

points of departure.

In the case of biology the introductory course should emphasize, but not be limited to, a study of organisms and populations of organisms — the levels of organization with which we are most concerned and the level with the greatest potential for motivation of the student. In view of the wide range of backgrounds with which our students come to us, provision should be made for those with excellent preparation to receive advanced placement. Whether biology is to be taught at the freshman level as an integrated discipline or as botany and zoology is a continuing point of contention. There are logical arguments to support both views, but logic seldom prevails when this topic is being discussed.

That the core have many points of departure, I believe is incontestable. The variations in depth of background needed by the students in agricultural business, agricultural engineering, agricultural technology, and those preparing to enter graduate school in one of the more sophisticated biological specialties dictate that this be so.

Biology core programs are presently in a state of turmoil. It is doubtful that there will ever be one standard because of the variety of purposes biology serves. In liberal arts colleges it will probably always be oriented toward general education. In some schools it has been traditionally biased towards the pre-med student. In the larger universities it must serve a variety of students including those in agriculture. Physics and chemistry departments have only begun to consider their service role to other areas; but mathematics, on the other hand, has given much attention to the development of a sequence of courses that they believe will serve the needs of all students. This "core" is characterized not only by many points of departure, but also by many points of entrance.

There was a fad a few years ago to equate agriculture with science. Colleges and departments changed their names. Courses in Poultry Husbandry became courses in Avian Science. Some people in agriculture were impressed; some politely ignored this attempt at respectability; but most scientists in the traditional disciplines laughed. I'm afraid a number of high school and college students laughed too. To them biology, physics, chemistry and mathematics are the sciences; agriculture becomes an *applied science* only to

the degree that it utilizes and applies these basic disciplines. Here we were teaching "agricultural science" to students with no workable knowledge of biology or physics or chemistry or math; and what was worse, we were not even using the backgrounds in these subjects that they did have in the development of our courses.

How often in your course with a prerequisite in organic chemistry and plant physiology do you really build on a concept that the student presumably learned in the prerequisite course? How frequently do you use higher mathematics, for example, in a discussion of the epidemiology of an animal disease? My effort here is to point out what I believe to be one of the greatest shortcomings of educational practice in agriculture: our failure to truly articulate our courses with those of the rest of the university or even with those in the students' backgrounds. While this is not entirely our fault, a major portion of it is. First, most of us are obsolete. Either we never were really qualified in the basic disciplines upon which our "applied science" is based, or we assume that the content of the present course in organic chemistry, plant or animal physiology, genetics, economics, and so on, are the same as they were when we took the course 20 years ago. Another factor that contributes to our inability to really challenge our students to apply basic concepts to our subject matter is that in order to fill our classroom with warm bodies we either omit legitimate prerequisites or we freely waive them. The students thus have such diverse backgrounds that we can't build on previously acquired information even if we were capable of doing it. Instead, we have to reteach material to the depth needed.

To summarize this point, let's look a little deeper at the mathematics requirements for the baccalaureate degree. We seldom require anything past algebra and trigonometry. We don't use it in our courses either because of lack of our ability or because some of the students have not had it. Therefore, the question is raised, "Why require it?" The technologist of tomorrow will be living in a mathematical age. The computer may solve the problems; but the man will have to understand the significance of probabilities, of limits, and other concepts to even interpret the answer that the computer hands him. In planning cur-

ricula for future students, don't sell them short. Prepare them for the era in which they will live.

I visualize that in the not-too-distant future the technical (and scientific) aspects of agriculture will be concentrated in the last two years of the baccalaureate program. There are two reasons for this: more and more of our students will be transferring into our four year programs in the junior year, and two years in the basic disciplines will be needed to gain the backgrounds that will be needed to teach the types of courses in agriculture that must be taught.

This does not mean that courses in agriculture should not be offered during the first two years, but let's not try to convince anyone that they are "science" courses. I visualize a course during the first year in which agriculture is approached through its socio-economic implications, both past and present. This course should also delve into the frontier areas of agriculture to demonstrate to the student the relation of the basic disciplines to the solution of the problems of the future. Show him why he will need calculus, physical chemistry, sociology and other courses if he is to compete in some area of agriculture 20 years from now.

Sometime before the end of the sophomore year introductory courses in crop production, animal production, soils, and the social sciences as they are related to agriculture could be offered. These should have few or no prerequisites and should be so taught that they would have campus-wide appeal. Neither should they be prerequisite for specialized courses to be taken later.

In closing I would make one final appeal. Realizing that 50 percent of the technical knowledge of today will be obsolete in 10 years, that 50 percent of the technical knowledge our graduates will need in 10 years has not yet been discovered, that, if he is typical, our graduate will make 4 to 6 major changes in his type of employment during his lifetime, and that he must live as a responsible citizen in his community as well as make a living, let us be certain that in planning curricula for the future, we put the good of the student foremost. We can and we must adapt to change, to the new curricula in biology, to the future requirements of the industry. Let us forget our vested interest in the *status quo* and move forward as the times demand.

Curriculum Development

and the Larger Learnings

by

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Curriculum development utilizing reasoned principles and directed toward reasoned goals in liberal learning is a challenge of the highest order to faculties in these times. First, there is the great challenge of trying to have the faculty agree on something — not only on one item but on an entire spectrum of

diverse experience based on reason. Second, there is the necessity for constant ferment and constant revision to keep curriculums from becoming out-moded and stagnant. Third and most important is the challenge to truly follow reason where the results will be a curriculum that is unique — one that is different and raises questions in the minds of our contemporaries. Curriculum makers are as susceptible to bandwagonism as most educators. Better to stay safe, too many say, make a "catalogue study" of offerings and hew to the line.

Given the task of providing for the major fields and general education, curriculum makers in the technical fields will have to grapple more earnestly with the latter than has previously been the case. Colleagues, industry, government, educational institutions, graduate schools, accrediting panels all tell us in no uncertain terms what students must have in a major field. And if new knowledge and processes demand a curriculum shift, they will tell us that also. In general education, however, these groups too often fall strangely silent and beyond a vague reference to "broad backgrounds" and "enrichment" as desirable curriculum components, have little to say on the larger learnings. Indeed, too many abdicate their responsibilities in this area in favor of English teachers and professors of history, many of whom seem dedicated to the training of Roman senators. The results, too often, are general education experiences which have little meaning for students, technical students who have little meaning to general education professors, and academic advisors who are puzzled by the entire affair and who resort to "getting the student through the institutional requirements" in the general education sequences.

The college — or department — that meets its responsibilities for the well-reasoned, well-rounded education of young people in the years to come will have a faculty which will not hesitate to spell out loud and clear the values and competencies they hope their graduates will possess. These curriculum makers will then set about working with experts in all disciplines to avail their students of experiences that will develop them. If the college catalogue does not carry the courses, they will put them in it. If their offerings look different, and even slightly awry, so be it. Happily, more and more institutions are coming to this view.

In visualizing the type of young person they would like to see in their graduation ceremonies, most faculties will envision a youngster who is articulate, both in speech and writing, one who has a feel for language, a respect for clarity and, hopefully, a knowledge of some language other than his own. The

young graduate would be at home in the world of quantity, numbers and measurements; he would be able to recognize the difference between fact and opinion; and he would be a logical thinker yet quite capable of imaginative and creative thought. Our graduate would know both the worlds of nature and the worlds of man; and he would not be afraid to apply what he knows with judgment and discrimination which comes from a deep knowledge of other persons, other problems and other times and places. Our graduate would never be a type. He would have acquired the bent and skill for perpetual self-renewal and a value system and yen for excellence which would serve him well in an increasingly changing world.

Visual models of students molded by general education experiences are easy to come by. Translating visionary materials onto the drawing board and thence into classroom and campus life is something else. Perhaps the first and most important step is to assemble a general education faculty which will commit itself to a developmental type of teaching rather than the sometimes unconscious commitment to faculty psychology or pre-graduate school training which characterizes the efforts of many college teachers. Professors who will try to measure and appreciate increases in critical thinking abilities, values and abilities to integrate knowledge in addition to the usual measurements of the increases in the *fact banks* for their courses are most effective in teaching for the larger learning. Professors, with broad sweeps to their general courses, who constantly relate past efforts of man to contemporary struggles to master the universe and perfect a society, will involve students in a developmental experience that has a lasting impact.

Given a good faculty, the outlines of a good curriculum in general education can be easily staked out. Curriculum horse trading, back scratching and empire building are pitfalls in general education, however. Too many common cores have been divided — exactly separate and exactly equal — among the feudal barons of the major disciplines of knowledge in a college with the administration sitting nervously in the middle. The more honest efforts set out the values and competencies to be developed and set about developing learnings to be mastered. Then the question of who will teach the students is considered in depth.

Some interesting approaches are emerging as a result. Who would have thought in years gone by that a professor of "scientific humanism" would become a highly respected member of the academic community. Or that economics, sociology and psychology would lie

down together in a cross-disciplinary social science course. Or that professors who wrote their dissertations in Early English History could find fulfillment in courses entitled Western Civilization; or that archery, tennis and community health, scoffed at in the past as beneath the ken of solid academics, would come to be more and more regarded as experiences necessary for preparation for the new leisure and for providing leadership for perfecting communities where poverty and poor health conditions still grip a third of our population. Who, also, would have envisioned the new honors movement making as much or more headway in general education programs as in major fields departments or the new breed that is emerging from the wedding of science and technology with the new general education programs, engineers, accountants and agronomists recalling the wisdom of Descartes and Aristotle as they make their decisions in daily life. Thus is the new academia as a result of serious attempts at a more complete development of the students.

Still largely unsolved is the problem of evaluating the outcomes of general education experiences. Judgmental types of subjective assessments leave much to be desired in curriculum development. Educators are beginning to come to grips with the problem of providing empirical data to be used in conjunction with subjective appraisals. It is important to note that the thrust is toward supplementing rather than supplanting subjective with empirical data. Some change phenomena defy complete empirical measurement.

Measurements of behavioral outcomes of general education have had the inherent weakness of ending at the last final examination or testing session of the senior class. Recently some institutions, notably the University of California at Los Angeles, have structured studies designed to ascertain the impact of general education on the lives of students *after* they leave the institution. Participation as an effective citizen in the cultural, social and economic life of their communities, maintaining a healthy perspective regarding home, family and careers and persistence of inclination to improve their communities are regarded by many as the *real* test of a good liberal education in college. For the young adult in a technical and scientific profession oriented toward rural and village life, a further test might be adjustment of perspective and often of careers to increased urbanization and to rapid changes in occupational structures.

Indeed, the challenge of change is perhaps the greatest of all for curriculum makers. For theirs is the challenge of preparing young men and women to expect and, indeed, welcome change and yet maintain the roots of family and community

upon which a strong society must rest. In the years to come this challenge will become even more severe as technology and popula-

tion shifts work their changes into the fabric of American life. It will be interesting to note in what way and how well those who set the out-

lines of the larger learnings in the college will meet this challenge.

"Strengthening

College
and
Industry

Communications
for

Improved
Student
Understanding"

MR. R. C. MORTON

*Manager, College Relations
Ralston Purina Company
St. Louis, Missouri*

It is an honor to address this group of educators today and to be a part of your Annual Convention Program. In recent years, I have watched the activities of NACTA and this Conference is certainly an indication that your organization is making the necessary adjustments to play even a more important role than in the past.

Most every agricultural conference that I have attended over the last ten years has sent me home with renewed faith in my selection of agriculture as the field in which I could possibly make the greatest contribution to our society and achieve the most personal satisfaction. Each of you has attended dozens of such meetings, some excellent, some good, some not so good; but the facts and figures invariably presented an extremely favorable picture of the challenge which American Agriculture was facing. This was true in spite of the usual ill winds, surplus situations, public relations complications and a host of other "enthusiasm-dampening factors."

It has been obvious for quite a few years that the supreme test and challenge of our food production machinery was yet to come. "Never Was the Future So Close As It Is Now" . . . says Dr. Earl Butz of Purdue University . . . "American Agriculture is an expanding industry in every important respect except one . . . the number of people required to run our farms."

In the past six months I have had the pleasure of talking with over a thousand fresh young college students who are probing many different industries and companies in search of a career that will meet their expectations. They grant that the facts and figures indicate as much or more opportunity in agriculture than other industries, but

they have watched *people*, neighbors, their own families respond to the trends. They are anxious to enter the agribusiness phase of this fascinating industry, but they do so with uncertainty and inadequate information, consequently, a weakness in that vital quality, enthusiasm.

I hasten to add that other company representatives from various areas of industry share my concern over student attitudes toward the business world. Then let me qualify this statement to some degree, at least, and assume a great share of the blame for industry. My thoughts along these lines parallel those of many educators, but the remedy is not simple.

Enrollment in our universities from coast to coast is skyrocketing; Colleges of Agriculture which were sagging a few years ago are also enjoying new growth. And at the same time, most businesses are surging forward with good profits, expansion, mergers, diversification and the like. We are both so busy going up our own ladders of success that we can't take time to understand each others' motives.

We can't expect instructors who have never really been exposed to the business world to sell the opportunities which are available with sincere enthusiasm. And on the other hand, we can "crack industry on the knuckles" for being so busy in their "busy-ness" that they have neglected to accept their responsibility in this important area of education and attitude development.

Our colleges of agriculture have made excellent curriculum changes in recent years, with particular emphasis on economics, certainly an indication that our economic system has a great deal to be desired. Many schools have been able to develop economic courses with practical application to our changing business world; others, however, are deep in theory and may not be accomplishing the desired goal.

There has long been a distaste on the part of college students for sales positions, and this will not change overnight. Possibly it stems

from an unfortunate incident, contact with a particular sales representative on the farm. As the influence and acceptance of technology reached new proportions in all of industry, the need for company sales personnel to become extensor-type representatives was extremely important. Agribusiness organizations exist on low-profit margins compared with most other industries and repeat sales are essential for survival. The one-shot, high pressure salesman is a thing of the past. Today's successful marketer, man builds a working business relationship with the producer that must be based on strength and profitability for all concerned.

If these observations are in any way accurate, there appears to be a big job ahead for both of us if we are to perpetuate the economic system which has produced for us the greatest society in the history of mankind.

Business, however, must bear the bulk of this load, but it will require your understanding and cooperation. Industry must be willing to give time and thought, our two most valuable assets to communicating with instructors and students and attempt to bridge the gap between these dynamic areas of education and business which are now thrusting forward too independently for each others' own good.

In addition, industry must be willing to invest dollars, a third asset of considerable importance to most businessmen.

Possibly industry's greatest concern today is in this vital realm of motivation. Every company can point to numerous examples of young men who entered their ranks with a weak scholastic record, or no college work at all. Yet these individuals had the capacity to recognize and reach for a challenge and become personally involved to the extent where they readily overcame their shortcomings. This is the exception rather than the rule, since the student's academic record is probably the best single measurement of performance potential.

"Life is an adventure in personal