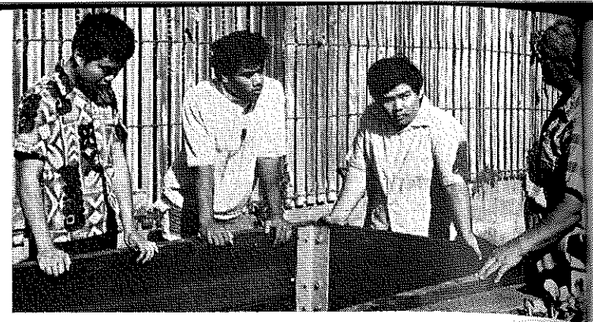
MOBILE SUMMER CLASSROOM
(Photo from Irv. Wedeking — See story, May '72)



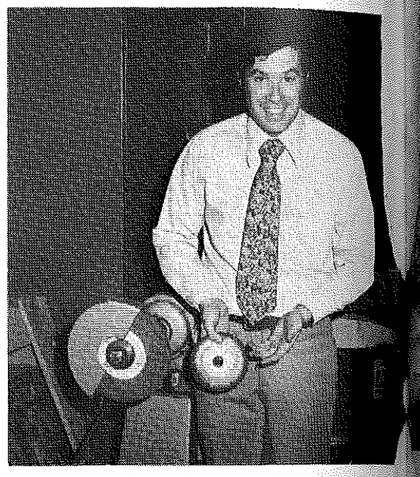
ORGANIZED SUMMER CLASSES
(Photo from Tom Hatakeyama, Hawaii)

STUDENT FOLLOWUP
(Photo from Peter M. Johnson, Massachusetts)

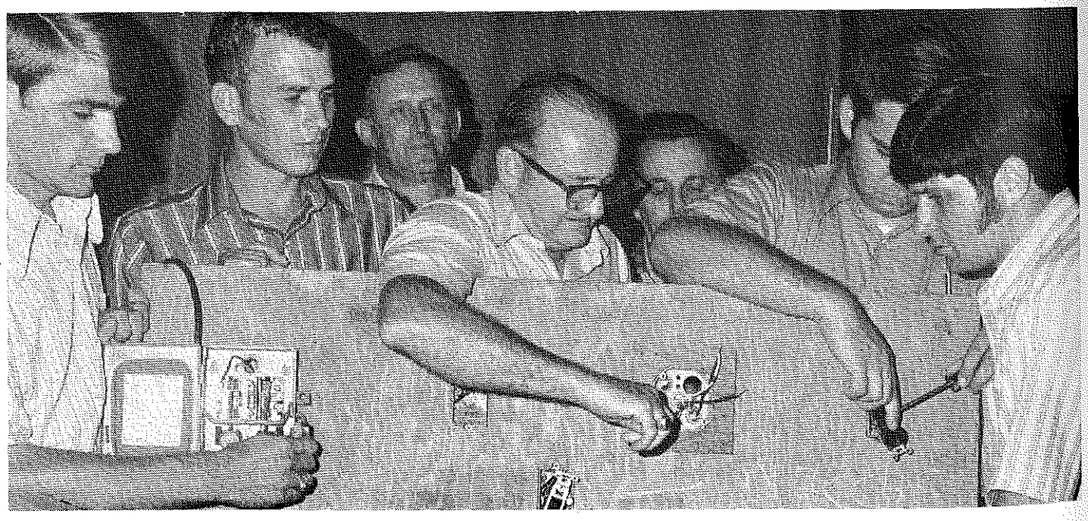
SUMMER TASKS FOR VOCATIONAL AGRICULTURE INSTRUCTORS

Stories in Pictures

by Richard Douglass



EQUIPMENT UPKEEP
(Photo by Richard Douglass)



LEARN NEW SKILLS (Photo from J. C. Simmons, Area Supervisor, Louisiana)

AGRICULTURAL EDUCATION

Agricultural Education

Volume 46 July, 1973 Number 1

Theme—CAREER EDUCATION:
Unique Instructional
Programs and Materials

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The
Agricultural Education
Magazine

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TABLE OF CONTENTS

This publication is the monthly professional journal of agricultural education. The journal is published by THE AGRICULTURAL EDUCATION MAGAZINE, INC., and is printed at the Lawhead Press, Inc., 900 East State Street, Athens, Ohio 45701.

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Send articles and pictures to the Editor or to the appropriate Special Editor.

COVER PHOTO

Turf Management Program at the Owen Sabin Occupational Skills Center, Milwaukee, Oregon. Classroom instruction is supplemented on the land laboratory with practical projects and work experience. John Ferguson, Head of the Agricultural Department and Dennis Dugan, agricultural instructor.
The Turf Management Program currently includes 4½ acres of sod. Students have responsibility for the planting, growing, maintenance and harvesting of the sod. Last year $7,000 of sod was sold from the project. Sod is utilized by local school districts for landscaping and sold to students and private parties. Turf makes an ideal project for the two-year Skills Center students emphasizing ornamental horticulture preparation. (From Gordon Galbraith, Specialist in Agricultural Education, Oregon State Department of Education, Photo by David L. Powell)

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Editorials

From Your Editor . . . IS YOUR PRESENT NEED FOR NEW PROCEDURES, OR NEW INSTRUCTIONAL MATERIALS?


Roy D. Dillon

The beginning teacher of agriculture has somewhat different needs than the experienced teacher, as they relate to teaching methods and instructional materials. The teacher starting in the field has just completed a pre-service teacher preparation program which included exposure to teaching procedures considered as "approved practices" in today's educational atmosphere. He is ready to implement those practices in the classroom and laboratory setting. He needs and should have regular in-service contact with state staff and/or teacher education staff for the purpose of identifying and solving operational problems while they are still small.

The beginning teacher has a second and critical need; to identify desirable instructional materials. The pre-service program, while concentrating on methods, programming, and student teaching, may not have included sufficient time for the beginning teacher to identify sources of instructional materials. If not, this is a task the teacher himself should undertake early in the summer, so that sufficient materials of suitable quality can be obtained. Search your new department for catalogues and other source lists. Ask teacher education staff and state staff for help in identifying and evaluating sources of materials.

The experienced teacher typically has slightly different needs in this area, as we mentioned. If he has been away from in-service education for several years, he may not have had the opportunity to learn and practice many of the newer teaching and program planning procedures. The lack of these newer "approved practices" may be holding his program behind, without his realizing. He, however, has two assets the beginning teacher does not have: (1) a teaching experience base that should provide meaningful insight into how to work with all types of students, and (2) a knowledge of sources of instructional resources both in and outside of the community. Actually, the problem is probably one of selection from rather than identification of, for the experienced teacher.

The experienced teacher should pursue the identification of the new teaching and program planning practices which may be helpful in upgrading his instruction, and of procedures for selecting and evaluating instructional materials from the sources he has identified.

Curriculum laboratories are being developed in several states across the U.S., with intra- and inter-state cooperation to make the materials available to agriculture teachers within a region. Later articles describe three such operations. You should become aware of the curriculum laboratories serving your state, because materials developed therein are being designed with career education and the individual student in mind.—RDD

Guest Editorial . . . THE PLETHORA OF TEACHING METHODS AND MATERIAL

Wayne Seeley
Teacher of Agriculture
Canton, Pennsylvania


Wayne Seeley

Yes, my fellow educators, today we have a plethora of teaching methods and materials for the vocational agriculture curriculum. The problem is no longer getting materials to incorporate into the course of study . . . far from it. Some of the most demanding decisions facing the teacher are: "What to teach?," "When to teach?," and "What teaching methods should be selected to promote learning?" While answering each of these questions, today's teacher must also be cognizant of accountability in both classroom and laboratory instruction. These decisions, however, must be dovetailed with curriculum planning based upon school, community and students' needs. When the inter-relationships of these factors and the outcome of decisions made are teamed with the possible relative success or failure of the curriculum, agricultural department and teacher, one soon realizes that today more than ever vocational agriculture teachers must select teaching methods and materials carefully, very carefully.

The problem today is not preparation of teaching methods and materials, but the intelligent "selection" of effective methods and appropriate materials for each learning situation.

Time-Tested Teaching Techniques

While a teacher needs to consider the educational materials to be incorporated into the curriculum, he must also consider the techniques by which he will present such

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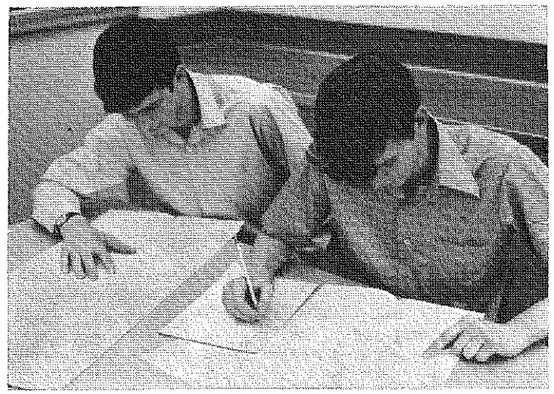

Students examine computer print-out before deciding on business management decisions for the next quarter. They are managing a farm supply business by simulation on a computer.

(Seeley — From page 3)

materials. The teaching technique needs to be considered because one type of educational material might be most easily understood if presented as a lecture through the problem-solving approach with questions and student response; whereas another area might be best covered by a film or perhaps by student reference work.

One method of classifying teaching methods or techniques would be the degree of stimulus required by the teacher. Such a method of classifying might be:

A. Teacher Directed Activities
   1. **Lecture**
   2. **Demonstrations**
   3. **Student Workshops**

B. Activities Involving Other Stimuli
   1. **Films, filmstrips, and filmloops**
   2. **Texts and references**
   3. **Panel discussions**
   4. **Reference persons**
   5. **Overhead transparencies**

Such a classification is by no means sacred. One would not belabor the concept that such an arrangement is fixed. For example, one teacher might provide a greater stimulus in a filmstrip than another teacher, and, as a result, he might desire to consider it as teacher-directed with supplemental materials. Our consideration at this time is that lectures, demonstrations, and student-worksheets are primarily stimulated by the teacher. It is the teacher who is responsible for initiating student interest, involvement and learning. On the other hand, in our second group of teaching techniques the primary stimulus for learning is something other than the teacher (although he may be directly or indirectly responsible, such as in the case of a text or panel discussion). In addition to the historical teaching methods listed above there are two concepts of pedagogy that have evolved recently.

Relatively New Teaching Methods

Within the past decade the following methods for learning in vocational agriculture have become quite widespread. These two methods are:

1. **Cooperative Occupational Experience**
2. **Gaming and Simulation**

We are all familiar with supervised occupational experience education. The student is placed in a business . . . usually agriculturally oriented, and over time with supervision learns certain skills and competencies. Gaming and simulation, on the other hand, are not so well-known or used![1] It can, however, provide a unique approach in the curriculum that usually results in very high student motivation.

In a recent research project by Penn State, simulation was used in teaching areas of management concepts. More specifically, high school students involved in the project were required to make management decisions in the operation of a feed store selling feed and fertilizer. A computer print-out informed the student of his relative success or failure by the number of tons sold, profit per ton, and total profit.

The results of simulation and gaming show it is (1) quite flexible, (2) useful in teaching management concepts, (3) yields high student motivation.

Summary

The teacher of agriculture has many duties and responsibilities but of them one of the most important is how he will present materials to his students. The methods available vary as much as the content of his curriculum but if he is going to do his best job he must be carefully select not only what he will teach but the method by which he teaches. ◆◆◆

1. Curtis, Samuel M., Dr. "Simulation—Experiencing Reality," *Agricultural Education, September,* 1971, p. 63.

Themes For Future Issues

October —	Career Education: Upgrading Adults
November —	NVATA Silver Anniversary Issue
December —	Career Education: Accountability In Evaluation
January 1974 —	Supervised Practice
February —	Staffing Agricultural Programs
March —	Looking Ahead in Vocational Agriculture
April —	Production Agriculture — Still in Vogue
May —	Summer Accountability
June —	Administration and Supervision — Local to National
July —	Program Planning and Evaluation
August —	Teacher Education
September —	School Organization and Articulation
October —	Instructional Technology
November —	Improving the Profession — the Job and the Teacher
December —	Better Teaching and Learning

Allan D. Petersen

AUDIO-TUTORIAL INSTRUCTION IN SMALL GASOLINE ENGINES

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The recent rapid expansion in the use of audio-visual materials and equipment in education has resulted in the development of a national interest in the effectiveness of the audio-visual materials in education. A common educator goal is to improve the quality of instruction in the educational process. In some studies the audio-tutorial approach to individualized instruction has increased the learning ability of students; whereas, in other cases it has shown no particular advantages. However, most educators would agree that we are still really only on the threshold of developments in audio-tutorial methods, and much research and investigation are necessary before we can fairly and accurately evaluate the value of various methods and techniques.

Based on these assumptions this investigation was conducted to evaluate the effectiveness of the audio-tutorial technique of instruction in a small gasoline engine course at Iowa State University. The audio-tutorial technique used was sequence-programmed lessons using an automatically synchronized 35 mm slide tape machine. Basically the technique was compared to the traditional lecture-laboratory type instruction.

The course selected to study the effect of audio-tutorial instruction versus traditional methods was an introductory course in agricultural engineering on small gasoline engines. This is a course in small power equipment which basically provides instruction in theories, principles and procedures of small gasoline engine and associated power equipment. A one-week segment of the course pertaining to the magneto and battery ignition phase of the course was chosen to conduct the experiment. The one-week segment included two 1-hour lectures and one 3-hour laboratory period.

The population consisted of 28 students, primarily juniors and seniors, enrolled in the College of Agriculture. The purpose of the investigation was to answer the following questions: (1) Can subject matter (lecture materials) in small gasoline engines be effectively developed utilizing the audio-tutorial method?, (2) Can subject matter and procedures in small gasoline engines which utilize the audio-tutorial method of teaching in the laboratory be effectively developed?, (3) Can selected factors which increase the effectiveness of the audio-tutorial method of instruction be identified? and (4) Is there a significant relationship between the attitudes of students using the audio-tutorial method and their pretest-posttest difference?

Figure 1: The A-T lab set-up showing two students working on small gasoline engines while being supervised by the laboratory assistant.

Design of the Experiment

Two audio-tutorial sequence-programmed lessons on subject matter principles and theory were developed to match the two lecture topics given by the regular instructor to students in previous quarters and to the control group during the study. A third audio-tutorial lesson was developed to match the regular laboratory procedure of disassembling, testing and assembling the ignition system of the small gasoline engine.

The audio-tutorial lessons consisted of a prepared and sequenced script recorded on 2-track cartridged magnetic tapes and 35 mm color slides containing diagrams, pictures, drawings, actual photos and typewritten key phrases from the audio script. After the tape was recorded and the slides prepared, the teaching machine was programmed to automatically advance the 35 mm slide tray by introducing electronic pulses on the second track of the audio tape. Individual study carrels, each containing a slide tape player with headphones and a small projection screen, were set up. A study carrel with the audio-tutorial equipment provided for the student.

In addition to the materials and equipment, the student had a one-page skill sheet for use during the laboratory. This sheet was used as a guide along with the tape and slides while completing the operations of disassembly and assembly of the ignition system on the actual engine. As noted, the skill sheet includes: part identification, operational procedure, abilities and understandings taught, materials needed and an evaluation score sheet. Approximately 20 of these skill sheets were used throughout the total small engine course. The skill sheet was also used by the control group during the laboratory portion of the investigation.

The following is the audio-tutorial program length and slide quantity for each of the three lessons:

Lesson	*Time in Minutes*	*Quantity of Slides*
1. Magneto ignition systems	32	73
2. Battery ignition systems	22	63
3. Ignition systems laboratory	26	47

Four tests were administered to the students including a mechanical aptitude test, pretest, posttest and laboratory test in that order. The pretest, posttest and laboratory test used in the experiment were developed by the author in

(Concluded on page 22)

BRING CHUNKS OF REALITY INTO THE CLASSROOM

Ronald W. Heisner

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David L. Williams

Teacher. "Today we are going to start a new unit on off-farm agricultural occupations. What does a person need to know for entry into an off-farm agricultural occupation?"

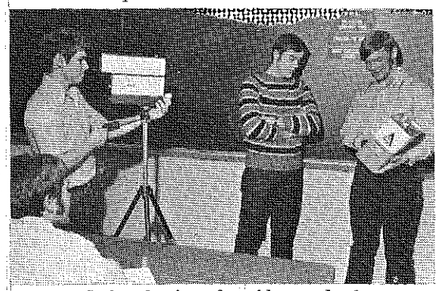
After a long pause two students in the back of the classroom begin their own whispering conversation.

First student. "Hey, Joe, looks like we're on this off-farm kick again."

Second student. "Yeah, I get the message. Last time it took him six weeks before we got back out in the shop to learn something practical."

If this scene is familiar in your classroom, you know you have a problem. For years teachers of agriculture have been commended for their ability to provide practical instruction. The problem-solving approach to teaching worked beautifully with the student who came from the farm, recognized his needs, and was going back to the farm. Under these conditions the instruction can be easily adapted to meet the needs of the student.

But what happens if the student is not going back to the farm? Or, what happens if the student is not from the farm, nor is he going to the farm? How much awareness and background in agriculture does he bring into the classroom? Does he know what he wants to do? Does he have problems and concerns? Can the problem-solving approach to teaching be used to prepare students for off-farm agricultural occupations?



Self-evaluation of a videotaped sales presentation and peer evaluation help a student see himself as others see him.

Time Moves On

Almost a decade ago the objectives for vocational education in agriculture were changed to reflect the changing agricultural industry. Continued economic pressures and new technologies have forced farmers to become more specialized and form larger units. Fewer farmers are required, but men and women with agricultural competencies are needed in increasing numbers to service a growing total industry. Many of the students enrolled in agricultural programs intend to enter an off-farm agricultural occupation.

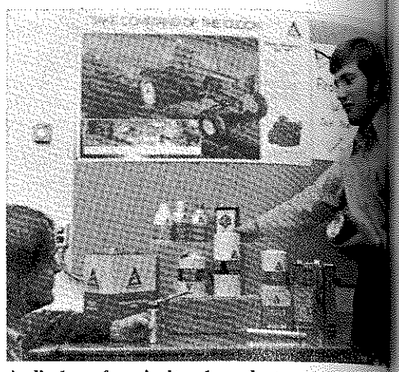
Simulation provides the stage for role playing several kinds of experiences.

Can teachers of agriculture still teach students something practical? Can the problem-solving approach still be used? **The answer is yes.** But when preparing students for off-farm agricultural occupations, it is necessary for the student to identify with an occupation just as a student who plans to farm identifies with the occupation of farming. A student must understand the job of a fertilizer salesman and identify with the occupation before he can appreciate the importance of solving a fertilizer salesman's problems.

Old Tricks of the Trade

Simulation has been used for years to teach approved farming practices. It is now being used by some teachers of agriculture at both the high school and community college levels to teach agribusiness competencies. An agribusiness environment can be simulated within the classroom or laboratory so that the instructor can formulate learning experiences that will help the student develop knowledge and skills needed in agribusiness occupations.

Many of the techniques used at Parkland College, a two-year community college, can be adapted to simulate an



A display of agricultural products provides a desirable setting for teaching students agribusiness competencies at school.

agribusiness atmosphere in a high school. A section of the classroom and one or two tables are all that is needed to begin a simulated agribusiness. At Parkland College, students enrolled in an agricultural salesmanship course are responsible for borrowing an array of products from local agribusinesses. They set up a display of these products in the classroom and return the products when the display is taken down. Each week two different students are responsible for the product display, so each week the display is different. This activity gets the students into the local agribusinesses. They have to present themselves favorably and meet local agribusinessmen. In addition to benefits that accrue to the students, desirable working relations are established between the school and local agribusinesses. This chunk of the real world in the classroom provides a prop for further learning.

Purposeful Role Playing

Simulation provides the stage for role playing kinds of experiences. There are many instructional areas that may be made more meaningful through role playing activities. Interviewing for a job, working with a difficult fellow employee, and meeting and communicat-

(Continued on page 11)

A FARM MANAGEMENT GAME FOR HIGH SCHOOL STUDENTS — Or Have Fun and Learn At The Same Time*

Donald D. Osburn
Associate Professor
University of Missouri, Columbia

Donald D. Osburn

"Make the learning process enjoyable." "The most lasting, significant learning is that which is satisfying." "Problems that are real are likely to be most stimulating." These education axioms are true, but difficult — especially in teaching economic principles to high school students.

The farm management game is one innovation that has been used effectively in the classroom. A game is merely a representation (or abstraction) of a real world situation. Most of the significant planning and production variables can be included, but all decisions and their outcomes are manifested on paper rather than in actual farm operation. The purpose of a farm management game is to help students learn economic principles by manipulation—management of resources and enterprises for a simulated farm situation.

A game situation is necessarily an abstraction. Thus, careful thought must be given to the variables and economic decision problems which are critical to the education process that is desired.

A game will be explained below. The objectives established for the game were:

1. To illustrate enterprise competition and the economic considerations associated with enterprise selection.
2. To demonstrate the effects of time upon the decision environment — i.e. decisions made in year i influence the alternatives open in year i + 1, i + 2, etc.
3. To illustrate the opportunities available to make economic sense out of incomplete data.

The purpose is to help students learn economic principles by manipulation.

The Missouri Farm Management Game

The Missouri Game is a non-competitive, probabilistic model. Each player-manager (student) begins with an identical farming situation. There is no buying or selling between players — an abstration. The results of a given simulated year are dependent upon the decision made and the events that happen during the simulated year. For example, corn prices can vary from $0.90 to $1.30 per bushel and yield can vary from 40 to 100 bushels. Corn prices and yields are examples of the *events* that can happen. Soybean prices and yields, steer returns and hog returns are other events that can vary from year to year.

Enterprise Competition

A specific game objective is to illustrate enterprise competition. There are 200 acres of cropland which can be planted to corn, soybeans, or a combination. The choice is influenced by potential net revenue from each crop. Since prices and yields are uncertain the player must weigh various factors and then decide.

The notion of enterprise competition is further complicated by the possibility of feeding corn to steers or hogs. Again, the two livestock enterprises are competitive for both corn and capital and economic analysis is in order if the player is to make the "best" decision consistent with the game objective of net worth maximization.

Time Dynamics

The game situation was developed to simulate six years. The player must operate at a level that allows him to survive, but to maximize net worth some risks must be taken. Among the risks are the decisions on added facilities for steers and hogs. Such decisions require the total investment in new facilities to be incurred in the year

Gaming can be an intensive learning experience if enthusiasm can be equated with involvement.

facilities are constructed. (This is an other abstraction, but may not be too different from the situation forced upon some farmers with low equity positions.) A poorly conceived facilities decision can mean real cash flow problems in succeeding years.

Making Sense of Incomplete Data

The game situation assumes crop costs of $40 per acre ($8,000 ÷ 200 acres) no matter which crop enterprise is used. A complete knowledge of possible corn and soybean prices is given from the game situation. Less information is given on yields. Yet, the discriminating player can determine, using average prices and yields, that corn receipts should average $77 per acre while soybeans average $68.85. Further, it is highly unlikely corn receipts will fall below $49.50 (55 bushels x 90c) but is quite likely that soybeans will be $48 per acre (20 bushels x $2.40).

Similar analysis can be made for steers and hogs and the return from corn used by these two enterprises. A brief economic analysis can establish that expected return per bushel of corn is higher for hogs. And, hogs are the more stable enterprise. However, hogs demand more investment capital per unit than steers.

Time Allocation and When to Use

Many of the teachers in Missouri are devoting a semester in farm management to the understanding and application of economic principles. Those teachers who devote a year to farm management instruction use the second semester to introduce records, record analysis, and whole farm planning.

(Concluded on next page)

Richard C. Churchill, Jr.
Teacher
Southern Maine Vocational
Technical Institute
South Portland, Maine

TIME STUDIES AND EQUIPMENT DATA CARDS IN TEACHING TURF MANAGEMENT

R. Churchill, Jr.

Students of turf management are studying to secure positions as landscape operators, golf course superintendents, sod farm managers and other related occupations. Many of the skills involved in the aforementioned occupations are related to the performing of various tasks using specialized equipment for turf maintenance. How may these skills be taught in an interesting and successful manner? Is it best to introduce a student to a piece of equipment, have him operate it, and assume your teaching ends there? No. I believe by using a more applicable method students can be taught not only how to operate a piece of equipment, but many of the other concepts related to using the particular piece of equipment. The use of time studies, which involves operating a piece of equipment on a predetermined area and recording the time necessary to accomplish a certain task, has proved to be a successful method of teaching.

Mower Operation and Time Studies

Teaching how to use an 18 inch reel mower will be used to explain the application of time studies to the teaching process. The first step is to determine the square feet of the area to be mowed, then the area is mowed. The time is recorded and a time per 1000 square feet is computed. The validity of the time can be increased by repeating the mowing on many different areas. An average time per 1000 square feet for flat, sloping, obstructed, unobstructed areas should be computed.

Using Equipment Data Cards

To complement the time study and facilitate recording the data "Equipment Data Cards" can be compiled for each piece of equipment the student is introduced to. (Table I) The back side of the card provides space to record the maintenance procedures performed. This will provide training in the record keeping necessary to properly maintain equipment. The time study information can be further utilized in the classroom where practical problems can be set up to use the compiled data. For example, give the students an area to compute the square feet of and referring to their time studies have them figure the time necessary to perform various turf maintenance practices. This information can be recorded on a "Summary Estimate Sheet" and used to teach estimating for grounds maintenance and landscape construction contracts. Time studies provide a basis for estimating which may determine the success or failure of your students in the business world.

TABLE I

Equipment Data Card

Equipment		Cost	
Specifications			
Maintenance-	Oil	Plugs	Other
Use			
Time Study Data			
Limitations			
Miscellaneous Information			

Conclusions and Recommendations for Other Instructional Areas

The use of time studies, equipment data cards, and estimate sheets has made the teaching of turf maintenance equipment operation an easier and more meaningful experience. Admittedly, there are many variables that can introduce error, e.g. the experience of the student running the equipment, difference in terrain, breakdowns while timing, and the interest of the student, but these are problems encountered in the industry also. The problems serve to teach the student that the time studies make good guidelines but they are as subject to error as any procedure involving humans and machinery. This teaching method has worked in our Turf Management program and it should be applicable to the teaching of any subject where equipment is used. ◆◆◆

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(Osburn — From page 7)

Most teachers using the game set aside approximately 5 hours at beginning of the semester devoted to application of economic principles. They have found the game to be highly motivational and instills in students the necessity of understanding the logic and application of economic principles in developing the "profit coefficients" associated with farm enterprises they consider in farm plan alternatives.

What Can You Expect

Obviously, the Missouri Game does not incorporate all the relevant variables a manager of a livestock grain farm must consider. The brief discussion above does suggest opportunities for using the game to show how decisions and variables are interrelated and how some economic analysis can pay off.

Previous use of a similar farm management game has shown that learning via the game situation is equally as effective as classroom lecture. However, use of a game plus some lecture gave a higher level of learning (as measured by reliable subject-matter and decisionability tests) than either gaming or lecture alone.

Students develop a broader appreciation of price variability and the logic of assigning subjective probabilities to prices with a game than with regular lecture methods. The concept of "normal" prices and yields as used in many budgets also begins to take on greater significance once students have participated in a gaming exercise. This is particularly true when the average yields and corn requirements are tied directly to coefficients (input-output relationships) in general use as in the case with the Missouri Game.

Finally, if enthusiasm can be at all equated with involvement, the Game qualifies as an intense learning experience. One frequently observes students to staying after class and/or discussing strategies they "should" follow in upcoming simulated years during free time. ◆◆◆

***K. C. Schneeberger, Department of Agricultural Economics, University of Missouri, and D. D. Osburn, Agricultural Education, University of Missouri.**

****An explanation of the mechanics of game play can be obtained from Professor Schneeberger, 200 Mumford Hall, Columbia, Missouri upon request.**

CONCEPT OF THE 70's— Individualized Student Instruction

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White Bear Lake, Minnesota

Bob Rannells

I can truthfully say, that I have never worked harder at teaching during my career as an instructor as I have since being involved in the individualized instructional program at 916 Vo-Tech Institute. Nor have I ever felt more positive about a system of instruction and the determination to make it work.

Upon being hired by a new vocational training facility such as 916 Area Vocational-Technical Institute, one of the first tasks handed me as lead instructor in the schools horticulture program, was to initiate a new concept in vocational education, known as individualized instruction in horticulture for high school and post-high school students.

I had been very comfortable in teaching Horticulture as I had been doing in the traditional method during previous years, and had to admit that I was rather apprehensive as to whether this new system of instruction I was about to develop, would really work. However, I resigned myself to the fact that it was a new job for me with a new challenge and therefore, I had better learn how it was to be accomplished and get started on development of this new dimension in teaching.

With the aid of the new vocational schools superintendent, Dr. William C. Knaak and Mr. George McGuire, 916 Vo-Tech Manager of Instructional Services, the concept was presented and I was told the basics and procedures to follow. I had been told to develop individualized instructional packages consisting of learning and reference material for the student to progress through various learning stages until completion of the one year course in horticulture. Upon completion, the student should be competent to enter many fields of the Horticulture industry and know what it is all about.

The task analysis procedure required that performance objectives be written so students will understand the standard of performance.

The *first step* in the development of the individualized learning packages was to determine what tasks existed which a student should be expected to master to achieve training for entry level positions in horticulture. I took the term "vocational horticulture" and divided it into areas which included: 1. Plant Materials 2. Greenhouse 3. Landscape Design, Construction, and Sales 4. Turf and grounds maintenance 5. Nursery 6. Fruits and Vegetables 7. Parks and Recreation 8. Basic Business 9. Mechanical Skills. Then in each of these areas I attempted to define tasks. The basic criteria I used to define tasks was that a task should be a skill necessary for entry level employment.

After defining areas and tasks within each area, a fourteen member advisory committee was formed. This committee, composed of business people involved in the field of Horticulture, contributed time and energy to 916 Vo-Tech and truly are professionals in their areas. The first questions raised were concerned with the areas selected and the task named within each area. There were many discussions on the task list and many changes made. The result was a task list which the Advisory Committee and I felt were comprehensive and basic to the entry level in the field of Horticulture.

After gaining the Advisory Committee Member's Approval, my next step was to look at each task and to list the steps one would follow in actually performing those tasks. Because of my experience in teaching Horticulture and working with a landscape firm, as well as my own free-lance landscape service, I was able to rapidly analyze tasks and list them on paper. There were, however, several areas in which I lacked competence. I again turned to the professionals for assistance. This time my Advisory Committee looked at each single task through the analysis form I had written and offered changes. Now I had prepared and validated a list of 275 tasks, and had received approval on the steps the student would follow in performing each step of these 275 tasks.

The student is contracting for performance and agreeing to complete assigned tasks within the specified time.

Next, I took each Task Analysis Form and analyzed the steps. Based on the task I wrote a Terminal Performance Objective for each task. In the TPO I described the performance I expected the student to be capable of doing when he completed with the task. These TPO's were written in action verb form. An example of a TPO in the Greenhouse area is: "Given an assortment of pots and soils, potted plants, seedlings, water, and space, you will correctly pot 100 plants of varied species within 3-5 hours such that all will live. The TPO had to describe the student the standard of performance he was expected to demonstrate upon task completion. Each TPO could have several substeps, which I called Micro Performance Objectives (MPO). These MPO's were also written action verb form. An example MPO for the potting task is: Given soils and soil additives, mix, according to your readings, the necessary mixtures.

Now I had a TPO and several MPO's for each of the 275 tasks. I then made a cross check to see that the MPO's listed, covered each step called for in the task analysis form. The MPO's were important since they were to be the framework of the evaluation system. Once satisfied that I had covered each step, I set about to write individualized learning guides.

Writing learning guides meant taking each MPO and listing the learning

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(Rannells — From page 9)
step the student would follow to perform that particular MPO. For example, one MPO was "Given soils and soil additives, mix according to your readings and observations the necessary soil mixture." The learning steps here are: 1. Recall from your reading observations the type of soil mixtures commonly used in potting plants. 2. Determine which type plant you have chosen. 3. Locate the soil and soil additives. 4. Determine the quantity of soil and soil additives needed. 5. Mix the ingredients. For these five learning steps there were resources the student would use to carry out the steps. These resources were listed in the guide.

Writing learning guides meant taking time to take 35 mm. color slides of the steps a student would follow in performing the tasks. For my program I chose a 3M Sound-on-Slide system. I took a series of color slides and made sets to match the tasks. Then I recorded a "lecture" on the slide holders. This was a very important part of the procedure since some students would be unable to read and this slide demonstration might be the only background information they would be able to comprehend.

Now the learning guide was nearing completion. Included in each guide was: 1. The task name. 2. The purpose. 3. A TPO. 4. Several MPO's. 5. The learning steps. 6. Resources. We had the framework now to give the student a totally individualized program. With the development of accompanying information, such as sound-on-slide set, reference books, and additional reference sheets when books were not available, we had a totally self-contained package.

In order to motivate the students, we installed time clocks and made out contracts for each package. We calculated the time we felt was necessary to complete the packages and listed it on the contract which we asked the student to sign. Thus the student is truly contracting for performance and agreeing to complete the assigned task within the specified time. His progress is monitored by computer readouts on his time card. When the system is totally operable, we will be able to tell employees how long it took a student to master a task, and how long it will take him to perform that task. In addition we can tell the taxpayers how much time it takes to train a student to perform a task and how much it cost to provide training in the varied areas.

Evaluation is accomplished in two ways. For each task there is a product or performance evaluation checklist. We take the MPO's and list the series of steps the student must perform and the qualities the final product must have. We then check "Yes or No" to the statements. All must be checked "Yes" before the product or performance passes the evaluation checklist. The second part of the evaluation is the competency test. To develop this we take each MPO and write a series of multiple choice questions. These then are computorized and when the student is ready to take the competency test after having passed the evaluation test, the computer will randomly select a series of test questions and issue a test. The computer also grades the test. If the student should fail the test, after additional study, the computer will issue another randomly selected test which may or may not have the same questions on it. This system of testing is good because it gives credit for prior learning!

The system is only as good as the end result. Our experience in student placement is so new that no significant results have been drawn as yet. However, the few students who have left the program to go into the field of Horticulture have been well received. I have heard the comment that the individualized study system trains them well to be self motivated and to be self starters since they get out of the system whatever they put into it. Comments from the students reveal that they like the system because of the chance to procede at their own rate to learn on their own, and to develop their own learning habits. Further they appreciate not being told every move to make and not being spoon fed bits and pieces of information, thereby placing more responsibility on the student's shoulders. ◆◆◆

STUDENTS PUT CLASSROOM KNOWLEDGE TO WORK IN PROJECT HOUSE

Roger Ross
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Roger Ross

Lincoln-Way High School Agriculture courses have always tried to give the students the most complete experience program possible in the class. In the past, this included instruction in the classroom and then doing what was learned, in the agriculture shop. The Agriculture Classes are now getting actual experience working on the Building Trades Project House.

This is the second year that Lincoln-Way High School has built a Project House with the cooperative effort of the Industrial Arts Department, Home Economics Department, and the Agriculture Department. Each department applies its classroom learning to the Project House. The Building Trades Classes do the construction, roofing, siding, plumbing, insulating, drywall, flooring, and outside painting. The Home Economics Class selects the color scheme, paints, and cabinet styles. The Home Economics Class stains the trim and paints the interior. The Agriculture Electricity Class and the Landscaping Classes do the electrical wiring and landscaping.

Once the rough shell of the Project House is up the Agriculture Electricity Class of twenty students goes to work installing the service entrance box, fuse

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Agricultural Occupations students will plan and landscape the project house.

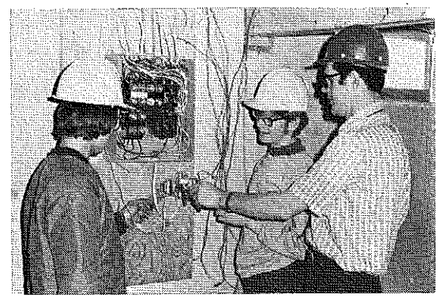
box, convenience outlet boxes, and rough in the wires for the circuits. After the Project House has been insulated and drywalled, the electricity students return to the Project House to finish the installation of duplex receptacles, light fixtures, switches, etc.

The Landscaping class also gets a wide range of experience on the Project House. The Landscaping students, during the winter months, each draw to scale the plantings to be made, select the plant material from catalogues, list the plant material size, and determine the amount of sod necessary to sod the front yard. Included with the plant material list is a cost estimate of plant material and labor cost.

Occasional trips to the Project House are necessary for site analysis prior to the actual landscaping of the Project House. Students work in various groups that get involved with taking and testing soil samples, determining slope and drainage, evaluating soil percolation, mapping out the location of septic tile and well, and observing views that may be created from windows.

In May the Landscaping Class goes to work planting the trees and shrubs at the Project House. Foundation plantings, shade trees, and flowering shrubs are planted after leveling, liming, and fertilizing the lot. Sod is laid in the front yard to give the Project House a more furnished look. The backyard is seeded to keep down the cost and give the horticulture students broader experience.

The landscaping is finished on the Project House, but still more is learned in caring for the plants. Proper watering is critical to the newly transplanted trees and shrubs and particularly the seeded lawn. Larger shade trees are supported with guy wires and occasional insect problems may have to be resolved.


Agricultural Occupations students and teacher plan and install the electrical wiring in the project house.

Broader experiences are achieved on the Project House which increases student competencies to a much higher level than do practice exercises. The students must perform at a level where the end product is functional and appealing to the public. At the end of the school year, the Project House is sold publicly to the highest bidder. ◆◆

(Heisner & Williams — From page 6)
ing with customers are just a few examples. In the agricultural salesmanship course at Parkland College role playing is taken very seriously. A portion of the student's grade is based on his ability to role play a salesman during a sales interview. During the course at least three sales presentations are given. The first two are videotaped and the instructor and students analyze the tapes. Analyzing the student's taped presentations provides valuable individualized instruction. The third presentation represents a major portion of the final examination.

Many schools are purchasing video tape equipment for the athletic or drama department. If such equipment is not available, perhaps the combined needs of two or more departments can justify the purchase. In the meantime, a tape recorder can be used.

Role playing as a learning activity is much more than just "playing store." The following are some principles that should be considered when using role playing as a teaching technique:

1. **The learning objective must be recognized by both the students and the teacher.**
2. **The students must identify with the roles they play.**
3. **Props and other forms of realia should be used to make the setting more authentic.**
4. **The techniques of role playing must be taught. It cannot be assumed that students will know how to role play. One way to begin is to have students read written dialogues, and gradually work into a more impromptu arrangement.**
5. **On occasion the instructor may take one of the roles himself, especially if he wants his students to control their reactions to a given character. For example, the instructor may play an irrate customer.**

Seeds for the Imagination

Students can learn the process of taking an inventory by listing school equipment or shop supplies. The ability to use the business telephone properly can be developed by having students use the telephone to find out commodity prices or to make arrangements for field trips. Some telephone companies have portable telephone training units which may be borrowed by schools. Using equipment catalogs, the teacher can have students determine the cost of equipment, and figure selling price using a given make-up. A number of other learning activities that may be used in teaching agribusiness are outlined in a research report by Williams, Heisner and Cattron.[1]

School and the Real World

Coupled with simulation at school should be exposure to the real world of work. After practicing skills at school, it is important that the student see them being used by an agribusiness employee. A field trip can accomplish this. A visit from someone engaged in an agribusiness can confirm what the students are learning at school. Supervised occupational experience in an agribusiness firm should be a part of the total instructional program. This is where the student can apply in a real setting what he has practiced in a simulated setting.

Conclusions

Preparing students for off-farm agricultural occupations can be just as exciting and rewarding as teaching students the basic agricultural production knowledge and skills. Indeed, these skills are basic and should not be overlooked in the training program. But in order to motivate and challenge today's student of agriculture, new teaching techniques must be employed. Instruction for off-farm agricultural occupations must be closely correlated with the real agribusiness world. Students in agricultural programs desire practical learning experiences, experiences that have direct application to their chosen career. ◆◆◆

1 Williams, David, Ronald Heisner and David Cattron, *Education for Agribusiness Occupations*, The Agricultural Education Division, University of Illinois, Urbana, 1971.

INNOVATIVE INSTRUCTIONAL MATERIALS FOR VOCATIONAL AGRICULTURE

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Instructors of vocational agriculture are being faced with redirecting their programs once again. This comes as no surprise for most instructors because we have had to change constantly since the inception of the Smith-Hughes Act. Program emphasis used to be that of production agriculture. However, with the Vocational Act of 1963 and the amendments of 1968, program emphasis has been placed on mechanics and agri-business training.

Now the new word in educational circles is "career education." Instructors on the local level are saying it is quite difficult to see where their individual program fits into the broad cluster of agri-business, natural resources, and environmental protection identified recently by the U.S. Office of Education.

A concentrated effort is being made by some states to change the name of their organizations. But **the question is,** does this change the instruction that is taking place in the classroom? We do not believe so. The only way change will come about in the classroom is through the use of new and innovative instructional materials.

This leads us to the second question; where do you find such materials?

Today's instructional materials have to be developed for the individual student. This is a must and can be achieved only through the use of behavioral objectives. Curriculum development in vocational agriculture is complicated by the diversity of occupational objectives, differences in educational levels, types of programs and groups served, geographical variations in occupations, and by a wide range of occupations. The problems mentioned above led to the development and implementation of the Oklahoma Curriculum and Instructional Materials Center, a division of the State Department of Vocational and Technical Education. The Center has been in operation since June, 1970, with the primary responsibility of developing instructional materials for all divisions of vocational and technical education.

Development

The Oklahoma Curriculum and Instructional Materials Center is using the systematic approach to curriculum management while developing instructional materials for vocational agriculture programs.

Today's instructional programs have to be developed for the individual student.

A brief description of the steps in the system are: (1) conduct an occupational and/or task analysis of the job titles or occupational clusters, (2) specify behavioral objectives which relate directly to the job performances, (3) determine prerequisite knowledges and skills, (4) establish criteria and reference measures for each specific objective, (5) limit course content to include only materials necessary for student achievement of the instructional objectives, (6) develop instructional materials (information sheets, transparency masters, assignment sheets, and job sheets) for teachers and students, (7) develop an evaluation technique (criteria reference tests, progress charts, and observation of performances), and (8) revise materials as indicated by feedback from evaluation.

Oklahoma curriculum specialists believe curriculum development must involve more than task analysis. Much consideration should be given to the values of society in the attitude of the individual student. The behavioral objectives must be related to the educational level and learning needs of the student. The level of learning attainment eventually achieved by the student is directly related to how well a student's learning level was identified and how realistic the instructional objectives were for the particular student.

In order for students to make a selection for an occupation within the broad field of agriculture, much exposure should be offered to train in a wide realm of offerings. Students in Oklahoma, preparing to enter a career in agriculture or related fields, have the opportunity to study in the following areas: (1) Basic Core Curriculum I, II, III, and IV and (2) two units of farm mechanics and occupational training (limited to junior and senior students only).

Manuals for Basic Core Curriculum I, II, and III have previously been developed covering instructional areas of animal science, plant and soil science, leadership, careers and orientation, chemicals, farm business management, and farm mechanics.

Basic Core Curriculum for Vocational Agriculture IV is now under development concentrating on the following areas: plant and soil science, supervised farm training, farm business management, leadership, and farm mechanics. Each manual is developed according to the unit or modular approach which includes two types of objectives: (1) terminal objectives which state exactly what the student will be able to do at the end of instruction for each particular unit, and (2) specific objectives which serve as learning paths necessary for reaching terminal objectives.

Using Bloom's Taxonomy of Educational Objectives as a guide, specific objectives are written on different levels of learning depending upon the student's behavior expected. Instructional materials necessary for reaching each specific objective are provided in the unit. These materials consist of information sheets and assignment sheets to reach cognitive objectives and job sheets to develop psychomotor objectives (performance skills).

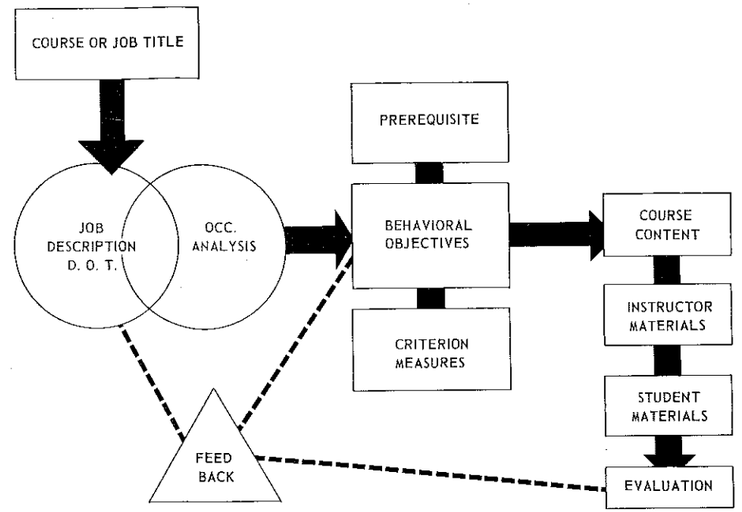
Transparency masters are included in units when necessary to supplement or enforce a specific objective. A criteria reference evaluation is provided to assess student achievement of the knowledges and performances called for by the specific objectives. Therefore, each unit of instruction is structured so that the individual student may reach the desired terminal behavior called for in the objective. This approach in curriculum development has increased the effectiveness of the educational process in such a way that both teacher and student know the expected changes in behavior and can measure when learning has taken place.

Services and Dissemination

Teachers' copies of the materials are provided to Oklahoma teachers free of charge. Student materials which are developed to correlate with the teachers' manuals are sold at a break-even basis. The student material consists of objectives, information sheet, assignment sheets, job sheets, and the test.

The production of these materials in such quantities requires a working relationship among several divisions and departments within a division of the State Department of Vocational and Technical Education. To substantiate this final typing, the instructional materials revert to the Communications Center and the printing department assumes the responsibility of all printing. Additional assistance is provided to the Center's operation by the Equipment Pool Division which assumes the responsibility of trucking the material to selected locations within the state for dissemination.

Each manual written for vocational agriculture is scheduled for dissemination in August of each year during summer conferences. This allows curriculum specialists an opportunity to explain new ideas and approaches for



implementation into the local programs. Orders for student materials are taken during Mid-Winter Conference in January prior to summer conference. These orders are processed and delivered to several locations within the state for the teacher's convenience.

Implementation

Developing curriculum is not an individual matter nor is it an individual agency matter. This is why a well organized system of implementation needs to be incorporated into the structure of curriculum management. One of the most important segments of curriculum management is that of preservice and in-service training of teachers. Implementing such training programs in Oklahoma is shared jointly with curriculum personnel, state supervisors of vocational agriculture, and personnel of the Agricultural Education Department at Oklahoma State University. We feel that the time teachers spend during in-service training contributes to better management and provides for increased diffusion when the final test comes for the adaptation to his local school.

Evaluation

Since the influence of curriculum material must be measured in terms of the educational product, rather than the number of copies of the publication sold, the evaluation of materials must be made in terms of their impact on students. This fact has instigated research projects on each publication and has allowed ample time for teachers to adapt the material to their local school.

The first publication to be developed and disseminated after the inception of the Center was the Basic Core Curriculum for Vocational Agricultue I. A master's thesis conducted by Patton provided considerable insight and direction for future development of curriculum. The mean response to the survey revealed that teachers held generally favorable opinions concerning the overall acceptance of the Basic Core Curriculum for Vocational Agriculture I.

Faculty members of the Agriculture Education Department, Oklahoma State University, have provided professional assistance to the researches attempted to determine the acceptance and usefulness of curriculum developed by the Center.

Conclusion

Teaching vocational agriculture in Oklahoma has changed and will continue to change in the future. Today's students, who will become the leaders and skilled workers of tomorrow, are receiving adequate instruction in subject matter areas providing them with the opportunity to become employed in a variety of occupations. This flexibility of training has come about through a combined effort of cooperation among curriculum personnel, supervisor staff, teacher-educators, and instructors of vocational agriculture. ◆

USOE PROJECT TO PROVIDE K-12 CAREER EDUCATION CURRICULUM GUIDES FOR AGRICULTURE

Harlan E. Ridenour, Director
Ohio Career Education
and Curriculum
Management Laboratory in
Agricultural Education

H. E. Ridenour

During the past decade, the concept of agricultural education has broadened to include occupations in all phases of agri-business, natural resources, and environmental protection. This change has evolved because of changing trends in technology, business procedures, and life styles of persons involved in agricultural occupations.

Many non-rural persons have erroneously assumed that agriculture is a declining industry. The steady decline in the number of persons involved in food and fiber production has influenced this assumption. On the contrary, agricultural production accounts for a significant portion of our gross national product. A study of occupations indicates that approximately fourteen percent of the work force is engaged in occupations requiring knowledge and skills in some category of agri-business, natural resources, and environmental protection occupations.

Agriculture in Career Education.

Many career education curriculum guides have been developed at the local, state, and national level. However, agriculture, in most cases, has either been omitted, treated in a superficial manner, or handled in a demeaning fashion. Such treatment has denied students an opportunity to become acquainted with a major segment of our economy. To correct this unreasonable situation, the United States Office of Education contracted with the Ohio Career Education and Curriculum Management Laboratory in Agricultural Education to develop a series of ten curriculum guides in the following areas:

Guides for K through 6th grade will emphasize career awareness. (The individual development of students is emphasized during this phase.) Elementary youth will be provided the opportunity to examine, from their own frame of reference, their values, aptitudes, and interests in relation to the wide range of occupational opportunities. The broad fields of agri-business, natural resources, and environmental protection will be available to them.

The student will learn mostly by perceptualization during the early years. Activities will focus on the nature of work, what people work, where people work, and why people work. During the latter elementary years, the ability to conceptualize different occupations should develop. Students will begin to form positive and negative attitudes toward different occupations.

Career education in agriculture should become an integral part of the curriculum and should be taught by the elementary teacher.

Guides for grades 7 through 10 provides for career orientation and exploration. The perceptualization and conceptualization process will continue. Students will explore specific agri-business, natural resources, and environmental protection occupations. Students will be exposed to hands-on experiences, observation of workers in action, interviews, and classroom instruction. The concept should be developed that everyone should make a contribution to society through his work. Students should begin to assess the status of their career planning. As students prepare to enter high school, they will decide whether or not to enter one of the agricultural education programs.

Guides for grades 11 and 12 will focus on preparation and/or continued education for careers in certain defined occupations. The eight areas included in the taxonomy of subject matter for agri-business, natural resources, and environmental protection are as follows:

- Agricultural production
- Agricultural supplies and services
- Agricultural equipment and mechanics
- Agricultural products (food processing)
- Ornamental horticulture
- Agricultural resources
- Forestry
- Environmental protection

Industrial states may choose to start the preparation phase of their programs at the 9th or 10th grade level.

The guides for each of the eight program areas will be divided into administrative and instructional components.

The administrative component will contain information dealing with facility and equipment requirements, teacher competencies, and the instructional level.

The instructional component will be divided into units of instruction for each subject matter area of the guide. Each unit will contain terminal behavioral objectives stated in terms of what persons do and are required to know in performing their jobs; technical content in outline form supported by concepts and generalization with available reference material listed; suggested student learning activities; supplies and equipment required for teaching the unit; and student evaluation.

The emphasis is upon the development of specialized programs in each of the taxonomy program areas with the employment of a teacher who is qualified by work experience and formal training to work in the particular occupational area. This procedure is strongly recommended over the practice of having the vocational agriculture teacher being all things to all people.

The first step in the project was to determine the state of the art in the areas of agricultural occupations and curriculum development. The work accomplished in the various states is being drawn upon in the preparation of the curriculum guides.

Vocational educational programs are funded for the purpose of preparing students for employment. The vocational agriculture teacher must spend his time and energies in this direction. The awareness, orientation, and exploration phases must be taught by the teachers assigned to the various grade levels. The materials presented in the awareness, orientation, and exploration guides should assist them in including agriculture in their programs.

At the conclusion of the project in mid 1974, a nationwide conference will be scheduled to present the guides to the states. The immediate project director is Roger D. Roediger of The Ohio State University. ◆◆◆

THE EFFECTIVE USE OF AAVIM RESOURCE MATERIALS IN CAREER EDUCATION

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Howard Turner

The proper use of resource materials can make the difference in a good teaching job or a poor one. The number of references may or may not be important. Teachers do not have time to search all the available information on a subject in the development of a lesson plan. Few texts and references are complete in themselves.

It is the aim of this discussion to give some hints as to how you can use the resource material developed by AAVIM more effectively. (AAVIM is an interstate organization and is now supported by 41 states.)

The subject of small engines is taken as an example for this article. Two texts on small engines are available from AAVIM. They are SMALL ENGINES, VOLUME I and SMALL ENGINES, VOLUME II.

Volume I deals with the care and operation of small engines—information that any operator should know. It is suitable for any class of instructors of small engines, regardless of the background of the student.

Volume II deals with maintenance and repair. The student who studies Volume II is expected to be able to disassemble the engine and accessories and replace broken or worn parts.

Transparency masters are available paralleling the illustrations in the books. Slides are now available on Volume I.

In addition to the information given in AAVIM materials, the specifications are needed for the engines in your laboratory. If you do not have these, order them from the engine manufacturer. The addresses are given in the appendix of both volumes of SMALL ENGINES. Another source of engine specifications is the SMALL ENGINES REPAIR MANUAL by Technical Publications. It is listed in the general references in the AAVIM publications.

You can get along very well without additional resource materials, but if you desire more information, there are a number of references in the appendix of additional resource materials on the subject. More than 400 resources were used in the development. Sometimes teachers do not realize that the AAVIM books are compilations of all known references and not "just another reference."

Once you have the resource material, decide what sequence you wish to teach the course. In a survey of 22 teachers who taught from the AAVIM books, none of them altered the sequence of teaching which is set up in the books. There is no problem, however, of changing the sequence. Each job stands on its own.

The scope is also important. As has already been mentioned, Volume I is suitable for lower grades than Volume II. You may also decide to teach less detail than is given in the books.

In the final analysis, you must decide which jobs to teach. The jobs are listed in the Table of Contents in the front of each book. They are listed as A-B-C headings. Under each heading are several "operations" or tasks. Some tasks take longer than others. But each job should be taught as a whole with all tasks being taught under that job.

For example, take the job of Servicing Carburetors and Air Cleaners." Manufacturers say that the average life of small engines would be doubled if every owner of a small engine would clean and service the air cleaners properly.

In the Table of Contents of Volume I this job is listed as follows:

C. Servicing Carburetor Air Cleaners.
—Types of Air Cleaners and How They Work.
—Importance of Servicing Air Cleaners.
—When to Service the Air Cleaner.
—Tools and Materials Needed.
—Servicing the Oil-Bath Type of Air Cleaner.
—Servicing the Oiled-Filter Types of Air Cleaner.
—Servicing the Dry-Filter Type Air Cleaner.

You can see from the operations in these jobs that a student would not be knowledgeable in servicing air cleaners if you taught only one operation. On the other hand, you could teach the servicing of all air cleaners of small engines to any group. If you taught nothing else about small engines, the students would have learned some skills that are useful. This is true with most jobs.

The next step is your use of resource material. Turn to the section on "Servicing Carburetor Air Cleaners." If your students have books of their own, make a home work assignment for the material you expect to cover the following day.

Ask your students to outline the task. Outlining is easy in AAVIM publications. The important points are listed and they are printed in italics and bold face. The step-by-step procedures are numbered and in italics. Alternatives are given under each step. Unusual situations are mentioned. Safety precautions are given.

Spend some time in the classroom reviewing the principles of operation, and step-by-step procedures. Use the visuals. Demonstrate the procedures. Then you are ready for a successful laboratory experience. As an example, note the steps taken directly from the book under "Servicing the Oil Bath Type of Air Cleaner" as follows:

1. *Disconnect the spark-plug wire.*

   This is a safety precaution which should be practiced each time you work on your engine. It is to prevent the engine from starting accidentally.

   CAUTION! Never work on an engine while it is running. There is a danger of getting hurt by the moving parts.

   WARNING! If you have a new engine which is equipped with an oil-bath type air cleaner, service it before operating the engine. Otherwise your engine will have no protection.

2. *Loosen oil cup, or cover, and remove the air cleaner (Figure 34).*

   Do not try to remove the cleaner when the engine is running. This allows unfiltered air to enter directly into the engine. Also, you might get hurt by the moving parts on the engine.

   If the cleaner is secured by a **bail wire** (Figure 34a), push the wire free by hand.

   Hold onto the filter cup.

   If the cleaner is secured by a **wing nut** (Figure 34b), you should be able to remove it by hand. If not, use a pair of pliers. Some are secured by nuts, or cap screws.

   There is one type on which the cover has a **threaded stud** attached to the cover. It is removed by turning the cover.

3. *Cover the exposed air intake.*

   There is a danger of dust blowing into it or of something falling into the opening. Cover it with a clean cloth or a plastic sheeting.

4. *Check depth of sediment deposit in bottom of oil cup (Figure 35).*

FULL QUARTER INTERNSHIP IMPORTANT IN UMW PROGRAM

Tom Yuzer
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Tom Yuzer

Preoccupational Preparation Program is quite a mouthful, even for a college student, and that is one of the reasons the nickname POP Program has come to the fore at the University of Minnesota Technical College—Waseca.

But call it what you will, the Preoccupational Preparation Program is a unique and most valuable part of the curriculum at UMW. Each student who pursues a degree program in this new technical collegiate program at the University of Minnesota—Waseca is required to complete the POP requirement for the Associate in Applied Science degree.

Seven quarters or 108 credits are required for graduation. Twelve of these credits are earned on POP. POP is a full quarter or twelve weeks of on-the-job internship experience in his or her chosen major of family of occupations. At least two quarters of resident instruction are required before a UMW student goes out on POP and normally the experience does not come until the fourth, fifth or sixth quarter.

Depending on who you talk to at the University of Minnesota—Waseca, the response to the value of POP will vary. But only in degrees of how important it is. Peter Fog, coordinator of the Program, sees it one way. Harland Hasslen, chairman of the academic divisions has another view. Provost E. C. Frederick has similar comments and Robert Hendricks, placement supervisor, still another opinion.

But all are 100 per cent behind the idea.

"A person learns most when he uses the 'learning by doing' concept of acquiring knowledge," Fog says. "The Preoccupation Preparation Program enables our students to apply classroom theories to an actual on-the-job learning experience."

"—because all of a sudden I know of several job opportunities and before I started here I couldn't find a one."

In a recent interview with Placement Director Hendricks, a UMW student said, "This technical college education must be the answer because all of a sudden I know of several job opportunities and before I started here I couldn't find a one."

Hendricks began the placement effort of the college recently and he sees so many advantages for the student following his POP experience. "The UMW student has already had a job interview experience, he has a job evaluation by an employer and he has a feel for the kind of work he plans to enter and is prepared to ask pertinent questions in the job interview," he said.

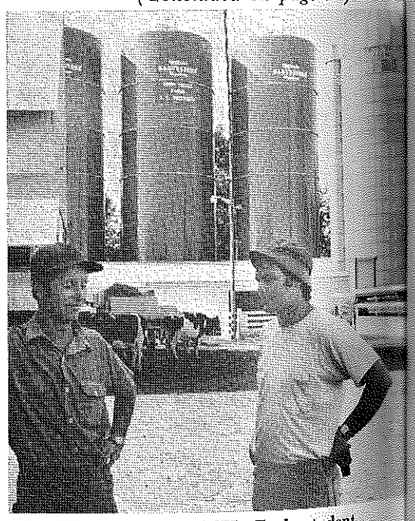
UMW operates under the single mission of training young men and women for semi-professional, mid-management positions in the broad fields of agriculture. The entire emphasis of the resident instruction is "hands on," according to Provost Frederick. "We have a heavy emphasis on laboratory experience in our course offerings," he said, "because we feel practical experience and knowledge is so important in technical education. And yet we realize that there are some experiences that can only be obtained by being on the job and that is why we feel the POP program is so important."

"We think this type of internship program makes the learning experience a meaningful one as far as students are concerned," Hasslen says. "Nearly every student who comes back to the college after his internship experience has said this is the greatest educational experience that he has had."

The success of the UMW Program requires the cooperation of the agricultural industry, Fog is quick to point out. "We get very good advice from our various advisory committees on where we can find POP stations, what kinds of experience our students can expect at these stations, how to prepare

(Concluded on page 18)

ON THE JOB: Students at the University of Minnesota-Waseca work in a position similar to the one they expect to move into upon graduation while still in college. Learning by doing is important in the development of each UMW student.



PRACTICAL APPROACH: Each student at the University of Minnesota-Waseca has an opportunity for a full quarter of practical experience while studying at the College. The POP Program puts the student, in industry, on the farm, or wherever he or she expects to find himself employed following study at UMW.

QUICKEN THE PACE OF STUDENT EXPLORATION

Glen M. Miller
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Through use of a computer terminal, a student can explore occupational information, Junior College information, Four-year College information, and Scholarship information in a few minutes.

Labels, in and of themselves, are meaningless to the layman. Unless the concepts underlying a particular label are understood, then the label serves no purpose. The Career Education label is no exception and, unless an understanding of its aims and purposes are conceptualized, then it too is meaningless and serves no purpose. Career education consists of some new "stuff" and some old "stuff," but is not really new to most vocational educators, or for perceptive educators in any field. Yavapai County, under the direction of Warner B. Dixon and his aides, Bill Burns and Dan Ryan, in conjunction with Yavapai College, and with the cooperation of superintendents, school boards, coordinators and cooperating teachers, has developed a new and vital approach to solving many of the problems dealing with career choice faced by students and educators alike. The following represents the effect of this program on the students as it has been instituted at Mayer High School.

"Mr. Miller," said Fred, "my career test shows that I am interested in medicine. I think I'd enjoy being a veterinarian or, at least be in some field related to it."

"Well, Fred," replied the teacher, "you could go to the library and try to find some information on veterinary medicine. But, of course, our library is small and information on any given career is limited. I suppose you could go to Prescott and ask a veterinarian about the career—that is, if he can find time in his busy schedule to see you. Then again, we could write to the University of Arizona, for I know they have a pre-veterinary program."

"I don't know, Mr. Miller," replied Fred dejectedly. "I sure have to go to a lot of trouble to find out about that career. I guess I'll start tomorrow."

How many times has a student come to you and asked for immediate career guidance, and you either did not know where to look, or the student lost interest due to lack of immediate feedback? As an educator, I have been frustrated many times by my inability to help a student identify careers and alternatives that would meet his needs. Our Yavapai County Career Education project is going a long way toward solving my and the student's problems.

The program branches into three major areas:

1) **Computerized guidance information**
2) **Employment Data**
3) **Personalized hands-on experience and programmed instruction.**

About 45% of the student body, determined by scheduling and availability, were given instruction in the use of a computer terminal installed in a private room in the high school. This terminal, connected with the Yavapai College computer, avails us to programmed information on a) occupational information, b) Junior College information, c) Four Year College Information, and d) Scholarship information. Through the use of simple codes, students independently search for detailed information within the area that concerns them. The student that was interested in veterinary medicine searched the occupational information file and not only found detailed information on veterinary medicine, but also found lists of related jobs. He then went on to the college file, derived information on schools that offered the program, and then turned to the scholarship file to explore the scholarships for which he might qualify. All this took place within the span of a half-hour, as compared to the several days or weeks it would take by the best alternative method.

Career education is not really new for perceptive educators.

The second phase of the program, Employment Data, consists of weekly print-outs of all the reported available jobs in the state of Arizona. This gives the student an opportunity to observe the frequency that the job appears, the pay scale, the educational requirements, the age requirements, and differences between communities relating to these factors. Many students are amazed when they see this realistic picture of the occupation that they are interested in. The student may find further information on any job appearing in the print-out by going to our microfiche system.

The third phase of the program is Hands-On-Experience. Resource people have been brought in to demonstrate their profession, providing hands-on-experience through the vocational programs now operating. Even though hands-on-experience is used in only a limited manner, much thought is being given to methods of expanding the experience available to students in a small school.

Without a doubt the factor that points up the potential for success of this program is the enthusiasm of the students involved in it. Career exploration has risen from the tedious exercise that students once associated with it, to a positive exciting learning experience. This program is and will remain a student oriented program; the students will see to that! ◆◆◆

W. H. Hamilton

CLASSROOM LABORATORIES—HELP NEEDED!

W. H. Hamilton
Assistant Professor of Agricultural Education
Purdue University

Allan Goecker
Agriculture School Counselor
Purdue University

Allan Goecker

How effective is the use made of your classroom laboratory? The Joint Agricultural Education staffs in Indiana were interested in the answer to this question for our state. Allan Goecker, State Consultant and William Hamilton, University representative, were appointed to research the question.

A one page questionnaire was devised and mailed to the 271 vocational agriculture teachers in all 222 departments of the state asking information on these four basic questions:

1. **Do you have a classroom laboratory?**
2. **How frequently do you utilize it?**
3. **What limits the use of the laboratory?**
4. **How do you use the laboratory?**

One follow-up reminder was sent to teachers. Of teachers in 88 departments who returned questionnaires, 79.5 percent reported having a classroom laboratory. Frequency of use was described as "daily" by 20.0 percent of the respondents, "several times weekly" by 34.3 percent of the group, "more than once a month" by an additional 27.1 percent, and "once a month or less" by 17.1 percent. (One teacher failed to answer this question accounting the missing 1.4 percent).

Items limiting the use of the laboratory were named as: equipment, listed by 34.3* percent; supplies 32.9 percent; ideas 38.6 percent; detailed plans, 35.7 percent, and "other reasons," 27.1 percent. The most frequently mentioned "other reasons" were the size of the laboratory, knowledge and time needed to work it into the lessons.

Forty-two different uses of the laboratory were named by the group, these were grouped into types of activities as shown in table 1. ◆◆◆

Table 1 Laboratory Use by Type of Activities

Kind of Activities	Number of Activities	Number of Respondents
Plant Science	12	130
FFA	9	49
Classroom Extension or Small Groups	6	19
Teacher Preparation	5	65
Animal Science	5	21
Equipment Use Room	4	4
Storage		65

***Note the totals will not equal 100 percent because many named more than one limiting factors**

(Yuzer — From page 16)
students for the POP interview and actual POP experience and how to ask for the industry support so necessary to make this program a success."

Where are the stations? In the first year they included landscape, nursery and floriculture shops, elevators, seed houses, fertilizer companies, canning companies, bulk fuel delivery enterprises, farm supply firms, beef farms, swine farms, dairy farms, crop production operations, day care centers, county extension programs and home farm management situations.

UMW students who enroll in the POP program are visited by Fog and other staff members throughout the quarter. They are also required to complete three monthly reports on their experience and their employer also files three monthly evaluation reports.

Yes, the term employer is used. "Our basic philosophy in the POP program is that our students are employees and earn their wages by work performance," Hasslen points out. "We impress on our students that this is a work experience and they should expect to be treated like any other employee on the job. They also realize that they are getting much more than wages because of the valuable learning experiences provided by this program."

To paraphrase a quote by John Dewey, "Education is life itself." That is the goal of the UMW Preoccupational Preparation Program—give the student a feel for what their life on the job will be like and then give him an opportunity to return to the classroom. Here he can question theory and practical experience with his instructor and fellow students. Here he can delve deeper into the textbooks and find the answers to so many of those questions he came across in twelve weeks of on-the-job exposure.

An overriding force in education development by the U.S. Office of Education today is career education. That begins very early in life and continues for all of life. At the high school level the vocational agricultural programs are "career" oriented with their "hands on" experience in the supervised occupational experience programs and the F.F.A.

The University of Minnesota Technical College—Waseca was developed to continue that career education beyond the secondary level. The agricultural industry in Minnesota is number one. Rural development is very much "in". The opportunities for our young people today are in the broad fields of agriculture and with a strong technical collegiate experience, including an on-the-job internship experience, young men and women should be ready to meet the challenges they face. ◆◆◆

TEACHING OCCUPATIONAL OBJECTIVES IN VOCATIONAL AGRICULTURE

Elbert McCants, Teacher
Agribusiness Education
Baldwin County High School
Bay Minette, Alabama

Elbert McCants

For two years I tried teaching occupational objectives in agriculture. I usually wound up following the old "lesson plan" method. The third year, I spent considerable time during the summer and studied them. I used the overhead projector constantly until I had a good working idea of how they should be taught. During the school term, 1970-71, I put my plan into operation. Success? Yes it was, and still is.

At the beginning of the school term, 1970-71, I had mimeographed copies of the objectives. Each student studied them carefully. For one week, I used the overhead projector, and explained each thoroughly, using examples. Fortunately, we have many industries which give good examples, and where parents are employed.

The second week, each boy selected his objective. After I grouped them, we used our guides to become familiar with references. During the summer, I checked and ordered sufficient references. Since we only had two answer books, each student, after answering the question was asked to place the referenced used and page number at the end of each question. This was fun. We reviewed each assignment carefully to ascertain the answers.

I used the army critique method for each group after the completion of each lesson. This proved very effective. Soon each group had a basic idea of what was needed and did a good job. I also used the shop guides and group lesson plans.

A very effective method to use is to alternate the class and shop. This method can prove advantageous over the older methods, if everyone is kept busy. Since we strive hard for scholarship, there is little or no horseplaying.

This, however, must be planned during the summer so that Audio-Visual Aids can be worked in. Films to support the objectives and shop guides must be planned, ordered, shown and discussed.

To the teachers who have difficulty in teaching the objectives, may I suggest that **first, plan well:** (1) After revising course outlines during the summer, order films to be shown at least once a week. Make sure the film is related to the discussion. Order films from at least three different companies, (2) Lessons common to all should be taught at least once a week if practical, (3) At this time many boys will be employed on-the-job training at many centers. Let them discuss their duties (it will help), (4) Be sure to use local consultants, as it will change the general routine, (5) Study your students carefully to determine their capabilities, (6) Be firm, but tactful in a manner that you give and obtain respect, and (7) Most of all, let them perform often. It will pay great dividends.

Remember if you have something to teach, boys will try to teach like you, so let them explain the operation of the 4-cycle gasoline engine or the propagation of horticultural plants.

The occupational objective method is very effective in my school, I would not want to change for another method.

Remember, units common to all can be taught any day you desire. This schedule only points out that you need one and is a course of action to follow.

BOOK REVIEWS

A SELECTED LIST OF EDUCATIONAL MATERIAL AVAILABLE FROM COMMERCE AND INDUSTRY by John F. Deasy. Ithaca, New York: The Institute for Research and Development in Occupational Education, New York State College of Agriculture and Life Sciences, Cornell University, 1972, 89 pp., $2.00.

This loose-leaf resource book is available, postpaid, from Instructional Materials Service, Room 201, Stone Hall, Cornell University, Ithaca, NY 14850.

The primary purpose of this publication is to alert teachers of agriculture and technical education to the wide variety of instructional aids available from commerce and industry. Although most of the items listed are intended to support and add variety to the customary teaching resources, some could serve as major student references. Included are descriptive listings of instructional materials available from 70 commercial and industrial organizations. The items listed are cross-indexed for both subject matter and source.

Charts at the front of the publication aid the reader to find material offered by a given company in a given subject matter area quickly. He can then turn to the book to find out detailed information about the materials available.

This material was prepared by a graduate assistant in Education, Mr. John Deasy, under the direction of Professor John Wilcox, Director of the Cornell Institute for Research and Development in Occupational Education. The material speaks for itself that the author did a good job of searching out and identifying the sources by subject matter areas.

It is my opinion that this reference is needed in state departments, teacher education departments and by individual teachers in all states. I know of no other such comprehensive listing of educational materials available from commerce and industry and feel this publication will be valuable for any individual teaching or working in agricultural education.

Book Review Editor

ADULT EDUCATION IN AGRICULTURE by Ralph E. Bender, Clarence J. Cunningham, Robert W. McCormick, Willard H. Wolf and Ralph J. Woodin. Columbus, Ohio: Charles E. Merrill Publishing Company, 1972. 225 Pages; Price unknown.

This book concerns itself with the development of a rationale for adult programs, practical application of adult learning theory, identifying prospective target audiences, planning programs, teaching methods and approaches, supplementing classroom instruction, using mass media, organizing student organizations, utilizing resources and evaluating adult programs.

The authors place emphasis upon the function of the vocational agriculture teacher and cooperative extension employee in working with adult programs. Examples relate to production agriculture with suggestions that the learning experiences should include agribusiness areas of concern as well. The procedures recommended for many components of the adult programs could easily be adapted to the particular agricultural competency needs by the enthusiastic and dedicated practitioner.

The varied and extensive experiences of the five authors provide a practical background for the application of theoretical concepts of andragogy—the art and science of teaching adults—as applied to agriculture and agribusiness. Combining the special expertise of the authors has resulted in a most comprehensive publication.

The book provides an excellent reference for present and prospective adult education practitioners in agriculture and agribusiness. In addition, this book will probably be used extensively as a textbook in undergraduate as well as graduate agricultural education courses. The book would be very valuable in acquainting advisory committee members, administrators of educational programs and other persons concerned with adult education programs in agriculturally related fields.

Harry E. Frank
Assistant Professor
Vocational and Adult Education

BUILD A TEACHING AID TO DEMONSTRATE THE PRINCIPLES OF HYDRAULICS

Keith W. Hatch
Instructor, Agricultural Education
Utah State University

Keith W. Hatch

If you have tried teaching the principles of hydraulics to high school students, you will most likely agree with me that it isn't easy.

How can we effectively convey to these inexperienced students the complex ideas involved in the relationships between oil temperature, oil pump speed, oil pressure and oil flow in the hydraulic system? The fact that the teaching problem is difficult doesn't make it any less important. The increasing use of applied hydraulics in new innovations being made available to the public also increases the need for individuals trained to service the hydraulic systems. Effective training techniques must be developed.

One such technique has been developed in the Agricultural Education Department mechanics shop at Utah State University. It involved the construction of an apparatus that utilizes both the student's sense of sight and hearing to enhance his comprehension of the effect of temperature, pump speed and oil pressure in relation to the volume of oil displaced from the hydraulic pump. We are proposing that similar devices be made and utilized in the high schools.

We designed the apparatus with 11th and 12th grade level students in mind. Considering their limited background, we constructed it so that they could readily see the driving mechanism and the oil movement. This would help them to understand the variations of the driven speed of the hydraulic pump, the oil movement and how these affect the work being accomplished.

We designed it to be simple and relatively inexpensive; quiet enough to allow a discussion during its operation; light and compact enough for one person to handle and move it; able to vary the hydraulic pump speed; able to develop enough pressure, flow, heat and speed that a relationship may be shown where one exists; and possible to easily install a flow meter to make the measurements indicated.

To construct a device such as ours for demonstrating the relationships in applied hydraulics, you will need the following items:

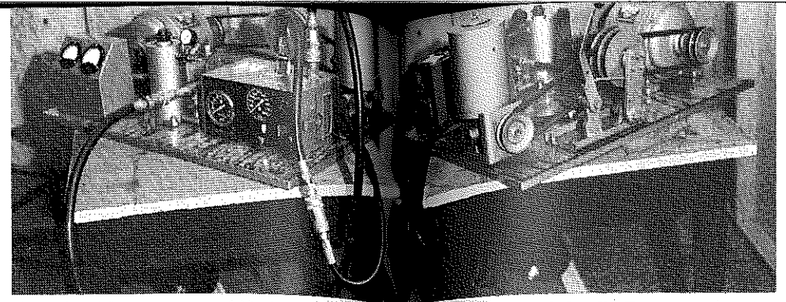
A positive displacement pump: For simplification a small self-contained reservoir will permit the rapid heat build up necessary in the test. An adjustable relief valve built into the pump simplifies outside oil lines. The pump we used contained these items and had a capacity of six gallons per minute oil flow at four thousand r.p.m. It was originally used on a hay baler to control the bale density.

A variable speed drive assembly: Keep it simple; a complex drive would be confusing to the student. The one we used was adapted from a lawn and garden tractor. We purchased the assembly and then mounted it on a base. We installed a lever assembly with a friction to hold the lever from changing positions during operation and a wire mesh safety shield over the drive.

A hydraulic cylinder: The cylinder should be compatible in size with the pump. For instance, a large pump with a small cylinder would cause the cylinder to move too rapidly for a good demonstration. We used one adapted from a hay baler. It had a three inch diameter and six inch stroke.

Hydraulic Hoses: These should be designed for easy installation of a flow meter using quick couplers. By using a clear plastic return line, students will be able to see a certain amount of oil movement and any air in the system indicated by a foaming condition. All lines we used were ⅜ inch diameter.

An Electric Motor: The electric motor must be quiet and of sufficient size to operate the hydraulic pump at an output of approximately six



Frontview of components of Hydraulic Principle Demonstration Apparatus, showing Volt Meter and Ammeter, at left front; Hydraulic Cylinder, just to the right of volt meter-ammeter box; Pressure Gauge, attached to hydraulic cylinder; T-joint Connection, to attach oil line to hydraulic cylinder; Flo-rater, box at right with gauges and controls on front and oil line connections on top; Oil Lines, input oil line at right, return oil line at left on box-to visualize the oil flow (the return line can be clear plastic); Hydraulic Pump and Reservoir, cylinder at right.

Back view of Hydraulic Demonstration Apparatus shows at the right a 1¼ horsepower, 220 volt, 3 phase electric motor; and plywood base. Note that components are bolted to the plywood base and it is reinforced all around with angle iron. (Photos by Cleon M. Kotter, Agricultural Information Specialist, Utah State University)

g.p.m. at a pressure of seven hundred p.s.i. It must also be relatively light in weight to enable an individual to handle the apparatus. We used a 220 volt, 3 phase, 1¼ horsepower motor. We sacrificed 2 g.p.m. by using this motor. Although apparently not serious, this does limit the range wherein the demonstration takes place.

An Ammeter and a Voltmeter: The ammeter and voltmeter are used to show a relationship of power required and work performed. We used a voltmeter designed for 220 volts A.C. and a 10 amp. A.C. ammeter.

Drive Belts: These must be of sufficient size to carry the load imposed by the electric motor. We used "V" type belts. To avoid the critical problem of slippage, we adjusted the belt tension to ¼ inch deflexation at 25 lbs. pull.

A Plywood Base: The components are mounted on a ¾ inch plywood base 32 inches x 36 inches. The base was then anchored in a ¾ inch angle iron frame for rigidity.

The demonstration involves the following three tests and an evaluation of the horsepower:

Test #1. With the variable speed control lever in the maximum drive speed position, adjust the pressure to 500 p.s.i. by restricting the flow of oil through the hydraulic flow meter. At this point record the gallons per minute oil flow, temperature of oil, pump speed, and pressure on the data sheet. To avoid excessive heat, only operate the unit for approximately two minutes at this point.

Now place the variable speed control lever in the minimum speed position, leaving the restriction valve at the same place on the flow meter. Again record the data.

Test #2. With the variable speed control lever returned to the maximum drive speed position and the restriction valve adjusted to a pressure reading of 50 p.s.i., again read and record the gallons per minute flow, speed and temperature.

Then adjust the restriction valve to a pressure reading of 450 p.s.i. and record the readings as shown on the flow meter.

Test #3. This step takes into account the effect temperature may have on pump output. Record the information from Test #1, run #1 as run #1 of Test #3. For run #2 of Test #3, run the apparatus under load to obtain a temperature of at least 180 degrees. Then adjust the variable speed control to obtain the same speed as in run #1 of Test #1 with the pressure adjusted to 500 p.s.i. Record data as indicated on the flow meter.

Horsepower Evaluation

The horsepower required by the electric motor can be determined by taking the amperage and voltage required to operate the hydraulic system at 500 p.s.i. and the amount of oil flowing at this time. To eliminate the complexities of calculations, a 40 percent conversion loss through the electric motor and drive can be assumed.

Assume 60 percent of the horsepower required by the electric motor being input horsepower to the hydraulic pump, calculate the output horsepower with the formula:

$$\text{Hydraulic Horsepower} = \frac{\text{g.p.m. x p.s.i.}}{1714}$$

the hydraulic pump efficiency can then be calculated by the formula:

$$\text{Pump Efficiency} = \frac{\text{output horsepower}}{\text{input horsepower}}$$

From the results of Test #1, the students will readily see that the speed the hydraulic pump is driven effects greatly the gallons per minute delivery of the hydraulic pump. The relationship is derived by comparison of the gallons per minute at the two speeds. The relationship of the pressure may also be seen at the two speeds.

Test #2 indicates the condition of the pump. Pressure should have very little effect on gallons per minute flow with a good pump, as the test indicates. Moreover, the students will observe from Test #3 that temperature has very little effect on the gallons per minute flow through the range in which the test is performed since the pump used is quite efficient. It should be noted, however, that the oil may be a factor at this point. We used American All Weather Hydraulic Oil during these tests.

The interval of heating up the oil in the system to perform Test #3 provides an opportune time to discuss horsepower requirements to drive the hydraulic pump as related to the work accomplished by use of the hydraulic system. Also, by noting the amperage and voltage utilized and converting this to wattage for electrical horsepower calculations, you can use the simple hydraulic formula given to determine horsepower derived from the hydraulic system.

Note that a clear plastic tube on the return line does not show the oil movement throughout the tests. Movement of oil is no longer apparent once the air bubbles are dispelled from the system. If this is to be shown to the students it will require directing their attention to it at the start of the demonstration.

Accuracy was considered in our tests. However, this is not as necessary for demonstrative purposes as for experimental tests. Since the apparatus was developed for demonstrative purposes, we emphasized simplicity over accuracy of tests. The unit's accuracy depends primarily upon the operator adjustments, the degree of accuracy of the flow meter and the elimination of belt slippage.

If it is properly constructed, you will find this to be a rather handy unit that is well designed for use in teaching a small group of 10 to 15 students. We trust it will result in the increased comprehension of hydraulic principles essential in today's mechanized world. ◆

Editor's Note: Interested persons should contact the author for sample data sheets and for further specifications.

TEACHER PREPARATION FOR TEACHING THE DISADVANTAGED

John F. Parker
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Windsor High School
Windsor, Virginia

John F. Parker

One of the most profound qualifications of a successful teacher of the disadvantaged rests with the teacher's attitude. Their attitudes must project an acceptance of all students, a caring for the students, and the ability to work with the students in a strong, positive manner. They must be able to identify the strengths that the disadvantaged student possesses. Usually, only the weak qualifications are identified. Teachers need to direct their teaching in such a manner that students will be given the opportunity to utilize their strengths to remove their weaknesses.

Certain characteristics must be present in the individual teacher. First of all, psychology must be studied to be able to understand these persons. Love, patience, endurance, professionalism, and creativity are very important.

Skills in arts and crafts and knowledge of operating visual aid equipment must be known to be able to perform successfully. Best results are obtained

(Continued on top next page)

(Parker — From page 21)
when adequate teaching supplies and visual aid materials are adequate for students usage.

Preparation of a well planned course calendar and having some flexibility in it lends to success with the disadvantaged. A teacher needs to know how to give individual instruction and still stay calm with repetition.

Different techniques must be known in planning the curriculum, and special goals should be set down as a guide in working with and teaching the disadvantaged. A teacher should know how to read well and have an imaginative insight for creativity. They must know how to communicate with the student with different levels of abilities for sending and receiving messages are especially important.

It is very important that a teacher for the disadvantaged love children and know how to cope with any problem that might arise. They need to know and study the history and background of each student. Visits in the home with both parents and students are helpful in the success of this student. This will help to win self respect and confidence.

Before starting to teach the disadvantaged the teacher should be prepared in courses of guidance and counseling to be able to gain more results with consultations and deliberations together. The numbers in each class should be limited and should be planned with both the teachers and administrators. ◆◆◆

Petersen and Hoerner — from page 5): **AUDIO-TUTORIAL INSTRUCTION**

cooperation with Dr. Thomas A. Hoerner, Associate Professor in Agricultural Engineering and Agricultural Education at Iowa State University. The pretest and posttest consisted of a 50-item 4-response multiple choice objective test. The only difference between the pretest and the posttest was the item arrangement. The laboratory test consisted of actual lab type activities such as using instruments and tools, part identification and using the specification manual. Additional student data were collected through the use of a questionnaire administered to all students at the start of the course. Grade point average, MSAT score, ACT score and high school rank were collected from student records in the Office of Registrar.

A-T Laboratory Procedures

The 14 students in the control group attended the regular one-hour lectures and three-hour laboratory during the experiment. The students in the treatment group were involved with the audio-tutorial materials for their lecture and laboratory materials. Each student signed up for two 1-hour lecture periods and the three-hour laboratory during the week of the experiment. The students were expected to complete the first lecture before beginning on the laboratory. Even though the lecture tapes were only 32 and 22 minutes in length, the students spent an average of 55-60 minutes on each lecture. Many, in fact, went through the tape and slides twice.

The laboratory portion took approximately 3 hours to complete. Shown in Figure 1 is the complete audio-tutorial lab set up with one student working on the lecture and one student working on the laboratory portion. Note the various tapes and slide sets that the student selected when coming into the A-T lab. The tapes were divided into 5-6 minute segments in addition to the full length tapes so the student could review various segments of the program if he so desired. In addition to selecting materials, each student signed in and out so that the total time that each student worked on the program could be determined.

Also shown in Figure 1 is the fact that a laboratory assistant was present in the lab at all times to answer questions pertaining to the program. The regular lab-lecture instructor was also available to answer questions as he was for the control group during their laboratory period.

Conclusions

Evidence based on the findings indicated that audio-tutorial sequence-programmed lessons may transfer knowledge in a strict subject matter situation; however, it was less valuable in teaching skills and procedures needed for laboratory work. It is the opinion of the authors that this technique should be as effective in teaching skills and procedures as in teaching subject matter materials because of the wide use of pictures on slides. Therefore, the authors feel two possible reasons may have caused this apparent non-significant gain for the laboratory skills and knowledge. The first was the increased length of time from the end of the experiment to the laboratory practicum test. This test did not have a retention testing function, and the higher ability students as existed in the control group may have retained more laboratory skills and knowledge just on time alone. It should be noted, however, that the treatment group mean for laboratory score was almost two test items higher than for the control group. This difference was approaching significance levels with analysis of covariance. On this basis the treatment did have a positive effect as the treatment group did gain more than the control group even though it was not a significant gain.

The second reason was the laboratory test reliability. Because this was a lab practicum type test, the test was hand scored and a reliability coefficient was not estimated. Possibly the test had a low reliability and, therefore, was not a good instrument for differentiating group differences.

Innovations of audio-visual materials used in educational methods and techniques are continuously being accepted as beneficial to learning by the administrator and classroom teacher in many cases without knowing if they are effective. This investigation was conducted to evaluate the effectiveness of the audio-tutorial technique. Until the actual process of learning for this particular technique is completely understood, the use of the technique should be repeated in other subject matter areas to substantiate or repudiate this study. In addition other techniques must also be evaluated and re-evaluated to determine their value.

It is the opinion of the authors that the audio-tutorial technique could: (1) be effectively used for individualized instruction, (2) increase motivation and (3) reduce the time required to teach students. However, it should be noted that the preparation of sequence-programmed lessons of this type are very time-consuming and relatively more expensive than the traditional methods. In our opinion this and many other audio-visual instructional methods and techniques should be investigated for use in agricultural mechanics as well as all vocational agriculture instructional units. We still believe as stated earlier that we in education are only on the threshold of the role audio-visual techniques can and probably should play in the educational system. Our imaginations are really the only limits we have in adding interest to our instructional programs. ◆◆◆

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AGRICULTURE PROGRAM FOR ALL

Agricultural electives became an important part of the curriculum at Ephrata High School during the 1970-71 school year. All students in the school had the opportunity to select special nine week courses in agriculture. Each class meets for one period a day and carries one-fourth credit. The electives, along with a brief description from the student's course selection booklet, include the following:

ANIMAL SCIENCE
Reproduction, selection, feeding and management of farm animals. Laboratory exercises will include digestion and reproduction projects. Animals to be studied include beef, dairy, swine, sheep, poultry, and the horse.

AGRICULTURAL PRODUCTS
Production, processing, and selection of meats, poultry, and dairy products, laboratory exercises will deal with quality control in production and processing. State and federal grading standards will be applied to the various products.

CONSERVATION OF NATURAL RESOURCES
Soil erosion, land use, air pollution, and clean water will be included. Methods and practices needed to conserve our natural resources will be covered. Special conservation problems found in the area will be the basis for a class problem.

FOREST AND WILDLIFE MANAGEMENT
Management practices for woodland, wildlife, and recreation areas. Includes wildlife and forest trees native to Pennsylvania. Identification, harvesting, and production will be used for laboratory exercises.

LANDSCAPING
Establishment and maintenance of shrubs, trees, and turfgrass used in the landscape plan. Emphasis will be placed on special landscape problems such as design and selection of materials. Turfgrass problems such as weeds, insects, and diseases will be the basis for laboratory problems.

SMALL GASOLINE ENGINES
Repair, operation, and maintenance of two and four cycle gasoline engines. Laboratory exercises will cover combustion, ignition, and carburetion problems. Design features and engine specifications will be included for selection purposes.

ELECTRIC MOTORS
Selection, operation, and maintenance of electric motors and emergency generators. Controls and drives will be included. Laboratory exercises will include servicing and maintenance practices and the operational features of different type electric motors.

ELECTRICAL WIRING
Electrical circuits, protection, safety, and measuring instruments. Laboratory exercises will include 3 and 4 switches, wire size, and wiring techniques. Heating and lighting will be included.

QUALITY CONCRETE AND BUILDING LAYOUT
Producing quality concrete by proper mixing techniques and use of materials. Laboratory exercises will include mixing, selection of materials, and proportioning. Individual projects will be made by each student. Block laying will also be included with the foundation layout exercise.

The enrollment last year was 100 students, and this coming school year 145 have enrolled. Student enthusiasm and interest is very high. It is evident that students like the "learn by doing" or the "hands on" activities that are a major part of each elective. Field trips and special projects like stream surveys, fish stocking, browse cutting, water testing, stream improvements, etc. have made the conservation and wildlife courses the most popular.

Small gasoline engines, also very popular, provides *complete* maintenance and repair instruction with the proper tools and testing equipment. The electricity and concrete courses complete the offerings in the mechanics area.

It is important to note that the elective phase of the program was not developed because of a weak enrollment in agriculture, but out of a need to give more students training in agriculture related areas. We firmly believe the instruction provided through electives gives each student skills and knowledge which he will use throughout his life. Students are also exposed to the vast employment and educational opportunities which are available in agriculture.

In addition to the electives described, the agriculture program at Ephrata includes a 6th grade agriculture-conservation program with 170 students, a 7th and 8th grade program with 65 students, a 9th through 12th grade program with 70 students enrolled, and a young-adult farmer program with over 100 farmers. A very active FFA chapter and young farmer association are a vital part of the program. Three full-time teachers share the instructional responsibility. ◆◆◆

BOOK REVIEWS

ANIMALS IN THE AMERICAN ECONOMY, By Sims and Johnson. Ames, Iowa: The Iowa State University Press, 1972, First Edition. 228 pages. Cost $7.50.

As stated by the authors in their preface, "this book attempts to familiarize the reader with most domesticated species, types, and breeds that have a place in the economy of the Americas." Covered in the contents are the following kinds of animals: cattle, swine, sheep, goats, horses, ponies and asses, poultry, dogs and cats, small stock, fur animals, Arctic livestock, and llamas and alpacas. Tables, diagrams, and black and white photographs clearly show the characteristics and commercial objectives of the domestication for each kind of animal. A reading list at the end of each of the twelve chapters should be useful, as the authors suggest for continuing exploration of literature to supplement the contents of this book.

The authors, both animal scientists at Iowa State University, have developed in this book a clear and comprehensive reference in one source which should be useful as a basic outline for anyone interested in breed development and improvement. It should be of special interest as a reference book to agricultural teachers, breed associations, veterinarians, livestock producers, those involved in artificial insemination practices for breed improvement, and for agricultural students at both the secondary and post secondary levels.

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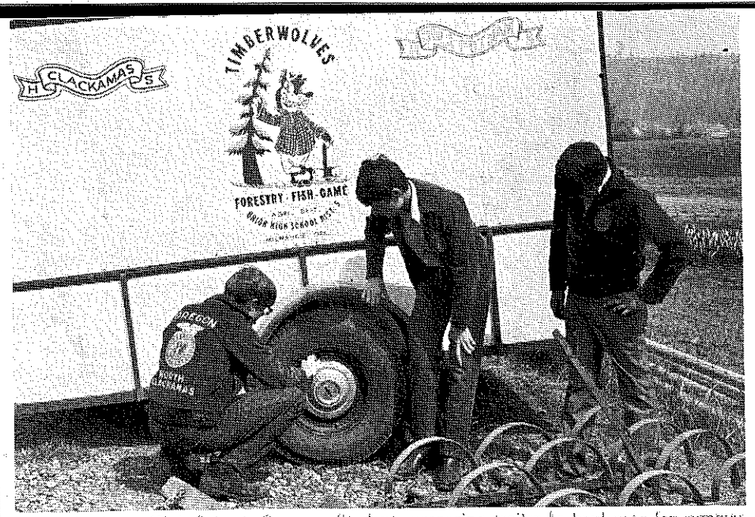
Madison, Wisconsin

KIDS GARDENING, by Aileen Paul. Garden City, N.Y.: Doubleday and Company, Inc., 1972, First Edition, 96p., $4.50.

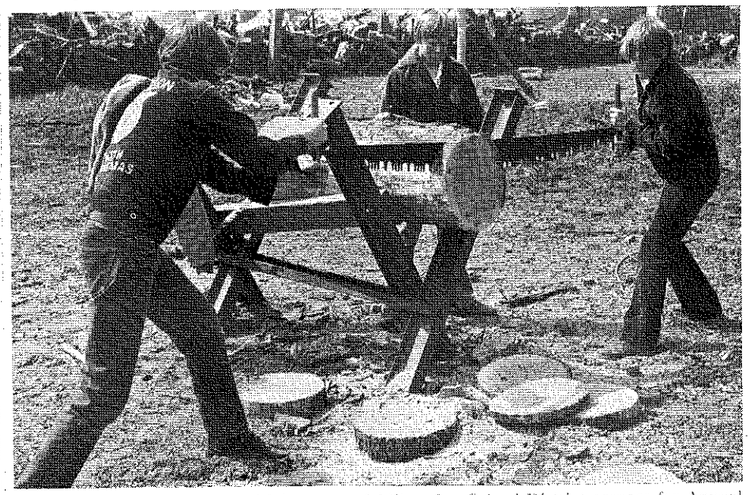
Kids Gardening is written in "cookbook" style with an abundant use of illustrations. The first chapter includes discussions on where to obtain plants and seeds; soils, including recipes for two soil mixtures; and containers for growing plants indoors. The needs of plants, including light, temperature, moisture, nutrients, and protection against pests are discussed in the second chapter. A major portion of the book is devoted to certain varieties of flowering and foliage plants as well as cacti. The proper soil and care are described for each of the varieties. Chapters are included on terrariums, arrangements, propagation, and artificial light.

This book is written on a level easily understood by students in the intermediate grades; therefore, it would be suitable for use in prevocational courses. A second use might well be with disadvantaged or handicapped students who, due to circumstances, cannot work with plants out-of-doors. To quote the author, "If you have never grown anything before, this is the book for you."

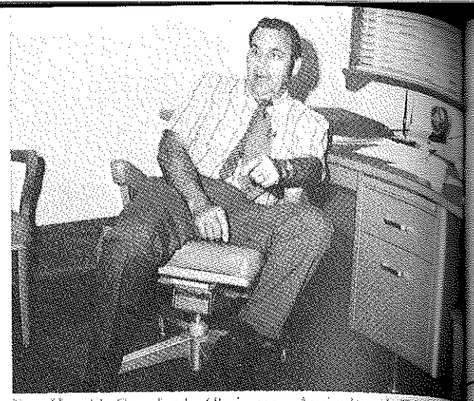
Donald E. Elson
Virginia Polytechnic Institute and State University



Clackmas High School, Oregon—Students preparing trailer to haul gear for summer field experience in forestry. Students spend three weeks at a mountain site gaining experience in forestry and natural resources. (From Gordon Galbraith, Specialist in Ag. Ed., Oregon State Department of Education, Photo by David L. Powell)



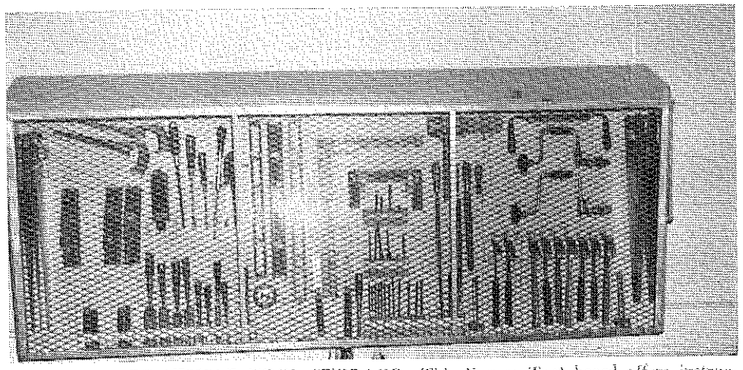
Forestry students at land laboratory of Milwaukee School District prepare for Annual Forestry Skills Roundup that involves a large portion of the more than 300 agriculture education students. (From Gordon Galbraith, Specialist in Ag. E., Oregon State Department of Education, Photo by David L. Powell)



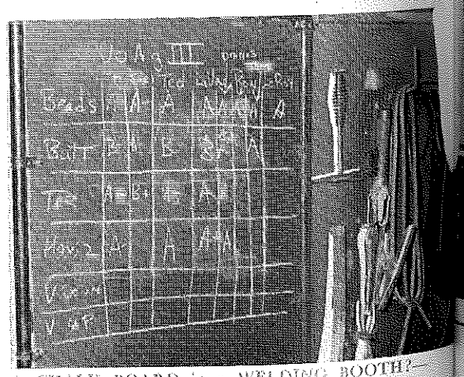
Dr. Harold Crawford, Chairman, Agricultural Education at Iowa State is noted for Unique Instructional Programs. (Photo by Richard Douglass)

Stories in Pictures

by Richard Douglass



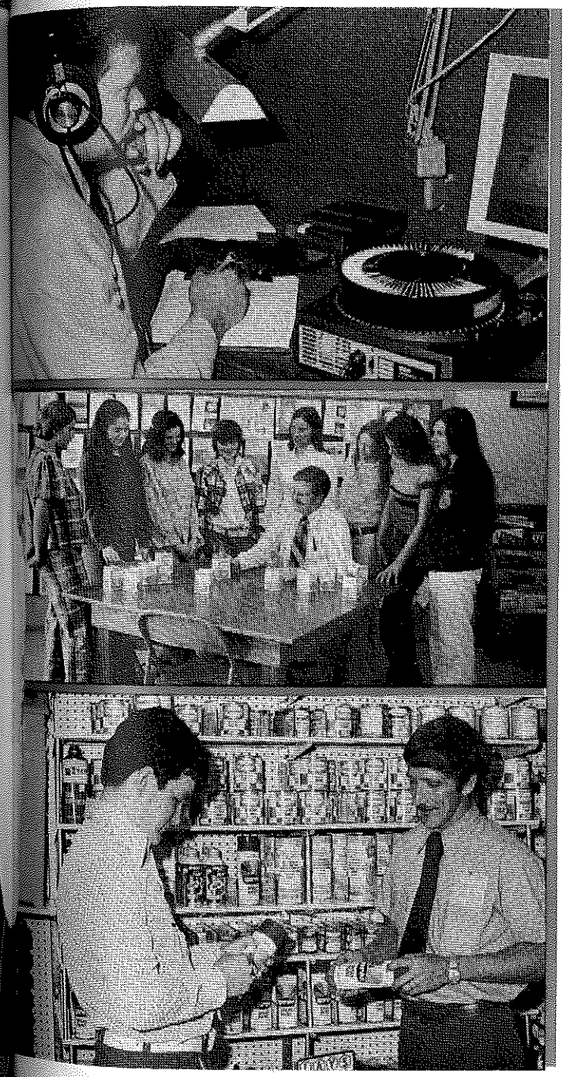
SAFE YET VISIBLE TOOL STORAGE—This Kansas Tool board offers instructors an idea that is both functional and attractive. (Photo from C. G. Eustace, State Supervisor, State Board for Vocational Education, Topeka, Kansas)



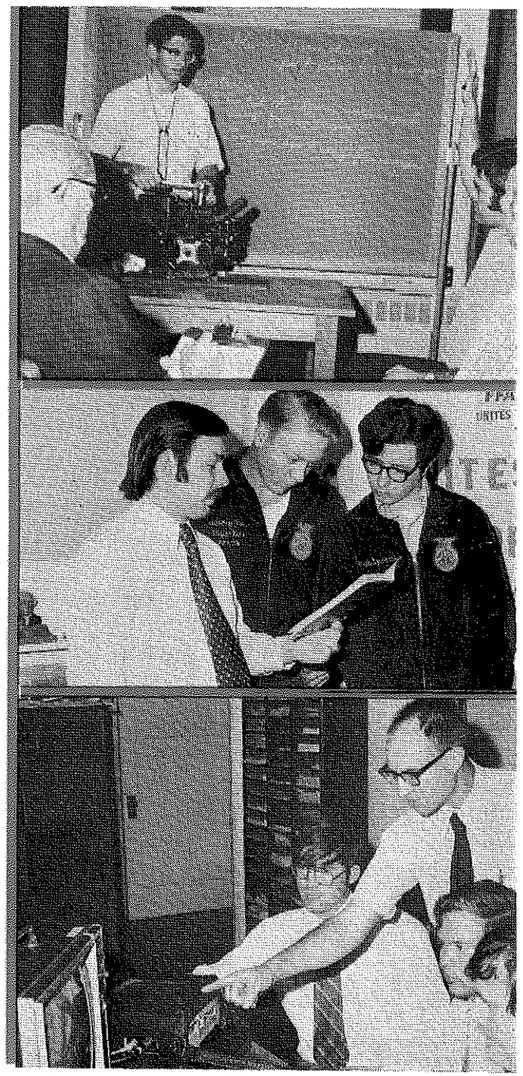
A CHALK BOARD in a WELDING BOOTH?—It was very useful when teaching welding. (Photo by Richard Douglass)

Agricultural Education

Volume 46 August, 1973 Number 2



TEACHER EDUCATION & SUPERVISION



Theme—CAREER EDUCATION: Being More Effective

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