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# A Potpourri of Ideas on Undergraduate Education

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***Agriculture and the Undergraduate: Proceedings.*** By the National Research Council, Board on Agriculture Staff National Academic Press, 1992, 268 pages, \$33

***Reviewed by Neil E. Harl***

The greatest contribution of most proceedings of conferences on undergraduate teaching is useful ideas for those concerned with resource allocation in academe and those involved directly with curriculum building. The modest volume ***Agriculture and the Undergraduate*** is no exception. The essays and the reports from discussion sessions at the 1991 conference from which the volume emanated provide a rich lode of insights, observations and experiences on ways to nudge the curriculum reform process. The volume is a potpourri of ideas on ways to improve undergraduate education. Some good. Some not so good. Some trivial. Some not so trivial. But all are deserving of careful thought and further reflection.

And yet the volume is laced with disturbing and troubling statements that deserve wider discussion than was received by this select group oriented heavily toward research in the physical and biological sciences.

A fundamental aspect of any effort at curriculum reform is the set of assumptions about employment challenges over the lifetime of graduates. One obvious component of that set of assumptions, at least for education related to a particular sector or subsector of the economy, is the direction likely to be taken by that sector or subsector over the next several decades.

One cannot disagree seriously with the observation by Charles Hess in terms of education in agriculture. The period before the 1970s emphasized production agriculture. Moreover, one cannot fault his statement that educational patterns in the 1970s reflected a decided shift toward economics and business, and his observation that in the 1980s greater attention was given to the underlying sciences, especially the biological sciences. But what is not at all clear is that the 1980s' emphasis on science, particularly on biotechnology, will continue to be the polestar guiding curriculum reform in the 1990s and beyond. That is a message, occasionally explicit and nearly always implicit, throughout the volume.

One particularly notable passage is in the essay by Peter Spotts in which he states, "When I peel back all of the layers of the issues examined in this volume, I come away with a sense that, at its core, undergraduate education in science—be it in agriculture or any other field—must help students know that they are part of a larger community, one that extends beyond the bounds of a particular discipline or even of the sciences as a whole." While I agree with the basic premise of the statement that students need to gain appreciation for the greater world, I am appalled by the assumption apparent here and elsewhere in the volume that *agriculture is synonymous with science*, particularly when the context is *physical science*. Such an assumption demonstrates a misunderstanding of the difference between the many faceted sector known as agriculture with the physical sciences, social sciences, and the various disciplines in the humanities which contribute to that sector. The misconception evident in the view that agriculture is physical science is readily apparent if one were to reflect upon the sage advice and counsel that would likely have come

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(and did) from similar conferences in the several decades dominated by production agriculture when agriculture was viewed as essentially the production of food and fiber and the only undergraduate education that really mattered was in the production disciplines

Indeed, one audacious display of scientific paternalism was the startling statement that we should "reduce the use of the term *agriculture* because of its negative image." I repeat once again something that should be self-evident to anyone well short of being an undergraduate: agriculture and physical science are not synonymous. *Agriculture is not physical or biological science*

While I know of no one who predicted accurately any of the shifts in curricular emphasis in agriculture over the past three quarters of a century, and I certainly doubt that I will mar that sterling record here, a good case can be made that the next major era of emphasis in agricultural education will be on management of information and management of resources in a world of rapidly changing technologies and gradually shifting policies. The skills needed by the graduates of our baccalaureate programs will go well beyond science and will include management, manipulation and analysis of information, the successful conduct of food production, processing and distribution operations within an increasingly constrained legal framework, and resource allocation (especially capital and labor) in a truly global competitive struggle. I would echo the observations of C. Eugene Allen in his assessment of the nature of the information management age.

A singular emphasis on science, especially the biological sciences, could well cripple U.S. agriculture. What the world does not need and could not long endure is a system of undergraduate education highly focused on the physical sciences to the point where everyone knows the difference between DNA and RNA and yet does not understand production function relationships or the configuration of a demand-supply curve.

Viewed through our own professional prisms, we tend to see a world deficient in those skills, abilities and understandings we know so well and take for granted. Economists have a certain disdain for their less-informed brethren who do not worship at the shrine of duality theory or even the subtleties of cross elasticity of demand. Lawyers recoil in horror at the thought that someone somewhere might not be able to recite the entire Bill of Rights and to maintain a learned discourse on each one. It is a bit disturbing that students—or even adults—do not fully comprehend plate

tectonics. It is even more disturbing that undergraduate degree holders—at Harvard or anywhere else—do not understand the relationship among the sun, the earth and the seasons. But as Otto Doering so aptly notes, the fact is that we can never elevate the knowledge level of the general public to satisfy scientists. The malleable minds of the world are not some kind of intellectual clay to be shaped into our own professional image. The world has become too complex to expect all of our students to meet such a standard.

There is a place for physical and biological science in undergraduate education. It is my view that every undergraduate should be exposed to the power, the mysteries, the beauty and the rigor of science. And it is important for those who have the ability and the interest to continue in graduate education in the sciences to do so. I agree with Nils Hasselmo that students need to understand the basic nature of science. I am less sure of the validity of the assertion that each student needs to know something about the theory and methodology of at least one science. Realistically, that can probably be achieved only with major emphasis in a science. I feel a degree of intellectual discomfort with such a requirement.

To a considerable degree, our level of living in this country and our economic and physical security depend upon our level of cleverness. Without a technological edge, we can scarcely expect to maintain income levels well above the rest of the world. Education in the sciences is critical to our national future and, more fundamentally, is critical for the future of the human family.

But that does not mean that we should force every undergraduate through the same preparation that would assure an adequate base for graduate education in the sciences.

Agriculture is and should continue to be a many-faceted, pluralistic sector with manifold educational needs and skill levels.

How, then, can we assure that those needs will be met?

In reading this volume of essays and group discussions, I am struck by the implicit acceptance of a planning model as individuals attempted to answer that question. Perhaps it is because of my recent educational work here and abroad with individuals from finance, banking, government, business and law in the transitioning economies of Central and Eastern Europe and the former Soviet Union that I have concerns about the efficacy of that model and the risks inherent in pursuing an

inclusive planning model. An approach to resource allocation based on planning often produces disappointing results and can be genuinely disastrous.

Higher education is producing, in a highly competitive environment, a collection of products in the form of educational experiences representing the faculty's best collective judgment of what will meet the needs of its students and what will be successful in the market. Even in the world of higher education, the consumer is king. Society has been, I believe, well served by a group of highly competitive institutions producing products with differing features and qualities. We cannot force feed a generation of students what they do not want and are unwilling to pay for. Sometimes we act as though we would like to wave a magic wand and force on our students our notions of a model or ideal curriculum. Sooner or later, students will obtain the collection of educational experiences they want. We are not entirely privileged to retire to monastic isolation and prescribe what we believe undergraduates should experience.

The last vestige of the student as captive may well disappear with the emergence of courses by satellite, permitting a degree of curriculum "merging" among institutions. Even with choice among institutions, once a student selected a particular institution the student tended to be a captive, at least for required courses. If students are free to select a course or courses by satellite from the leading intellectual light in a particular area, the student is even less a captive of the institution. Indeed, it seems likely that consumer choice among students will be an even greater factor as emerging technologies work in favor of student selection of course experiences and as economic pressures cause institutions to give greater attention to the marketability of their products.

What all of this adds up to is that we should be placing less emphasis on trying collectively to divine the intellectual configuration of society's needs and how we can meet those needs, and more emphasis on educational products to assist a student to develop uniquely in a world none of us can now very well know or understand.

A good case can be made that an individual completing work for an undergraduate degree should have gained the ability to think, to analyze and to reason and the ability to communicate orally, in writing and electronically. The former can be acquired in any good, rigorous curriculum that emphasizes the skills of critical thinking and analysis. As Karl Brandt noted, a college education should be about thinking. The latter is somewhat

the responsibility of us all in academia, not merely those in language, speech and mass communication skill areas. Regrettably, we have perhaps not done as well in that area as we might.

In this regard, I am uneasy with reference throughout the volume to "professional" undergraduate education. It is a natural tendency to want to upgrade a product by renaming it. If what is meant by the use of the term "professional" is to encourage a higher level of critical self-evaluation, I have no quarrel with the use of the term. But I would have difficulty with the use of the term to the extent the use of "professional" is meant to connote a mastery of a part of the great body of knowledge sufficient to rank the individual among those who have achieved through post baccalaureate experience, education, training or some combination a level of performance signifying genuine mastery.

There seems to be little doubt that the curriculum should be the product of individual and collective faculty thought and debate. Ideas floated by an administration eager to capture the latest educational fad that are not subjected to the annealing heat of faculty debate are often doomed to failure or worse—misleading or misguiding a generation of students. There is no assurance that students will not occasionally be misled or misguided but the probabilities are lower if left in faculty hands.

The shortcomings of the best curriculum reform model are well known—(1) individual faculty members may thwart the reform process by continuing to teach the way they have been teaching (a type of conflict of interest on the part of faculty members), (2) the actual content of a course may not be known other than on a very general basis by faculty colleagues as peers so peer review is less than complete, (3) faculty may have a less than perfect perception of student needs, and (4) individual faculty may not be at the leading edge of even their own discipline and so may argue for and ultimately teach outdated concepts and ideas. These are all important problems and deserve attention. This volume focuses relatively less attention on these areas.

At the risk of appearing to be hopelessly provincial, I am moved to register surprise at the omission of law from the pantheon of disciplines involved in undergraduate education in agriculture. The failure to recognize the importance of the study of the legal or institutional framework within which resources are allocated and income is distributed is, in itself, surprising. But the absence of agricultural law in the chart by Norma Scott and Brian Chabot is jarring, particularly with the

listing of the "humanities" as a subject of "sciences" with specific mention of government, history and linguistics as the components of humanities

Elsewhere, I have noted the major dimensions of the transition now occurring in US agriculture (1) a transition away from reliance on government price and income supports, (2) a transition toward greater reliance on the market, (3) a gradual demolition of trade barriers for food and fiber products and (4) increased concern about the impacts of agriculture on the environment (and the environment on agriculture) and increasingly restrictive policies as to food safety. In all of these areas, law is playing and is expected to continue to play an increasingly important role in production, processing and distribution operations. James Moseley alluded to this fact in reflecting upon the demands imposed upon him as assistant secretary of agriculture in USDA. But the need to know and understand the basics of the legal system goes well beyond undersecretaries of agriculture. Virtually everyone involved in agriculture in the twenty-first century will encounter the legal framework almost daily, from scientists to farmers.

A major concern in institutions of higher education

involved with education in agriculture is the extent to which faculty in the agricultural side of disciplines are able to and do keep up with developments in the discipline generally. The argument is often heard that the agricultural side of disciplines, focusing on the applied rather than the theoretical, may fail to keep pace. Certainly this problem argues for strong efforts to encourage close intellectual linkages with individuals elsewhere on the campus functioning in the same core disciplines.

With concerns about arms control and national security receding from the international policy agenda, support for solving problems of food sufficiency, hunger and malnutrition, resource adjustment world-wide, and economic health of the food and fiber producing sector are moving to center stage. Far from diminishing in importance, issues relating to food production, processing and distribution appear likely to be poised for priority attention. Education to serve the diverse and complex agricultural sector is a topic worthy of debate and discussion. The volume reviewed makes a nice start in the direction of discussing undergraduate education *involving physical and biological science in agriculture*.

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