

reliable research. We should move from the realm of authoritative opinions to carefully designed and controlled experiments in college level teaching of agriculture. NACTA members are vitally interested in this field and could contribute greatly by doing such research and publishing it.

During this past year I have been with various groups who have been talking about the future of NACTA. One point of discussion has centered around the question of whether this association was primarily an association of administrators or an association of teachers. A review of annual programs held over the past years indicates that a large portion of the topics being considered were of more concern to administrators than to the teachers themselves. In addition a review of the names of the persons attending the conference indicate a predominance of men with administrative duties with a much smaller number engaged in teaching only. We should, therefore, question the function of our organization. How much is it an association of administrators and how much an association of classroom teachers? If we are to make it most available to classroom teachers, then a modification in our annual meeting schedule would probably be in order.

A national meeting presents a considerable financial cost which is difficult for a teacher himself, or for his institution to bear. Regional meetings covering as small an area as can be justified in relationship to the number of people who could attend might be more suitable for this purpose. I would suggest that we might consider scheduling our annual conferences so that every other year a regional meeting would be held with the focus of interest on the classroom teacher. In alternate years we could have a

national meeting with the focus of interest on administrative concerns. In both types of meetings we would be working on the general theme of Improvement of College Instruction in Agriculture.

As I talk with our faculty members, I find a strong loyalty and interest toward their professional societies. In each of these societies is a section on teaching which we learned about at last year's meeting. NACTA should continue to be a coordinating body for these sections. We may reach many more teachers of agriculture through these professional society teaching section meetings than we could ever reach through our own national meetings.

We have a deep commitment to the philosophy of service to the industry of agriculture. We recognize our own importance to world peace through helping the world feed itself. We recognize the deep unrest which characterizes the world in which we live.

We are members of a young organization, committed to improvement of college teaching in agriculture, flexible enough to adapt to changing times. We are also a small organization which needs to grow and needs to work closely with all possible agencies and groups which can help us meet our objectives.

During the coming year every single member needs to identify some specific contribution which he can make and follow it through to completion. At the end of the next year we should try to have NACTA twice as large and twice as effective. As in adolescence, we need to grow rapidly and establish an invaluable place in higher education in the United States.

# Auto-Tutorial Resources In Animal Science Teaching<sup>1</sup>

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Effective communication is the essence of efficient college instruction. Every means available needs to be pursued to maximize understanding between teachers and students. For this to be accomplished we submit that, "talk is not enough." In this era of rapidly advancing technology newly developed instructional resources must be sought out and evaluated just as new subject matter ideas and principles are sought out and evaluated. More effective communication is possible and becomes increasingly necessary with the rapid accumulation of the world's knowledge. In the nearly 2,000 years since the birth of Christ there was at first a slow, but now a rapidly accelerating growth in the accumulation of knowledge. To plot this accumulation on a time line beginning with the birth of Christ, it is estimated that it took 1750 years for the first doubling of world's knowledge to take place. The second doubling occurred in the next 150 years. After another 50 years the accumulation of information had doubled once again and now in a scant ten years the total body of world knowledge has doubled for the fourth time. The amount of scientific information published world wide every day would fill 24 volumes of the Encyclopedia Britannica. To paraphrase the Mad Hatter in *Alice in Wonderland*, "You have to keep running just to keep up." And yet simply keeping up is not enough.

Modern commerce is daily accelerating its program of information and education to meet this challenge. Small businesses and large industries all over the world are reaping the benefits from modern, forward-looking, audio-visual communications. A powerful program using the most modern, effective and hard hitting audio-visual communications media is one means by which scientists can share knowledge to educate young minds and train the leaders of tomorrow. It seems only reasonable that institutions of

learning should adopt such procedures and characterize the philosophy, "talk is not enough."

The College of Agriculture at the University of Illinois recognized a need and instituted an instructional resources program in 1963.<sup>4</sup> The position, Coordinator of Instructional Resources for the College of Agriculture, a joint appointment between the Agricultural Communication Department and the Office of Instructional Resources, was created to assist faculty of the College of Agriculture. Working within the Agricultural Communications Department, the Coordinator has access to excellent technical assistance on both media and visual services. More specifically, the efforts of the Office of Instructional Resources are directed toward media, materials and methodology—methodology as it applies to education and methodology as it applies to preparation and presentation.

A semester-long series of seminars on the use of instructional resources provided the spark that resulted in attempts to change teaching methods in the Pork Production course offered by the Swine Division of the Animal Science Department. The philosophy in introducing instructional resources into courses in the College of Agriculture is one of suggesting ideas and offering services to those interested in implementing changes in existing programs. The Coordinator of Instructional Resources will fund pilot programs and equipment; cooperating departments are asked to pay costs of materials only. The first step is to determine teaching objectives, though no attempt is made to define accurately the terminal behavior expected of each student as has been suggested by numerous educational specialists. The book, *Preparing Instructional Objectives* by Mager<sup>5</sup>, is suggested reading for all instructors planning to study or implement changes in teaching programs. The initial goal in changing the teaching of Pork Production was to provide supplemental material to the student on an individual basis. Several problems arise in teaching a course

such as Pork Production. First, there is a problem of antiquity in textbooks. This is not a criticism of authors but a compliment to rapidly advancing technology. This problem has been minimized by the preparation of outlines of subject matter materials coordinated with the lectures. These are kept current just as lecture notes are updated. We see no disadvantage in providing an advanced outline of what is to be covered during a lecture. The distinct advantage of providing outlines is that note taking is minimized and the students have more time to participate in class.

The amount of material to be covered in production courses increases continually and rapidly. This is true of any course encompassing several disciplines. Contributions from nutrition, genetics, physiology, ecology, engineering, economics, immunology, pathology and microbiology must all be studied and evaluated as they influence pork production. Coverage of the many disciplines requires efficient use of the time of the instructor and certainly of the students. Increasing competition for class time challenges the instructor to select materials most appropriate for the class within the course description. An instructor must decide whether he can spend formal class hours on management practices such as clipping needle teeth, or on economic practices such as futures buying. Lectures have been supplemented with library assignments from various journals. However, much of this material can best be presented for individual study in the form of instructional resources, combining audio and visual materials. Numerous audio and visual aids are used in class, but they limit the time during which students can study the material. The major function of educational media should be that of helping the learner learn rather than that of helping the teacher teach, though the latter is often a by-product. A broad spectrum of educational media and materials exists for the use of educators today. These vary from the very conventional blackboard and mimeographed handout materials to the most modern of electronic equipment. Keeping in mind the desire to help the learner learn at his own pace with individualized study, we elected to develop a system of auto-tutorial references.

After the reference objectives were determined, media were selected appropriate to the limitations imposed by economics and staff resources. Attention was focused on three material items: audio tapes, 2x2 slides, and super 8 film loops. These materials were available or could be developed most effectively. Audio tapes are inexpensive; and they can be easily changed, updated and duplicated. They contain instruction and carry part of the personality of the instructor, specifically his voice. In addition audio tapes can be easily reversed to replay segments for clarification or reinforcement of a particular idea. The 2x2 slides show all the detail needed to tell the story and show it in color. They are inexpensive, easily duplicated and also can be updated and changed at any time without duplicating a complete program. In addition, existing reserves of 2x2 slides influenced the selection of this medium. Where motion is needed to complete an idea effectively, super 8mm film is used. Many commercially produced loops are available but are primarily for the mass market of secondary and elementary education. Super 8 film loops can be simply produced for specific needs with a minimum investment in equipment and materials. The advantage of the super 8 format is that it permits larger lenses with accompanying increases in quality and lower production cost for equipment. The selection of equipment for projecting the audio and visual material and the carrels containing the equipment and described in detail by Behrens and Harmon, 1967<sup>6</sup>. The teaching carrels used for this material have been integrated into the Agricultural College Library System where students can check out a packaged assignment just as they check out reserved books. There are currently 14 carrel units to serve the students of agriculture.

In the preparation of individual units, objectives are translated into working plans using the story board approach. This is followed by narration, practice, recording and rerecording. Just as in preparing television lectures,

the problems are worked out before the final presentation is made. This may be more than is done many times under conventional teaching methods.

The package units take on many different formats, as indicated in the first 3 units that were prepared. The unit, Breeding Procedures, utilizes 5 minutes of super 8 film loop accompanied by an audio tape. The unit on Baby Pig Management uses a 3 minute film loop, 69 2x2 slides and an accompanying audio tape. Total time to play this unit is 27 minutes. The third unit, entitled Swine Buildings and Equipment, uses audio tape and 80 slides. Listening time without repetition is 24 minutes. In addition, we have assignment units with the following titles: Artificial Insemination, Selecting Gilts, Nutrient Deficiencies, Swine Evaluation—Live and Carcass, Mixing Swine Diets, Scrotal Hernia Reduction, Measuring Meat Quality on Hoof and Rail, and Immunological Response of Swine. The coverage of these topics outside the classroom has enabled students to study these particular areas at their own pace with as much repetition as they desire. Auto-tutorial references offer advantages to the instructor as well as the student. The instructor can make a one-time preparation which can be a thorough presentation of subject matter with simple updating of the unit as desired. Demonstrative material can be prepared outside the classroom once and presented repeatedly. This is particularly valuable in material involving biological timing. The auto-tutorial references system provides a framework for coverage of additional objectives for gifted students.

The units have allowed changes in the class structure and encouraged further innovations. The increasing use of auto-tutorial references frees classroom time for more discussion and class projects. To consider effective replacements for class meetings, weekly half-hour oral quiz-discussion sessions limited to no more than 5 students each have been used for 2 years. These have been well accepted by the students and participation has been excellent. The term oral quiz-discussion may encourage participation. As further package units are completed, conventional lecture periods will be replaced by the half-hour oral quiz-discussion. When completed the 3-hour course will be scheduled as one 1-hour lecture per week and 1 half-hour small group oral quiz-discussion per week. The remaining material will be taught with auto-tutorial assignments. The auto-tutorial reference units will utilize subject matter outlines just as are currently provided to the students. Now the students complete the outlines during lectures. Under the auto-tutorial reference system the student will complete the outlines at his own pace.

Experiences with auto-tutorial references encouraged us to attempt to improve classroom presentation. The outlines continue to be a vital part of the lectures. With assistance from the instructional resource coordinator simultaneous use of 2x2 slides for detail and orientation and 16mm or super 8mm film to show action has been used effectively. Dual screens also improve the effectiveness of 2x2 slide presentations where both overall and detailed views of subject matter are desirable. Also, overhead projectors continue to be quite valuable for classroom use in presenting schematic or tabular materials. Research at Pennsylvania State University shows abstract linear drawings to be more effective in conveying knowledge than actual photographs.

Another vital addition to the hardware package of classroom materials is the tele-lecture conference set developed by Bell Telephone System. The unit, mounted in a storage console, is moved to major agriculture conference and classrooms in which extension telephone jacks have been installed. The equipment allows the instructor to bring the field trip subject matter directly into the classroom, thereby eliminating some of the problems of field trips — scheduling, interference with other courses and transportation costs. With a course such as Pork Production, a greater problem exists. Efficient producers are justifiably reluctant to allow visitors to enter the farm and possibly risk disease contamination of the premises.

Possibilities for use of the tele-lecture equipment are varied. At the University of Illinois, it has been used as long as a 2-hour lecture or as short as a 10-minute interview. Intercommunication between instructor, students and resource person can proceed just as if the resource person were in the classroom. A swine raiser that had produced a hog with a 9-inch loin eye was interviewed to find how he would maximize subsequent expression of the trait in his herd. In another class meeting the director of a hybrid hog production business lectured for 30 to 40 minutes; this was followed by a question-answer session between the producer and the students. The most effective use of tele-lecture equipment has been the replacement of all traditional off-campus field trips in Pork Production. All significant points to be discussed on the particular field trip are photographed and organized into a logical sequence. The resource person with a duplicate set of visuals guides the tour of his premises with much greater specificity, clarity and opportunity for discussion of all points of interest.

In summary, the increasing wealth of knowledge of all basic and applied sciences challenges the concerned

instructor to implement changes in teaching methods that will facilitate the most effective coverage of applicable disciplines.

The methods here described, using the course Pork Production as an example, offer alternatives to the standard lecture format. The auto-tutorial references also provide the student the opportunity to proceed at his own learning pace with as much repetition and reinforcement as is necessary.

- 1 Presented at National Association of Colleges and Teachers of Agriculture Conference, April 8, 1968.
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# An Introductory Course In Agriculture

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The content and sequence of a course or a curriculum is the responsibility of the faculty of the college or university in which it is offered. It varies from school to school depending on local conditions, type and origin of students, and ultimate goal of the course or program. Few will argue with this statement; yet we all know that until about ten years ago most programs in agriculture were designed by the rubber-stamp method. Individual courses, the major components of the curriculum, and even the supporting course requirements were marked by a uniformity—a sameness, that was hard to disguise.

In recent years, however, there has been a sharp change in the order of things. Courses and curricula are in a state of ferment; new ideas are being tried and in certain institutions new curricular patterns are emerging.

Among the forces at work to stimulate this study and effort for improvement are three that I would dwell on briefly.

1. *Changes in the Agricultural Industry.* It is becoming more diverse and hence requiring persons with different backgrounds and particularly backgrounds that are broad and afford experience in the systems approach or the integration of concepts from different basic disciplines. It is becoming more sophisticated and requiring people better trained than ever before.

2. *Changes in the Student Body.* Although high school preparation of the incoming freshman is better than ever before, there is, unfortunately, an ever widening gap between the poorest and best. This poses serious problems in the handling of freshmen. Are they all to be put through the same funnel during their final collegiate year? If so, do we cater to the student with the poor background and bore our most exciting resource or do we teach him and leave the lad who because of no fault of his own comes to us with an inferior background?

Increasing percentages of our student body come from an urban background. Their interests, their experiences

and, frequently, their goals are different. What impact does this have on our elementary courses?

The problem of junior college transfers and the increasing percentage of intercollege transfers confuses the issue even more as does the one- or two-year "basic college" plan as adopted by several universities. How do we program our general courses and beginning specialized courses in agriculture to not only accommodate but to effectively challenge students of such diverse backgrounds?

3. *Changes in Objectives of Students.* Our students are not only becoming more variable as to background but also as to the range of goals they have when they enter or develop while in school. Many new fields of specialization are emerging—particularly in the interdisciplinary areas: system ecology as applied to land use, biomathematics including computerization of feed lot operations, and biochemical genetics applied to problems of chemurgy. An increasing emphasis is being placed on global agriculture. It's high time we shifted the local or regional forms of our courses, especially in those institutions that have accepted the challenge of educating and training students for the careers of tomorrow instead of yesterday.

The great increase in the number of students continuing to be graduated from college is another factor that makes it imperative that we critically examine our curricula and make it possible for students to prepare for their ultimate goal with a minimum of wasted effort.

Picture with me two freshmen with identical I.Q.'s sitting side by side in a beginning course in plant science. One has lived all his life on a general farm, has been in an active FFA chapter, has worked side by side with his Dad in the day-to-day operations with his Dad, has had several projects of his own on which he kept complete records. He plans to return to the farm upon attaining his B.S. Oh, yes, he rode the bus to a small township school that offered algebra and trig, a nature-study type of biology in the 9th grade and a general physical science course in the 10th.