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"COMPLIMENTARY COPY FROM THE EDITOR"

THEME: Basic Competency Programs

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Table of Contents

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Basic Competency Programs . . . Are There Any Dinosaurs?

JASPER S. LEE, EDITOR
(The Editor also serves as Professor and Head, Department of Agricultural and Extension Education at Mississippi State University.)

What should be taught in vocational agriculture/agribusiness? How should the time of students be used in learning activities? What methods and techniques of instruction should be used? These are a few of the fundamental questions which have faced agricultural educators. Answers have been sought but never really found. Our programs have involved satisficing — the decisions which were made involved compromises and imperfect information.

What Should Be Taught?

In recent years, the controversy over what to teach has been resolved by using the career objectives of our students as the base in which to build instructional programs. The approach has been that once we knew the occupational goals of our students we would conduct competency studies of the occupations. The studies would supposedly indicate the competencies people in the occupations needed. This appears to be a good approach in determining what students need to learn, and it is probably the best approach we have. This approach has precautions and, further, any assessment of it should be tempered with the everyday realities of the educational environment.

Are there knowledges and skills which people need for success which are not revealed with competency studies? Educators have the responsibility of making decisions about the level of competence to be taught and the prerequisites for instruction in a specific competency.

Other factors strongly emerge in determining what is to be taught. These include the "everyday realities" of personal interests of the teacher, pressures of the local school administration, influences exerted by state supervisory personnel, instruction in teacher preparation programs, and the available instructional materials and facilities. Do these consider the needs and interests of students?

Enter the Dinosaurs

The matter of what to teach cannot and should not be taken lightly. A personal example will be used here. The Editor has two children enrolled in the elementary school (grades 3 and 5). They know that the word dinosaur is rooted in the Greek words of dinos, meaning terrible, and sauros, meaning lizard. They know that the Brontosaurus lived in swamps and grew to about 80 feet long, while the Stegosaurs was only about 18 feet long, was protected with bony plates, and had a nerve center 20 times the size of its brain near its hip.

The children can identify and describe each dinosaur merely by showing them a picture. This raises the first problem. The picture is actually an artist's perception and may be considerably different from the dinosaurs. That which has been learned may be (and probably is) incorrect.

The next problem is that to my knowledge no mention has been made by their teachers of the animals which are of the most importance in our lives today. The differences between hogs, beef cattle, and dairy cattle have not been taught. If they were shown a photograph of these animals, they could not tell them apart on the basis of their school instruction!

Does vocational agriculture/agribusiness have any "dinosaurs"? If we look around, we might find the need for some of our instructional content to be much like dinosaurs — extinct! Or we might find some that lacks relevance to the purpose of the program and needs of students. Sometimes state and local reward systems encourage perpetration of "vo-ag dinosaurs." What about furniture making and leather working? These are obvious "vo-ag dinosaurs" in most places where they might continue to exist.

"Vo-ag dinosaurs" come to life when we don't include the proper content, use the correct methods and techniques in teaching, allocate time proportionately among content areas, and have the needed facilities and materials. These dinosaurs are further enhanced when students are not required to be active in the learning environment and the teachers are unprepared for their work.

Beyond the Dinosaurs

Beyond the obvious "vo-ag dinosaurs" there are those which are not so obvious. Some educators would use terms such as "curriculum balance" and "program relevance" to describe the less obvious dinosaurs. Local programs may be impacted by state-level curriculum guides and reward systems. Some states place heavy emphasis on livestock shows. Other states emphasize production agriculture almost to the exclusion of the real world of agricultural industry. Still other states emphasize different program areas.

The best way to overcome problems of curriculum balance is through basic competency programs, especially at

(Continued on Page 4)

Basic Competency Programs . . . Are There Any Dinosaurs?

(Continued from Page 3)

the ninth and tenth grade levels. This involves developing the curriculum around common competency areas such as plant science, animal science, agricultural mechanics, and agricultural business principles. The competencies to be included are those which are prerequisite to a wide range of agricultural occupations.

Another step in overcoming a lack of curriculum balance at the local level is through the adoption of standard curriculum and instructional materials for vocational agriculture/agribusiness. It is imperative that such materials reflect a balanced approach and allow for a certain amount of localization. The balance must be in both content and instructional strategy.

The task of developing standard curriculum and instructional materials is awesome. Input from the best research available is needed. The individuals selected for this task must be the best in our profession. They must have sound, modern philosophies of vocational agriculture/agribusiness. They must have the best intellectual capacities available and a broad understanding of programs throughout the United States. They must understand the meaning and scope of agricultural industry and the prerequisite for success in it. Even with all of these, who is to say there will be no dinosaurs in vocational agriculture/agribusiness?

The Theme — April, 1980

This issue of the MAGAZINE addresses the theme of Basic Competency Programs. The Theme Editor is Max Amberson of Montana State University. Dr. Amberson has a massive amount of experience in studying the needs of agricultural industry, carrying out competency studies, and curriculum development in vocational agriculture/agribusiness. He has solicted articles from leaders in the profession for this issue of the MAGAZINE.

The Cover

The photograph on the cover shows a student working under the direction of a partsman at Gallatin Equipment Company in Belgrade, Montana. Supervised occupational experience is important in the application of basic competencies. (Photo courtesy of Max Amberson, Montana State University.)

THEME

The Competency-Based Core Curriculum: Innovative and Accountable

BY MAX AMBERSON, THEME EDITOR

Editor's Note: Dr. Amberson is Head of the Department of Agricultural and Industrial Education at Montana State University. He has assumed many positions of leadership in the profession, including his current position as President-Elect of the American Association of Teacher Educators in Agriculture.

The vocational educator's concept of the kind of education required for each individual is not particularly different in theory from that of the academician's. It is deplorable to find a high school graduate, or even a dropout, who cannot read, write, speak, or do simple calculations. It is also deplorable that many people do not have a thorough understanding of both the nation's heritage and his or her own family heritage. It is unexcusable if the person cannot find employment because he or she has not been prepared to become an employable, productive citizen.

Courses which made up the academic and vocational curricula of high schools, technical schools, and colleges once were thought to be adequate in preparing people for life and for gainful employment in agriculture. This has been proven to be a false assumption. Students taking an English course, for example, did not always improve their basic skills in reading and writing. Likewise, taking a mathematics course does not always improve the ability of students to do mathematical calcuations. Furthermore, enrolling in an animal science course does not ensure that a student will be adequately prepared to manage livestock.

The general public has become alarmed about schools and courses taught within the schools. Forces both within and outside the school system are making demands that schools be held accountable — responsible for students learning what schools purport to be teaching. The concept of accountability is perhaps the major reason why educators are now emphasizing total programs of competency-based instruction rather than "a one or two year course." The shift to competency-based instruction does not mean that some traditional courses will not continue to be taught. The major concern will be to develop an instructional program that is integrated and designed for a purpose and that results can be measured by people observing and studying the program.

With competency-based instruction, the specific knowledge, skills, attitudes, and experience expected to be learned by students in each course will be stated so the results are measurable by the teachers, students, parents, and society in general.

Core Curriculum in Agriculture/Agribusiness

Core curriculum is a new concept in agriculture/agribusiness education. Since 1970, efforts in Arizona, California, Iowa, Montana, Ohio, and a national U.S. Office of Education funded competency study conducted by Dave McClay, professor emeritus from Pennsylvania State University, have successfully identified job titles and accompanying competencies required for entering these occupations. Today, some interesting trends in agricultural education are developing in several states. These trends indicate that curriculum developers are designing and recommending that teachers teach a one or two year competency-based core curriculum to all students interested in agriculture/agribusiness.

Where states have developed core curriculums, the areas of emphasis most commonly included are: leadership and personal growth, occupational experience programs, an orientation to what constitutes agriculture/agribusiness and the accompanying career opportunities, and general knowledge/skills attitudes and experiences in plant science, animal science, and agricultural mechanization. The particular competencies taught have been selected for their importance in the common job titles born out by occupational analysis.

Students in high school are often unable to identify a specific career goal because they are not familiar with all the alternatives available in the broad spectrum of employment in agriculture/agribusiness. Yet, they know they want to work somewhere in the industry. Research data about employees in agriculture/agribusiness show that nearly all workers in the industry must possess certain basic or common competencies. The core curriculum can provide these common competencies and prepare a foundation upon which to build specialized agricultural programs. Core programs are generally two years in length in high schools having four grades but in high schools having three grades, one year core curriculums are more usual.

While there is a need for a core curriculum for all students, there also is a need for specialized instruction. Specialized instruction is divided into two major areas: production agriculture and agribusiness. Agribusiness is further subdivided into the areas of services and supplies; agricultural mechanics; products, processing and marketing; horticulture; renewable natural resources; and forestry.

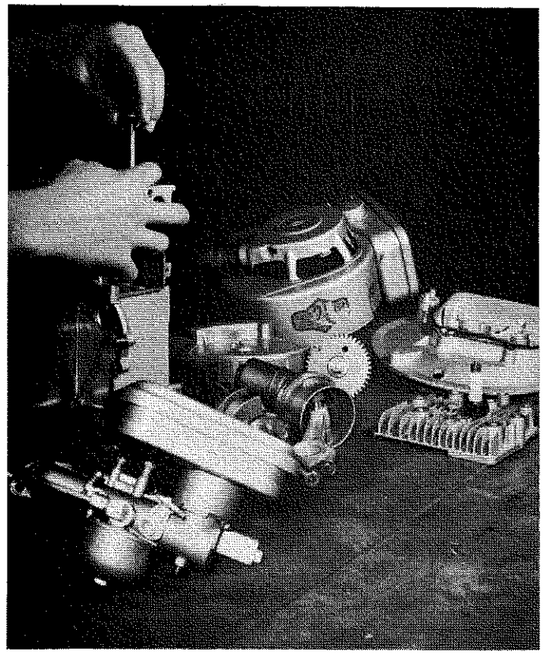
Specialized Programs

In a competency-based curriculum, specialized programs of vocational agricultural education are built on the knowledge, skills, attitudes, and experiences developed by students participating in the core curriculum. Students desiring specialized instruction beyond the core curriculum need to determine the specialized area of instruction in agriculture in which they wish to enroll. This area of emphasis is usually defined while the student is enrolled in the core program.

The degree to which schools may wish to offer specialized programs in agriculture/agribusiness is determined locally by constraints of time, school size, and organization, teacher qualifications, financial resources, adequacy of physical facilities, and the demand for employees in a particular specialized area of instruction.

The U.S. Interdepartmental Committee on Employment Opportunities and Training Needs in Agriculture/Agribusiness reported in 1975 that the schools and two-year post-high school institutions were meeting only 27 per cent of the replacement needs for full-time employment in agriculture/agribusiness. Even now, America's high schools and two-year colleges and institutions seem to be having trouble preparing enough trained employees to replace these who are leaving or retiring from the agricultural industry. Not only will replacements be needed for persons leaving the industry, but people will be needed to fill new jobs yet to be identified as the agricultural industry continues to change and expand in an effort to deal with new technology and the worldwide need for more food. Yes, future employment opportunities are still bright for those who are trained in the respective areas of agriculture/agribusiness.

Competency-based vocational programs provide a new mechanism through which schools can work to assure that American agricultural production/agribusiness will be provided an adequately trained work force. A trained work force performs substantially better than one not having received and perfected specific knowledge, skills, attitudes, and experiences. American agriculture can be proud that its production per man hour has continued to increase as compared with other sectors of our economy. Vocational education in agriculture continues to contribute to this position by helping to train the work force.



Small internal combustion engines play a vital role in performing necessary work in agriculture/agribusiness. Operation, trouble shooting, and maintenance skills are considered core agri-mechanics competencies.

THEME

What Is A Competency-Based Core Curriculum In Vocational Agriculture?

Down through the years different curricular patterns for vocational agriculture have been espoused, used, and sometimes discarded. Among them have been the horizontal or traditional, vertical or spiral, fused, cross-sectional, modified cross-sectional, and modular approaches. Now increasingly, teachers are being encouraged to develop and use a "competency-based core curriculum." What is such a curriculum? How does it differ from other curricular approaches? If such an approach is sound, is developing and using such an approach a logical responsibility of the local teacher of vocational agriculture or should a state-wide competency-based core curriculum be developed and then used by teachers in local programs? These are the three questions addressed in this article.

By James E. Christiansen

Editor's Note: Dr. Christiansen is a Professor in the Department of Agricultural Education at Texas A & M University. He has been actively involved in agricultural education for a number of years.

What is It?

To describe a competency-based core curriculum we first need to define four terms in the context in which they are (or should be) used, namely, curriculum, core curriculum, competency, and competency-based curriculum.

As used here, a curriculum is ". . . a body of prescribed educative experiences under school supervision designed to provide the individual with the best possible training and experience to fit him for the society of which he is a part, including qualifying him for a trade of profession."[1] In other words, the curriculum is the total of all the intra-extracurricular purposive learning experiences acquired by the student while under your thumb as the teacher. This includes such activities as FFA leadership activities, formal study in the classroom, informal teaching-learning activities built around productive enterprises or cooperative work experiences, group activities, individual activities, activities at school, activities in the community, activities in the agricultural mechanics shop or land laboratory, and activities conducted at home but growing out of school-based experiences.

It follows, therefore, that a core curriculum is that body of intra-extracurricular experiences which provide the knowledge, skills, interests, understandings, appreciations, attitudes, values, and ideals considered important for all students to possess irrespective of their sex, socio-economic background, or particular vocational goal in agriculture.

A competency reveals a person's ability to perform beyond that level of simply demonstrating knowledge. Specifically, competencies in vocational agriculture mean performing those tasks and skills and displaying those ". . . attitudes, values, and appreciations, that are deemed critical to successful employment."[2]

A competency-based curriculum has been defined as "A program composed of the essential task elements of a specific occupation. Performance objectives and content are identified by the analytical process. The student's accomplishment of an objective, under prescribed conditions complying with designated standards, is accepted as indication of mastery of the various elements of the occupation."[3] Such a program ". . . specifies the desired objectives or competencies in an explicit form, identifies the criteria to be applied in assessing the learner's competencies, and holds the learner accountable for meeting those objectives."[4]

Thus, if learning basic arc welding competencies is part of the core curriculum, one might reasonably expect to see the following competency expected of the student, namely, to be able to weld ¼" mild steel plate together using 5/32 inch, E-6011 electrodes to make single vee butt welds which can be bent double without the weld breaking. It may thus be seen that the teacher's establishing and using behavioral objectives in instruction fits well into the framework of a competency-based core curriculum.

Maynard J. Iverson of Auburn University relates the following personal incident which succintly describes what a competency-based curriculum, and the competency-based education which should result, is all about. While talking with his family physician, Dr. Iverson responded jokingly to the M.D.'s complaints of "too much to do" by saying that he would be glad to help him — for a cut of the loot. The doctor looked at Iverson and said, "Fine, but what can you do?" Obviously, Iverson was unable to perform the tasks of a physician and therefore did not get the job.

How Does A Competency-Based Core Curriculum Differ from Other Curricular Approaches?

The main difference is that in such a curriculum ". . . the student is held accountable for the demonstration of precisely specified competencies. The emphasis is on demonstrated output and not on participation. Thus it is that competency-based programs may be described as achievement-based while traditional programs are experience-based or activity-based."[5]

A competency-based core curriculum is compatible with the basic philosophy in vocational education that the emphasis should be on a student learning "how to grow corn" rather than on a student learning "how corn grows." It is realized of course that a prospective corn farmer needs to know how corn does grow in order to do a better job of growing corn.

The accompanying table compares a "typical" traditional curriculum and a competency-based core curriculum (CBCC). It should be remembered, however, that some threads of commonality exist between the two approaches. For example, in both curricular approaches the common thread exists of developing a person's ability to think, a thread which underlies all American educational efforts.

Should A Competency-Based Core Curriculum Be Developed in a Local District?

In view of the description of the type of curriculum outlined above, it would follow that the components of a competency-based core curriculum would be best assembled by you, the local teacher, since you are in the captain's chair of being a director of a program of vocational agriculture and able to assess, consider, and juggle the three core components in a curriculum. Those components are the input (or student), teaching-learning experiences, and output (or graduate) of a curriculum. Curriculum planning is a problem-solving approach. You, the local teacher, are the one in the best position to solve the problem of deciding what is the best core of teaching-learning experiences for the students in your care since their needs change from year to year, month to month, and even from day to day. The late agricultural educator, Dr. Philip R. Teske, pointed out that in designing a curriculum you have to ask four questions.

They are: (1) Where are my students? (2) Where do I want my students to be on completion of this curriculum? (3) How can I most efficiently and effectively get my students from where they are to where I want them to be? and (4) How well are my students doing?[8] You, with the help of community and school resources, are in a position to answer those four questions most effectively.

Should a statewide CBCC be designed for implementation by local districts, it would seem that two consequences might result. First, so much might be included in the competency-based core curriculum that it may become general and little time for "local option" might be available for the local teacher to use to include those core topics essential because of the uniqueness of a particular group of students and community. Second, and most importantly, a state imposed core curriculum might effectively destroy the decision-making role of the teacher at the local level. As pointed out by Pautler, the teacher should be involved in making decisions about the curriculum if that curriculum is to be meaningful to the student, the learner.[9]

However, it would be most appropriate, and feasible for a state or a region to provide resource materials that may be used by teachers in developing a competency-based core curriculum for their particular local situation. The precedent has been set for such undertakings by the activities of several of the curriculum materials development centers in their respective states.

Conclusion

A curriculum that emphasizes holding the student accountable for demonstrating competence in previously specified competencies needed for employment has a place in vocational education in agriculture. Such a curriculum needs to be given serious consideration.

(Continued on Page 14)

TABLE 1
Comparison of a "Typical" Traditional and a "Typical" Competency-Based Core Curriculum (CBCC) Program*

Characteristics	Traditional Program	CBCC Program
1. Competencies to be demonstrated by the student are:	a. Derived from committee consensus b. State in general terms c. May or may not be made public	a. Derived from explicit concepts held of student roles upon completion of program b. Stated so that competence may be assessed c. Made public in advance
2. Criteria to be employed in assessing competencies are:	a. Based upon general program objectives b. General with respect to stating levels of mastery expected	a. Based upon specified competencies b. Explicit in stating levels of mastery under specified conditions c. Made public in advance
3. Assessment of the student's competency:	a. Uses course grades as evidence of competence b. May or may not include performance as well as knowledge c. May or may not focus on objectivity	a. Uses performance as evidence of competence b. Takes student knowledge as it relates to performance into account c. Strives for objectivity
4. Rate of student progress through program is determined by:	a. Predetermined time of completion of course	a. Demonstrated competency b. Emphasis on exit, not entrance requirements
5. Instructional program is intended to:	a. Facilitate the student's achievement of certain general program objectives	a. Facilitate development and evaluation of the student's achievement of specific competencies
6. Instructional program is more likely to:	a. Emphasize group instruction	a. Be individualized and personalized

*Adapted from Finch and Hamilton, 1975, and Elam, 1971.

THEME

Implementing A Competency-Based Curriculum

By Floyd G. McCormick

Editor's Note: Dr. McCormick is Head of the Department of Agricultural Education at The University of Arizona. He has been actively involved in numerous curriculum development activities in Arizona.

The term "competency-based instruction" is in vogue and rightly so. However, this concept is nothing new to vocational agriculture teachers. Since the enactment of the Smith-Hughes Act in 1917, teachers have used problem solving in their day-in, day-out teaching. Application of agricultural technology and science, through supervised occupational experience programs, has been the accepted approach. Teachers of vocational agriculture have always championed the integration of theory and practice. "Learning to do" means developing competencies.

Further evidence that competency-based instruction is nothing new to vocational agriculture teachers can be found in Bulletin 4, "Objectives for Vocational-Technical Education in Agriculture," published in 1966 by the U.S Office of Education. The first two major program objectives cited in this document state:

1. To develop **agricultural competencies** needed by individuals engaged in or preparing to engage in production agriculture;
2. To develop **agricultural competencies** needed by individuals engaged in or preparing to engage in agricultural occupations other than production agriculture.

The instructional program in vocational agriculture has always been based upon two basic ingredients, namely:

1. employment opportunities existing in agricultural occupations, and
2. those competencies associated with major job titles found in these occupations.

In essence, vocational education in agriculture = jobs + competencies. Teachers have always defined vocational agriculture as "specialized educational training for specific agricultural occupations."

What Is Competency-Based Instruction?

Competency-based instruction is designing and delivering educational strategies which will teach students those knowledges, skills and attitudes (competencies) needed for successful entry into employment and advancement in agricultural occupations. It is nothing more than identifying those competencies which students should possess if they are to make a successful entry into agricultural/agribusiness occupations. Once identified, teachers need to develop their teaching activities around those competencies. There is the need to design every unit of instruction to culminate in a performance objective. A performance objective is one in which a problem, decision, or activity is used to apply the subject matter taught in the unit. If properly planned, these performance objectives employ the competencies taught. Finally, provisions must be made for recording those actual agricultural competencies taught to students enrolled in vocational agriculture programs.

Why Implement?

The message is coming in loud and clear! "People do not know what kinds of occupational preparation programs are currently being offered in vocational agriculture." Of more consequence, they do not know what kind of a product we are producing.

How would you answer these questions?

1. Are you producing an employable product as a result of your vocational agriculture instructional program?
2. Do employers look to your vocational agriculture graduates as potential employees?
3. Do your vocational agriculture graduates really know what they can do from a competency standpoint?
4. Do your students graduate with a list of actual agricultural and human relations competencies they can perform with some degree of mastery?
5. Do you really "have a handle" on what your students CAN DO as prepared manpower for the agricultural industry?

If you can answer each of these questions in the affirmative, you probably already have in operation a competency-based instructional program.

Value of Competency-Based Instruction

The obvious benefit of competency-based instruction is that it helps assure that we are providing vocational education as it should be — **specialized instruction for specific occupations.** From a curriculum planning standpoint, it helps teachers make decisions relative to **what to teach, when to teach it** and **how long to spend on it.**

Vocational agriculture must become, and be recognized as, a viable delivery system for prepared manpower for agriculture. Competency-based instruction is one vehicle to help accomplish this goal.

How to Implement

Teachers, by and large, are not reluctant to approach the task of implementing a competency-based curriculum in their vocational agriculture programs. However, they need assistance. They need help to determine (1) why implement, (2) how to implement, and (3) what to use.

In actuality, implementing a competency-based curriculum amounts to little more than "putting into a package" what teachers of vocational agriculture already have available and what they have been using all along. Five easy steps are suggested along with **why, how,** and **what to use.**

Step 1. Set a goal and make a solid commitment to initiate a competency-based instructional program in your department in 1980-81.

Why?

Each of us must plan and deliver the type of instructional program which will equip our students with saleable/marketable skills. We must plan our instruction in such a manner that a problem, decision, or "hands-on" activity is used to apply the subject matter taught in the lesson. If properly utilized, these activities can become the competencies taught. We must tell the many publics (especially our students) what we are teaching. Of more consequence, we must let students, parents, and employers know what competencies our vocational agriculture graduates possess as a result of our instructional program.

How?

- Poll your students to determine what saleable skills they feel they possess.
- Ask parents and key agribusinessmen in your community what they believe graduates from your department possess in the way of saleable skills
- As a teacher, answer this question: "What kind of a product am I producing?" Document!
- Discuss competency-based curriculum with school principal.
- Discuss with advisory committee.
- Begin using performance objectives for teaching units.
- Identify competency-based instruction as one of the goals in the annual department program of work.
- Make a sincere professional commitment to implement a competency-based curriculum in 1980-81.

What to Use?

- The statement of philosophy endorsed by the Agricultural Education Division, AVA.
- The identified set of Standards for Quality Vocational Programs in Agricultural/Agribusiness Education.
- Federal legislation emphasizing competency-based instruction.

Step 2. Identify a list of agricultural and leadership competencies you plan to teach in your course of study by years. Reproduce and distribute this list to students. Refer to this listing continuously.

Why?

To design and deliver a "true" vocational program in agriculture, you must base your instructional program, to a large extent, upon the employment opportunities in agricultural occupations in your community along with those competencies (knowledges, skills, and attitudes) associated with the major job titles within these occupational clusters. Planning instruction in this manner will provide the basis for identifying essential competencies to be taught in your curriculum. Of more consequence, there will be some degree of assurance graduates from your program will possess essential saleable skills.

How?

- Review employment opportunities in agricultural occupations in your community, state and region.
- Survey people employed in these occupations to determine essential competencies associated with these occupations (conduct task analysis).
- Utilize the competencies identified and validated in the **National Ag Occupations Competency Study.**
- Refer to competency studies conducted by various states (Arizona, Iowa, Ohio, etc.)
- Develop a tentative list of agricultural and leadership competencies to be taught in your course of study by years.
- Involve advisory committee, along with key agribusiness personnel, to finalize list of competencies to be taught.
- Reproduce and distribute to students, parents, employers, advisory committee members, school guidance personnel and administrators.
- Use list of competencies to plan your annual curriculum.

What to Use?

- Local and state task/job analysis
- Research studies dealing with competencies needed in various agricultural occupations.
- **National Ag Occupations Competency Study.**

Step 3. Develop and utilize a system for recording the competencies taught to your students.

Why?

One means to provide a measure of program accountability is to be able to present evidence that your students have been taught specific competencies and can perform these competencies.

There is a need to establish a form or folder whereby students can record those competencies they have been taught. As soon as students have been taught a specific competency, each student should record the competency on their own form. This system then becomes a "running record" of specific competencies taught your students.

How?

- Decide upon the format which you can best utilize to record those competencies taught. Set up a form or folder for recording competencies for each student in each class.
- Have students record actual competency as soon as taught.
- Set aside class time periodically to check individual student's record of competency accomplishment.
- Consolidate other required records, such as long range SOE program plans, into one system.
- Have students also record those competencies developed through their SOE programs including improvement projects and supplementary skills.

What to Use?

- "Student Supervised Occupational Experience Record", from the Interstate Printers and Publishers, Inc., Danville, Illinois.

(Continued on Page 10)

Implementing A Competency-Based Curriculum

(Continued from Page 9)

Step 4. Develop an evaluation scale for each competency taught which will indicate the degree of mastery of the specific competency.

Why?

The mere "checking off" of competencies taught or learned by students is not enough. A method which will provide an indication of the relative degree of mastery of each specific competency learned by students must be developed. As competencies are completed, provisions should be made for students to record actual date of accomplishment. The teacher should then indicate the degree of mastery of the competency on the evaluation scale.

How?

- Incorporate evaluation scale on format (system) developed in Step 3.
- Involve advisory committee to assist in establishing evaluation scale.
- Include degree of mastery in performance objectives for instruction units taught.
- At the time students record actual competencies they have learned, date of accomplishment and degree of mastery should also be recorded.
- Establish time periodically to record teacher's evaluation.
- Use competency accomplishment to evaluate, in part, individual student's performance at end of each grading period.

What to Use?

- Select a suitable evaluation scale.

Example A — Experience-oriented

1 — observed, knowledgeable
2 — exposed to how to perform
3 — actually practiced in school setting
4 — actual application made
5 — experienced in real job situation

Example B — Achievement-oriented

1 — Excellent
2 — Good
3 — Average
4 — Lacking
5 — Poor

Step 5. Design a reporting system (or procedure) for reporting and recording actual competencies taught in your instructional programs by years.

Why?

In order to communicate the instructional intent and outcome of your program, it is essential for you to synthesize a list of agricultural and leadership competencies taught your students in each class. Remember, there could be a distinct difference between what you planned to teach and what you actually taught. It is anticipated, if effective planning took place, there will be a high degree of consistency between what was planned and what was taught. These composite lists of competencies become the evidence relative to the kind of product produced by your vocational agriculture program. They should be placed in the individual permanent files of students.

Copies of actual competencies taught should be shared with school administrators, state departments of education, advisory committee members, parents, and employers. In addition, each program completer should have a list of those competencies they possess. Be sure that they "know" they have mastered these competencies.

How?

- At the conclusion of each grading period, synthesize a list of agricultural and leadership competencies **actually** taught students in each class.
- Periodically check individual student folders to determine whether students have recorded actual competencies taught.
- Use class time to check competencies taught (at least once each grading period).
- Place list of actual competencies taught with evaluation in each student's permanent file.
- Composite lists of competencies taught should be sent to school administration and the state department of education.
- Students should take folder listing competencies upon graduation.
- Department keeps one copy of the competency report form in a permanent file.
- Upon graduation, issue each program completer a certificate which indicates those agricultural and leadership competencies mastered.

What to Use?

- Permanent record of competencies gained by years enrolled in vocational agriculture.
- Certificate of competence.

Summary

The use of these five easy steps will provide a system for implementing a competency-based curriculum in your vocational agriculture program. At the same time, it will provide objective evidence of what your students are actually taught. Accountability of the program, in part, will be in the recorded evidence. Graduates of your program, when asked, "what can they do?" will be able to share with potential employers **what they can do,** as well as provide an indication of **how well they can perform** each competency gained from the vocational agriculture program.

A little planning and some record keeping will do the job. However, there is one caution: Be sure your students can actually perform those competencies listed! It would be disastrous to imply that your students have mastered certain competencies when in reality they cannot "produce as advertised." Program and product creditability must be maintained, else we lose it all!

THEME

Pros and Cons . . . Should We Adopt A Statewide Curriculum?

By Paul Marvin

Editor's Note: Dr. Marvin is Professor and Head, Division of Agricultural Education, University of Minnesota at St. Paul.

Discussion concerning what should be included in a curriculum or educational program must begin with an examination of the foundation or philosophy for the curriculum.

In defining curriculum, the core or basic portion becomes a part of the definition and as such requires a pro and con consideration. While I believe the secondary programs of agriculture should have a common core, it is necessary to examine the con side to arrive at a rational decision. The purpose of this article is to examine those negative aspects of a common core curriculum. A purpose of education is to seek the truth. If we ever assume we have found it, we will very surely be in trouble!

Assumptions

Any curriculum based on a common core must assume that someone or some group of persons knows what the content of the core should be. My earliest experience with core content was in my first teaching position as a teacher in a rural ungraded school. Every teacher was given a course of study guide that specifically identified what should be taught in each subject at a given grade level. For example, the fourth grade should learn the multiplication tables through 9 x 9 and the sixth grade should be taught European geography. The number of weeks to be assigned to specified areas of geography was stated and the duty of the county superintendent of schools was to monitor the adherence to the core curriculum. I often wondered about the source of wisdom to decide how much time should be assigned if the time were to be appropriate for all teachers and all students. In order to have some measure of how well the school followed the curriculum, the students were required to pass standard state-wide examinations in the seventh and eighth grades.

When I Taught

One of the advantages of common core curricula is that the beginning teacher knows precisely what the content of a course will be. While I was only 19 years of age, with one year of training beyond high school that first year in 1937, I was confident that I knew what to teach. I have never had that level of confidence in any year since.

The rigidness of the basic program has since given way to the more flexible curricula which are now so flexible as to be considered by some to be disorganized or non-directional. In the minds of some professionals, agricultural education curricula in the secondary schools are tody non-directional.

Today's Taxonomy

As we look at the taxonomy of programs, the following areas are listed: production agriculture, agricultural supplies and services, agricultural mechanics, horticulture, agricultural resources, agricultural products, and forestry. Is there anything common to all of these that could be identified as core? The word agriculture appears in nearly all titles, but if we do in fact prepare at the secondary level for employment in all of those areas, the common core becomes difficult to identify. Cayce Scarborough, writing in the December, 1970, issue of The Agricultural Education Magazine, suggested that we should be looking at a broader program. He stated that if we continue to use the term "individuals engaged in or preparing to engage in agricultural occupations," we eliminate all of those occupations requiring bachelor, masters, or doctoral degrees. If we broaden the program, do we broaden the core or does the core become less contributory to many of the broadened occupational areas? The answer to these questions would tend toward less total content to be identified as common core.

Core Versus Individualized Instruction

The shift away from a rigid core curriculum was the result of instructors desiring to tailor curricula to better meet the needs of different communities and students. Instructors were taught, and in most states, still are, that the first step in planning an agriculture program is to "survey the community" so that the curriculum will fit the needs of the community and students of the school area.

Agriculture instructors have long been proponents of individualized instruction. Core curricula and individualized instruction appear to be philosophically inconsistent. Theoretically the most effective individualized instruction would probably require each student to have a curriculum individually tailored. The recommendations for teaching the disadvantaged are advocating such a system.

In determining the percent of a total course of study that might be in a common core, the inability to change to meet the changes of the field must be considered. Much of the content in the field of agriculture is in a constant state of

(Continued on Page 12)

flux. Changes in the core are likely to be delayed long after the core has become outdated. Even in the pure sciences of physics, mathematics, and soils, what was considered core and basic is being changed daily by new information discovered by research.

The atom was once defined as the smallest unit into which an element could be divided. I trust the core content of the physics curriculum was changed with a minimum of delay. Less dramatic discoveries are likely to occur and not be taught if the instructor doesn't assume full responsibility for keeping up-to-date in the field. The greater the portion of a total curriculum included in a core, the more likely needed changes will be slow to reach the classroom instruction.

Earl Price, writing in the August, 1966, issue of THE AGRICULTURAL EDUCATION MAGAZINE, stated that: "only a poor curriculum never becomes obsolete." He further indicated that the vocational agriculture curriculum instead of offering a wide variety of production practices and skills, will offer particular courses in agricultural chemicals, ornamental horticulture, forestry, and the like, each planned to provide knowledge and skills for a cluster of agricultural occupations. As specialization increases, the portion of a curriculum that is common will become smaller if it isn't destined for obsolescence.

Curricula with a great deal of commonality is a publisher's paradise. The difficulty with a textbook becoming the curriculum is that it is likely to remain in use after updating is needed. The American Farming series of texts (published by Webb Book Co. in 1941) is a case in point. Many teachers had a tendency to repeat the common core material in each of the grade levels, with little change being made each year. I would guess that today this series of texts is considered obsolete, not only for its curriculum organization, but also for its content.

Why We Need A Core

Returning to the pro and con positions for a common core in the vocational agriculture curriculum, I come to the conclusion that at this time in vocational agriculture a common core can be useful. When we observe how far afield some of our secondary programs have gone in the name of agriculture, some mechanism is needed to help us define our discipline. Course titles, such as natural resources, mounting fish and game, flower arranging, pet care, and horse grooming, can be found in many vocational agriculture programs. While specialization and local adaptation should be a consideration in developing a curriculum, I have difficulty finding much common instruction in these course titles. The common core is needed to help the beginning and many of the older teachers have some confidence that they are teaching the right thing.

A more clearly defined curriculum which includes all of those activities associated with the learning will help teacher educators to develop a curriculum that will prepare instructors for the job they are expected to do. We may have less frustration of young instructors and an improved ability to attract and hold them in the field if the job can be more clearly defined.

From Job to Classroom and Back Again

BY DOUG BISHOP

Editor's Note: Dr. Bishop is a Professor in the Department of Agricultural and Industrial Education at Montana State University. He has been closely involved in the research described in this article.

The title is not so much a play on words as it is an accurate description of the way vocational agriculture leaders in Montana chose to identify and prepare curricula. The basic approach was to identify those competencies that were appropriate to be taught in high school vocational agriculture departments. The process, funded by grants from the Superintendent of Public Instruction and the Montana Agricultural Experiment Station, involved the persons employed in the selected occupations and their supervisors, the local teachers, and the teacher training institution. The procedure, although lengthy and at times very frustrating, did involve those being affected by the program, a principle that we in vocational education have embraced from the beginning of our program. This article will report on the different phases of the project.

Phase I

The long range effort was divided into phases in order to establish benchmarks against which progress could be measured. Each major phase was subdivided into smaller more manageable segments.

Evaluating the Job Market. At the time the project began, there was a considerable amount of apathy toward agricultural education. Many said, as some still do, agriculture was declining and the opportunities for employment were quite limited. Our first step was to test the staff's assumptions that there were jobs in the state that needed training that could be provided through vocational agriculture, and that the right kind of training was not always being given through the programs that were being offered at that time.

In order to evaluate the nature and extent of the job market, potential employers were categorized into two groups, those in production agriculture and those in agribusiness. The agribusiness group was further divided into the six remaining taxonomy areas. A sample of the employers was contacted and asked to describe their present and projected employment needs. The data was summarized to determine the order in which the seven taxonomy areas would be developed both for the identification of job competencies and the subsequent development of instructional material.

The employment data was collected through the use of mailed survey instruments and direct contact through the use of the telephone. Two reports were prepared that could be used to document the findings to the appropriate clientel.

Phase II

In addition to gathering data used to quantify and describe employment needs, phase one was used by the researchers to establish a list of names and addresses of agricultural employers (both producers and agribusiness persons) who could be contacted later to help identify and verify job competencies.

Job Titles. Job titles were prepared for each of the taxonomy areas. The initial list of job titles was verified by interviewing a number of managers. Changes were made in the list of job titles prepared by the staff to coincide with the job titles actually being used by the employers in the field.

Competencies. An exhaustive review of previous research efforts, a search of the literature, and interviews with selected workers and managers resulted in an initial list of entry-level competencies needed by the workers in the various job titles. Several revisions and trial runs resulted in an instrument for each job title in the taxonomy areas in which each competency could be ranked depending on its importance as perceived by the workers and their supervisors.

The actual completion of the instruments was accomplished through personal interviews. An interviewer's manual was developed, interviewers were trained through a special training session and sent into the field to gather the competency data. At this point, vocational agriculture teachers were utilized along with other departmental and university interviewers. Some of the interviewers had been trained by the Department of Sociology at Montana State University and resided in several areas of the state. Workers and their immediate supervisors were interviewed.

After gathering, the data was summarized and analyzed. Comparisons were made between the opinions of the workers and their supervisors relative to the importance of each competency to the success of the worker. A weighted value was given to each competency. A final report was prepared for each of the taxonomy areas containing the job titles and the competencies needed by each worker in the respective taxonomy areas.

Competency Commonalities. Needless to say, the assorted efforts to identify needed job knowledges and skills resulted in the identification of some 3500 different competencies. Thus, the objective at this point was to analyze the previously identified competencies to determine if commonalities existed among the numerous job titles as identified by the initial studies. To accomplish the task, each statement was placed on a card along with its mean, importance rating, and the job title to which it was related.

On the first sort, those competencies considered unique to each job title were pulled out. The remaining were then sorted into eight main cores: animal science, plant science, mechanics, clerical, leadership, business management and marketing, merchandising, and miscellaneous. This division had been devised by Arizona State University in designing curriculum for a core curriculum project. The eight main cores were further subdivided into sub-cores under each of the aforementioned categories. Completion of this step allowed the vocational agriculture teachers and the departmental staff to direct their attention to the feasibility of establishing programs in which there was overlap or commonality among identified job titles. These areas were used later to form the skeleton upon which teachers' curriculum guides were prepared.

Phase III

With the agricultural competencies commonalities identified, curriculum could now be prepared. This step in the curriculum development effort was designed to involve selected vocational agriculture teachers. Fifteen teachers were selected to participate in a two-week summer workshop on the basis of their interest in the project. All districts of the state were represented by one or more teachers. Dr. Phil Zurbrick, teacher educator from Arizona, was asked to consult with the teacher and teacher training staff.

Before moving ahead, a number of questions had to be answered. At this point, the teacher education staff stepped into the background and let the teachers themselves seek answers to the following questions:

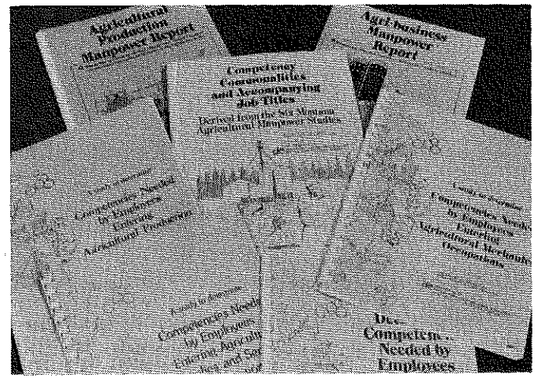
1. What kind of curriculum format would be most acceptable in light of the Montana program?
2. In what way should the competencies be packaged to insure their inclusion in the instructional program?
3. How should the curriculum material be packaged?

After much discussion with the consultant and in light of the long range program objectives, the teachers decided that a two-year freshman and sophomore core would be developed with specialized programs for the junior and senior years of high school. The core program for the first two years included: animal science, plant science, agriculture mechanics, leadership, careers, and supervised occupational experience. Specialized programs were identified for the junior and senior years.

The teachers discovered that questions two and three could not be considered separately. The core would in-

(Continued on Page 14)

clude: (a) areas of instruction, (b) units of instruction, (c) competencies upon which to base instruction by job title, (d) concepts to be taught, (e) objectives to be taught, and (f) suggested subject matter content. Upon the suggestion of the teachers, resource units were developed to facilitate the core instructional program. These resource units were to include questions and problems for discussion, suggested student activities, teaching aids and equipment, and suggested teacher references.



The teachers attending the workshop were then divided into teams, given the lists of competencies, and asked to sort them according to the previously described core. Their most important task as far as curriculum development was concerned was to sort the competencies by grade level: freshman, sophomore, junior, senior or postsecondary. Thus, the advanced level competencies were not included in the instructional units prepared for the core curriculum.

Phase IV

Once the competency commonalities had been identified and categorized according to grade level, the departmental staff was ready to develop the instructional units. Some of the units were developed by the staff, graduate students prepared others, and when funds permitted, selected individuals were hired to develop the instructional material. All instructional units were developed on the basis of the priorities established by the teachers. To date, 18 units have been developed for use by the teachers in Montana. Future development calls for units of instruction in the specialized areas and instructional units for adult instruction.

Phase V

Any model to implement competency-based instruction is of little value unless the components of that model are understood by the teachers who will be using the material. First, the model must be carefully explained to the experienced teachers on several occasions. In Montana, the model has been woven into the undergraduate teacher education instructional program. The core curriculum is one of the references used in the early courses to explain the nature of vocational agriculture in Montana. It is very important that the undergraduate students be taught to use the material during their curriculum development and teaching methods courses.

Phase VI

Although the need for vocational agriculture was well established in the early surveys, the plans are to update and verify the employment data periodically. One such update has taken place. In addition to a mailed instrument, staff researchers have found that the telephone can be used effectively and economically to gather updated information. When possible, data regarding employment is sought from the same employers used in the earlier surveys. However, it is important to maintain an updated list of employers in all seven taxonomy areas. Eventually, it will be necessary to validate the job titles and competencies if the curriculum in vocational agriculture is to keep pace with the rapidly advancing technology in agriculture.

Summary

Any curriculum effort is successful only to the degree that the teachers using that model and its accompanying instructional material are convinced that it will make their job easier and their teaching more effective. One of the best ways for teachers to realize their efforts are paying off is to receive feedback from the workers in the field. Basing curriculum on the actual competencies needed by the workers cannot help but foster good relations among the teacher, the employer, and the employees.

What Is A Competency Based Core Curriculum In Vocational Agriculture?

(Continued from Page 7)

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THEME

A Competency-Based Core Program In Agricultural Mechanics

By Albert Pat Pruitt

Editor's Note: Dr. Pruitt is an Assistant Professor at Utah State University. His area of emphasis is agricultural mechanics education.

Recently a freshman college student who had taken a vocational agriculture specialized program in animal science while in high school came into my office at Utah State University wanting to know how to figure board feet.

In another instance, a student in a course I teach on the maintenance of tractors and agricultural equipment was asked to get a common hand-operated grease gun from the storage area. He returned and stated that it was empty. He was asked to fill it so it could be used. His reply was: "I don't know how." This student was a graduate of a vocational "specialized" program!

To avoid problems like this there must be a common core of competencies vocational agriculture students need to know and be able to apply. Our goals in teaching have not changed. The change has been in the influx of students with non-farm experiences for which we must provide more thorough training. We can not assume the student knows how to fill up a grease gun or hook up a tractor to a plow and operate it safely. Also, where does a student in a specialized program in animal science learn to figure board feet? Agricultural mechanics has been and will continue to be a major part in vocational agriculture programs for all students.

In the National Agricultural Occupations Competency Study (completed May, 1978), most of the occupations required skills in agricultural mechanics. However, the level of competence and the total number of skills needed varied depending upon the specific agricultural occupations identified. The careers that were identified required both technical knowledge and mechanical abilities.

Many articles and studies have reported the value of "specialized" programs for training students for placement in the agricultural industry following high school graduation. These programs are well and good, but is industry getting graduates and employees from these programs who lack basic skills? Some "specialized" programs in selected areas of agricultural mechanics at the secondary level have regressed to the point they can no longer be identified as an agriculture program. An example would be a program which stresses the production of trailers and trinkets. This often leads to a course which is little more than welding.

In agricultural mechanization, the teacher is constantly confronted with what and how much to teach. Five basic areas of agricultural mechanics should be included: basic skills, farm power and machinery, soil and water management skills, agricultural structures, and electrical power and processing. The skills learned must be useful to the student. As we look at the area of basic skills, the most popular unit of instruction would probably be welding, and as a result, this unit tends to be "out of balance" compared to instruction within the other units. If we take a close look at what industry expects of vocational agriculture graduates, welding skills rank low as compared to servicing and operating equipment safely and performing preventive maintenance on tractors and equipment.

When employers complain that students (graduates of our programs) are inadequately trained and are not productive enough for job retention, the reason in many cases is that we may have failed to identify what the student needs on the job. It is not possible that a set curriculum could provide for the exact needs of every student but there is a need for a common core of basic agricultural mechanical skills and competencies needed by all students prior to enrollment in a specialized program. These can be provided through Agriculture I and II courses before allowing students to enroll in specialized programs.

There is little hope for uniformity in farm mechanics instruction. Indeed, local differences demand some differences in curriculum to match local industry needs. It is the writer's position that a core approach emphasizing the five basic areas of agricultural mechanics should preceed specialized programs that are designed to prepare students for agricultural jobs. The core program recognizes the level of career commitment present in freshman and sophomore students.

We need to see that the core is representative of appropriate breadth and that it adequately prepares students for the specialized portion of the program.

National Conference For Agricultural Education To Be Held This Summer

A National Conference for Agricultural Education will be held July 15-17, 1980, in Kansas City, Missouri. Teachers, teacher educators, and state supervisory personnel are encouraged to attend.

All meetings will be held in the Continental Hotel. A registration fee of $50 will be charge. (The fee includes three meal functions.)

THEME

Restructuring The Curriculum For Vocational Agriculture In California

By Richard Rogers

Editor's Note: Dr. Rogers is Associate Professor and Head of Agricultural Education at California State University in Fresno.

The agricultural industry in California is very diversified. Over 200 different agricultural commodities are grown and processed in the state each year. This diversity presents a challenge to teachers of vocational agriculture. It also presents a challenge to the development of curriculum for agricultural education programs. As one might suspect, the opportunities for employment in agriculture are nearly as varied as the types of agricultural enterprises.

In 1971, O.E. Thompson and others at the University of California-Davis, conducted a study of future employment needs in agriculture in California. This study showed a significant decline in the need for employees trained in production agriculture and a significant increase in demand for employees in ornamental horticulture, agricultural mechanics, and agricultural sales and services. Based partially on the results of this study, the California Agriculture Teachers Association (CATA) in conjunction with the Bureau of Agricultural Education launched a vocational agriculture curriculum development project in 1972. The goal of this project was to develop a competency-based curriculum which would provide for a common core of agricultural instruction. In addition, curriculum materials were to be developed which would facilitate the implementation of instructional programs in the taxonomy areas of production agriculture, agricultural supplies and services, agricultural mechanics, agricultural products and processing, ornamental horticulture, agricultural resources and rural recreation, and forestry.

Getting Teacher Involvement

A project steering committee was formed consisting of vocational agriculture teachers from each of the seven geographical regions of the state and representatives from the Bureau of Agricultural Education and teacher education institutions. This committee formulated the policies which were to guide this project in the succeeding years. Among the policies which were of major interest to the teachers was the provision that all curriculum materials developed would provide for flexibility at the local level. It was determined that a one year core course consisting of units of instruction in each of the seven taxonomy areas, the FFA, and supervised occupational experience (stressing careers in agriculture) would be appropriate in any vo-ag department in the state. This course was to serve as a point of entry for students into instructional programs in one of the taxonomy areas. Because agriculture varies significantly from one region of the state to another, local schools would have the option of selecting the instructional programs that met their specific needs. Instructional programs in each taxonomy area were to be from 2-3 years in length and designed to follow the introduction to agriculture course.

The next step was the formation of committees of vocational agriculture teachers and industry representatives for each of the seven taxonomy areas. Each of these seven committees was charged with the following responsibilities:

1. identify job titles in their subject area;
2. identify skills, knowledge, and attitudes required for the successful performance of the jobs they had identified; and
3. develop a topical outline identifying appropriate units of instruction for an instructional program in their taxonomy areas.

At the completion of the development of the topical outlines for each taxonomy area, instructional unit writers were identified with the aid of the CATA and state supervisory personnel. As was the case with the introductory core course, each unit of instruction was to be written by a vocational agriculture teacher with expertise in that specific area. To date, more than 150 vocational agriculture teachers have been involved in the writing of instructional units for the core course and the seven program areas. The introductory course has been pilot tested, revised, and used in most of the high schools in the state. The curriculum guidelines for agricultural production, ornamental horticulture, and forestry are available and used in many local programs. The curriculum guidelines for the other instructional program areas will be available shortly.

Curriculum Acceptance

The acceptance of these curriculum guidelines by vocational agriculture teachers has been excellent. Teachers have cited the following reasons for their willingness to utilize these materials:

1. The design of the project (an introductory course followed by two to three years of specialized instruction in one or more of the taxonomy areas) is highly flexible and easily adapted to local needs.
2. The use of independent instructional units allows for increased flexibility.
3. The format of each instructional unit allows the instructor to teach directly from the unit without extensive modification.
4. The learning activities, suggested resources, and transparency masters in each unit of instruction improve the quality of teaching and provide valuable resources to the teacher.
5. The extensive involvement of vocational agriculture teachers in the development of the entire curriculum project kept the materials practical.
6. The ease with which FFA and SOE activities can be incorporated into each instructional program is helpful to the teacher.

Numerous in-service workshops have been held around the state in utilizing the curriculum guidelines in the local school system. All five teacher education institutions have incorporated the use of the CATA curriculum guidelines into their preservice teacher preparation programs. Further development and revision of the curriculum guides continues under the direction of curriculum specialists at the University of California-Davis.

Summary

The primary objective of the CATA-Bureau of Agricultural Education curriculum development project was to develop instructional programs in agricultural education which were consistent with the current career opportunities in California agriculture. An additional objective was that curriculum guidelines for the core course and the instructional program areas be based on competencies required of employees in the various taxonomy areas. A final objective was that vocational agriculture teachers be involved in the development of the structure and content of this curriculum project and in the development of all teaching materials to implement it.

The utilization of the curriculum guidelines by vocational agriculture teachers, as measured by their purchase of these materials, appears to be widespread. Whether or not vocational agriculture programs using these materials have undergone the desired changes must be determined after all the guidelines have been available for a sufficient period of time. The fact remains, however, that in order for agricultural education programs to meet the needs of vocational agriculture students and the employment demands of agricultural industry in California, secondary vocational agriculture programs must adopt a competency-based curriculum which provide for specialized instruction in the appropriate taxonomy areas.

ARTICLES

Using a Programmable Calculator in Vo-Ag

A new teaching tool that is becoming increasingly popular with secondary, post secondary, and adult agricultural teachers in Iowa is the programmable calculator. This aid has found its way into the classroom, laboratory, and field trips of many vocational agricultural instructors. The highly versatile calculator can be used by students to solve agricultural math problems and adult farmers to solve production and financial management decisions. This article will highlight the use of the programmable calculator, its capability, and possible uses by a vocational agriculture teacher.

By Larry D. Trede

Editor's Note: Mr. Trede is with the Department of Agricultural Education at Iowa State University.

Description

The programmable calculator is a small, portable calculator that has a computer complete with a memory storage unit. The programmable calculator can perform basic mathematical operations (addition, subtraction, multiplication, and division), store and recall specific data, perform special mathematical operations (square root, inverse, scientific notation, logarithmic function, etc.), and "run" pre-written programs from a module or magnetic card. It is the latter function, its capability to compute and solve specific programs, that may have the most use to agricultural teachers. Extensive programming knowledge is not required to write or run programs on the calculator.

Programming Examples In Agriculture

Several agricultural programs for the Texas-Instrument TI-59 calculator have been written by agricultural specialists at Iowa State University. Specialists in the technical agricultural fields of agronomy, animal science, farm management, and agricultural engineering have written programs that can be used by vocational agricultural teachers to illustrate and/or demonstrate a specific point in a teaching unit. Each program is designed to solve a specific problem. Examples include analyzing a beef feedlot ration, analyzing a swine ration, determing depreciation costs, estimating farm machinery costs, and calculating interest and principal payments for a loan. More specifically, the livestock ration programs can be used to teach nutrition and ration balancing. (The calculator will show whether a particular ration meets the nutrient requirements and determine that ration's cost.) The depreciation program is written to compare the allowable depreciation for each depreciation method on a particular piece of equipment. Thus, a comparison of each method can be made for tax purposes.

Several programs have been written to examine breakeven prices for purchased feeder livestock — feeder cattle, feeder pigs, and feeder lambs. The calculator will determine the price necessary on a market animal to break even after taking into account all costs of production. Versatility exists in that program so that by changing prices and costs, different break even prices will be determined. Therefore, a vari-

(Continued on Page 18)

Using A Programmable Calculator in Vo-Ag

(Continued from Page 17)

ety of teaching situations exist for examining several pricing alternatives and their impact upon potential profits.

Other agricultural programs contained in the "Programs Applied to Agricultural Decisions Manual," published by Iowa State University, include ration formulation using pearson square, adjusting beef cattle weaning weights, land purchase analysis, estimating farm income tax, scoring judging cards, grain marketing costs and returns, and several others. Over 40 agricultural programs have been developed. Each program is stored on its own magnetic card, and after the card is inserted into the calculator, the programming steps are stored in the calculator's memory banks. Storing the program on a magnetic card allows the teacher to run the program an infinite number of times.

Advantages of a Programmable Calculator

The programmable calculator can be used in individual and group teaching situations. Agriculture instructors working with individual students or farmers will find the calculator helpful in quantitatively analyzing farm production and management decisions. Data supplied by the farmer from farm records can be inputted directly into the calculator and the calculator will supply an answer to that farmer's or student's question. If the farmer or student doesn't have the data, secondary sources such as experiment stations or extension information will suffice in many situations. At the same time, small group teaching can be effectively done by allowing students to work in groups of two on a problem situation developed by the instructor. In either case, the teacher and student(s) can evaluate and analyze several alternatives to a basic agricultural decision.

The programmable calculator also has the advantage of storing large quantities of data. The Texas Instrument TI-59 calculator has the capability of using up to 100 memory units for storing data and 960 programming steps to solve a particular program. This capacity is generally large enough to handle most agricultural programs.

Programmable calculators can save valuable teaching time. Most programs can be solved in a short time since manual calculations to the same problem are avoided. With the high speed electronic calculator, calculations within a program are completed in a few seconds. This allows more time for group and/or individual interaction and discussion with the teacher.

Hookups to a computer terminal or central facility are not needed with the programmable calculator. The machine has its own built-in computer complete with memory units and storage locations. The teacher can take the calculator to the teaching environment rather than creating a teaching environment around the remote terminal or micro-computer. Since most programmable calculators contain a rechargeable battery, electrical service is not even required as an integral part of the teaching environment.

The calculator can greatly enhance the teaching environment by improving individual and group decision-making skills. The teacher can predetermine a set of facts and conditions to a specified problem. The individual and/or group can then identify several courses of action. After the data have been collected, the calculator can assist in evaluating and arriving at a decision to the problem. It should be remembered, however, that the calculator is only a teaching aid and the user still has to decide the course of action.

The calculator can also be used to evaluate information supplied by the user when making exact reasoning decisions. A direct, quantitative comparison of several alternatives can be made.

Compared to a large scale computer and remote terminal, the programmable calculator can be obtained at a relatively low cost.

Vo-Ag Teacher Training Sessions

During the past year several informational meetings and training sessions have been conducted by Iowa State University staff members on the use of programmable calculators. A day in the summer in-service training for vocational agriculture instructors has been devoted to information and training on the operation of a programmable calculator. The programmable calculator has been used in the graduate course for beginning teacher educators. It has been featured at a special meeting conducted by vocational agriculture teachers for adult farmers. Training sessions have also been conducted for teachers outside Iowa.

Implications and Potential Uses

While no research has been done on the effectiveness of the programmable calculator as an effective teaching tool, observation of its use would indicate that it does stimulate and create an effective learning environment. Teacher-student interaction and/or teacher-farmer interaction has been greatly enhanced by the use of the calculator.

The calculator can also serve as a catalyst for more joint educational efforts within a school system and between a school system and other educational agencies. Joint planning between agricultural and mathematics departments could occur since both have a vested interest in the development of math skills. Potential uses also exist for joint programming efforts between vocational agriculture departments and agri-business agencies to achieve a common educational goal. Similar efforts are achievable between vo-ag programs and secondary agricultural programs and/or extension service programs.

Potential uses of the calculator with vo-ag program are almost unlimited. The calculator could be used in computing and analyzing supervised occupational experience records. Students in experience programs can use the calculator to help them make production decisions about their farming enterprise. Vocational agriculture instructors can use the calculator in many of their day-to-day tasks, such as scoring crop and livestock judging contests, corn and soybean yield contests, and statistically evaluating examination questions and scores. Other uses will be developed and tested as more instructors adopt and use the programmable calculator.

The programmable calculator has many implications to agricultural education programs. Its flexibility, size, cost, and versatility all make it a valuable addition to the teaching tools available to the instructor. Perhaps its greatest contribution will be that being able to bring the "computer" into the classroom or laboratory with minimal investment without having to take the class to the computer.

Agricultural Education In India

By
Himanshu Pandya
Editor's Note: Mr. Pandya, a native of India, is teacher of vocational agriculture at Troy Area High School, Troy Pennsylvania.

While each developing country is unique, there are often many striking similarities and common problems. These similarities are, first, most of the countries have achieved their independence less than 30 or 40 years ago; second, all the developing countries have been blamed for slow progress; and third, more than 70 percent of the population farms. Common problems are a high illiteracy rate (70%) in the present generation of farmers (above 25 years of age), and high birth rates. India, my home country, is one of these developing countries.

After the achievement of independence in 1947, India has tried to change its educational system in order to meet the new challenges and needs of the society at all levels. This article will deal with the present agricultural situation and problems, with possible solutions to these problems.

Agricultural Education At the High School Level

It is impossible to speak of agricultural education at the high school level without thinking of the education system as a whole. Education in India is primarily the responsibility of the state governments. The concern of the federal government is with the coordination of educational facilities, the determination of standards for higher education, research, and scientific and technical education. Primary education up to the fourth grade is free throughout the country. Education up to the eighth grade is free in the majority of the states. Adequate government financial aid is available to the children of the poor to enable them to pursue their studies to the college level.

In the present Indian educational system, a student spends most of his/her time learning languages, social and natural sciences, and mathematics. Upon the recommendation of the Kothari Commission on Education, a few comprehensive schools have started teaching agriculture as a subject in school. Still the residential schools have dominated agricultural education in the country.

As in many advanced countries of the world, all of the schools with agriculture in India have accepted agricultural occupational work experience as an integral part of education. Both comprehensive and residential systems in India have their own problems with work experience programs in agriculture. The problem with such a program in the comprehensive high schools in India is that students come from relatively small farms with limited farm and family resources. In very few cases are sufficient land and other resources available to allow students to "learn by doing" at home or at school. Because of this limitation, it is very difficult to introduce supervised experience programs.

The residential schools in India, as well as other developing countries, have entirely different problems. Most of the schools are located on relatively large farms (approximately 100-200 acres), four to five miles away from towns. Most of the students enter the schools after the 9th or 10th grade in comprehensive schools. The whole curriculum is directed toward production agricultural education. Most of the students do not enjoy the curriculum or their stay at the schools as the curriculum doesn't meet the individual needs and interests of students, and they feel their lives are cut-off from society. Work experience on the school farm is more like farm labor than a learning activity, with tasks consisting of pulling weeds from plots, or making small canals for irrigation, with little emphasis on the introduction of new methods of agricultural production.

The biggest problems of the schools are those of teaching materials and teaching staff. Most of the teachers come from colleges with a general agriculture degree, and without any formal teaching experience. Most teachers have problems adapting college level knowledge to high school educational levels. The reading level of the textbooks is college level.

After the success of vocational-technical schools in some states, efforts are now underway to create vocational agriculture schools which can be used by more than one school. It is hoped that these schools will provide a more practical educational experience for the students.

Adult Education

At present, adult agricultural education is implemented through the community development program. Two types of agricultural educators work toward the education of farmers. First, the village level worker, or gramsevak, whose job is much the same as that of an extension agent in the United States. There is approximately one gramsevak for every 5 to 10 villages, or a population of about 6,000 to 7,000. The average gramsevak is a young man with a high school education and two years of training in agriculture and community development. Although his job is related to all aspects of village life and development, agriculture, health, education, etc., some of the many jobs a gramsevak performs are: promoting of new agricultural methods, improving conservation practices, aiding cooperatives, and trouble shooting problem situations in farming.

The second type of agricultural educator in the community development program is the subject matter specialist. These specialists cover an area of about 100 villages. They may be agronomists, veterinarians, or experts in any one of a number of other specialities. The subject matter specialists are called upon by the gramsevaks to help

(Continued on Page 23)

TEACHING TIPS

Selecting The Right Grinding Wheel

By Jack M. McHargue

Editor's Note: Mr. McHargue taught vocational agriculture at Sandpoint, Idaho, prior to moving to his current position as a teaching assistant in Agricultural Engineering at the University of Idaho.

Using the right tools and equipment for the agricultural mechanics job is an important principle we should teach our students. Yet, how many times have you seen grinding wheels in the shop that were cracked, glazed, or worn so badly that they presented a safety hazard?

Excessive wear and glazing of grinding wheels can usually be attributed to using an improper wheel for the metal being ground. Not only does this represent a serious hazard to students in the agricultural mechanics laboratory, it also places the vo-ag teacher in the position of serving as a bad example by using the incorrect equipment for the job.

Care should be taken in the selection and use of grinding wheels in vo-ag laboratories. Grinding wheels are now grade marked according to a system which is standard throughout the industry. This marking system consists of six positions, with the letter or number in each position denoting a specific characteristic of the wheel. For example, a marking might be 32A46—H8VBE. (See example of the standardized marking system for grinding wheels.)

Interpreting The Grade Markings

Each of the letters and numbers in the marking system for grinding wheels has a special meaning. The example in this article, 32A46—H8VBE, begins with a two digit optional prefix of 32. The prefix is a manufacturers symbol and is treated separately from the six positions in the marking system.

Position 1 — KIND OF ABRASIVE. The letter "A" indicates aluminum oxide abrasive. The letter "C" indicates silicon carbide abrasive. These letters sometimes appear alone. In combination with a number prefix they indicate a specific grade or type of abrasive. The symbol 50A, indicates a special "friable" aluminum oxide abrasive, whereas 75C indicates a regular black silicon carbide abrasive. Aluminum oxide wheels are preferred for grinding materials of high tensile strength. They are used to grind carbon steels, steel alloys, soft or hard steels, cast alloy cutting tools, wrought iron, and tough bronze. Silicon carbide abrasive grains are harder and more brittle than aluminum oxide. Silicon carbide grinding wheels are used to grind materials that are easily penetrated, such as copper, aluminum, rubber, plastics, magnesium, and fiber. They also are used to grind hard materials of low tensile strength, such as cast iron, cast bronze, glass, marble, ceramics and pottery. Cemented-tungsten-carbide cutting tools must be ground on either silicon carbide or diamond grinding wheels.

Position 2 — GRAIN SIZE. Grain refers to the size of the abrasive particles used. The grains are graded according to size by allowing them to pass through a series of screens. The grain size is indicated by a number which refers to the screen size used. For example, a 36-grain wheel is one made of particles of abrasive which just pass through a 36 mesh screen, but which will be retained on a 46-mesh screen. A 36-mesh screen has 36 openings per lineal inch, or 1296 openings per square inch.

Fine grain wheels are preferred for small diameter work and for grinding hard materials since they have more cutting edges and, therefore, cut faster than coarse grain wheels. Coarse-grain wheels are used for rapid metal removal on softer materials and for grinding large work pieces. Grain size should be selected by the type of material to be ground, the finish desired, and the amount of metal to be removed.

STANDARD MARKING SYSTEM FOR GRINDING WHEELS
(Example is typical marking: 32A46—H8VBE)

	Position 1	Position 2	Position 3	Position 4	Position 5	Position 6
(Prefix)	Kind of Abrasive	Grain Size	Grade or Hardness	Structure	Bond Type	Manufacturer's Record
Example 32	A	46	H	8	V	BE
Manufacturer's symbol indicating exact kind of abrasive.	A-Aluminum Oxide C-Silicon Carbide	(coarse) 10 12 14 15 20 24 (medium) 30 36 46 54 60 (fine) 70 80 90 100 120 150 180 (very fine) 220 240 280 320 400 500 600	Soft to Hard A - Soft B C D E F G H I J K L M N O P Q R S T U V W X Y Z Hard	Dense to Open 1 Dense 2 3 4 5 6 7 8 9 10 11 12 13 14 15 Open	V-Vitrified S-Silicate R-Rubber B-Resinoid E-Shellac O-Oxy-chloride	Manufacturer's private markings to identify wheel. May be a letter or number or both to designate modification of bond or wheel characteristics.
Use is Optional)				(Use is Optional)		(Use is Optional)

A silicate bond ("S") produces a soft wheel that breaks down readily, thereby exposing new sharp grains. Silicate bonded wheels are used for grinding edge tools, drills, reamers, milling cutters, and similar tools.

A shellac bond ("E") produces wheels that are elastic in nature, are resilient, and cool cutting. They produce a very fine finish. They are used to grind mill rolls, camshafts, and fine cutlery.

Position 6 — MANUFACTURER'S RECORD. The symbols in this position indicate specific bond combinations, type of reinforcement, or side treatments of the wheel. This symbol also indicates whether the wheel is coated, smooth or rough or a combination of these features.

In the agricultural mechanics lab, an A60M5VA1 stone is used for tool sharpening. For grinding carbide cutting tools, the 80C80H6VS2 stone is generally used.

Conclusion

Using the right wheel for the job is an important concept to teach vocational agriculture students. We as agricultural educators can help reinforce this principle and make our agricultural mechanics lab a safer place to work by simply choosing the correct grinding wheel for the job. We need to teach our students about the standard marking system and to change wheels when the one in place isn't the most appropriate for the job. While this is only one small aspect of an overall agricultural mechanics safety program, such consideration may help prevent that one accident that results from a grinding wheel being shattered in the shop.

BOOK REVIEW

An Introduction To Agribusiness Management, **by Walter J. Wills. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1979, Second Edition, 167 pp., $9.75.**

This book is designed as an introductory text in the area of agribusiness management. The author has attempted to help clarify some of the problems facing managers, to provide prospective employees with a better understanding of their obligations when taking a job, and to assist agribusiness firms in developing personnel training programs.

The text is divided into 16 chapters. It contains a definition of management and a discussiion of organizing for management, management responsibility, and approaches to management. Firm growth, warehousing, inventory control, personnel management, and training are presented. Following these topics, there is an examination of sales management, public relations, and financial records as management tools.

The final areas covered are capitalization of a business, credit, and management controls. The writing style is simple and straightforward. Effort has been made to minimize the application of abstract concepts to an understanding of management.

The author, Dr. Walter J. Wills, is a professor in the Agribusiness Economics Department at Southern Illinois University in Carbondale. The book is in its second edition, with the first one being published in 1973.

This book was specifically planned and written as a class text for high school and first-year junior college students. It may also be used by the practicing agribusinessman for a review and reminder of the basic management functions.

J. Dale Oliver
Virginia Polytechnic Institute and State University

Annual Research Meeting Planned

The Seventh Annual Agricultural Education Research Meeting is scheduled for December 5, 1980, in New Orleans, Louisiana. Dr. L.H. Newcomb of The Ohio State University is serving as Program Chairman.

Individuals who wish to submit papers for consideration should do so by June 6, 1980. Additional information is available from Dr. L.H. Newcomb, Room 208 Agricultural Administration Building, 2120 Fyffe Road, Columbus, Ohio 43210.

Using A Project Supervision Record Form

By Robert R. Jensen

Editor's Note: Mr. Jensen is a vocational agriculture teacher with the Box Elder County School District in Brigham City, Utah. The article is based on his entry in the Ideas Unlimited Contest sponsored by the National Vocational Agriculture Teachers Association.

For many years, a major strength in vocational agriculture programs has been the close relationship between the instructor and the student under his or her supervision. The traditional on-farm supervised visits made by teachers have provided a close tie between the farm, home, and school adding purpose and meaning to classroom instruction. More recently, programs in vocational agriculture have expanded to include agribusiness, horticulture, and placement programs in a wide variety of agricultural areas. These efforts have been considered by school administrators to be "ahead of their time" in providing accountability to programs in vocational agriculture.

In recent years, it has been felt in the state of Utah that the student involved in the agricultural program has not fully realized his or her role in the supervision process, and that supervised experience is an extension of the classroom with high priority in the program. Supervised experience is the "homework" of the agricultural class and that "homework" needs to be completed by the students and made a part of their class work.

In order to provide a better tie between the student and instructor in experience supervision, the vocational agriculture teachers in the Box Elder (Utah) School District, have developed a system of accountability using a Project Supervision Record Form. The form is used as follows:

1. The form is completed by the instructor and student during each farm or agribusiness supervisory visit. (Four copies are made using carbon paper.)

2. The instructor describes and commends the student on the positive work he or she is doing in his or her program.

3. The instructor and student discuss and agree upon improvements which need to be made and these are listed on the form under "suggestions for improved performance."

4. The form is signed by the student and instructor as an agreement that the student will make the improvements suggested and the instruction will assist in these improvements.

5. Copies of the form are kept by students in their agricultural journal or supervised experience record book to enable them to know exactly what project improvements will be expected by the instructor upon the next visit.

6. Copies of the supervision form are submitted monthly to the school principal and vocational director. These copies constitute the monthly report of the vocational agriculture instructor.

7. The records of the visits are summarized in September of each year in the annual report.

Using the project supervision record form has resulted in an increase in the attitudes of students toward supervision and student accountability in vocational agriculture classes. Students expect close supervision and realize that the role of the instructor is to assist in supervised experience as well as being a classroom instructor. The use of this system is recommended to other teachers.

(Student Copy) **Box Elder School District**
Brigham City, Utah

PROJECT SUPERVISION RECORD

Date_____

Name _____

Address _____

Year in School_____

Type of Project_____

Scope of Project_____

COMMENDATION:

SUGGESTIONS FOR IMPROVED PERFORMANCE:

The above comments and suggestions are agreed upon for the purpose of improving the student's supervised program.

Vocational Instructor _____ Student _____

Your Valuable Resource: The FFA

By Donald G. Farrand

Editor's Note: Mr. Farrand is conservation instructor at Schuyler-Chemung-Tioga BOCES in Elmira, New York.

As a vocational agriculture instructor, I have found the FFA to be the most interesting and valuable resource available to promote and develop my instructional program. When I think of my vocational agriculture program, the FFA and agriculture are synonymous. In fact, if it wasn't for the active FFA program in our school, I would either be teaching at another school or be employed in some other less challenging, but more lucrative occupation.

Integral Part

Some teachers of agriculture do not use the FFA organization as an integral part of their vocational agriculture program. All agricultural educators must make the choice to be an FFA advisor or not. For more than 20 years, the FFA has helped me as a member or a chapter advisor and now as a New York State FFA District Trustee. I feel students are missing an important and exciting part of their vocational agriculture program if they are not actively involved in the FFA. I can make this statement without hestitation or mental reservation because I have seen what the FFA organization can do for students in developing attitudes, citizenship, and leadership abilities.

Statements to the effect that the FFA won't work in my vocational program because students don't want to be associated with it or the administration is against having an FFA Chapter in some cases might be true. To win approval and support from the administration and get the students motivated to be active FFA members, the vocational agriculture teacher must first be interested in the FFA organization and must secondly be willing to devote a lot of extra time without monetary compensation.

Reasons for Success

At the Schuyler-Chemung-Tioga BOCES Center, we have five active FFA mini chapters consisting of agricultural mechanics, conservation, farm production and management, general agriculture, and ornamental horticulture. The reasons why they have been successful are:

1. They are an integral part of the educational system. The FFA activities are a combination of the classroom instruction, outdoor laboratory activities, and the supervised occupational experience program.

2. The chapters have been important to our students. They participate in FFA activities such as the Greenhand Degree, Chapter Farmer Degree, and Sub-District Degree. Students participate in local, sub-district, and state contests. Other activities include demonstrations, citrus sales, State and National Conventions, and the FFA-Farm Bureau Governmental Seminar. This participation gives the members the opportunity to learn by doing. It develops leadership through public speaking, working with others, and the discovery of talents.

3. The FFA chapters have been important to the agriculture teachers. Advisors have benefited along with the students by motivating students to use their supervised occupational experience programs to achieve FFA degrees and rewards. Preparing for competition motivates the student to do additional studying.

4. The impact on the school and community has been one of astronomical importance. The students have represented the FFA and the BOCES Center by participating in many programs sponsored by civic groups and organizations in the community, such as the Lions Club, Kiwanis Club, Rotary Club, and Soil Conservation Service.

The Schuyler-Chemung-Tioga BOCES FFA mini chapters have cooperated with the local 4-H Cooperative Association and the local Agricultural Stabilization Conservation Service in conducting a program called Old McDonald's Farm at the local fair grounds. Basically, the program acquaints grade school children with the importance of agriculture and the role it plays in the community. Farm animals such as a cow and calf, a ewe and lambs, chickens, ducks, and geese are used as a part of the demonstration to stimulate interest and questions.

Contributions

Programs of this type contribute considerably to the total vocational education program:

1. There is a cooperative or joint effort involving the school and organizations in the community.

2. All the FFA members have a chance to contribute in some role in the performance of the program.

3. The public is made aware of the FFA and the vocational education program.

4. The members gain personal development by interacting with other agriculture agencies in the community.

As I look back over the eight years as an agriculture instructor, I definitely realize that being the FFA chapter advisor is one of the most rewarding experiences of my teaching career. I know that my role as FFA advisor stimulated interests in agriculture and helped build a good rapport with the students.

(Continued from Page 19)

deal with problems which require their expertise.

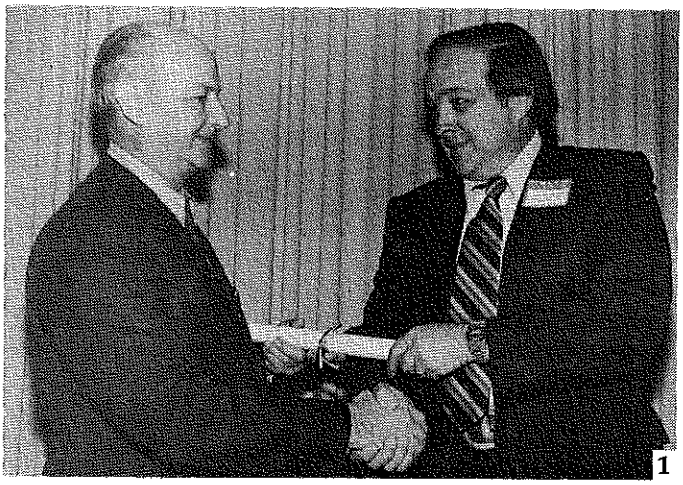
Overcoming Illiteracy

The present program of agricultural education has been proven to be successful to a certain extent. Because of the high illiteracy rate of adults, educational progress is slow and on a one-to-one basis.

The success of India's effort to reduce illiteracy will have a profound impact on the developing countries of the world, on Indian agriculture, and on agricultural education in India. With increased literacy, it will be much easier to introduce new agricultural practices.

Honors for Agricultural Education

Members of the agricultural education profession are dedicated to their careers. Awards are made to some of those who serve in an outstanding manner. Several recent award recipients are shown here.



1. Glenn Lewis, retired State Supervisor in Maryland, is shown receiving a Certificate of Merit Award in Agriculture from Robert L. Gluckstern, chancellor of the University of Maryland. The presentation was made during an Agricultural Forum held at the University. (Photo courtesy of the University of Maryland.)

2. Honorary Life Membership in the National Vocational Agricultural Teachers' Association is granted to selected individuals who have made outstanding contributions to the profession. Recent honorary life members include (left to right): Robert L. Kelley, Kentucky; Ralph W. Edwards, Idaho; and Floyd J. Doering, Wisconsin. John Mundt, NVATA past President, is shown presenting the memberships. (Photo courtesy of NVATA.)

3. Ray Wiegand (left) of Evansville, Wisconsin, is shown being presented with the NVATA Agriculture Teacher Recognition Award by F.J. Koebrich, Director of Marketing Services for Pfizer Agriculture Division. The award was presented because Mr. Weigand advised the National FFA Swine Production Proficiency Award Winner. (Photo courtesy of NVATA.)

4. The six recipients of the NVATA Outstanding Young Member awards are shown here with Robert E. Rowe (right) of the U.S. Steel Corporation. The recipients are (left to right): Richard S. Callahan, Tennessee; Gary Kubicek, Nebraska; J. Larry Every, Oklahoma; Julius A. Fraley, Missouri; Darwin McKay, Idaho; and Bobby K. Waddell, Virginia. (Photo courtesy of NVATA.)