

was made to include participation of all Negro colleges offering agriculture. However, this effort was a "lost cause" judging from the almost nil attendance at the annual conferences. This portion of our clientele are now included in the NACTA membership since there are no longer Negro Colleges separate from other colleges. Integration has solved this problem.

The Constitution of NACTA has been revised several times in the past ten years, but changes have been of a routine nature to keep the constitution current: changes in membership, dues and fees, state affiliates, etc. The basic purposes, however, have never been changed and the main goals of NACTA have remained the same. The last revision of the constitution (to date) was June 14, 1974. Perhaps there will be many more revisions in years to come, and rightly so, to keep in step with the rapid growth of NACTA and constant changing academic requirements.

The question of whether to include junior and Land-

Grant colleges into NACTA membership has been a rather long and somewhat hard-fought battle. Many individuals were involved from both Land-Grant and non-land grant schools. A resume of this caliber does not allow inclusion of all the many discussions, group meetings, "bull sessions" and private conversations along with all the official meetings that were involved in this NACTA action. To be sure, it was a well thought out democratic procedure that produced results.

Let us hope that the concept of **The Improvement of teaching among all institutions offering college level instruction in agriculture** never be changed. Let us also strive continually to resist reestablishment of the "pecking-order" that existed among institutions of higher learning, pertaining to the improvement of teaching. Obviously improvement in any field is not confined to a select few. May we continue in the future to sit at "King Arthur's Round Table" as equals to solve our never-ending conundrums.

Missions of Undergraduate Curriculum In Agricultural Sciences

Sandra S. Batie

"The great end of education is to discipline rather than to furnish the mind; to train it to the use of its own powers, rather than fill it with the accumulation of others."

— Tryon Edwards

As academic faculty and administrators in the agricultural sciences at land-grant universities, we spend considerable time considering the resources available for teaching — our time, credit hours, lab equipment, visual aids, and teaching technique. It is doubtful, however, that we will improve on the use of our resources, that is, improve our teaching, until we consider what we are trying to accomplish using these resources. What is our product? What do we want students to know? This paper suggests some answers to these fundamental questions of educational purpose and discusses implications for a curriculum in the agricultural sciences.

Although this is not an original endeavor, it is an important one. Universities are increasingly subjected to legislative scrutiny and accountability. If our undergraduate programs are to be determined by adherence to educational philosophies and not by resort to data on job placement rates or costs per credit hour, it is imperative that we develop defensible and well articulated statements of our educational missions.

The American land-grant university has several

missions demanded of it by society, and these are reflected in the objectives of undergraduate instruction. The university is a preserver of culture, tradition, and of past knowledge. It has an obligation to transmit this knowledge to new generations. Also, the university has a responsibility to utilize the knowledge in solving the social, economic, and political problems of the nation and world. Stated succinctly, the university maintains a stock of knowledge, adds to the **stock** of knowledge with a **flow** of information, and then applies the knowledge to problem-solving.¹ It is these three missions then that ultimately dictate the objectives of undergraduate education.

Objectives of Undergraduate Education Development of Intellect

"The growth of knowledge, even in the individual, is not a simple cumulative process by which information is pumped into the head and remains in a reservoir" (2, p. 165). The growth of knowledge in the individual requires critical, objective thought. Thus, one of the primary goals in undergraduate instruction is to develop the intellect of the student, to enable the student to have the self-discipline to think for himself or herself, and to develop

¹It is tempting to suggest that each of these three missions corresponds to the usually mentioned list of education, research, and extension — tempting, but incorrect. For education, research, and extension all maintain the existing stock of knowledge, add new flows of information, and apply knowledge to problem-solving.

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logical approaches to problem-solving and decision-making (5, p. 281). Or, as one author states, "the mission of the university to teach people to think is infinitely more important than its efforts to teach people what to think about" (1, p. 706). This objective implies that our students need to know both how to **analyze** and how to **synthesize** facts, disciplinary concepts, and values and, thereby, obtain logically correct conclusions. This goal is, in actuality, the preparation of the student for self education.

With this objective, the teachers' mission is a demanding one. Forcing, coaxing, leading, or inspiring students into integrative thought is neither easily done nor always popular. Critical thinking for many students, particularly on their first exposure, is a frustrating experience. An instructor must be prepared to deal with this frustration, hopefully in such a manner that the frustration does not interfere with the learning progress.

Encouraging critical thought as a goal suggests an instructor should not teach a course by imparting only conventional wisdom and the disciplinary facts deemed important. Course time must be devoted to the analysis of concepts — not just their presentation. Separate thoughts must be integrated to form new thoughts. At some point in the course, students should be encouraged to execute this thought process without instructor assistance. Exams should reflect that this is expected performance.

An example from a course dealing with principles of agricultural economics illustrates this type of teaching. It is insufficient to terminate a discussion of, say, the history of U.S. agriculture with a descriptive statement of past events such as the U.S. history of agriculture has been one of few farms, few farmers, larger farms, and more product. The student should be encouraged to use their hopefully growing knowledge of agricultural economics to discuss why this occurred and whether it will continue in the future. Analysis would include "tearing apart" the issues to identify the key elements: substitution of fertilizers for land, new technology development, substitution of farm machinery for labor, etc. Synthesis would include putting the pieces back together with an emphasis on why agricultural history proceeded as it did. Students should draw on the concepts of relative price ratios, production relationships, and demand and supply responsiveness to prices to obtain new insight. Students can be encouraged to consider implications of the historical changes as well. That is, students can be encouraged to question the benefits and costs of the tremendous transformation that characterizes U.S. agricultural history.

Analysis and synthesis skills can be tested in examinations. Rather than asking exam questions addressing **what** happened, ask **why** events happened. Students can be examined with "what . . . if" questions to test their integrative skills. That is, an examination question might be "What would happen to the quantity

of cropland utilized if world food prices doubled? Justify your answer."

One author encapsulates these objectives in a checklist to be used when evaluating course work. According to this author, the goal of our teaching is to provide the students with (1) the background to know what questions need to be answered to solve the problems covered in the course, (2) the knowledge to know what information is needed to answer the question, (3) the knowledge of where to find the information, and (4) how to interpret the information so as to answer the question (10, p. 750).

One excellent means of improving a student's ability to think critically is to impart an understanding of research methodology. Perhaps undergraduate students will not undertake original research, but they should understand the process, strengths, and limitations of scientific inquiry, for scientific inquiry is society's means of discovering new knowledge. Furthermore, instructors should provide models of excellence in scholarship, so that good research is easily identifiable by the student (3).

Developing the intellectual skills of our students further requires the development of communication skills, both written and oral. One can be suspicious that students who do not communicate with well organized sentences and logical paragraphs do not think with well organized and logical thought processes either. And even if these students' thoughts are well ordered, who will be able to discern it if their communication is poor?

Development of Values, Physical Abilities, Social Skills, and Aesthetic Appreciation

Closely related to the development of a student's intellect is the second goal of undergraduate education: attainment of a general education which includes development of the student's values, physical abilities, social skills, and aesthetic appreciations (3). It is a sound premise that "any student graduating from a university should have a broad education regardless of major" (5, p. 283). This suggests a university obligation to provide the opportunity for the student to engage in some creative endeavor such as music, drama, visual arts, or speech. It suggests that all students should have some course work in humanities as well as physical sciences, in arts as well as biological sciences, and in social sciences as well as agricultural sciences. Unfortunately, general education as a concept appears to have undergone considerable erosion, as faculty, students, and legislators have concentrated their resources in more specialized education areas (7, p. 184). It would behoove faculties and administrators of agricultural colleges to lend their support to the strengthening of general education. It is these areas of art, humanities, and social sciences that provide our students with advanced communication skills as well as learning skills to be utilized throughout their lives. It is from these areas that a holistic view of the world, the world's cultures, and the world's history will emerge and assist the student in developing an appropriate perspective for effective decision-making. It is from these areas that a student should garner the intellectual resources for

forming a philosophy of life so that the "student can learn to live harmoniously with himself, others, and the physical world" (8, p. 155).

The development of a student's values may appear to present special difficulties in an institution which insists on the separation of "facts" from "emotions." However, the ethical ideals of intellectual honesty, careful analysis, and consideration of alternative viewpoints which are widely supported throughout the university community do provide a model for students (7, p. 15). Obviously, we as teachers and administrators in agricultural sciences can stimulate the development of morals and values in explicit ways, including strict adherence to a code of ethics, careful identification of value judgments utilized in decision making, and consideration of moral consequences of any proposed problem solutions (7, p. 248).

Development of Depth in a Discipline

As demanding as the previous two objectives are, they do not conclude a complete list of objectives of undergraduate education. Students need to develop depth of understanding of a discipline. They should know many of the facts, concepts, principles, attitudes, values, and skills associated with their chosen discipline. They should have an understanding of the discipline's paradigm: the basic theory and means of analysis utilized in a discipline.

Furthermore, if students are to learn this type of knowledge, we must be teaching coherent programs as opposed to sets of courses. In agricultural economics, for example, the curriculum includes teaching fundamental concepts throughout most courses. Of course the applications of these concepts differs between courses, but the concepts provide a unifying theme. These include the concept of marginal analysis; systems concepts, such as the functioning of economic systems; process concepts, such as the process of equilibrium or obtaining an optimum; the concept of probability and the stochastic nature of knowledge; the difference between data and information; and the conflicts that occur when attempting to maximize more than one objective (8, p. 712). These common course concepts bind and integrate courses into a curriculum and help to provide the students with disciplinary depth.

Enable the Student to Take a Responsible, Productive Position in Society

Knowledge of a discipline's paradigm is frequently not adequate preparation for a student to secure employment upon graduation. Agricultural colleges have a commitment to preparing students for entrance into professional disciplines. Most employment opportunities require some technical skill as well as subject matter knowledge. The technical skills might be computer programming, lab procedures, or use of specialized equipment. However, in a university setting, it is always difficult to decide how narrowly to define the technical skills requirement. Generally, in a university, we do not

want to train individuals as technicians. This is particularly true if such training suggests a large tradeoff in terms of an education in the broadest sense of the word. Indeed, one must weigh carefully the amount of depth required of a student in his/her discipline *per se* at the expense of more breadth and flexibility.

It is true that ours is a highly specialized society with numerous employment opportunities requiring well-defined technical abilities. Yet, as a university faculty, we should be careful not to overspecialize the education of our students. In a society that changes as rapidly as ours, simply matching a future supply of trained individuals to meet the future demands is a risky business, as anyone trained as an aerospace engineer in the late 1960's can testify. Ours is a society of quick obsolescence for narrowly specialized individual skills. But, even in those cases where it is conceivable to match trained students with employers' demands on a one to one basis, we shouldn't. University faculty only have four years to influence most students; university faculty are best at educating, not training. The faculty's advantage and mission lies in **educating** a student, not in serving as a **training** attache for possible employers (4, p. 1163). This does not suggest a lack of relevance to the educational mission, rather a university mandate to teach a student "to continue to learn with others throughout his (or her) lifetime" (4, p. 1163). The challenge to the educational structure is to plan for change, to plan for surprise, to create "adaptable specialists" (1, p. 708).

Development of a Student's Survival Skills

Final in the list of undergraduate educational objectives is the development of students "survival skills." Students have personal and professional goals not encompassed by the objectives previously discussed. Students, like all individuals, must deal with conflicting objectives and learn to manage their own time and emotions. They need to know a host of survival skills in a university setting. These skills range from how to make effective use of their advisor, to how to take an examination. Hopefully, we as teachers can be of assistance here as well by respecting our students' individuality, by listening to our students, and assisting them where possible in their decisions by isolating the advantages and disadvantages associated with alternative courses of action. Also, we need to keep ourselves and our students informed of special counseling and advising services that are available.

Priorities and Tradeoffs

The undergraduate educational objectives discussed above delineate what our educational product is. The fulfillment of each objective requires the student's attainment of certain knowledge and skills. However, the course load necessary for the complete attainment of these objectives is extremely demanding, considering the constraints imposed by a four year program.

Economists have a saying "that all things worth doing are not necessarily worth doing well." That

statement is a provocative way of saying that we have limited resources that constrain the number of activities we can accomplish. Thus, if one uses his or her resources to achieve a goal at a level of perfection, one leaves fewer resources to attain the next goal. For example, a student has a limited number of credit hours to allocate between the previously discussed areas of technical skills development, discipline paradigm depth, and exposure to other disciplines. Obviously, as an agricultural college elects to move toward the obtainment by its students of more, say, technical skills, it eventually sacrifices some student exposure to other disciplines as well as achievement of depth in the student's own discipline. The task before any curriculum committee is to decide how to allocate the required hours, given competing goals and with limited resources.

Furthermore, different allocations are appropriate for different students. The terminal B.S. student has different program requirements than a student desiring an advanced degree. The returning older student frequently has different program requirements than his younger counterpart. Thus, program development should be an individualized activity, and university requirements should allow such flexibility.

Although there is sound rationale for different undergraduate curriculums, this need for flexibility does not suggest that administrators and faculty should retreat from articulating educational policies to be utilized in guiding curriculum development. Indeed, in this age of accountability, it is imperative that colleges and universities take the initiative in developing clear statements of mission and purpose. These statements should reflect the realization that teaching is not synonymous with learning. Teaching is an input, a resource. Learning is the output. Further, **the ultimate product of an educational system is educated people.** People are not to be used as a means to some societal end. We are producing educated men and women, not a labor supply (2, p. 175). If we keep this principle firmly in mind, it should guide us to the appropriate design of the various components of our educational system.

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