

This summer we will have one student intern with the State Department of Agriculture, one student assistant with the Statistical Reporting Service, and one student trainee with John Deere Company. We now have more students interested in the program than we have positions available. The work experience, the credit hours earned, and the money they get are all incentives for students to participate in the program. The credit hours earned and the emphasis on a learning experience seem to be the factors that differentiate this program from the usual summer job in the mind of the student. Similar programs were initiated in Political Science, Communications, Computer Science, and Sociology.

#### Computer-Based Testing Recognized

Project No. 8, "Computer-Based Testing" is one of two projects in the category of other experimental programs. This program has proven to be very successful and was recently given national recognition in Business Administration circles.

Computer Generated, Repeatable Testing (CGRT) encompasses several important improvements over typical testing procedures. First, tests are given more frequently. Second, students are allowed to schedule tests at their own convenience, within broad limits. This is made possible by the provision of multiple test forms. Third, immediate feedback is provided on test performance: students are given the correct answers to all questions as soon as they turn in their response sheets. Finally, students can repeat tests several times to satisfy either achievement needs or letter grade aspirations. This program consists of a computer generated repeatable testing system which enables the student to be tested more frequently, and in addition, gives immediate feedback of his test results.

The ultimate aim is to encourage the student to use diagnostic information and to re-study material he has not mastered, and it thereby decreases the student's aversion to the examination process while maintaining appropriate demands for the mastery of the course content. Allowing the student to repeat the same test for a better grade yields positive psychological reinforcement.

The other program in this category is the Audio-Visual Center program for campus-wide coordination of the individualized instruction projects.

#### Summary

Washington State University has recently implemented many new and different educational programs that are working. Student interest in these programs is evidenced by higher enrollments and positive student feedback. Faculty interest is shown by the number of project proposals submitted and the amount of time spent on the projects now underway. The interest of the Legislature and related government agencies continues to be at a high level and the progress of existing programs is being carefully and closely evaluated. Our brief but intensive experience with innovative educational programs suggests that the exploration should be continued, and that the types and results of such programs should be shared both within and among institutions.

<sup>1</sup> Paper by Martin M. Waananen, Professor of Agricultural Economics, for presentation at the 1973 NACTA Convention June 14, 1973. This paper draws heavily from "Report on Innovative Educational Programs," Washington State University, January, 1973.

<sup>2</sup> Washington State Legislature, Substitute H.B. 151.

## AGRICULTURE'S RESPONSE TO A CHANGING ENVIRONMENT\*

Milford Heddleson — The Pennsylvania State University

Much is being both spoken and written today concerning the need for change — change in our approach to solution of complex environmental problems — change in our level of understanding of the problems themselves and their interrelationship of one to another — change in public attitudes, which will bring about economic and/or social adjustments — change in teaching methods and content, in order to better equip our young people to meet the future demands of society. We hear much discussion on these issues, and the problems themselves are evaluated at great length, but there is little agreement as to the most appropriate method of reaching future goals or avoiding obvious pitfalls, which are most certainly in our way.

One of the major criticisms expressed both with respect to training of students and attempts at understanding our immediate problems, is that we do not look at the problem in its entirety, but continue to look at each fragment separately. We continue to see only one or at most two tentacles at a time and never realize that both are attached to an octopus. We fail to realize that many legs are contributing to the motion of the octopus, and even though one or more legs might appear to be moving in a backward direction at the moment, it is still contributing to the overall forward motion of the mass. As we observe our environmental conditions and problems, we usually look at only one segment at a time and seldom try to understand the

total system of which we are a part.

As we scan the literature, we find many suggestions and attempts at bringing about changes in our educational institutions which will provide more meaningful ways of seeking rational solutions to environmental problems. The motivation for change does not appear to be the desire of the institution itself to change, but because of pressures being applied by the students or by the public asking for answers to questions that currently appear not available. The institution, therefore, must defend its position and justify reasons for not making changes or it must attempt to adjust to its new environment. These efforts of change range from merely a change of course name or number to creation of new institutions with specific objectives and methods in mind. Most will agree that little is accomplished by changing either course number or instructor without modifying the course to the extent that understanding of ecological principals is an important part of the course.

#### New Major in Environmental Resource Management

At the Pennsylvania State University, a new undergraduate major in Environmental Resource Management was approved and initiated in 1971. The requirements were drawn up by a committee composed of staff members from Agronomy, Agricultural Economics, Rural Sociology, Forest Resources, Horticulture, and Agricultural

Engineering. The advisors also are selected from various departments within the college. Student enrollment was about 35 the first year of offering, about 140 the second year, and will be an estimated 200 this fall, the third year. About 10% of the current enrollment is female. The first class graduates this June 1973, and at this point employment prospects appear to be quite good.

Within the past two years, some administrative changes have been made in the College of Agriculture in order to bring about closer coordination between the various departments where environmental problems were a factor. Prior to 1972, there was no individual within the college who had responsibility for coordinating the on-going work within the college. A number of research projects which were environmentally related were being conducted by various departments such as Agricultural Engineering, Agronomy, Plant Pathology, Entomology, Horticulture, and others. Extension programs were quite varied as well and only through voluntary specialists' cooperation was the adult educational programs tied together.

#### Coordination Developed

In July 1971, a committee was appointed to advise the Dean on environmental matters and to study ways by which effort of these various departments could be more closely coordinated. As a result of that study, an office of Environmental

Quality Affairs, with a Coordinator, was established within the College to accomplish these aims. To advise and assist the coordinator, several task groups were organized primarily on subject matter basis. The task group members, however, were assigned from various departments and thus could work as a problem oriented group rather than along department lines.

One of the first duties of the various task groups was to do a thorough evaluation of the research and educational programs now being conducted within the college. All projects which were reasonably related to environment, or resource management, were included in the study. The task groups are also given the responsibility of reviewing both new and on-going projects to assess their relative merit and to determine how or if changes in one project can gain information, useable and valuable to others. With time, we should be able to modify and direct our research in a way that will bring about more integrated studies and at the same time derive answers to problems which more restricted or isolated research is not providing. This is the overall objective of attempting to eventually develop inter-departmental and interdisciplinary projects and programs.

One of the task groups is assigned the responsibility of continuous evaluation of course materials and need for changes in the resident instruction. Sometimes it is difficult to make changes in either course content or in structures as quickly as we would want. Winter courses, or short courses can also be used to incorporate new materials and concepts and to expedite training of certain groups.

#### Training Program Initiated

Since additional demands are being made on our staff, especially county personnel, special efforts are being made to assist those people in providing educational assistance and leadership within their communities. A long-range training program has been initiated for both male and female county agents and specialists. The program is designed to give the staff member a broad understanding of environmental and ecological concepts rather than to train him as a specialist in one of the sub-

ject matter areas. The goal is to provide him with background information and fundamental training from which he can provide leadership and guidance to community leaders in their efforts to understand needs of their localities. This staff member can serve as a contact person not only within his own county, but across county lines as he will be able to provide guidance to various groups, both local and regional.

The training was started in November of 1972 and is scheduled to continue for a period of two years. Week long sessions are scheduled at about 5-month intervals and each session will place emphasis on a different subject matter area. For example, the first session was centered around Waste Management Problems. The second session was concerned primarily with pesticides, but included many other interests, such as food additives, food toxicants, organic gardening, and other subjects. The training periods are scheduled long enough apart so that the individual has time to digest the material presented, but not such a long time that he will have forgotten important segments of the training. The individuals are chosen carefully and the same persons are carrying through the entire two years of training. This provides opportunity for persons who have been out of school for a period of time to gain new materials and to be brought up to date on fresh concepts and developments in the various environmental areas.

The adult training is conducted for either in-service training for the individual or he can apply for academic credit of two hours for each week of training. The offering of college credit for courses of this type is quite popular with our county staff, as it gives them an opportunity to obtain additional credits without taking leaves of absence. Since the training is for only one week duration for any one period, the staff member is not required to take leave and his expenses are paid by the University.

#### Possibilities for Systems Approach

In most of our institutions of higher learning today, both teaching and research are conducted within departmental framework. This tends to promote narrow thinking in terms of single aspect solution to

problems rather than to attempt to gain information on the broad concerns. At the present time there is no meaningful way to assemble the pieces or fragmented research into meaningful resource management programs. Perhaps this is where the "systems" approach can be effectively tested or used in problem solution. Rational direction of governmental or civic groups is not readily available because our research programs are not geared to obtain this type of information. Perhaps this is one of the reasons for the extent of conflicting opinions and diverse attitudes toward present resource management problems.

There is a tendency toward broad training for more students as compared to technical training in a specific subject matter area. Many instructors and students agree that today's technical training does not provide wide enough understanding to enable the student to understand or evaluate ecological problems. On the other hand, there is a fear that the training will be diluted to the point that the student does not have adequate background in any area to be useful in problem solving. If the student is given only a general training in any number of fields, perhaps only the most gifted will really become useful in environmental work. Perhaps those less able to use or adapt their basic skills in the various area of work will be unable to find employment or will be only followers in programs and their development. Many will agree that it is highly desirable for the student to have sound training in a discipline of his choice. Then, ideally, beyond this, he should have adequate broadening courses which would enable him to both appreciate and understand the interrelationship of his discipline to various others and would enable him to visualize how his expertise can be incorporated into and utilized by other disciplines. Incorporation of techniques or technologies into an interdisciplinary program will provide the key to environmental understanding.

\*A textual digest of a vivid slide presentation made by Dr. Milford Heddleson, Professor of Agronomy and Coordinator of Environmental Affairs, The Pennsylvania State University, at the 19th NACTA Conference, June 15, 1973.

## USE OF THE COMPUTER FOR INSTRUCTIONAL PURPOSES\*

David L. Armstrong\*\*

Recently Flip Wilson appeared on our campus as a guest lecturer. He stepped to the platform and found himself rather speechless. Finally he said that he knew that he was going to speak to this group nearly a year ago but he didn't prepare a manuscript or bring any notes. His reason was that he thought he was talking with friends and when you were talking with friends you don't need notes. He added — when you have someone to your house you

don't prepare notes, do you? I was rather impressed that perhaps more of us when we speak with our friends at professional meetings should be much more relaxed about the use of notes and manuscripts. Although I have an outline and a manuscript I am going to attempt to speak with conviction about how I feel computers fit into instruction for most colleges of agriculture.

It is easy for anyone to say in this day

and age if there is a big problem and you have a big computer then there ought to be a solution. Questions like — why can't we predict the class enrollments for six years in advance, or why can't we anticipate the job market shifts, or why is it that students and faculty can't be better informed on these complex problems are examples of this phenomenon. Obviously, there is a gap between what the computer can do and what the computer does. In most cases it is