop and implement their training programs.

An Agribusiness Trainer

A large majority of the trainers held positions of manager, supervisor, executive, director, or coordinator with responsibilities for training and retraining employees requiring only a part of their work hours. In Minnesota, agribusiness training is a function of a job rather than a job itself. Several trainers were members of the sales departments, thus showing the important role sales training plays in agriculture.

The trainers surveyed indicated that they have several years of experience and a great deal of education. Their belief that agribusiness training is not an entry level job was supported by several factors.

First, the average age of the agribusiness trainers was 41; no one was under 26. Second, all trainers surveyed listed a number of years of experience in fields other than train-



By CHLENE ANDERSON

(Ms. Anderson is with the Human Resources Planning & Development Department of Farm Credit Services, 375 Jackson Street, St. Paul, Minnesota 55101.)

ing. Management/supervision and sales/marketing were listed most often.

It was surprising to find how few of the respondents had teaching experience, especially since a large number had majored in education. This could be the result of their graduating with an education degree without intending to teach.

Trainers typically had at least a bachelor's degree, and one in five surveyed held an advanced degree. Their degrees were concentrated in the fields of agriculture, business, and education. Trainers reported they utilized only one-third of their formal education to perform current duties.

All trainers surveyed had at least one year of training experience and the majority had more than 10. According to *Training* magazine, in the past people gained a training position by being good at what they did. They used training as a stepping stone to make horizontal and vertical career movements, usually staying in a training position less than three years. But, this is changing. Today, people are deliberately choosing training as a career. The result is a lower turnover rate in training and more consistency in the training and development plans of organizations. This may be contributing to the long tenure of trainers in agribusinesses.

How long does it take to become proficient in the training and development field? According to those surveyed, anywhere from six months to two years. The length of time respondents estimated to become proficient increased with their years of training experience.

Training Responsibilities

Most trainers surveyed performed training tasks less than 50% of their total work time. Only 7 out of 131 performed training tasks over 90% of their total work time.

Pat McLagan (1983) defined various roles which encompass the field of training and development. They are as follows:

- **Evaluator:** Identifying the extent of a program, service, or impact of the product.

- **Group Facilitator:** Managing group discussions and group processes.
- **Individual Development Counselor:** Helping individuals assess personal competencies, values and goals, and identify and plan development and career actions.
- **Instructional Writer:** Preparing written learning and instructional materials.
- **Instructor:** Presenting information and directing structured learning experiences so that individuals learn.
- **Manager of Training and Development:** Planning, organizing, staffing, controlling, training and development operations and projects, and linking with other organizational units.
- **Marketer:** Selling training and development viewpoints, learning packages, programs, and services.
- **Media Specialist:** Producing software for and using audio, visual, computer, and other hardware-based technologies.
- **Needs Analyst:** Defining gaps between ideal and actual performance.
- **Program Administrator:** Ensuring that all necessary components of a learning event are present and that program logistics are conducted smoothly.
- **Program Designer:** Preparing objectives, defining content, selecting and sequencing activities.
- **Strategist:** Develop long-range plans for training.
- **Task Analyst:** Identify activities, tasks, and sub-tasks to accomplish specific results in a job or organization.
- **Theoretician:** Develop and test theories of learning, training, and development.
- **Transfer Agent:** Help apply learning (p. 16).

According to the survey, agribusiness trainers performed a variety of training roles within their jobs, often accomplishing five or more of the defined roles. Some trainers specialized and spent all or a majority of their time in one or two of the roles. Almost one-half spent at least 25% of their time in the role of instructor. Six of 10 functioned as

either program administrators or as individual development counselors.

The least performed role was that of theoretician. Only six of 131 filled training roles other than those mentioned. In general, agribusiness trainers were responsible for a wide range of training duties even though training was only part of their total job.

The average trainer conducted nine to 10 programs per year with about 18-19 participants per program. Many, however, conducted only two programs per year.

Needs assessment methods used were fairly consistent. Subjective methods such as requests by management, personal observation, and opinion surveys were most popular. The only widely used objective method was the performance appraisal. All of these methods were less expensive and less time consuming than least used methods: outside consultants, assessment centers, formal training courses, and organization audits.

Conclusion

It appears that agricultural instructors possess many of the skills required to fulfill training roles. While it may be difficult as a generalist to obtain original employment in agribusiness training, agricultural education majors are more useful and flexible than a training specialist such as a media producer and will probably be equipped to survive in the midst of economic change and business reorganization.

Some agricultural instructors may find that they could gain valuable experience in training by serving as training consultants for local agribusinesses which cannot afford full-time trainers. They are well-qualified to help plan and design employee programs and could fulfill the role of part-time training director.

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RESOURCE

Disaster Tax Help Available

Taxpayers who suffer property damage from a disaster may be able to get immediate tax relief, according to the Internal Revenue Service.

If the taxpayer has a deductible casualty loss from a disaster in an area that the President of the United States later declares eligible for federal disaster assistance, the taxpayer may choose to deduct that loss on a return for the tax year immediately preceding the tax year in which the disaster happened. If the

taxpayer has already filed a tax return for the immediately preceding tax year, he or she may file an amended return on Form 1040X.

Otherwise, the taxpayer may deduct the loss on his or her return for the year the loss occurred.

The amount of loss must be reduced by an insurance or other reimbursement and by a \$100 deductible. If the loss is to nonbusiness property, it is deducti-

ble only if total losses for the year exceed 10 percent of the taxpayer's adjusted gross income.

These calculations are explained in free IRS Publication 547, *Nonbusiness Disasters, Casualties, and Thefts* and Publication 584, *Nonbusiness Disaster, Casualty, and Theft Loss Workbook*. Both can be obtained by using the order blank in the IRS tax return package or by calling the IRS toll-free at 1-800-424-3676.

Teaching Vocational Ethics In Agricultural Education

In November, 1984, a Q-sort survey was conducted at the American Vocational Association convention in New Orleans. The purpose of the survey was to determine vocational educators' perceptions of the ethical characteristics required of workers to be continuously and productively employed in today's world of work.

One hundred seven vocational educators from across the U.S. participated in the study. Subjects represented five occupational teaching areas: Agriculture, Business, Health Occupations, Home Economics, and Industrial Education. Data from this study revealed that out of 50 possible choices, teachers in the area of agriculture rated willingness to work, accepting responsibility for one's own actions, being at work on time, willingness to learn, and being reliable/trustworthy as the most important ethical characteristics for worker success in agriculture-related occupations.

The responses of agriculture teachers, on the whole, were similar to those of the sample drawn from all vocational teaching areas (Miller, Rubin, & Glassford, 1987). This suggests that there is general agreement among vocational education teachers as to the ethical characteristics students need to develop prior to entering the workplace. The question that arises is: *Now do we develop these characteristics within the school context?*

In 1987, the Illinois Department of Adult, Vocational, and Technical Education recognized vocational ethics as a component of the core orientation curriculum for vocational program at the 9th and 10th-grade levels in Illinois. Orientation curriculum guides being developed in the areas of Business, Marketing and Management, Health Occupations, Industrial Technology, Home Economics, and Agriculture will include activities addressing the goals of vocational ethics instruction.

The following is an overview of the vocational ethics instructional model.

Teaching Vocational Ethics

The teaching of vocational ethics is best construed as educating for and toward the development of an enabling work ethic. An enabling work ethic is an integrated and interactive system of attitudes, values, and beliefs that empowers workers to sustain long-term job satisfaction and productive employment. An enabling work ethic is based upon:

1. The ability to recognize ethical problems and issues within the work context.
2. Ethical reasoning skills.
3. The ability to resolve ethical conflicts within oneself

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(Dr. Miller is Director of the Center for Vocational Ethics and a Research Project Development Specialist for the Office of Research, Development and Administration; and Mr. Coady, a graduate student in Psychology, is an Administrative Assistant for the Center for Vocational Ethics at Southern Illinois University, Carbondale, Illinois 62901-4709.)

and with others in the work environment.

4. The ability to implement ethical decisions.

The content of vocational ethics instruction concentrates on two main types of skills to be acquired by students: ethical reasoning skills and mediation skills. The format of instruction includes the presentation and discussion of ethical problems between and among the teacher and students. The teacher serves both as a model and facilitator in the problem-solving process. Teachers encourage students to generate a variety of alternatives for solving the problems and evaluate each solution using the following value assessment criteria.

1. **Reciprocity:** Would you want this choice made if you were in the place of others in the situation?
2. **Consistency:** Would this choice be appropriate for you to make in other similar circumstances?
3. **Coherence:** Would this choice contribute to the overall well-being of the group or organization of which you are a part?
4. **Comprehensiveness:** Would this choice be appropriate for everyone to make in other similar situations?
5. **Adequacy:** Would this choice solve the short-term problem?
6. **Duration:** Would this choice solve the problem over time?

The awareness of the relative adequacy of each solution that is evaluated leads students to either alter or affirm their existing work attitudes, values, and beliefs. Thus, students become more aware of the consequences of various choices as well as the diversity of opinion on ethical issues held by others.

Beyond giving students skills for analyzing ethical issues, students are encouraged to develop the behavioral skills needed to successfully implement decisions. This requires the student to possess four primary types of mediation skills: assertiveness (Colter, 1976), emphatic listening (Reed, 1985), principled negotiation (Fisher & Ury, 1981), and risk taking (Carney, 1971). Training in these important skills enables students to take effective action based upon their view of ethical issues in the work environment.

Conclusion

Instruction in vocational ethics offers many advantages as a means of teaching students to recognize and successfully deal with ethical conflict. These advantages include clear instructional goals, replicable teaching strategies, and objective evaluation procedures. By taking a more conscious approach to instruction, teachers can help students acquire necessary knowledge and skills in a systematized manner and to practice what they have learned in the classroom prior to tackling real-life situations.

The teaching of vocational ethics involves bringing to consciousness student values, attitudes, and beliefs about worker rights and responsibilities and providing each stu-

dent the opportunity to alter or affirm his or her personal work ethic.

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ARTICLE

Ways to Encourage Student Learning

Principles of educational psychology are directly applicable to vocational agriculture instruction. The daily interaction between teacher and student allows for the continual application of various educational principles. Psychological theories possess a practical component that can be transferred to classroom situations. Teachers may have a general understanding of certain educational psychology principles, but they may be unable to implement the principles into an actual classroom setting. Several principles will be used to illustrate how vocational agriculture teachers can put "theory into practice."

Developmental Theory of Intellectual Growth

At about 11 or 12 years, most children develop formal reasoning skills that enable them to hypothesize about solutions to problems, to determine the reality of situations, to consider the logical relations between variables, and to deduce from hypotheses that certain events should occur. School personnel and researchers have recently confronted the challenge of teaching thinking skills directly. Causing students to become aware of their own cognitive processes and instructing them in particular thinking strategies can have a direct effect on reasoning ability. Evidence indicates that students who are taught to think, along with traditional subject matter instruction, will retain the knowledge much longer and can integrate the information into other settings.

Educators have known for some time that verbal questioning is a way to stimulate thinking. The vocational agriculture instructor should strive to include both low order (factual recall) and high order (evaluation and analysis) questions when covering specific topics or units. For instance, an agricultural mechanics teacher discussing the procedures and applications for drilling and tapping holes in cold metal asks the class, "What are the steps in the process?" The students would respond: measure correctly, mark with a scratch awl, center with a punch, drill, and tap. The teacher can go beyond these knowledge/comprehension type questions by asking students: "How



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would we determine the minor diameter of two types of threaded fasteners? What factors would we consider in selecting a bolt for a specific application?" When students are exposed to analysis and evaluation type questions, there appears to be a positive correlation between high-order teacher questions and high-level cognitive responses from students.

Motivation Theory

Most teachers are aware of the concept of motivation and its relationship to learning. Novel, meaningful, surprising, ambiguous, and complex stimuli lead to curiosity which in turn leads to increased motivation to acquire information about the particular stimuli. The apparent need to maintain optimum levels of curiosity or stimulation may account for such student behaviors as exploration and problem solving. The teacher should attempt to include classroom activities that will encourage increased student curiosity or stimulation.

A unit on welding for beginning vocational agriculture students has the potential for creating a variety of unique stimuli. The welding equipment and safety paraphernalia would be novel and unfamiliar to most beginning agricultural students. The physical skills required for running an acceptable flat bead and learning the technical terminology associated with arc welding would be challenging for the beginning student. Vocational agriculture teachers need to

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Ways to Encourage Student Learning

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realize the impact that their classroom presentations have on student motivation. Including meaningful and unique classroom/lab experiences should strengthen student learning by maintaining adequate motivation levels.

Advanced Organizers

When beginning a new instructional unit, outlining certain underlying principles or steps can help produce meaningful permanent learning. Teachers should present a fairly general introduction to a specific unit before providing detailed information. Advanced organizers, which function as mediating links, will provide students with some cognitive structure to aid them in learning particular pieces of information. Fertilizing greenhouse crops is a typical unit of study in an introductory horticulture program. Utilizing the concept of advanced organizers, the horticulture instructor could develop an outline or list of questions that summarizes the detailed content. This outline could assist students in structuring of the technical information that will be provided during the next several weeks of instruction. Figure 1 depicts an example of one such outline that could be an advanced organizer. Helping students organize and categorize incoming facts and information should result in better retention and comprehension throughout an instructional unit.

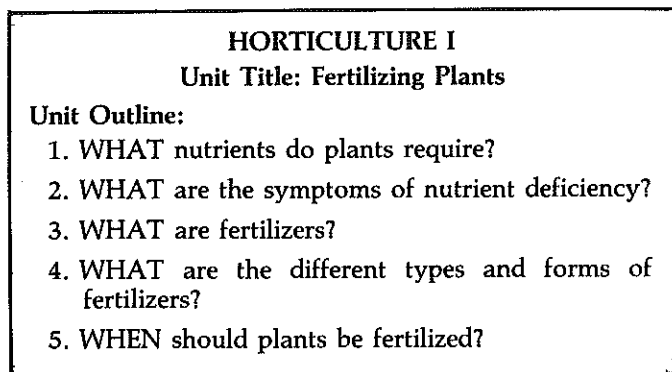


Figure 1: Materials to be covered in a unit.

Figure 1

A brief summary of the material to be covered during a unit of study can assist students in structuring the more detailed and technical information that will follow.

Discovery Learning

Discovery learning provides opportunities for intuitive thinking in classroom situations. This method of learning presents units of instruction "not as a set of knowns, but as a set of unknowns." Discovery learning may be more appropriate for older students who are more likely to have the ability to deal with the abstract. Four techniques are used for encouraging discovery and critical thinking when presenting new units or topics. These include: a) emphasizing contrast, b) stimulating informed guessing, c) encouraging participation, and d) stimulating awareness.

Fertilizing field crops is a unit of instruction that could readily be adapted to the discovery learning process. The vocational agriculture teacher could compare and contrast the nutritional needs of man with those of plants. Both groups need certain essential elements for growth, but utilize different methods of obtaining these nutrients. Asking students to hypothesize how plants obtain needed minerals and then showing a filmstrip to illustrate how the plants actually do obtain the nutrients will stimulate informed guessing. Experiments that determine the optimum levels of nutrient balance can encourage student participation in the unit and also stimulate awareness by having students analyze the experimental results. The discovery method of learning can help to encourage and promote critical thinking and problem solving in the classroom.

Summary

A basic understanding of educational psychology should not be optional for the conscientious vocational agriculture teacher. Implementing the various theories and principles can result in one of the main objectives of educational instruction: To create a classroom environment that stimulates learning and allows for optimum student growth.

RESOURCES

The increasing prison population and the focus on the importance of providing education programs for inmates have combined to offer postsecondary vocational-technical institutions an opportunity to expand their role by establishing and expanding postsecondary vocational education programs in correctional institutions.

Colleges With Fences: A Handbook For Improving Corrections Education Programs was developed to help correctional educators carry out effective

postsecondary vocational programs in prisons. This new publication, by Brian E. Simms, Joanne Farley, and John F. Littlefield, addresses three major educational issues: postsecondary correctional vocational education environment, delivery, and evaluation. These areas and related concerns central to the development of the implementation strategies included in this handbook.

Order *Colleges With Fences: A Handbook For Improving Corrections Educa-*

tion Programs (RD 266—\$8.75), 82 pp., 1987, from the National Center for Research in Vocational Education, The Ohio State University, Publications Office, Box N, 1960 Kenny Road, Columbus, Ohio 43210-1090; or call toll free 1-800-848-4815 or 614-486-3655 inside Ohio and outside the continental United States.

The development of this publication was sponsored by the Office of Vocational and Adult Education, U.S. Department of Education.

How Technical and Academic Courses Compare

Are agriculture classes offered as technical courses equivalent to those offered as academic courses in junior colleges? Agricultural educators, employers, certification agencies, and others frequently ponder this question. They wonder if technical courses are offered with the same standards as academic courses. The instructors of technical courses often comment that they are; others say they are not.

Students want quality instruction. They want to enroll in postsecondary programs that do not excessively limit their future alternatives. In some cases, they want to take technical courses that can be transferred as academic courses to a university. In others, they want to enter work with the assurance that they have received a quality education in technical agriculture.

One approach in answering the question is to investigate the equivalency of the courses by studying the perceptions of individuals who have completed them. This article summarizes a research project conducted at Mississippi State University to investigate the perceived equivalency of courses taught in the public junior colleges of Mississippi. The research addressed course quality and final grades received by students.

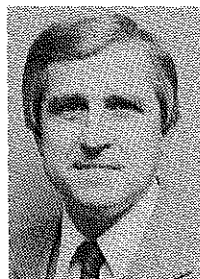
Background

There are eleven junior colleges in Mississippi that offer agriculture courses. Some of these courses are academic; others are technical. Most of the junior colleges offer both technical and academic courses. Students frequently enroll with the intent of later transferring to a university to pursue baccalaureate studies. Of course, the technical courses are offered by the junior colleges specifically to prepare for occupational entry.

Four courses are most commonly offered by the junior colleges in the technical and academic program. These are introductory courses in animal science, plant science, agricultural economics, and soils. The syllabi for the technical and academic courses tend to be very similar. In a few cases, academic and technical courses are cross-listed so that students in both programs may be in the same class. Further, Mississippi State University offers four courses which are very similar and of similar titles. The junior college courses are often transferred as equivalent to the university courses.

Procedure

The study involved surveying 167 seniors in agriculture majors at Mississippi State University and separating out those who had attended a junior college. Fifty-three students indicated that they had attended a junior college, with 51 having taken courses in agriculture. Four introductory agriculture courses were investigated: animal science, plant science, agricultural economics, and soil science.



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A survey instrument was used to assess educational demographic characteristics and information about course quality, with the latter being done with seven attitudinal constructs and a five-point rating scale. The instrument was reviewed by a panel of experts and field tested prior to the survey.

Findings

Of the 51 respondents who had taken agriculture courses in a junior college, 17 (33.3%) had taken one or more courses as technical courses. More had taken the introductory animal science course for technical credit than any other course. The findings with regard to the four courses are presented here.

Introductory Animal Science Course

Thirty-three of the students had taken the introductory animal science course in a junior college. Of these, 14 (42.4%) had taken it for technical credit. The overall rating on the attitudinal constructs was 3.35 for those who took the course as a technical course and 4.11 for those who took it as an academic course. Thus, students who took the course for academic credit rated it significantly higher than the students who took it for technical credit ($t = -2.66$, $p = .013$).

Students who took it as a technical course had a mean final grade of 3.50 (4 point grade system, with A = 4, B = 3, C = 2, D = 1, and F = 0), while those who took it as an academic course had a mean grade of 3.88. In other words, those who took it as an academic course had significantly higher grades ($t = -2.49$; $p = .019$).

Introductory Plant Science Course

The number of students who had taken plant science as a technical course was too small for meaningful comparisons (four of 34 students). However, the tendency was for the students who had it as a technical course to rate it higher but receive lower final grades than those who had it as an academic course.

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How Technical and Academic Courses Compare

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Introductory Agricultural Economics Course

Twenty-eight respondents had taken the introductory agricultural economics course in a junior college. Of these, 9 (32.1%) had taken it as a technical course. Those who took it as an academic course rated the course only slightly higher than those who took it as a technical course (4.03 for academic as compared to 3.97 for technical).

When final grades were assessed, those who took the course for academic credit received slightly lower final grades (3.47 grade average for academic as compared to 3.56 for technical). The difference in final grades was inconsequential.

Introductory Soil Science Course

Of the 39 respondents who took soil science in a junior college, nine (23.1%) took it as a technical course. The overall rating on the attitudinal constructs was 3.97 for those who had taken it as a technical course and 4.04 for those who had taken it as an academic course. There was no significant difference in the attitudinal ratings.

Students who took the soil science course as an academic course had a grade average of 3.50, while those who took it as a technical course had a grade average of 3.25. No significant difference existed.

Summary

Overall, the study reported here did not find academic introductory agriculture courses to be of significantly higher quality than technical courses as perceived by students, except for the animal science course. The overall rating for all four courses was 3.73 for technical courses and 4.01 for academic courses.

When grades were considered, the overall grade point average for the four courses was 3.46 for those who took them for technical credit and 3.71 for those who took them for academic credit.

Students in academic courses tended to rate their courses of higher quality and received higher grades.

The quality and grade differentials are not easily explained. Perhaps academic courses have higher standards and are taught by instructors who are more skilled. On the other hand, students entering the technical programs may not be as well qualified for postsecondary study as those entering the academic programs. Another source of the differences may be the level of expectation held for the courses by the students and the teachers. Could it be that both teachers and students have lower expectancy for the technical courses? The answers must come through additional research.

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ARTICLE

Opening Up Opportunities For Vocational Agriculture Professionals

The vocational agriculture profession is interesting, challenging, and rewarding. It is interesting because there are always new things to learn from its practice. Newly graduated entry-year teachers quickly learn that things are not as clear-cut as they were presented in their college classrooms. They learn from their environment as well as from experiences of their peers and those of teachers far along in the profession.

The challenge of the profession comes from the huge responsibility of molding the minds and characters of our future leaders. The vocational agriculture teacher also faces other challenges. Among these are changes in the profession because of the impact of technology, changes in curriculum, and changes from legislation. However, rewards come when one's students graduate and go on to better things. Rewards also come from parents, peers, and the administration's commendation on how well one's program is progressing.

While most vocational agriculture professionals have found the profession rewarding, others have remained



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stagnated. For the latter, the profession has either failed them, or as some of my colleagues would prefer to put it, they have failed the profession. Objectively, our profession has a lot to offer anyone who dares to venture into it. The profession offers a chance for progress and self-fulfillment. However, the profession can do much more. The logical question, then, "Is it wise for our profession to integrate its knowledge base so as to afford for greater opportunities for students who have chosen this field?"

Collaboration

As we move into an era of inter-disciplinary approaches in problem-solving and the ever compelling information age, how prepared is the vocational agriculture profession? Most in the field would affirmatively say we are prepared and up to the task. We are ready to offer the best that we have to our students and the profession. We are ready for the change that may occur due to the impact of computers and other information and teaching gadgets. However, others in the field may have little reservation about such thoughts. They may wish to find out how prepared is our profession. Are we all ready to accept the inevitable changes to all professions, including ours, by the impact of computers?

Surely, some in the profession are far along in the use of computers, in preparing lecture materials, grading papers, delivering lectures and performing their everyday functions. However, some are far behind and may have been lost by the introduction of computers to our profession and life. How can we make sure that other ambitious students coming into the field do not fall by the wayside due to the impact of an area of knowledge that has not been part of the curriculum in training as a vocational agriculture professional? The logical answer is the need for an inter-disciplinary curriculum for vocational agriculture training rather than the over-specialized curriculum used in training our entry-year professionals. Other areas of knowledge should be adapted into the curriculum that all colleges use in graduating their entry-year teachers.

The introduction of other bodies of knowledge into our field can contribute to the advancement of the profession. We should focus our attention on those prospective students with background knowledge considered unrelated to vocational agriculture. Majors of computer science, history, and biotechnology should be encouraged to obtain their advanced degrees in agricultural education or extension education. The coming together of knowledge at an advanced stage will obviously transform the vocational agriculture field. However, it will afford our profession to keep abreast of the innovations in other disciplines that may be influencing our profession in the future, just the way computer science is now doing. The net result is a better prepared vocational agriculture teacher and a broad-based knowledgeable professional who can take advantage of other opportunities open in the market place.

Commitment

At this point, we can safely agree that most in vocational agriculture are committed wholesomely to the profession. Some colleagues have even given more to the field than they may expect out of it. This commitment is what makes everyone connected with the profession proud. However, how readily acceptable are we to the idea of integrating our knowledge base with other bodies of knowledge? Is the fear of losing the identity that has been so much a part of being a vocational agriculture teacher and a distinguished professional not there? Assuming we succumb to the idea of integrating the vocational agriculture curriculum to combat the fear of constant influence by other bodies of knowledge, to what degree would we accept the integration?

As other bodies of knowledge influence our profession,

ours also influences others. There certainly cannot be a total eclipse of a fine profession as ours. The discipline of vocational agriculture has not only made its mark, but it has created a target for other disciplines to match. The advocacy for integrating our body of knowledge is to afford for dynamism in our field. Apart from the fact that the idea would open other doors of employment for vocational agriculture professionals, it is a prudent decision in light of the trend towards a multi-disciplinary approach in problem-solving.

Let us take the current field of computer science and its impact on vocational agriculture. Most university faculties of agriculture have invested a lot of money in installing microcomputers for use by students and faculty. The microcomputers are constantly being used by vocational agriculture faculty members for the betterment of the field. Students are encouraged to learn more about microcomputers to help their learning process. Research has also indicated that the majority of the leaders in vocational agriculture in our secondary schools have included computer literacy as part of preparation for advanced study in the universities (Sutphin, H.D. and Newcomb, L.H., 1983).

Why is someone not doing the same for biotechnology, mathematics, history, etc.? Is anything wrong with having a grounded knowledge of history, advancements, and developments in vocational agriculture? We can assume that as time goes on, we will be having curriculum that features how a knowledge base in computer education has revolutionized vocational agriculture. If the last assumption is possible, why wouldn't the same happen for biotechnology or mathematics?

The Challenge

The challenge before vocational agriculture teachers and professionals is the need to forge a curriculum that takes cognizance of multidisciplinary and inter-disciplinary approaches to problem-solving. Teachers of vocational agriculture in the future are likely to see an array of demands on them that will require a knowledge base not only in agriculture but also in other disciplines. Acquisition of skills in the use of computers for instructional purposes is evident. It has even been reiterated that unless teachers identify appropriate strategies to use computers in the classroom, laboratory, and at the work sites of students on supervised occupational experience programs, they may find themselves short in performance (McCracken, 1983).

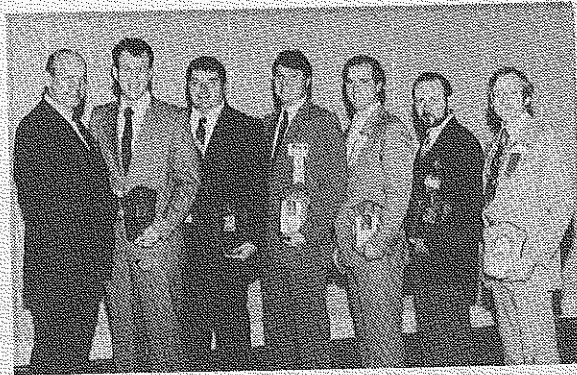
Our profession must accommodate the idea of an inter-disciplinary approach in solving societal problems. There is change out there. We must join the innovators and always be in the forefront of change that will be beneficial to our profession.

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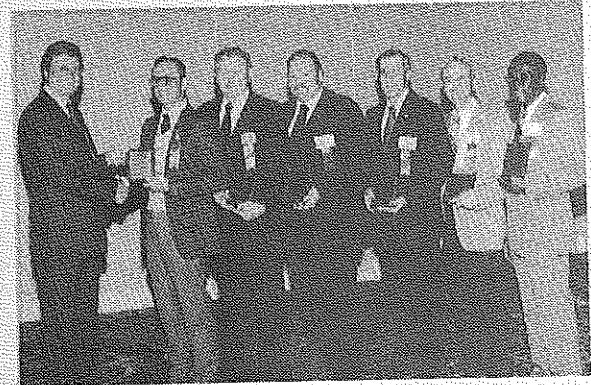
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NVATA OUTSTANDING VOCATIONAL AGRICULTURE TEACHER AWARD

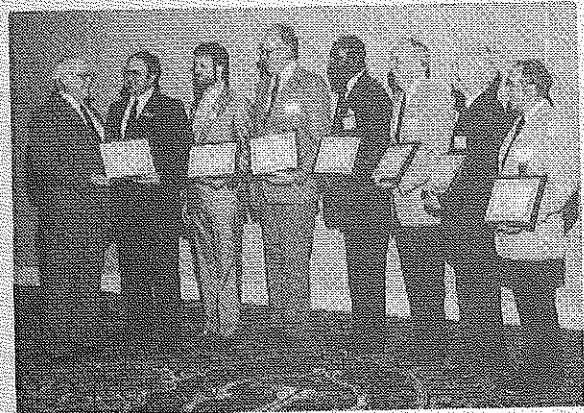
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Left to right: Ralph Thomas, NVATA President, Woodward, OK; Jerry Dennis, Granite, OK, accepted the award for Leonard Hunter, Vocational Agriculture Teacher-Retired, Kingfisher, OK; Brad Greiman, Algona IA, accepted the award for Marshall Grosscup, Vocational Agriculture Teacher-Retired, Jesup, IA; John W. Elliot, Supervisor, Grange Insurance, Cheney, WA; Nelson J. Senter, Vocational Agriculture Teacher-Retired, Nashville, TN; Paul E. Hemp, Teacher Educator-Agriculture, University of Illinois, Champaign, IL; G. Donavon Coil, Supervisor-Agricultural Education-Retired, Tolona, IL; Robert Meredith, Vocational Agriculture Teacher-Retired, Shoshoni, WY.