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THEME: SOE For The Future

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Table of Contents

	Page
EDITOR'S PAGE	
Supervised Experience	Phillip R. Zurbrick 3
THEME: SOE For The Future	
Supervised Experiences in Agriculture	Gary E. Briers 5
Supervised Experience: The Success Story Continues	David L. Doerfert, Jack Elliot, Harry N. Boone 6
Is SOE Destined to Become A Dinosaur?	Douglas A. Pals 8
Experiential Needs of Students in Agricultural Programs ..	Floyd G. McCormick, David E. Cox, Glen M. Miller 10
Supervised Practice in the Science of Agriculture	J. David McCracken, Edward F. Darrow 12
Production Experience Program: A New Look For the Future	Richard J. Norris, Jack Harrington 15
Linking Technology to SOE ..	Terry E. Queen, Maynard J. Iverson 18
Agricultural Proficiency Program	Kim Balfe 20
FEATURE COLUMNS	
Computer Technology Resources	W. Wade Miller 4
Book Review	David L. Howell 17
The Software Sampler	Kerry S. Odell 21
STORIES IN PICTURES	24

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Supervised Experience

Based upon a quick perusal of this month's theme articles, several conclusions about supervised experience as practiced in agricultural education can be drawn. It appears that the profession has generally accepted a formal definition of supervised occupational experience (SOE) as indicated by the citation of several authors of the definition used by Phipps. On the other hand, there is a great deal of confusion as to the definition of supervised agricultural experience (SAE). Some authors use the two terms interchangeably, while others put forth a convincing argument that the two (SOE and SAE) are not the same.

Another conclusion that might be drawn from the theme articles is that we have a very different operational definition of SOE around the country. Rather than spending time coining new terms for supervised experience programs, the profession would appear to be better served by spending some time agreeing upon the operational definition of supervised occupational experience and supervised agricultural experience.

There does appear to be agreement on the concept of supervision and experience being crucial parts of the experiential learning concept as employed in agricultural education. Thus, the title of this column used the two words on which we seem to agree with the hope that the profession can work towards an understanding of and an appropriate use of both SOE and SAE.

The editorial stance of *The Agricultural Education Magazine*, at this point in time, is that SOE and SAE are not the same and should not be used interchangeably. Thus, the theme articles were edited to eliminate that concept and where there was confusion as to which type of experience the author was describing, the phrase "supervised experience" was inserted.

The concept of Supervised Occupational Experience (SOE) seems to have many different operational definitions with obvious differences between states and regions of the country. Some still equate SOE to "home projects" and/or "supervised farming programs!" Others have accepted the definition in a literal sense and use it to encompass ownership and placement experience so long as the experience involves development of agricultural knowledge, skill and/or attitudes of an occupation orientation. The difficulty with the broadened operational definition of SOE is that too often tradition and convenience are allowed to narrow the perception of what might be an acceptable supervised experience. Taken literally, the operational definition of SOE is limitless as long as it involves some facet of agriculture and has an occupational orientation. Such a broad operational definition allows for adaptability and creativity in developing an individually designed and planned supervised experience program.

Those who have not blindly accepted supervised agricultural experience (SAE) as a new name for supervised occupa-



BY PHILLIP R. ZURBRICK, EDITOR

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tional experience will argue long and vehemently that the two experiences are not the same. The operational definition of SAE encompasses any experience of an agricultural nature, be they of a general nature; an academic nature; or of an occupational nature. Thus, SAE encompasses all those experiences appropriately classified as SOE plus a great deal more. Therein lies the concern for using supervised agricultural experiences in an educational program with a vocational purpose. It is possible for a student to complete a four-year vocational agriculture program without having an experiential experience of an occupational nature in agriculture. Students could select supervised agricultural experience of an academic or general nature and not have any occupational experience. Students could do individual research on an agricultural topic, as an example. This could involve going to the library and preparing a written report on biotechnology. Further, students might interview a professor of molecular biology and finally prepare a science fair project on biotechnology in agriculture. While all of these activities are commendable and perhaps "cutting edge", they do little to develop occupational competence, work ethic or enhance the individual's employability in agriculture. The old saying of there being a big difference between reading about something and doing it would seem appropriate in this scenario.

Rather than engaging in a protracted, academic discussion on whether we should use SOE or SAE, I would hope that the profession would have the wisdom to use both types of supervised experiences in agricultural education. The profession needs to recognize that the two experiences are, in fact, different and that each has a place in the concept of

(Continued on page 7)

About the Cover

Students have collected and will identify organisms, egg masses and insects from the ecology of a marsh. These samples will be placed in an aquarium so the identification can be verified as the living material goes through later life cycles. Students are also testing the soil of the marsh. (Photo taken at Harry E. Tolles Technical Center in Plain City, Ohio by Rosemarie Rosetti.)

Computer Technology Resources

The Colors of Agriculture

Ask someone which color comes to their mind first when they think of agriculture and they will probably answer green. I can appreciate green — it is the color of growing foliage — but many more colors can also be symbolic. What about golden grain, roan colored horses, red beef cattle, white sheep, orange oranges and yellow sunflowers?

What does all of this have to do with computer resources? Let me explain! Turn on that computer you have over in the corner of your classroom. Is the monitor screen green? Now "boot-up" your favorite computer program. Chances are you are looking at more shades of green. Get the message? Green can become rather boring. Some of you have noticed this phenomenon and have converted over to color. Your computer can display animals, plants, and machinery in color. You may also be able to display text in your favorite color and set the screen color as well. Students will find that computer programs, especially those with illustrations, are more interesting in color.

If color is better than monochrome green or grey, then why are there so many monochrome monitors? Color monitors have always been more expensive than monochrome monitors. Also, until recently, color monitors were not very good at displaying 80-column text. The letters and numbers were blurry and the screen seemed to glare at you. Color monitors have improved over the last few years and prices have dropped as well. If you have not considered a color monitor for awhile, it may be time to reconsider. If you are purchasing a new computer system you may want to order one that has a color monitor instead of green, amber, or grey monochrome.

Adding a color monitor to your computer seems easy. First, you secure the funds and second, you buy a color monitor and plug it in. Unfortunately, it is more difficult than that. With a little checking, you will find that there are many brands and types of color monitors. You will also find that connecting a color monitor to a computer is not as easy as connecting a monochrome monitor. I will address some of the points to consider in selecting and connecting a color monitor to two popular makes of computers: the Apple IIe series and the MS-DOS computer.

Selecting a monitor for an Apple IIe is relatively easy. There are two basic types of monitors that can be connected to an Apple computer. One of these is known as a "composite" color monitor. This type of monitor is very similar to a regular color television set. In fact, one could connect a color television to an Apple, but I would not recommend it. The color is fuzzy and the glare is atrocious, but the biggest problem is that 80-column text is almost illegible. Composite color monitors designed for computers are somewhat better than color television sets. The second type of monitor is known as RGB (Red-Green-Blue). It is more expensive, but it is well worth it. The color is better and 80-column



BY W. WADE MILLER, SPECIAL EDITOR
(Dr. Miller is Associate Professor, Department of Agricultural Education, Iowa State University.)

text is much more legible. A RGB monitor also requires a "RGB card" to connect it to the computer. If you purchase an Apple IIGS computer, the RGB feature is built into the machine.

There are a number of manufacturers of RGB monitors and cards. From past experience, I feel it is best to see a monitor in use before purchasing one. I suggest that you visit your local computer store for a demonstration. It is also a very good idea to visit nearby schools with color monitors to see what they purchased.

Once you find a monitor you like, ask to see the RGB card so that you can order the same one. Selection of an RGB card for an Apple IIe is especially important. If you use AppleWorks, chances are that you also have an expanded memory card. Many expanded memory cards replace the 80-column display card and must be installed in slot-O of the Apple. Many RGB cards also replace the 80-column card and must also be installed in slot-O. Some manufacturers make RGB "piggy-back" cards that can be added to their expanded memory card. Some RGB cards can be installed in one of the other slots. You will need to open the case of your computer and take inventory before ordering an RGB card.

The most popular computer in the business world is the MS-DOS machine manufactured by IBM and many other companies. A majority of IBM and IBM-compatible owners use color monitors instead of monochrome. Some software even requires the use of color graphics boards and color monitors. Since IBM introduced its first personal computer there have been many changes and improvements in the design of MS-DOS machines. The problem is that there is no one standard for color graphics boards. If you have an IBM computer or compatible you will need to determine which color graphics standards for MS-DOS machines: CGA, EGA, and VGA. The primary differences lie in resolution (stated in terms of the number of dots that a monitor can display) and the number of colors that can be displayed simultaneously from a palette of colors.

The Color Graphics Adapter (CGA) standard was released by IBM in 1981. CGA can display a maximum of four

(Continued on page 23)

Supervised Experiences in Agriculture

SFP, SOE, SOEP, SAE, SAEP — To some who have been around awhile or who are well-versed in American History, this “alphabet soup” may look like the New Deal of FDR’s presidency. To others, however, we recognize the letters as acronyms for a component of instruction in agriculture — the “applied” component or “vocational” component some would contend. The theme for this issue deals with the “supervised experience” part of agricultural education. And I’ve assumed that my role as theme editor is simply to present what the profession knows, believes, or practices in the area of “supervised experience.”

As we have discovered and are continuing to find, change in our profession, in our programs, and yes, in our terminology is inevitable. Yet much of what we do is fundamental enough that it does not change — or, at least we have held onto it to date. For example, we cling to the belief—the foundation — that leadership development is critical to students’ education in agriculture. Similarly, experiential education — learning by doing — is the way our students learn best. And this last statement “gets to” the core in terms of why we have a “supervised experience” component. Simply, it is because we believe in several theories about learning and about motivation to learn that support active involvement or direct experience is causing learning. Further, we have institutionalized our belief in direct experience as a method of learning. This institutionalization manifests itself for example in the form of teacher, employer, or parent supervision of the experience and in the requirement that the experience be related to an occupation in agriculture.

On the other hand, even our institutions change — from boarding school, cooperative projects in production agriculture to home-based, individual projects in production agriculture to off-farm, cooperative education in agribusiness occupations. One might argue that some of the changes are cyclic. My observation has been that school-based, cooperative projects among students are making a comeback!

At least two explanations for changes in supervised experience over the years can be offered: 1) changes in **agriculture** and opportunities in agricultural occupations have demanded changes in the kinds of agricultural experiences; and 2) changes in public education have led to changes in the methods of providing agricultural experiences. Surely, one would agree that the change in occupational opportunities in agriculture from production to off-farm has demanded that students be provided experiences in off-farm experiences. In the same vein, change from boarding schools to neighborhood schools allowed a shift from school-based to home-based experiences.

These two examples of change in the past in the kinds of and methods of providing supervised experiences in agriculture are merely prelude to changes that apparently are occurring now in supervised experiences in agriculture. Nevertheless, I would argue that current changes are driven by the same two factors — changes in agriculture (or, more precisely, what kinds of information and abilities are ex-



By GARY E. BRIERS, THEME EDITOR

(Dr. Briers is Associate Professor, Department of Agricultural Education, Texas A & M University.)

pected by agricultural employers of potential employees) and changes in public education (again, more specifically, what kinds of “basic skills” are expected of students).

I contend that prospective employers in agriculture expect a “general education” in agriculture rather than specific job skills. In other words, vocational education in agriculture should become more general in nature and emphasize fundamental, scientific knowledge of agriculture and “transferable” skills such as ability to communicate and ability to get along with fellow employees. So, as the “whole” of vocational education in agriculture becomes more fundamental and transferable and less job specific, supervised experiences in agriculture might follow suit.

I contend further that the “back-to-the-basics” movement in education is not necessarily a return to readin’, writin’, and rithmetic. The movement should be an urge to emphasize fundamental knowledge and those skills that are transferable to many occupations. And, perhaps the “generalization” of secondary-level vocational education in agriculture is a response to the increase in post-secondary education in a multitude of forms — community college, university, technical school, in-service education, retraining, adult education, proprietary schools, apprenticeships, company-sponsored training programs, etc.

The bottom line — as I see it — is that supervised experience in agriculture is as important as it has ever been in education in agriculture. But just as agriculture has grown and expanded (to include genetic engineering and biotechnology and floral design as well as corn and cow production and farm construction and . . .), so must supervised occupational experience in agriculture expand (to include exploratory experiences and vicarious experiences and simulation as well as farming projects and off-farm employment and . . .).

No, we in agricultural education cannot be all things to all people. But we can be and are more than we have identified ourselves as being: we are more than vocational educators in agriculture (and probably always have been) and supervised experiences in agriculture are more than SOE (and always have been). Let’s recognize the “continuum” of experience promulgated by Edgar Dale in his “cone of experience.” Call them what you will — SFP, SOE, SAE; let the theme articles in this issue expand our view and continue our debate about supervised experiences in agriculture.

Supervised Experience: The Success Story Continues . . .

What's in a name? Do semantics dictate the success of a practice? What characterizes the true success of a supervised agricultural experience?

Based on the history of supervised experience, the frequent name changes suggest drastic differences since the inception of the concept. Home project, supervised practice, farming programs, supervised occupational experience, and now supervised agricultural experience are a few of the descriptors that have served in the past eighty-one years as labels for supervised experiences (Table 1).

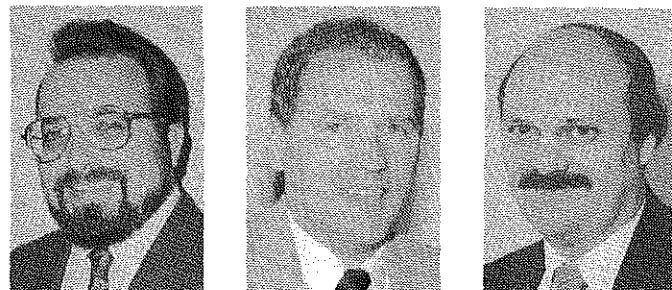


Table 1

Names Used to Describe Supervised Experiences

Named Used	Year First Used
Home Projects	1908
Supervised Practice	1928
Farming Programs	1944
Farming Programs and Occupational Experience	1963
Supervised Practice, Including Work Experience	1966
Supervised Occupational Experience	1967
Supervised Occupational Experience Programs	1979
Supervised Agricultural Experience	1988

It appears that agricultural education has been preoccupied with the name that represents the concept of supervised practice. However, the actual process is more important than the name assigned to it.

In the Beginning

The concept of "home-projects" was conceived in Massachusetts in the early 1900's. Due to the influence of people like Stimson, Prosser, and Snedden, the concept was incorporated into the Smith-Hughes Act of 1917 (Boone, Doerfert & Elliot, 1987). In 1928, agricultural agents of the Federal Board in Washington drafted "Some Characteristics of Desirable Program of Supervised Practice Work" (Maltby, 1929). The twelve characteristics included plans which detailed the objectives of the experience, maintenance and interpretation of accurate records, the establishment of a new plan for the ensuing year, supervision of student's projects, and participation of students, teachers and parents. Maltby (1929), a Southern Regional agricultural education agent, elaborated on the twelve characteristics and concluded with the following challenge to vocational agriculture workers: "Set a standard of performance for our agricultural pupils both in terms of their **ability to think** and their **ability to perform**; secondly, set a **higher standard** for our participation" (p. 4).

Phipps (1980) defined supervised occupational experience as follows: "Consists of all practical and functional activities of educational values conducted by pupils outside the class for which systematic instruction and supervision are provided by the vocational agriculture teacher, parents,

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employers, and others" (p. 199). In this definition, as in the characteristics outlined in 1928, lies the heart and soul of the concept of supervised experience.

Supervised experiences provide students the opportunities to apply technical information received through classroom instruction. Originally, supervised experiences consisted of farming activities, which provided farm boys appropriate skills for the occupation of farming. Since the early 60's, activities have expanded to include non-farm experiences and greater participation of females in high school agriculture programs. However, the heart and the soul of supervised experience remained throughout these changes — planned instruction, supervision, record keeping and the involvement of others.

Through the years, this heart has grown sluggish and the spirit has weakened. Researchers revealed a decline in the number of students involved in supervised experiences (Iverson, 1980; Berkey & Sutphin, 1983; Arrington & Price, 1983; Harris, 1983). Other findings indicate that agricultural instructors failed to regularly supervise students with planned experiences (Miller, 1980; Berkey & Sutphin, 1983; Arrington & Price, 1983).

What is the status of supervised experience today? The National Research Council in their report *Understanding Agriculture: New Directions for Education* (1988) reported characteristics of high quality SOEs: involved teachers, planned experiences, adequate resources, and student placement in agribusinesses or commercial farms. Do these characteristics sound familiar?

Standards, developed more than sixty years ago, remain the basic components which are important to the continued use of supervised experience in agricultural education. Developing annual plans for supervised experiences ensure that learning activities are conducted by design, not by

chance. Skills such as record keeping and interpretation promote the development of an appreciation for earning. Yet, the most important standard lies with the teacher and not the student.

SUPERvision is the Key

Excessive paperwork, excessive number of students, and students without farm backgrounds were found to discourage instructors in West Virginia from implementing SOE programs (Lee, 1985). The quality time necessary to supervise students' SOEs would appear to require a superhuman effort on the part of the instructor. When push comes to shove in an instructor's time schedule, it is easy to say "I'll visit each student once, that should be enough." Though this may ease the burden on the teacher, what is the effect on the student — does learning occur?

The key to successful supervised experiences is the word supervised, or should one say SUPERvised? If supervised experience is to be an extension of the classroom experience, the teacher must be involved; not as a casual observer, but rather as a classroom instructor. As in the classroom, supervised experience requires careful planning and execution if learning is to occur. Agricultural educators must rededicate their time and efforts to provide the type of quality supervision needed for successful SUPERvised experiences.

New Directions for Supervised Experiences

The fact remains that future education programs will include predominantly non-farm students in semester courses. Furthermore, today's agriculture is different than the agriculture of Maltby's era. Future supervised experiences must reflect the changes in agriculture and address the needs of today's students, schools, and society.

The National Research Council (1988) provided some food for thought when suggesting the new directions that supervised experiences should take. These thoughts included supervised experiences of less than four years in length and activities in non-traditional settings such as:

- greater use of school laboratories (greenhouses, biotechnology laboratories, forests, shops, land, etc.). School districts will need to provide financing and a process for after school and summer supervision and access to such facilities.
- volunteer activities with Boy and Girl Scouts, 4-H, Junior Achievement, Retirement Centers, Junior Granges, handicapped organizations, etc.
- research activities and scientific experiments. This could lead to participation in science fairs.
- work experience activities with agricultural research and development laboratories.

One needs only to look to the past and utilize other ideas for new directions. Group supervised experiences, incor-

porated in Kentucky sixty years ago, serve as such an example (Burd, 1929). Readoption of this technique allows for the effective use of teacher's time. The absence of the word "individual" in all previous names for supervised experience reiterates the notion that a supervised experience can include more than one individual.

One must question whether these non-traditional experiences are worthy of being classified as quality and effective supervised experience programs. Are they planned instruction? Are they supervised? Are records kept? Are others involved? The answer can be yes to all of the preceding questions. Yes, supervised experience will be different in the future; but aren't the students different, and isn't agriculture changing?

One must not neglect the past when considering and/or adopting new changes for supervised experiences. Through numerous name changes and the inclusion of new types of experiences (esp. since the 1963 Vocational Act), certain characteristics of successful supervised experiences have remained the same: planned instruction, record keeping, involvement of others, and especially quality supervision by the instructor. Supervised experience: the success story continues . . .

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Supervised Experience (Continued from page 3)

a broadened mission for agricultural education at the secondary school level. Surely, the logic of using SAE in the "about agriculture" courses designed to develop understanding and appreciation is sound and should be an approved

practice. On the other hand, it is educationally astute to use supervised occupational experience (SOE) for the "in-agriculture" program. Agricultural education has need to use both SOE and SAE, but they need to be clearly delineated and appropriately used as we move towards making agricultural education more than vocational agriculture.

Is SOE Destined To Become a Dinosaur?

Has one of the most recognized methods of teaching in vocational education become one of the most vulnerable? Since the Smith-Hughes Act of 1917, the supervised experience (SOE) program, has been described by agricultural educators as an essential component of the secondary agriculture program. Harris and Newcomb (1983) wrote, "Vocational agriculture has undergone many changes through the years but its advocates have always maintained that the concept of learning by doing is central to the program."

However, in the late seventies and early eighties, there was concern that SOE may have failed to adapt to the needs of students and employers. Bindley (1977), after touring vocational agriculture programs in 12 states, expressed concern about the quality of SOE programs. Miller (1987) wrote: "We have changed the names of SOE over the years from home project to SFP to supervised practices to 'SOE' but for far too many, SOE has remained a home project . . ."

Miller continued, "We have failed to keep up with the times as far as SOE is concerned."

A number of studies have confirmed that SOE programs are not being fully implemented into the agriculture curriculum (Iverson and Brown 1979; Leising 1982; Dunham and Long 1984; Zurbrick 1984).

Does all of this indicate that the learning by doing concept (SOE or SAE) is following the path of the dinosaur. Is the program that agricultural educators called an inseparable component of the secondary agriculture program now finding it tough to survive?

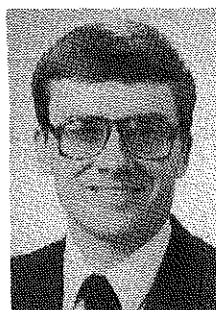
Saving the Dinosaur

In the eighties there have been many attempts to preserve the supervised agricultural experience program as a vital component of secondary agriculture programs. The two national workshops on SOE in 1982 and 1984, the numerous research studies and state and local efforts to improve the SOE programs have been instrumental in documenting the benefits of the SOE program to students. Those who are directly involved in the SOE program can best attest to its value — specifically students, secondary agriculture teachers, parents and employers.

Students and the Value of SOE

Williams (1979) found that "SOE programs were beneficial to students, not only in the development of knowledge and skills, but also in the development of desirable occupational and educational attitudes and values." ZURBRICK (1984) stated that vocational agriculture students most often indicated responsibility when asked what experience and values they gained from conducting an SOE program.

Pals (1988) found that 749 vocational agriculture students in Idaho reported that the five highest benefits from SOE were:



BY DOUGLAS A. PALS

(Dr. Pals is Professor, Agricultural and Extension Education, University of Idaho.)

1. provided opportunity to learn on own
2. promoted acceptance of responsibility
3. developed independence
4. developed pride in ownership
5. learned to appreciate work

Students who participated in experience programs credit SOE in the following ways:

My skills that have been developed are basically working with people, both fellow employees and the public. The people skills that I have learned could not have been gained, experienced, or taught anywhere else.

The skills that I have learned are how to work with people, keeping proper records, and developing good work ethics which will assist me in my future plans.

Teachers and the Value of SOE

The teachers' perceived value of SOE can be best summed up by a description in a publication by the Center for Vocational and Technical Education (1965).

Educationally

The opportunity for first hand experience that exists in such programs makes for lasting and more complete learning. "Doing to learn" is the principle involved.

Economically

The opportunity to "earn and learn" through an SOE program . . .

Psychologically

1. Success builds self confidence.
2. Increased earning power enables a student to grow realistically toward independence.
3. A feeling of accomplishment is attained.

Socially

The cooperative efforts of school (teacher, employer, parent, and student provide the basis for a strong background in working with people.

Pals (1989) confirmed that Idaho secondary agriculture teachers rated the benefits of SOE similarly to the ones cited in the 1965 *Center for Vocational and Technical Education* publication. Teachers indicated SOE:

1. helped students learn extra things not taught in agriculture class
2. promoted acceptance of responsibility
3. provided opportunity to learn on own
4. provided opportunity to make decisions
5. provided individualized instruction

Parents and the Value of SOE

Rawls (1980) reported that parents thought students derived three major benefits from SOE: work attitudes, occupational development, and human relation skills. Pals (1989) found that 551 parents of vocational agriculture students in Idaho rated the following five SOE benefits highest:

1. promoted acceptance of responsibility
2. developed self-confidence
3. learn to work with others
4. provided opportunity to learn on own
5. developed independence

Parents with students participating in the SOE program have this to say:

The SOE program gave our boy a chance to learn, earn and excel in something other than sports.

SOE taught him the work ethic which I feel is one of the most important things that we can teach any young person.

Employers and the Value of SOE

Pals (1989) found that employers rated the SOE benefits to students similarly to parents except for their number one benefit:

1. helped earn money while in school
2. promoted acceptance of responsibility
3. developed self-confidence
4. developed independence
5. learned to work with others

One employer of a student participating in SOE said:

It is a great program to get young people to have hands on experience in helping them to decide if this is an area in which they are interested for a career.

Yes, students, secondary agricultural educators, parents and employers have documented the value of SOE and indicated that with proper management we can preserve it for years to come.

SOE Must Adapt

The fact that the dinosaur did not adapt ensured its extinction. If SOE is to survive it must adapt to the forces prevalent in our schools today. Secondary agriculture programs are changing their image. Agriscience and technology give students the opportunity to prepare for exciting careers in agriculture which will be available in the future. SOE programs must incorporate this new image into today's programs.

High school graduation requirements have limited student access to vocational agriculture curriculums. Secondary agriculture programs have become more flexible by offering semester and trimester agriculture courses. SOE programs will need to adapt to these flexible offerings.

The percentage of students from the farm has decreased steadily as farm sizes grew larger. It has become necessary to attract urban students to agriculture programs. Since 1969, the number of girls in agriculture classes has increased. For these reasons it is imperative that SOE become more relevant and adapt to the times.

Students must be allowed to complete short term agricultural experiences for their SOE requirement. Idaho teachers in 1988 adapted their record book to include a section to record agricultural-related competencies. Attempts are being made to incorporate this concept into the FFA awards program. The SOE program must become non-traditional if it is to survive.

Summary

No, Supervised Experience is not destined to become a dinosaur! Understanding the value of supervised experience, respecting the school environment, and effectively managing our resources will mean changes for supervised experience programs. We have made successful attempts to measure the value of the SOE program for students. The agricultural education community's efforts to help the SOE program survive will be successful.

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Experiential Needs of Students In Agriculture Programs

Students tend to learn more and better when they are actively involved. Like the old adage states: "Experience is the best teacher!" Research reveals the predominant learning style of vocational agriculture students involves "active participation" (Cox et al., 1988). Active participation on the part of students helps to reduce abstractness in learning new knowledges, skills and attitudes. In essence, experience is necessary and essential for permanent learning to occur.

Experience can be defined in a number of ways. For use in this article, experience is defined as "activity that includes training, observation of practice and personal participation" (Guralnik, 1982, p. 493). In reference to any teaching-learning process designed to change the behavior of the student, it is safe to assume any experience which will help to modify the behavior of an individual as intended by the facilitator of learning (teacher) is desirable and of value. Experience is an implied and explicit part of the learning process.

Therefore, experience should be considered as a valuable teaching tool to help students develop knowledges, skills and abilities. This is true since "a person is a sum total of his or her experiences!"

Types of Experiences

For use in this article, three types of experiences are highlighted: (1) those experiences of a general nature which every individual encounters at least once in a lifetime; (2) agricultural experiences which increases an individual's knowledge and appreciation of agriculture, broadly defined; and (3) occupational experiences which are specific experiences to assist students prepare for employment, including self employment, in a selected job, occupation or career.

General Experiences

Both positive and negative experiences contribute to the development of an individual. In all probability, we learn as much from negative experiences as we do from positive experiences. Touching a hot stove, stumbling and falling on a gravel road or being stung by a bee are all examples of negative experiences which can make a lasting and permanent impression upon an individual.

Experiences of a general nature occur to everyone and may be either planned or unplanned depending upon the circumstances. From an educational point of view, experiences of a positive nature are the ones usually planned and provided students so they may participate actively in events or activities.

General experiences make a vital contribution to the development of any individual. Whether positive or negative, they are an essential component in the behavior modification of all individuals. They provide an opportunity



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for active participation in events and activities which each and every individual encounters in life.

Agricultural Experiences

Experiences of an agricultural nature are more specific than those considered general experiences. Agricultural experiences are those experiences which pertain to or deal with some aspect of agriculture. These experiences could involve:

"the production of agricultural commodities, including food, fiber, wood products, horticultural crops and other plant and animal products . . . also included is the financing, processing, marketing and distribution of agricultural products; farm production supply and service industries; health, nutrition and food consumption; the use and conservation of land and water resources; development and maintenance of recreational resources; and related economic, sociological, political, environment and cultural characteristics of the food and fiber system" (Committee on Agricultural Education in Secondary Schools, 1988).

The actual degree of involvement in agricultural experience can vary from casual observation all the way to actual "hands-on" participation. The scope of agricultural experiences should depend, to a large extent, on students' needs, interests and career goals.

Agricultural experiences can be obtained from individual research reports; actual experimentation; observation and study of an agribusiness, a plant or an animal production unit; or experiences gained on school land - livestock laboratories, including greenhouses. In essence, Supervised Agricultural Experience (SAE) programs would be most appropriate for students involved in educational programs about agriculture.

Occupational Experiences in Agriculture

Occupational experiences encompass those experiences which are necessary or desirable from the standpoint of preparation for employment or self-employment in a particular occupation or occupational cluster. In the case of occupational experiences in agriculture, the experiences deemed appropriate would relate specifically to some area of agriculture and would result in the development of competencies necessary for employment or self-employment in that area of agriculture. When these experiences are planned and supervised by the teacher, employer, parent or others, they become Supervised Occupational Experience Programs in agriculture. They are characterized by being: (1) planned in terms of the student's occupational goal in agriculture; (2) directed at providing new experiences with educational value; (3) specific to agriculture; (4) occupationally-oriented; and (5) providing "learning by doing" experiences. Because education in agriculture programs are occupationally-oriented, Supervised Occupational Experience (SOE) programs are absolutely essential for students participating in this type of instructional program.

Experience and Learning

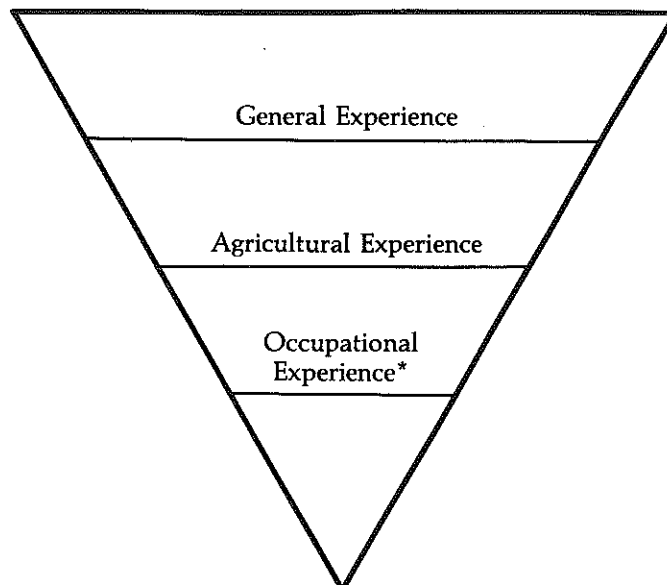
All three types of experiences discussed above impact the learning of individuals in both formal and non-formal settings. However, it is the intent and intensity of those experiences which govern the utility of such experiences. For example, students may participate in a variety of agricultural experiences to acquaint themselves with the breath of agriculture. The intent of this type of experience is not occupational in design and the intensity is not sufficient to develop occupational competence. The intent and intensity of the agricultural experience are sufficient for the student to develop an understanding and appreciation of the agricultural practices in which they participated.

By comparison, a student may work along side a mechanic in a tractor dealership to develop competencies in machinery assembling, repair, and adjustment. The activities in which the student participates are designed to become increasingly complex over time. The intent of this type of experience is to provide the student with the opportunity to develop competencies in critical facets of the occupation while the intensity of the experience is of such depth and duration to develop, to some degree, occupational competence.

In these examples, it is clear that experience is a common element, but the intent and intensity of the experiences along with the educational goal of the student determines if prescribed experiences should be classified as either agricultural or occupational in nature.

Summary

The hierarchy of experiences discussed in this article is illustrated below.



*Narrower and deeper than other two types of experiences in terms of subject matter and area of mastery.

In an educational setting, whether formal or non-formal, all three types of experiences referred to in this article should have teacher supervision. However, the degree of supervision is drastically different.

Agricultural experiences are those learning experiences of an agricultural nature used by a student who desires to gain an understanding and appreciation about agriculture in order to satisfy personal interests and needs. Teacher involvement is primarily one of planning the experience with supervision limited basically to evaluation.

Supervised occupational experiences are planned participatory learning activities and experiences supervised by the teacher whereby school and community resources are used to provide actual occupational experiences of a "hands-on nature" essential to develop and apply agricultural competencies associated with and directly related to students' occupational goals. These experiences are "occupationally-oriented" and can be gained either "in class/laboratory" or "outside of scheduled class time."

(Continued on page 23)

Supervised Practice in the Science of Agriculture

Many teachers of agriculture encourage their students to apply classroom instruction. The application of instruction has taken place in the school laboratory, the supervised occupational experience program, and through the FFA organization. An area of current emphasis is on teaching the science of agriculture. This emphasis makes sense because many biological and physical science principles find practical application in the field of agriculture. Students should be encouraged to practice, under the supervision of their teachers, the science of agriculture.

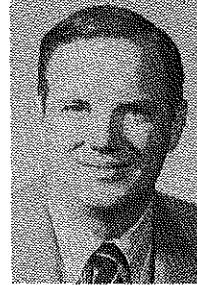
There are several compelling reasons for agriculture students to experience supervised practice in science relating to agriculture. Science literacy is important in society. Science and technology is having an increasing impact in the workplace, the home, leisure activities and the environment. Because society is increasingly becoming more technological, students of agriculture must be prepared in a different way than in the traditional vocational agriculture program. A side benefit of emphasizing science in agriculture may be that more academically talented students might choose agriculture as a career field.

Broaden the Definition of Supervised Practice

The traditional definition of supervised practice may need to be broadened to accommodate applications relating to the science of agriculture. One definition states, "Supervised occupational experiences consist of all the agricultural activities of educational value conducted by the student outside of class for which systematic instruction and supervision are provided by parents, the vocational agriculture teacher, employers, or other adults" (Williams, 1978). It is supervised. It is occupational because it helps prepare for an occupation in agriculture. It is experience or "learning by doing" because it allows one to apply practices and principles learned in the classroom and to develop new skills and abilities (p. 8).

Newcomb, McCracken & Warmbrod (1986) suggest that students learn what they practice and that supervised practice that is most effective occurs in a functional educational experience. "If supervised practice is to make sense to students, teachers must deal with real situations, problems, and current and accurate data and information in the classroom. For certain learning outcomes, it is essential that supervised practice be provided in laboratories that are equipped with facilities that are up-to-date and operate properly." This definition of supervised practice is broader than the one forwarded by Williams in that it could be provided in the classroom, laboratory, community, and the world of work (p. 39-40, 44). There is also no limitation that is must occur outside of class time.

The report of the National Academy of Sciences study on agricultural education in the public schools spoke of the need



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to further broaden the scope of supervised practice. "A broader range of SOEs (Supervised Occupational Experiences) should be encouraged. SOEs should include time in research laboratories . . . some locations might include an agricultural experiment station . . . academic endeavors, such as work in . . . a research laboratory . . . should be encouraged. The emphasis of SOEs should be on learning . . . schools should consider providing on-site laboratory facilities for SOEs" (National Research Council, 1988, p. 42).

Teach Students to Solve Problems

Teachers of agriculture should consider the active involvement of students in scientific inquiry. Such inquiry will not only enhance the ability of students in science but will also assist in developing their problem-solving skills. "Recent research documents the effectiveness of hands-on, inquiry oriented science courses in enhancing higher-level intellectual skills such as critical thinking, problem solving, creativity, and process skills as well as a better understanding of scientific concepts" (Darrow, 1985, p. iii).

The science of agriculture is constantly changing. However, the process of science is durable over time. Students who become practiced in the scientific method will be able to use it the rest of their lives.

Some teachers of agriculture may question their ability to teach the science of agriculture. However, an examination of the college preparation of most agriculture teachers would reveal a strong background in chemistry, soil and geological science and the biological sciences. Scientific principles provide the basis for much of the course work in the animal sciences, the crop sciences, and agricultural mechanization and systems. Teachers do have the background and expertise to teach students to solve problems in agricultural science.

Provide Career Exploration in Agricultural Science

Scientists are needed to work in agriculture on agricultural problems. Biotechnology is only one of the new sciences where a great deal of specialized expertise is required. Students need to be encouraged to consider careers in these areas that will have enormous impact upon the future of agriculture. Currently, few scientists are available who have the necessary expertise in molecular biology and who also have a background and understanding of agriculture. Students who have both an understanding of agriculture and who are prepared in specific scientific specializations will be able to make a greater contribution to society than persons who have expertise only in agriculture or in science.

Teach Scientific Principles

Teachers should teach the "old" science more thoroughly and also the "new science" and technology. Areas of the "old science that could be taught more thoroughly include: basics of growth and reproduction, basics of nutrition, genetics, diseases, and physics. Students should understand the scientific principles involved. They should be expected to apply the principles in supervised practice.

Science content which should be added include such topics as basics of recombinant DNA, gene splicing, gene insertion, tissue culture, cloning, growth enhancers, and growth retardants. An Iowa Technical Committee on Biotechnology developed and reported a more comprehensive list of topic areas necessary to infuse biotechnology into the curriculum (Martin, 1988, p. 38). In order to teach this new science, teachers will need to update themselves by utilizing up-to-date resources and taking advantage of opportunities for in-service education related to these topics.

Technological topics which should be considered include: remote sensing, modern irrigation technology, satellite communications, computer applications in mechanization, and electronic communications.

The National Academy of Sciences in its study of agricultural education in the public schools recommended topics for study related to the science of agriculture. "The committee . . . identified the following units as suited to the teaching of science through agriculture (National Research Council, 1988).

— Applied genetics: classical applied genetics, plant and animal breeding, and molecular biology and recombinant DNA.

— Bacteria: the nitrogen cycle, beneficial uses of bacteria in food production, food spoilage, formation of genetic resistance to drugs or pesticides, and advice for the safe handling of food.

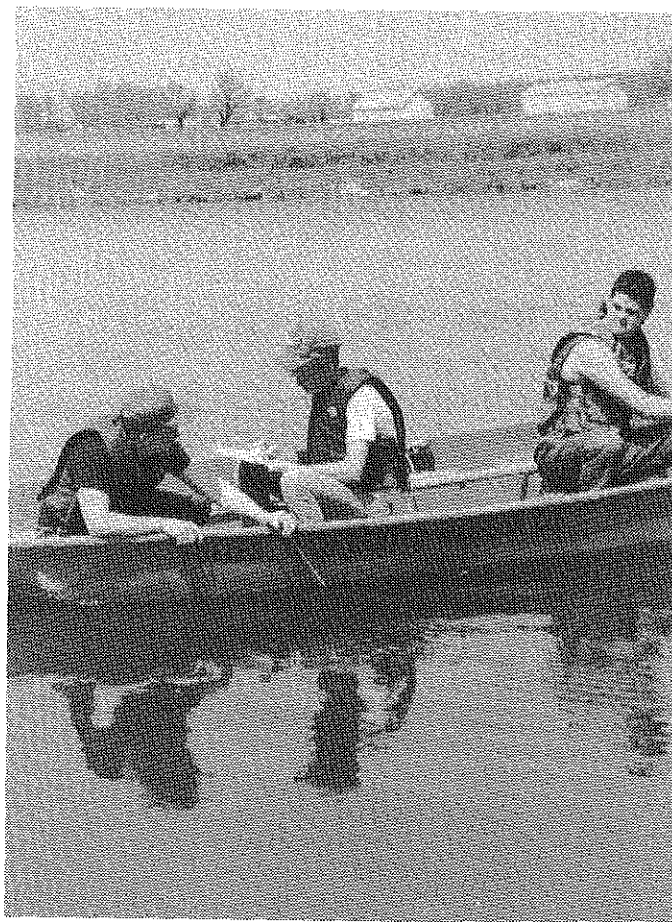
— Multicellular plants: plant structure and function and the biology of trees.

— Invertebrates and vertebrates: insects and other arthropods, parasites, earthworms, fishes, birds, and mammals; and the relationships of these animals to humans.

— Ecological relationships: ecosystems, populations, communities, and the genesis of environmental problems. (p. 14-15).

"Special applied science courses (National Research Council, 1988) on agricultural topics should be available as optional elective science courses for those students who wish to go beyond the traditional science course curriculum. Such

courses, when designed and taught with an acceptable level of scientifically relevant content, should earn full academic credit toward graduation and college entrance requirements" (p. 15).



Charting the depth and temperature of a pond enables students to determine the wildlife that can be developed based upon the habitat, and also calculations can be made of the gallons of water in the pond, the number of fish to be stocked, and the amount of various treatments at the Harry E. Tolles Technical Center in Plain City, Ohio (Photo by Rosemarie Rosetti).

Provide Supervised Practice in the Science of Agriculture

Teachers should consider having students work with a mentor. The mentor could be with a testing laboratory, a specialist with the Cooperative Extension Service, an employee of the Soil Conservation Service, a medical technician at a hospital, a scientist with a local company, or with an agricultural experiment station. There should be an expectation that students will conduct a science project as part of their supervised agricultural experience program. The local advisory committee or an alumni group can help provide appropriate incentives. Students can participate in science fairs. Scholarship money would be a good incentive for the winner of local science project competitions.

Consider These Examples of Science Projects

The winners' list of the 48th annual Westinghouse Science Talent Search was announced in *USA Today* (Farley, 1989). Four of the top twelve winners conducted projects related

(Continued on page 14)

Supervised Practice in the Science of Agriculture

(Continued from page 13)

to agriculture. Projects included: developing a new DNA mapping system, improving the detection of a type of water algae that poisons cattle, studying the effect of temperature on corn genes, and researching molecular virology.

Practical example of projects that may be conducted at the high school level are in *The Science Workbook of Student Research Projects in Food - Agriculture - Natural Resources* (Darrow, 1985). Some of the projects from this reference are described in the following paragraphs.

It has become popular with some people to take large amounts of vitamins because they believe that these substances may improve their health. However, high levels of vitamin intake may become toxic at megadose levels. Vitamin A, for example, disturbs metabolism and is toxic at high levels. The student can investigate the effects of high levels of vitamin A by observing the effect of supplemental doses on the chick embryo. High levels of vitamin A disturb metabolism and alter the normal structure of the embryo as well as its extraembryonic membrane. Fertile chicken eggs are the biological system for this project.

A student might compare the rates of decomposition of various residues added to soils. A major problem in the world is the disposal of organic waste materials such as sewage sludge, wastes of food processing plants, paper manufacturing plants and livestock feeding operations. Frequently these organic materials are spread on soils and then must be decomposed before the nutrients are available to plants. In some cases, when nitrogen is added to the residue, the rate of decomposition is increased. By measuring the quantity of carbon dioxide produced by the soil organisms in a pint jar of each organic matter, rates of decomposition can be compared.

In some areas of the world, salt will build up in the soil and become a stress factor limiting agricultural crop production. Students can study the effects of various concentrations of saline water on the growth of plants and determine an approximate minimum salt concentration which is harmful to growth.

Students might also determine (1) whether grapes grown in various regions of the United States differ in organic acids and, if so, why; (2) whether different kinds of insects show

a preference for light of a particular color; (3) the relationship between environmental temperature and development of an insect; (4) the digestibility of grass clippings and/or autumn leaves by microbes from the rumen of sheep or cattle and if digestibility is improved by grinding or chemical treatment with 1-5% ammonium hydroxide; (5) the rate of survival and growth of tree seedlings when grown using nutrient solutions having different total concentrations but the same ratio of essential plant nutrients; (6) how much nitrogen is required to inhibit nodule formation and growth of nodules on legumes; (7) the role of both the quantity and quality of light in red color formation of apples; and (8) the influence of temperature on pollen germination and pollen tube growth.

The Challenge

The program at Anderson Valley High School (Perry, 1989) was developed by a teacher with an interest in teaching students the science of agriculture. Examples of experiments conducted by students in that school are comparisons of inoculated versus noninoculated legumes, comparisons of irrigation methods, and research on alcohol-tolerant yeasts so cull apples can be used to fuel vehicles. Students have entered tissue culture research projects in science fairs and won several awards. Several students are planning to continue their interests in college. The time for practical application of science principles in agricultural classes has arrived. The challenge is for teachers of agriculture to move ahead quickly to develop realistic supervised practice for their students in the science of agriculture.

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Production Experience Program: A New Look For The Future

Supervised Occupational Experience Programs (SOEP): The mention of those words bring specific images to the mind of agricultural science instructors and students alike. Most of these images are of cows, hogs, sheep, corn and soybean production, or some other "traditional" SOEP. However, times are changing.

In recent years, agricultural education has come under fire all across the country as an antiquated program, whose major thrust continued to be production agriculture at a time when less than 3% (Burton, 1986) of the work force was engaged in that type of occupation. Lending credence to the claim that agricultural education had little to offer students today was the alarming rate at which enrollment in agricultural programs at the secondary level was dropping nationwide. During the past decade (1976-1986), enrollment had dropped nearly 171,000 students (National FFA Organization, 1986).

In response, many states have begun to restructure their existing programs of agricultural education. Texas, one of the first states to attempt such an undertaking, is reporting a resurgence in enrollment in "agricultural science" in just the first year of implementation (Jay Eudy, Texas' State Director of Agricultural Education). Texas, like many other states, is attempting to emphasize the scientific aspects of agriculture in their new curriculum while down-playing, but not eliminating, the production thrust. From the initial reports, an increase in enrollment indicates that students like the changes.

What do these changes mean for one of the most basic portions of the agricultural education curriculum, the Supervised Occupational Experience Program (SOEP)? First a broader interpretation must be given to what constitutes a meaningful experience than has been used in the past. Does it mean an end to production-oriented experience programs as many fear it will? The answer is NO! Many of the changes do mean, however, that some students are being pulled into the program who might have passed it by before, and many of these students have chosen non-traditional types of production programs. The remainder of this article will focus on two such students from the state of Arkansas.

This is Production Agriculture?

Max Rogers, a sophomore at Stamps High School in Stamps, Arkansas and David Newkirk, a freshman at DeValls Bluff High School in DeValls Bluff, Arkansas have several things in common. Both Max and David are early in their agricultural education experiences, and both students have had experiences with the more traditional aspects of agriculture such as cattle, soybeans, corn, etc. But, most important to this story, each student has an agricultural science instructor who admits to being "just a little in the dark" when it comes to advising them about the major por-



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tion of their SOE. Both Max and David are examples of students with production projects which would not have been considered traditional in nature just a few years ago. Neither will exhibit their project in a show ring, and competition in their proficiency award areas will probably be much smaller than if they were raising beef or swine. But both have the beginnings of viable, possibly outstanding production programs. Max is a beekeeper and David a fish farmer; their stories follow:

Max Rogers — Beekeeper

In the period of a year, Max Rogers has increased his bee colonies from one to seven, and plans to expand even further. His SOE program began with one hive which was given to him by a regional honey producer who learned of his interest in beekeeping. Since that time he has been able to expand through collection of swarms, and forced divisions of existing hives. Max is currently experimenting with hatching his own queen bees in incubators, which will then be used to further divide his existing hives.

Max's hives produced 52 quarts of honey for sale last year. This year's production is expected to more than double last year's, and is causing Max some concern as to how to market the product. He owns a hand extractor with which he is able to separate the honey from the comb, and put it in jars. Last year he was able to sell all of his honey to family and friends, but this year's production may be more than that same market can handle. So, Max is looking elsewhere to sell his product. "I have checked into selling at local stores," Max said, "but that would require government inspections, labels with specific origin of the honey, and other hassles. I may try advertising though and see how that works." One can easily see that this is not just a production project, but involves packaging and marketing of the finished product as well.

(Continued on page 16)

Production Experience Program: A New Look For The Future

(Continued from page 15)



Max built this hive in his Ag Mechanics class, under the direction of instructor John Gentry. (Photo credit: Jack Harrington)

John Gentry, vocational agriculture instructor at Stamps, will confirm that this project has benefited Max in the classroom as well. "Max has constructed 12 hives and supers in agricultural mechanics classes," Mr. Gentry stated. "He is always looking for ways to improve the hives. For example, he didn't like the handles that came on the commercial hives he had bought, so he designed his own and they are easier to use. I told him he should get a patent on the idea."

Besides the beehives, Max also had two cows and calves as part of his SAEP. Though Mr. Gentry will admit that he's more comfortable advising Max when it comes to the beef portion of his supervised experiences, he will also be the first to say that the beekeeping program has been a rewarding experience for this "non-traditional" student.

David Newkirk - Fish Farmer

Like Max, David has an experience program that probably gets a few raised eyebrows from his classmates. He helps

manage and maintain 27 ponds which range in size from 1/2 to 15 acres. These ponds produce channel catfish, grass carp, and white amur which are marketed nationwide. The business is owned by his father, Houston Newkirk. But David is slowly learning all about the many details of fish farming, and intends to take on more responsibilities, even financial ones as he gets older.

At the present, David's major responsibility lies with the brood ponds. He watches over the spawning and feeding of the brood fish, as well as the general upkeep of the ponds themselves. These ponds are vitally important to the operation as they are the means for restocking the ponds after harvest of the mature fish is complete.

The busy time of the year for David is from September until January. This is the time when the fish are harvested for market, and as David said, "It's a full-time job plus some during harvest." But, once the harvesting and marketing are complete, it's not long until spring and time to restock ponds for the coming year. James Rogers, vocational agriculture instructor at Devalls bluff stated, "David's involved in all aspects of the fish operation. He is willing to learn and take on responsibilities even though he's still very young. I have no doubt that by the time he graduates he'll know this operation as well as anyone."

Besides the fish operation, David is also involved in the planting, cultivation, and harvesting of 900 acres of rice, soybeans, wheat, and oats on the family farm. Like Max, he knows what traditional agriculture is all about. But his real future appears to be in a more non-traditional area.

The Future of Production SAEPs

David and Max are but two examples of the growing number of students carrying on production SOE programs in areas once considered non-agricultural. Programs involving the raising of mushrooms, vegetables by means of aquaculture, speciality birds such as pheasant, quail, and even parakeets are all becoming viable options for students enrolled in many of the new programs offered through the agricultural education curriculum. The skills learned by the students, responsibility, decision making, risk taking, and record keeping are still realistic outcomes of these programs just as with our more traditional ones. We in agricultural education must keep our eyes open to these valuable opportunities, even if advising students involved in such programs is not within our area of expertise.

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Book Reviews

Management — Farm and Classroom

Management is an important ingredient in any operation. This month's book reviews will again focus upon publications by The Interstate Printers and Publishers. Both reviews relate to aspects of management — management of the agricultural classroom and financial management in agriculture. In both cases it takes good planning to be a success.

The book on Financial Management in Agriculture is reviewed by John E. Davis, who has been teaching at the Chicago High School for Agricultural Science the last two of his ten years of teaching. His background in agricultural economics from the University of Wisconsin and teaching experience provide insight for the level of understanding of high school students for teaching concepts in agribusiness management. This is an area where many of our curriculums need strengthening but John points out that we need to look further for teaching resources.

The review of the Handbook on Agricultural Education in Public Schools was completed by Dr. John Hillison. Dr. Hillison is Associate Professor and Program Area Leader in Agricultural Education in Virginia Polytechnic Institute and State University. He is currently serving on the Publications Committee representing the Southern region for the American Association of Teacher Educators in Agriculture (AATEA). He has worked as a teacher educator in agricultural education for 16 years. Much of his experience has been in teacher preparation and assisting student teachers. Everyone in the profession should be interested in his review of this book.

FINANCIAL MANAGEMENT IN AGRICULTURE: by Barry, Hopkin, Baker, The Interstate Printers and Publishers, Inc., Danville, Illinois, 1988, Fourth Edition, 500 pp., price \$24.95.

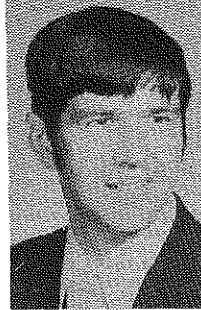
I found the book **FINANCIAL MANAGEMENT IN AGRICULTURE** to be very detailed and concise. The book is divided into six sections, ranging from the nature of financial management to cash flow budgets to policy issues affecting financial management.

High marks can be given to the book for its in-depth chapter questions and chapters on risk management and goal planning.

Another valuable part of the book is the appendix that immediately follows several of the chapters. These helpful sections give further explanation of the formulas and theories used in the chapters.

The book also does an exceptional job of explaining how actions in one segment of the world's economy will affect agriculture in the United States.

The list of references that follows each chapter is also very valuable and provides the reader with an opportunity for further study.



By DAVID L. HOWELL, SPECIAL EDITOR
(Dr. Howell is Associate Professor, Department of Vocational-Technical and Adult Education, University of New Hampshire.)

While a lot of success in farming and agriculture still hinges on the weather, hard work, and the actions of other market forces, it always pays to be knowledgeable and have proper planning. This book stresses this concept.

We have beginning and advanced agribusiness management classes at our school. I feel this book would be too difficult for all but a few of the students. However, I would highly recommend the book to colleges and as a teacher-student reference in high school.

John E. Davis
Chicago High School for
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Chicago, IL

HANDBOOK ON AGRICULTURAL EDUCATION IN PUBLIC SCHOOLS: by Lloyd J. Phipps and Edward W. Osborne. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1988, Fifth Edition, 593 pp., no price given.

This standard textbook for agricultural educators has been revised for the current fifth edition. It covers a wide gamut of information on the profession of agricultural education with 32 chapters covering the major topics of introducing agricultural education, developing agricultural education programs, teaching procedures, managing the agricultural education program, directing supervised occupational experience programs, involving students in the FFA, providing laboratory instruction in agricultural education programs, and conducting postsecondary and adult education programs in agriculture. The appendix contains complete or partial manuscripts of significant federal acts which have influenced agricultural education.

The book has utility value for any professional who works directly in the field of agricultural education such as teachers, teacher educators, supervisors, and future teachers. Others who can benefit from the book include school principals, superintendents, vocational directors, and postsecondary administrators. Certainly every agricultural education department at both the secondary and postsecondary levels should have a copy of the book.

(Continued on page 22)

Linking Technology to SOE

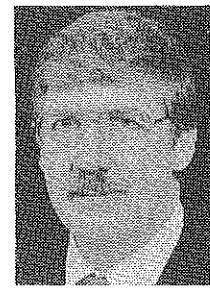
hydroponics (hi' drä-pon'iks) n. pl. [from the Greek hydro (water) and ponos (labor)]. The science of growing plants in solutions containing the necessary minerals, instead of in soil. — *Webster's Third New International Dictionary.*

Agricultural educators across the nation are actively seeking practical, science-oriented, and innovative ideas to expand student opportunities through the supervised occupational experience program. The recent National Conference on Agriscience and Emerging Occupations and Technologies held in Orlando, Florida and sponsored by the National Council for Vocational and Technical Education in Agriculture (1988) is an example of the national effort to upgrade the program. A strong local initiative is exemplified in Towns County High School, located in the mountain resort community of Hiawasee, Georgia. There, student needs for supervised experience programs were linked to a state-of-the-art hydroponic greenhouse used for the production and sale of Bibb lettuce in the Atlantic market. The project represents the best in community directed demonstrations of technology in agriculture.

In 1987, discussions among local officials — the teacher of agriculture, the agricultural education advisory council, and administrators — resulted in plans for building a greenhouse at the school to produce horticultural crops. After the decision was made to launch the endeavor, several community and state agencies became involved with the project. Financing for the project was found through the Tennessee Valley Authority, but carried with it the requirement that a hydroponics greenhouse operation would be built. Further research into the technical, management and marketing aspects of hydroponic vegetable production revealed positive results. Systems available for commercial vegetable production using hydroponics may be grouped as "aggregate" culture — using such soil substitutes as sand, gravel, sawdust, wood shavings or vermiculite — or water culture (Stephens, 1981). Variations of water culture are soilless culture, solution or liquid culture, nutriculture and the nutrient film technique (Gerber, 1982). The decision was made to use a solution culture in which the nutrient-rich liquid flows past the plant roots in a trough or canal, and drains back into the central reservoir. Provision was also made to use student labor, paid at prevailing local rates, to operate the system. In produce marketing, the availability of a favorable market "window" is critical to profitability (Mizelle, 1982). The restaurant trade in Atlanta was found to be a virtually endless and seasonally constant market for Bibb lettuce. Thus, by the time school started in the fall of 1988, a school-based Bibb lettuce production facility using hydroponics and the latest greenhouse technology had become a reality in the "Enchanted Valley" of Hiawasee, Georgia.

Description of the Operation

A two-bay, 60' x 96' (5760 sq. ft.) double layer,



By TERRY E. QUEEN AND MAYNARD J. IVERSON

(Mr. Queen is Teacher of Agriculture, Blairsville, Georgia. Dr. Iverson is Head of Agriculture Education, The University of Georgia.)

polyethylene greenhouse was built on the campus of Towns County High School during the 1987-1988 school year. Advanced bracing techniques were used in constructing the galvanized steel pipe framework. Two sheets of polyethylene were applied to the top and sides; the ends were covered with fiberglass sheeting. A five stage, computer-operated environmental control system was installed to automatically control the heating and cooling system. A sophisticated system for pumping and recovering nutrient solution was also installed.



Students remove three-week-old Bibb lettuce plants from germination trays and place them in spaced openings in the growing channels. The roots must be "coned" — dipped in a cup of water to narrow the root system — in order to fit into the channel openings.

The greenhouse has an eighteen tray starting system at one end where seeds are germinated and seedlings are kept for three weeks. Each week enough seeds are sown to fill one-fourth of the greenhouse with plants. The Bibb lettuce plants are grown for four weeks in shallow channels through which nutrient-rich water is pumped. One-fourth of the

plants in the greenhouse are harvested weekly. The capacity of the house is 12,320 heads of lettuce, of which 3,080 are harvested each week. Germination rate of the seed sown has averaged 91.2 percent; the survival rate of transplants averaged 94.5 percent. Over 145 cases (at 20 heads per case) of Bibb lettuce, labeled "Enchanted Valleys," are shipped each week.

How The Greenhouse Came About

There were many reasons for adding this instructional area to the existing program. Land in Towns County has become so expensive in recent years that it is virtually impossible to find available farm land in the area. The population in Towns County fluctuates greatly due to the many retirees, tourists and others who seek the coolness or seclusion of the mountains during the summer. The situation is further complicated by the fact that about two-thirds of Towns County is national forest, which makes the land that is available very expensive. Towns County ranks in the lowest ten percent in the state of Georgia for per capita income (Bachtel, 1989). Most jobs are taken by those who have families to support, which leaves very few employment opportunities for young people, including recent high school graduates. Consequently, a large majority of graduating seniors leave the area and move to areas where jobs are more plentiful. A primary reason for establishing the hydroponic greenhouse was to provide part-time jobs — since start up, primarily in the afternoons and on non-class days. A secondary reason for conducting the project was to influence local residents to build other hydroponic operations that would employ adults as well as students.



At seven weeks, the fully developed Bibb lettuce plants are carefully removed from the channels and placed in individual plastic envelopes. Twenty plants are placed in each cardboard box and immediately taken to a nearby walk-in cooler. A local trucker transports approximately 75 cartons of lettuce to the Farmers Market in Atlanta twice a week.

Because of the interest expressed during the year of construction, the Towns County High School Agriculture Department offered two horticulture classes in 1988-89, which enrolled 42 students. A basic horticulture curriculum was offered; laboratory experiences were primarily in the hydroponic greenhouse and in landscaping activities. The curriculum has been so successful that a second greenhouse has been approved for 1989 by the local board of education. The new hydroponic lettuce house will be 54' by 120' with a capacity for 14,920 heads of lettuce.

Cooperative Arrangements

A multifaceted partnership has enabled the Towns County Agricultural Education Department to provide this new instructional area. "Partners" in the operation with the Department include: Towns County FFA Chapter and FFA Alumni, the county board of education, Tennessee Valley Authority, the county government, Chestatee-Chatahoochee Resource Conservation and Development Council, and the state government of Georgia.

The Tennessee Valley Authority awarded the school a \$50,000 grant from job development monies, while the local board of education, county and state governments furnished the remaining funds. Vocational agriculture students/FFA members, along with FFA Alumni and other interested adults in the community, assisted a hired crew in building the facilities. The Area Development Council worked closely with the school in developing a market for the product. During the various phases of the project, all of the local agricultural agencies — Cooperative Extension Service, Soil Conservation Service and others — have helped the Towns County Board of Education put the operation into production.

The Production and Marketing Plan

The Agriculture Department follows a curriculum plan which includes the following teaching-learning components: student work schedule, environmental control settings, seedling production, transplanting, the grow-cut cycle, harvesting and packaging, mixing and storage of fertilizer-formula, nutrient management, pH management of the nutrient solution, and record keeping.

The lettuce is sold to a wholesaler at the Atlanta Farmers Market under an exclusive agreement that guarantees delivery of all that can be produced. The wholesaler wants a year-round product, so the greenhouse operates continuously throughout the year. A local produce distributor, who once traveled the 120 miles to the Atlanta Farmers Market in an empty truck to pick up fresh produce for his route, now delivers the lettuce to the market twice weekly. The trucker is able to offer low cost transportation, and the bi-weekly delivery insures product freshness. The resultant high-quality product is what the wholesaler wants for his customers, who are primarily restaurant owners in the Atlanta area.

Implications for Supervised Experience Programs

The greenhouse provides not only a laboratory for in-school classes but also jobs. During the 1988-89 school year, 33 students secured after-school employment in the greenhouse; their earnings totaled over \$10,000. The students used these jobs as part of their Supervised Experience Program. Several have subsequently made application for district and state FFA awards. The department has also featured the project in its Building Our American Communities program.

In addition to work in the school greenhouse, students have opportunities for employment in several small, traditional greenhouse and nursery operations in the county. There is also one large operation in a neighboring county which grows annuals on an eight-acre facility and employs

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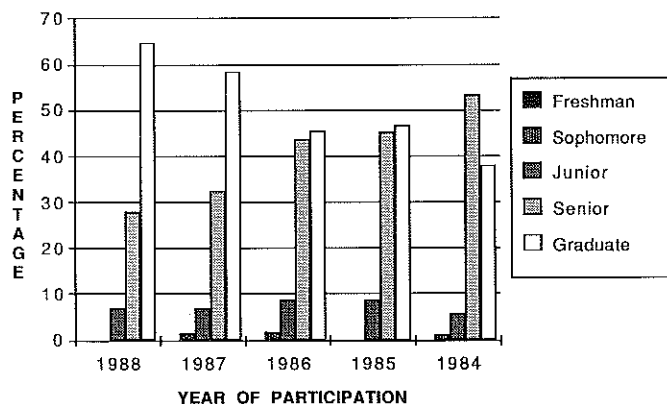
Agricultural Proficiency Program

An important complement to a successful supervised experience program is FFA's Agricultural Proficiency Award program. Providing recognition to students who utilize skills learned in the classroom encourages the student to achieve higher goals, both personally and professionally.

A survey of the 116 National FFA Proficiency Award finalists was taken at the 61st annual National FFA Convention in Kansas City last November. One hundred fourteen individuals responded, answering questions that pertained to their supervised agricultural experience programs, their agricultural backgrounds and their level of participation in FFA activities.

Even though the agricultural proficiency program is designed for the high school student, 65% of the respondents waited until their last year of eligibility to compete (having submitted the application in the spring of their senior year of high school). Twenty-eight percent indicated that they were seniors in high school, and 7% were currently juniors. This follows similar trends of previous years, demonstrating that the majority of national finalists have put three to four years of experience into their programs before they submitted their applications for a proficiency award. (See Chart 1.)

CHART 1--SCHOOL STATUS



It is estimated that 25% of the national FFA membership is female. In 1988, only 5% of the regional agricultural proficiency winners were female. Eighteen percent of the regional winners in 1984 were female and the percentage has decreased steadily since then.

Out of the 29 proficiency areas 55% of the categories can be classified as production with 45% being non-production oriented. One may conclude with these opportunities there would be a high percentage of urban-based students winning regional proficiency awards. The 1988 statistics indicated that 7.9% of the winners live in an urban setting, 8.8% live in the country but not on a farm and 83% of the participants

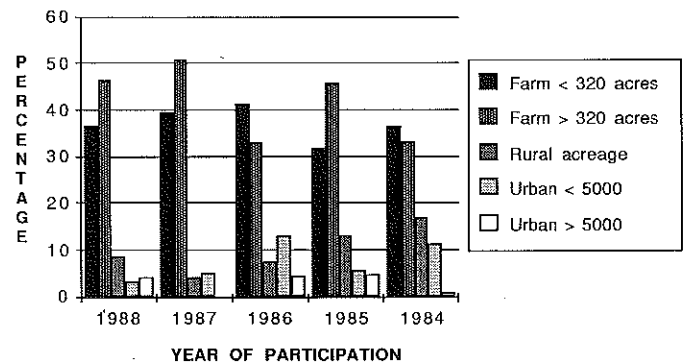


BY KIM BALFE

(Ms. Balfe is Staff Intern, National FFA Center.)

have grown up on farms: — 36.8% from 320 acres or less and 46.5% from greater than 320 acres. Over the past five years the majority of proficiency winners have farm backgrounds and since 1984, the number of urban-based proficiency winners has decreased. (See Chart 2.)

CHART 2--RESIDENCE



As expected, the agricultural proficiency program attracts academically motivated students. Besides excelling with their experience programs, 87. % of the finalists regularly get A's and 11.4% get B's in their agriculture classes. This follows with previous statistics which indicate that approximately 80% of the respondents consistently received A's in their agriculture classes.

When asked what their career plans were, 42.1% of the individuals stated that they would return to the farm while 48.2% said that they would pursue some form of agribusiness career. Other agricultural career areas were the choice of 14.9% and 2.6% indicated that they were going to pursue non-agricultural interests. (NOTE: Percentages reflect that more than one choice may have been listed by the respondent.) As Chart 3 shows the number of individuals wanting to pursue farming as a career has remained about the same over the past five years. The choice of an agribusiness career has increased since 1985.

(Continued on page 21)

The Software Sampler

Application Software

What is application software and how can it be used in secondary agricultural education? Simply stated, application software consists of programs written to perform specific tasks. These tasks commonly include word processing, data base management, and spread sheet calculations. Integrated software that joins all three of these tasks into one program is also included in this category. The second part of the question is a little more difficult to answer.

When reading textbooks on using microcomputers in agricultural education you will notice the discussions of application software usually focus management tasks. Preparing lesson plans, writing reports, maintaining tool inventories, and keeping classroom records are commonly



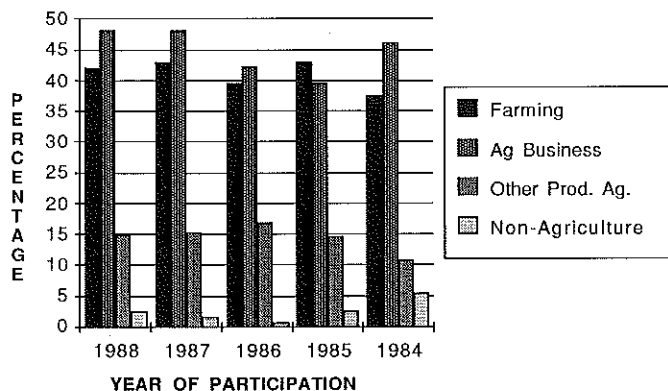
By Kerry S. Odell, Special Editor
(Dr. Odell is an Assistant Professor in Agricultural Education, West Virginia University.)

highlighted uses of application software. Management of the FFA also provides many opportunities for use of applica-

(Continued on page 23)

(Continued from page 20)

CHART 3--CAREER PLANS



"Practice makes perfect" may be a good indicator of the success of the national finalists. A total of 90.4% have participated previously in other proficiency award areas with 38.6% in at least one area, 25.4% in two, 21.1% in three and 5.3% in four or more.

Teachers may speculate that it would be easier to assist a student in the development of an award winning effort if there was more than one teacher in an agriculture department. According to the 1988 survey nearly 50% of the students came from a one-teacher agriculture department, 33% from a two-teacher department and 11.5% from a three-teacher department.

Much of their success as a proficiency finalist has been attributed to the assistance of their advisors. The national finalists rate 85.1% of their advisors as being excellent, 11.4% as good and 3.5% as fair.

What does this mean for formulating experience programs for the future? The proficiency recognition program was developed to motivate students. According to 73.3% of the

national finalists, the recognition that is available at the national level motivated them to participate. The agricultural proficiency recognition program can be utilized as a tool to get students involved.

While recognition can serve as enticement, getting students involved in a successful experience program has greater rewards. An overwhelming 90.4% of the national finalists in 1988 indicated that the award area they were receiving recognition in was related to their career interest.

A vast number of changes have occurred in supervised experience programs. Based on statistics from the past, here are a couple of questions for educators to consider when developing their curriculum.

1. Opportunities for females in the agriculture industry have expanded significantly in the last 5 years yet the number of female regional finalists has considerably decreased over the past five years. Why?
2. There is a low percentage of urban students receiving National recognition. Is it because:
 - a. Rural students have an easier time of establishing an experience program because their parents are involved in agriculture in some way, versus an urban student whose parents may not be affiliated with agriculture?
 - b. Urban students find it harder to develop an experience program (support, connections "in the business," advisor not familiar with the new areas of agriculture, or is unable to provide necessary support because the curriculum is production oriented)?

While some definite trends have been set, one can only speculate as to what direction they will go. That direction will be determined by the way teachers work with students in developing experience programs. Its careful formulation for the future can provide endless opportunities for the students of tomorrow.

Linking Technology to SOE

(Continued from page 19)

experienced workers in its operation. Another opportunity that graduates of the program have is to use skills gained in the hydroponic greenhouse at school to set up greenhouse businesses for themselves.

Applications in Schools

Schools today should teach those things that hold promise for the future, while holding onto the successful parts of the program from the past. Using a hydroponic greenhouse to produce a high return crop with paid student labor certainly meets this criterion. By implementing a hydroponic operation, new emphasis can be placed on agriscience in the curriculum. Benefits that were never available before — an applied science laboratory which provides expanded employment opportunities — can result. Experimentation, ranging from altering pH levels to using different types of shade cloth, can be initiated and used to teach the plant sciences (Jones, 1985).

One of the most important parts of any secondary school agricultural education program is the supervised experience component. In many communities, jobs for youth are scarce. Use of school facilities to grow labor-intensive crops can help the community provide needed employment for its young people. The high school agriculture program in Towns County is serving both the economic needs of the community and its youth who are looking for part-time work. Opportunities are also being stimulated for jobs after graduation and for local entrepreneurs to set up their own businesses.

Prospective investors should study the literature, visit other hydroponic greenhouse operations, and investigate potential markets. In short, school officials should learn as

much as possible about hydroponic greenhouse operations before deciding whether or not to build. A national organization, The Hydroponic Society of America, P.O. Box 6067, Concord, CA 94524 publishes reports of their national meeting and special symposium proceedings, as well as a list of sources for information on hydroponic or soilless culture. Help with developing related instruction can be secured from active programs, Extension specialists, university horticulture professors or trade associations. An excellent unit of instruction on hydroponics has been developed by the New Mexico State Department of Education (Hopkins, 1975). The extensive display of hydroponic/soilless growing systems in The Land exhibit at Disney World Epcot Center can give the beginner or the experienced producer important technical, economic and cultural information (National Council, 1988).

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Book Reviews

(Continued from page 17)

Its use in teacher education programs should continue. The book should be a standard textbook in introductory and curriculum courses in agricultural education. It would make a supplemental or reference book in supervised agricultural education courses, youth organization courses, adult courses, and methods courses.

The fifth edition has replaced pictures with illustrations, forms, pie charts, graphs and tables. They are well done and

a needed improvement. Other new topics covered in this edition include microcomputers, more extensive coverage of special needs instruction, and re-organization of other topical areas.

Overall, it is good to see an old friend to agricultural education return. The profession of agricultural education needs it.

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The Colors of Agriculture

(Continued from page 4)

colors (from a palette of 16) at a resolution of 320x200. An improved color standard called Enhanced Graphics Adapter (EGA) was introduced in 1984 by IBM. EGA offers a resolution of 640x350 and can display 16 colors (from a palette of 64). Finally, another standard for color graphics display was introduced in 1987 for IBM's PS/2 line of computers (except Models 25 and 30). This standard is called Video Graphics Array (VGA). It offers slightly higher resolution than EGA and is better for text display. It can display 16 colors at 640x480 or 256 colors at 320x200 (from a palette of 262,000 colors).

Monitors designed for one standard are not normally able to understand the signal put out by the display card of another. If you have a choice, you will find that the EGA

or the VGA standards are superior to the old CGA display. If your computer already has a color graphics display card you will need to purchase a color monitor that can use the same standard as your present display card. If your computer does not already have a color graphics display card, you will need to purchase a card and monitor that uses the same standard.

The same advice for the Apple also applies here. You should make a trip to your local computer store for a demonstration and visit neighboring schools or businesses before spending the school's money.

Switching over to color is not very difficult if you "do your homework" and seek sound advice from your computer dealer. Once you have used a computer with a color monitor for awhile you may find that monochrome is no longer adequate for your classroom. Color can make your computer programs come alive in living color. Agriculture is in color, shouldn't your computer be in color as well?

Experiential Needs of Students In Agriculture Programs

(Continued from page 11)

Teacher involvement is much more intense and far reaching for supervised occupational experience programs. Teachers need to insist that SOE programs are well planned in terms of students' occupational goals. Further, the teacher needs to provide individualized instruction specific to the occupational experience. This might involve individualized instruction at the site of the occupational experience. The teacher must also provide regular supervision of students' SOE programs. Supervision involves assessing student growth and educational value of the experience program, and checking to see that all parties are fulfilling their

responsibilities as they relate to the occupational experience program. In summary, the supervised occupational experience program is a highly individualized educational experience involving intense teacher supervision.

If education in agriculture is vocational, it is obvious the type of experiences for these programs must be Occupational Experiences which are planned and supervised.

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The Software Sampler Application Software

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tion programs. These managerial uses of application software are great, but what about using them directly in student instruction?

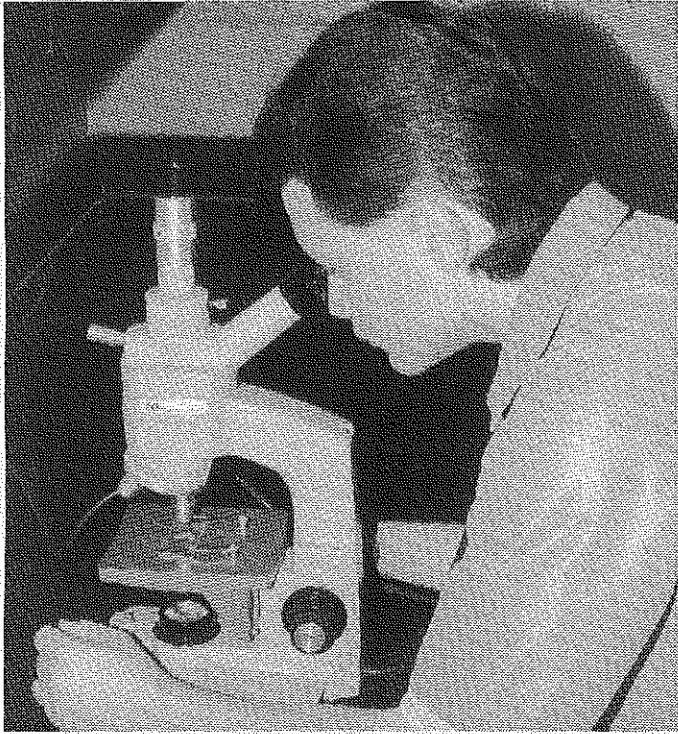
What I am implying is that we should teach students how to apply their knowledge of word processing, data base management and spread sheets directly in agricultural problems and situations. Teachers are the vital link in using the microcomputer and its associated software as an instructional tool. How could a teacher use application software in agricultural instruction?

It would be novel and most useful if some teachers would respond to this question. After all, this is a magazine for teachers of agriculture. How are you using application software in agricultural instruction? Send me your responses to the following questions and we could have an interesting article in an upcoming issue.

1. Describe the instructional setting. How many computers and what kinds of software do you use?
2. Describe the procedure you use when using application software in agricultural instruction.
3. Describe the results of instruction. How effective is this teaching method? How do the students perform?

I'll bet no one responds to this request.

Stories in Pictures



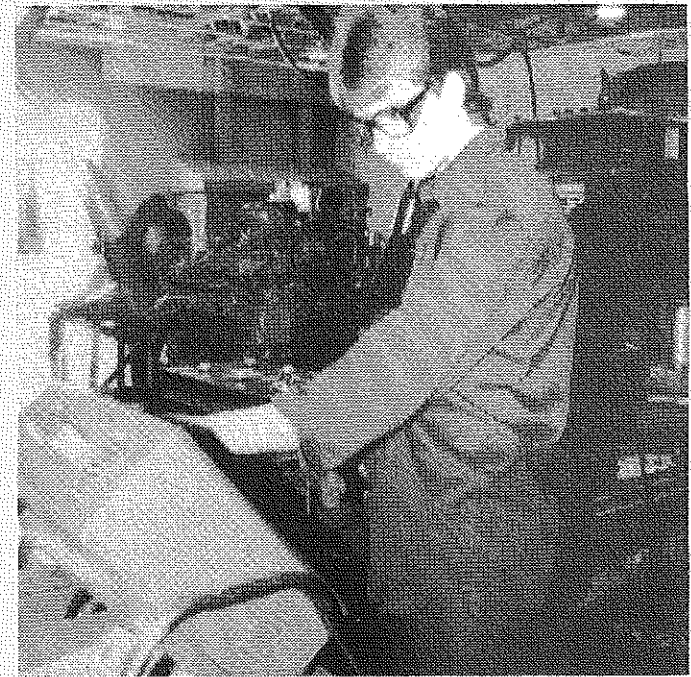
Performing a fecal floatation for parasite analysis at the Northwest Career Center in Columbus, Ohio (photo by David McCracken).



Leg banding a cockatiel for record-keeping purposes at the Northwest Career Center in Columbus, Ohio (photo by David McCracken).



Conducting diet comparisons between two tanks of tropical fish at the Northwest Career Center in Columbus, Ohio (photo by David McCracken).



Testing a battery for charge in a comparison of various charging systems at the Harry E. Tolles Technical Center in Plain City, Ohio (photo by Rosemarie Rosetti).