Changes in Colleges of Agriculture at Land-Grant Institutions

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Abstract

Surveys were sent to colleges of agriculture to document changes of mission, departments, and majors from 1997 through 2002, as well as to document respondents’ perceptions of competencies, skills, methodologies, and pedagogy in the classroom; approaches to student learning; and key issues for the future of agriculture and food-systems education. The institutions responding to the survey are in the midst of change, with 94% of the responding 52 institutions changing mission, departments and/or undergraduate majors from 1997 through 2002. Problem solving, written and verbal communication, and critical thinking were the competencies and skills rated highest by the respondents, who also rated hands-on learning (experiential learning and field trips) as equally important to traditional lecturing as a learning approach.

Respondents identified the key issues facing agricultural and food systems education in the future as: changing the image of agriculture and how it relates to student recruitment; encouraging a systems (interdisciplinary) approach to the study of agriculture; fostering appreciation of diversity and development of global perspectives; facilitating the transition from a teaching paradigm to a (student-centered) learning paradigm; finding new educational applications for technology and developing appropriate instruments for assessing technology’s impact on learning; and developing more stable sources of funding and other resources necessary to provide top-quality undergraduate education.

Introduction

The Morrill Act of 1862 established a national system of publicly funded colleges dedicated “to teach such branches of learning as are related to agriculture and the mechanic arts, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life” (NASULGC People and Programs, 2001, p.16). The colleges created by the Morrill Act were funded by the sale of publicly owned land and became known as land-grant institutions. The Second Morrill Act, in 1890, created 17 colleges and universities for black students. These institutions, now known as the “1890s land grants,” are a legacy of the “separate but equal” policies of the United States in the late 19th century. A third federal law—the Elementary and Secondary Education Reauthorization Act of 1994—extended land-grant status to 29 Native American colleges.

Agriculture remains a main focus for land-grant institutions. But as agriculture has changed, the land-grant institutions have changed as well. Lee and Thomas (1995, p. 11) observed that “agricultural education changed through the years and will continue to do so in the future. Prosperity for agricultural education demands making adjustments.” Their research also indicated that change processes take distinctive courses in different places, with the result that “local programs and state-level direction for programs vary tremendously among the states” (p. 11).

This variance reflects the complex character of agriculture. The term “agriculture” itself, as it is used today, encompasses the food system, natural resources, environmental sciences, biotechnological sciences, and food and fiber production, processing, marketing, distribution, and consumption. According to Kunkel (1995), “Gone is the limitation of the scope of agricultural education in the 4-year institutions to production and marketing processes.”

In the late 1980’s and 1990’s business and industry, as well as higher education, was challenged to re-think its major mission to prepare for the 21st century. Business was bombarded with total quality management (Walton & Deming, 1988), just-in-time management (Sandras, 1995), reengineering (Hammer and Champy, 1993), and learning communities (Senge, 1994). Higher education and specifically colleges of agriculture were also being challenged to think about the need for change in order to address issues in the 21st century (National Research Council 1988 and 1992; Enhancing the Future of the Land Grant System, Symposium, 1992; Pickert, 1992; Meyer, 1992; Meyer, 1995; Lunde et al., 1995; From Issues to Action: A Plan for Action on Agriculture and Natural Resources for The Land Grant Universities, 1996).

Changes in agriculture raise two important questions with regard to land-grant institutions. First, are land-grant institutions keeping up with the rapid changes in agriculture and food systems? And second, are land-grant institutions adequately

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preparing our food systems professionals for the future?

In 1994, the W.K. Kellogg Foundation began funding a nationwide initiative, Food Systems Professions Education (FSPE), to examine these two questions. Thirteen land-grant institutions received FSPE grants. Each of the 13 collaborated with other higher-education institutions in FSPE programs; collectively, more than 60 higher-education institutions land grants, community colleges, tribal colleges, and other public and private institutions took active roles in FSPE.

The FSPE initiative challenged land-grant institutions to re-think education for the future and to restore land-grant education to its original mission of serving society as a whole. All FSPE projects began with an 18-month visioning period. Representatives of stakeholder groups were recruited for participation in the extensive process of generating a vision of food-systems professions education for the year 2020. Recruiting involved large- and small-group presentations by project staff and visioning sessions involving between 6 and 150 stakeholder representatives. The visioning sessions led to the creation of a vision statement for each of the 13 FSPE projects and goals and objectives to be achieved in pursuit of those visions. (Silag, et al., 1998).

After the visions were created, the Kellogg Foundation awarded an additional 5 years' funding to each of the 13 FSPE projects to support implementation of innovative approaches, creative ideas, and new models of collaboration and partnership inspired by their respective visions. Implementation activity was meant to catalyze change within land-grant institutions (Silag and Schultz, 2001). Especially valued in the 5-year implementation phase would be new ways to connect post-secondary education, business and industry, and government and other community institutions a major objective generated in one form or another during the visioning phases of all 13 FSPE projects.

Now, eight years later, results of the survey research reported here document some of the changes made in the colleges of agriculture at land-grant institutions, including FSPE institutions and institutions that did not participate in the FSPE initiative. Changes examined in the survey included changes in mission, departments, programs, and learning approaches taking place during the years 1997 - 2002.

**Purpose of the Study**

The purpose of the study was to explore changes in undergraduate agricultural and food systems education in land-grant universities and to identify key issues facing agricultural and food systems education. The study’s concrete objectives were to review

- Changes in the names of colleges of agriculture
- Changes in departments and majors at colleges of agriculture at land-grant institutions
- Changes in teaching and learning approaches in undergraduate agricultural and food systems education
- Key issues facing undergraduate agricultural and food systems education

**Methods**

A survey instrument was developed to generate information appropriate to the objectives of the study. Extensive discussions with representatives of the 13 FSPE project groups informed the contents of the survey instrument, as did frequent visits with Kellogg Foundation staff to coordinate the design of the FSPE study with the research designs of other Kellogg-funded initiatives.

Surveys were sent to the Academic Associate Deans in Colleges of Agriculture of the fifty 1862 Land Grant Universities as listed in the 2002 Directory of the National Association of State Universities and Land Grant Colleges (NASULGC), plus to the Associate Deans of five institutions who are members of the American Association of State Colleges (AASCU) and also affiliated with NASULGC. In addition, surveys were sent to Associate Deans of all 1890 institutions listed in the 2002 NASULGC directory (fifteen of the eighteen institutions were listed). Surveys were also sent to fifteen 1994 institutions. Of the 85 surveys that were distributed, 52 were completed and returned for a total response rate of 61 percent.

Changes in undergraduate education in colleges of agriculture could be generated at the formal level (policies, programs, procedures, relationships, and funding mechanisms) or at the informal level (what happens in the classroom). The survey, therefore, contains questions dealing with the formal structure of colleges of agriculture (mission and changes in departments and majors), as well as questions dealing with the informal level of undergraduate education (ratings of skills, competencies, methodologies, pedagogy, and learning approaches).

Part of the original rationale for the Food Systems Professions Education initiative was to foster innovative ways to ensure a food-systems workforce prepared to meet the opportunities and challenges of the 21st century. The SCANS Report (1991), a national commission of business leaders and educators, decried the lack of practical verbal and mathematical skills evident among beginning employees, including beginning employees whose educational achievements would have predicted otherwise. The SCANS Report contended that educational institutions over-emphasized training in reading and writing at the expense of training in talking, listening, and other competencies that are highly valued by employers.

Teaching undergraduate education does not singularly focus on skills and competencies. While important, the instructor also has to consider other
important methodologies, such as promoting teamwork, community or service learning, study abroad opportunities, understanding cultural diversity, and preparing the student for participating in research. Therefore, the survey included questions to determine the importance of many different dimensions in undergraduate teaching, including competencies, skills, and methodologies. The respondents were asked to rate dimension from “very important” to “not important at all.”

Barr and Tagg (1995) have identified an institutional paradigm shift from teaching (or instruction) to learning, where instead of primarily lecturing, the faculty engages students through a number of learning approaches, including experiential learning, field trips, team projects, and team teaching. The agriculture and food systems education study groups whose work is reported in Kunkel et al. (1996) recommended a similar change: “the college of agriculture should put the student first” (129). In its guidelines for change, the study groups also recommended trying new methods of teaching teaching students “how to think, not what to think” and giving students opportunities to integrate knowledge and skills in experiential learning situations (134-135).

The survey included questions to determine whether agriculture and food systems educators saw evidence of this type of pedagogical change on their campuses. As change indicators, the survey listed 12 learning approaches. Half of the approaches are considered in the professional literature to be traditional and half are considered innovative. Respondents were asked to rate each approach from “very important” to “not important at all.” Respondents’ ratings were viewed as a reflection of the degree to which their colleges of agriculture had shifted from a teaching paradigm to a learning paradigm.

The survey also included open-ended questions designed to elicit information about activity at specific institutions. Respondents were asked to provide examples of the most innovative learning approach and the most innovative practice in agricultural undergraduate education in their college. The final question of the survey asked the respondents to identify key issues for the future of undergraduate agricultural and food systems education.

The survey questions were developed using a Likert scale of 1 to 5, with 1 meaning “not important at all” and 5 meaning “very important.” The open-ended questions were qualitatively analyzed, grouping similar answers together in order to distill the answers into like groupings. Some of the open-ended responses appear in Tables 1-6.

**Results and Discussion**

Of the 52 responding institutions, 45 (87%) are 1862 institutions, 4 (8%) are 1890 institutions, and 3 (6%) are 1994 institutions. Given the distinct differences between the three categories of land-grant institutions and the low representation in two of the categories, these composite numbers have limited value. Fifty respondents included the number of students and departments in their respective colleges, and 48 respondents included the number of majors as well. The mean number of students is 1,673, ranging from 92 to 6,329 students. For respondents reporting institutional and program data, the mean number of departments is 10.5, and the mean number of majors is 15.3. Of the responding institutions, about 1/3 (36%) have 1-999 students; about 1/3 (33%) have 1,000 - 1,999 students; and about 1/3 (34%) have over 2,000 students.

Remarkably, 94% of the responding colleges made changes in mission, departments, or majors between 1997 and 2002. Of these colleges, 33% changed their mission statement, 56% established new departments or discontinued departments, and 77% established new majors or discontinued existing majors.

**Names of Colleges of Agriculture**

The names of the colleges in this survey range from the traditional, stand-alone “College of Agriculture” (14% of respondents) to colleges making no reference to agriculture in their names (4% of respondents). The colleges of the vast majority of the respondents (82%) had “Agriculture” or “Agricultural” in their names combined with other descriptors, such as:

- Life Sciences (12 colleges)
- Natural Resources/Natural Sciences (11 colleges)
- Environmental Sciences (6)
- Food (5 colleges)
- Agricultural Sciences (5)
- Family Consumer Sciences/Home Economics (3)

Nearly half (47%) of the respondents regard their colleges’ names as very reflective of their undergraduate programs, while 43% regard their colleges’ names as somewhat reflective and 10% regard their colleges’ names as not reflective of their programs.

**Missions of Colleges of Agriculture**

Changes in the missions of colleges of agriculture occurring during the five-year period in question were reported by 33% of the respondents. Changes in mission noted by the respondents include:

- Broadening the scope of agriculture, to include biotechnology, economic viability, natural resource management, food safety, community viability, consumer education, sustainable agriculture, landscape horticulture, veterinary medicine, and agricultural economics and biosystems engineering, while reducing traditional production agriculture curricula due to decreasing enrollment in agronomy, production horticulture and animal production
- Reaching out to students coming from urban
Areas

- Conducting applied research across disciplines (including split appointments) that benefits the region served by the land-grant institution
- Expanding service courses provided by the college of agriculture to the university as a whole
- Enhancing undergraduate experiences; producing workforce-ready college graduates
- More emphasis on learning (student outcomes), rather than teaching (institutional assets)

The importance of the mission is reflected in the fact that 94% of the associate deans responded that the mission either entirely or largely influences undergraduate education, while only 6% of the associate deans think the mission of the college only somewhat influences undergraduate education.

### Changes in Departments and Majors

From 1997 through 2002, almost 90% of the responding colleges have made changes in either the departments and/or undergraduate majors. Concerning departments, 42% of the respondents indicated that they had established new departments; 35% of the respondents indicated that they had discontinued existing departments. When asked about specific departmental changes (an open-ended question), many respondents listed examples of merged departments where some old departments were discontinued and newly named departments emerged. Table 1 lists newly established departments; Table 2 lists merged departments. While some colleges both established new departments and discontinued old departments, 44% of the respondents stated that they neither established new departments nor discontinued existing departments.

Concerning undergraduate majors, 67% of the respondents indicated that they had established new majors, while 40% of the respondents indicated that they had discontinued majors. The newly established majors were clustered in four major areas: (See Table 3 for specific examples.)

- Interdisciplinary and interdepartmental majors
- Environmental majors
- Systems-approach majors
- Plant and horticulture majors
- Biotechnology and medical majors

The discontinued majors were clustered in four major areas: (See Table 4 for specific examples.)

- Traditional agriculture
- Natural resources
- Food science
- Other subject areas

While some colleges both established new majors and discontinued old majors, 23% of the respondents indicated that they neither established new majors nor discontinued majors.

### Dimensions/Learning Approaches in Undergraduate Education

The survey identified two areas for assessing undergraduate practices in the classroom. The first area was identified as "dimensions in undergraduate education" and included competencies, skills, methodology, and pedagogical

#### Table 1. Newly Established Departments

<table>
<thead>
<tr>
<th>General subject area</th>
<th>New departments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural education</td>
<td>Agricultural Education; Agricultural and Extension Education;</td>
</tr>
<tr>
<td>Environmental sciences</td>
<td>Agricultural Leadership, Education, and Communication</td>
</tr>
<tr>
<td>Extension</td>
<td>Environmental Health Science; Land Resource Environmental Sciences; Environmental and Molecular Toxicology; Environmental Horticuture</td>
</tr>
<tr>
<td>Plant sciences</td>
<td>Plant Sciences and Plant Pathology</td>
</tr>
<tr>
<td>Medical lab science</td>
<td>Medical Lab Science</td>
</tr>
<tr>
<td>Biological sciences</td>
<td>Bio Science and Technology; Genetics and Biochemistry</td>
</tr>
<tr>
<td>Food and nutrition</td>
<td>Food Science and Nutrition</td>
</tr>
<tr>
<td>Sustainable development</td>
<td>Sustainable Development</td>
</tr>
</tbody>
</table>

#### Table 2. Merged Departments

<table>
<thead>
<tr>
<th>New department's name</th>
<th>Old department name(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural Sciences</td>
<td>Animal Science and Plant and Soil Science</td>
</tr>
<tr>
<td>Plant Biology &amp; Pathology</td>
<td>Plant Science and Plant Pathology</td>
</tr>
<tr>
<td>Molecular Biosciences and Bioengineering</td>
<td>Biosystems Engineering, Plant Molecular Physiology, and Agricultural Biochemistry</td>
</tr>
<tr>
<td>Natural Resources and Environmental Management</td>
<td>Agricultural &amp; Resource Economics and Agronomy &amp; Soil Sciences</td>
</tr>
<tr>
<td>Plant and Environmental Protection Sciences</td>
<td>Entomology and Plant Pathology</td>
</tr>
<tr>
<td>Tropical Plant and Soil Sciences</td>
<td>Horticulture and parts of Agronomy and Soil Sciences</td>
</tr>
<tr>
<td>Natural Resource Ecology and Management</td>
<td>Forestry and Animal Ecology</td>
</tr>
<tr>
<td>Ecology Evolutionary Biology</td>
<td>Life Sciences and Genetic, Cellular, and Developmental Biology</td>
</tr>
<tr>
<td>Agronomy and Horticulture</td>
<td>Agronomy and Horticulture departments</td>
</tr>
<tr>
<td>Viticulture and Ecology</td>
<td>Parts pulled from two other departments to form the new department</td>
</tr>
<tr>
<td>Merged (no new names given)</td>
<td>Cell Biology and Neuroscience (added faculty and broadened mission); Geography merged with School of Agriculture; Bioresource Engineering merged with Plant Science; Dept. of Ag Information, Science and Education merged with the School of Human Sciences; 11 departments merged into 6 new ones</td>
</tr>
</tbody>
</table>
practices. This eclectic section listed eleven dimensions and asked the respondents to rate each dimension on a scale of 1 ("not important at all") to 5 ("very important"). The dimensions receiving the highest rankings were problem solving (4.19 mean), written and verbal communication (4.17), and critical thinking (4.17). The balance of the dimensions are ranked according to their mean: internships and co-ops (3.98), computer skills (3.94), teamwork (3.83), understanding cultural diversity (3.79), creativity (3.76), research (3.71), study abroad (3.29), and community/service learning (3.19).

The second area for assessing undergraduate practices in the classroom focused on learning approaches. The respondents rated each dimension on the same scale of 1 ("not important at all") to 5 ("very important"). Experiential learning (4.00) and lecture (4.00) tied for top importance; environmental sustainability (3.98) and field trips (3.90) tied for third. The remaining learning approaches were ranked very closely: team project (3.75), domestic and cultural diversity (3.71), emphasis on ethics (3.71), international perspectives (3.67), case study (3.62), discussion with practitioners (3.60), team teaching (3.54), and interdisciplinary teaching (3.50). The closely clustered mean ratings of learning approaches suggests that at least some respondents’ institutions were using more than one learning approach.

The distinction is often blurred between learning approach as a philosophy and as a practice, and perhaps for this reason several respondents duplicated their comments. Therefore, the survey responses from these two sections of the survey have been combined and categorized into nine areas. Table 5 presents the categories and selected examples.

<table>
<thead>
<tr>
<th>Assessment and competencies</th>
<th>Experiential learning</th>
<th>Service learning</th>
<th>International education</th>
<th>Educational collaboration</th>
<th>Academic structural changes</th>
<th>Use of technology</th>
<th>Changing pedagogy and methodology</th>
<th>Freshman Orientation</th>
</tr>
</thead>
</table>

**Key Issues in Agricultural and Food Systems Education**

As indicated, agricultural and food systems education is in a period of significant change, with 94% of the responding institutions reporting changes in mission, departments, or majors from 1997 through 2002. Signs abound in the survey data that colleges of agriculture are incorporating new issues and approaches into their curricula, addressing more diverse populations, becoming more interdisciplinary, and shifting to a student-centered approach to learning. But these changes are taking place at a time of unprecedented fiscal uncertainty: educational costs continue to rise and state education budgets continue to shrink and there is no telling how a changing economy will influence undergraduate education in the future.

Having traced several features of this complex picture in the course of the survey, respondents were asked to name the key issues for the future of agricultura-
Agricultural and food systems education. The responses were grouped into 6 categories (below). Table 6 lists the cluster categories and many specific examples of issues. Responses to this question outnumbered the responses for any other open-ended question.

- Funding and resources
- Diversity of perspectives, including global
- Student-centered learning
- Student recruitment, and changing the image of agriculture
- Systems (interdisciplinary) approach
- Rewards for faculty
- Use of technology and its impacts

**Summary**

Agriculture has been a primary focus for land-grant institutions. However, agriculture is changing from production and marketing to a food systems approach fueled by technology changes, demographic changes, and changes in pedagogy. That Colleges of Agriculture are engaged in change is clearly indicated by the fact that more than a third of the surveyed institutions (33%) have changed their mission from 1997 through 2002, and 90% are adding, deleting, or restructuring departments and/or majors. In addition to these structural changes, colleges of agriculture have begun to increasingly embrace student-centered pedagogies as well. Hands-on learning (experiential learning) was ranked equally with traditional lectures as the most important learning approaches. And among various dimensions of undergraduate education, the associate deans rated active approaches to learning problem solving, written and verbal communication, and critical thinking as “very important.”

Clearly, the respondents in this survey feel strongly that undergraduate agricultural and food systems education presently and in the future must focus on change. The most important changes that they recommended include:

- Changing the image of agriculture and how it relates to student recruitment
- Encouraging a systems (interdisciplinary) approach to the study of agriculture
- Fostering appreciation of diversity and development of global perspectives
- Facilitating the transition from a teaching paradigm to a (student-centered) learning paradigm
- Finding new educational applications for technology and developing appropriate instruments for assessing technology’s impact on learning
- Developing more stable sources of funding and other resources necessary to provide top-quality education.

Not doubt, undergraduate colleges of agriculture are already changing. The question is whether they can change fast enough to meet the changing educational needs of the food system.

**Literature Cited**


Enhancing the future of the land grant system, symposium, summary and background. 1992. Board on Agriculture of the National Association of State Universities and Land Grant Colleges.
### Table 5. Innovative Practices and Approaches

<table>
<thead>
<tr>
<th>Category</th>
<th>Innovative practices and approaches</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assessment and competencies</strong></td>
<td>Creative approach to incorporating student outcome assessments and assessment of institutional educational effectiveness process throughout the curriculum, i.e., freshman cornerstone course, junior perspectives/integration course, and senior thesis capstone course Focus on critical skills and competencies which are required of all B.S. programs which include: oral and written communication skills, analytical, problem solving, business management and technological skills; developing positive and ethical personal characteristics and appropriate interpersonal and leadership skills; and each student being required to do an internship as a way to gain real world experiences and explore career-related opportunities</td>
</tr>
<tr>
<td><strong>Experiential learning</strong></td>
<td>Students in our culinary arts program work at the University restaurant and practice their food preparation skills in a real food management environment Landscape architecture courses involve students in real problems; teams work out their own solutions; projects are them presented in public to faculty, students, and persons who had the problem to be solved. Two programs within the Agronomy major require a 3-semester coop education work experience</td>
</tr>
<tr>
<td><strong>Service learning</strong></td>
<td>Service learning integration into courses (mentioned several times) and with Extension Creation of Ag Ambassadors program</td>
</tr>
<tr>
<td><strong>International education</strong></td>
<td>International student exchange programs, international kiosk, global courses including a trip abroad Development of a global seminar to link university, community colleges and high schools to create shared learning communities</td>
</tr>
<tr>
<td><strong>Educational collaboration</strong></td>
<td>The Student-Centered Learning Initiative - a group of 34 faculty from our college, joined by 18 faculty from three of the regional campuses, collaborated over a five-year period to study and experiment with a variety of teaching techniques that made the faculty/student and teaching/learning relationship more of a partnership. Quarterly seminars were held and each member received an annual stipend and a quarter of release time to support their change efforts. Now developing 2+2 programs with three community colleges so remote students can finish most, if not all, requirements for a four-year degree in their home community</td>
</tr>
<tr>
<td><strong>Academic structural changes</strong></td>
<td>Research program for undergraduates (resources are allocated to faculty to encourage undergraduate experiences) Direct involvement of undergraduate students in grants, resulting in inquiry, writing up and presentation at local, regional, and national meetings and seminars</td>
</tr>
<tr>
<td><strong>Use of technology</strong></td>
<td>Electronic student portfolios (mentioned several times) Infusion of multimedia and web based assistance in the classroom (mentioned several times)</td>
</tr>
<tr>
<td><strong>Changing pedagogy and methodology</strong></td>
<td>Many, but not all faculty, moving away from lecture-based formats to pedagogy that involves learner to learner interactions and student participation. Faculty are trained in teaching writing across the curriculum; students are required to complete several writing intensive courses Teach teaching approach in our language classes so that an instructor who learned the language within the community is paired with an instructor who learned the language in a formal educational setting</td>
</tr>
<tr>
<td><strong>Freshman Orientation</strong></td>
<td>30 upper-class students help teach the required freshman orientation class reinforcing effective communications skills, organizational skills, problem solving and creativity among the upper-class students while providing models and mentors for the freshmen who are assigned to their small groups. The development of a summer program for incoming freshman and a comprehensive academic support program to provide mentoring, tutorials, referrals, and other assistance to students</td>
</tr>
</tbody>
</table>
### Table 6. Key Issues in Undergraduate Agricultural Education

<table>
<thead>
<tr>
<th>Issues</th>
<th>Perspectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Funding and resources</td>
<td>Adequate resources to continue offering appropriate instructional activities, including equipping science laboratories. Numbers and resources. Each institution can no long afford to offer the current variety of labor/lab intensive programs to a small number of local students. We need to regionalize our programs, with each institution offering a few strong programs.</td>
</tr>
<tr>
<td>Diversity of perspectives, including global</td>
<td>Addressing the diverse needs of grad school-bound vs. job-bound students (not everybody is headed to grad school); Responding quickly to the needs of the marketplace. International ag experience - students need to see more parts of the global nature of agriculture; greater attention to globalization; international perspective; preparation for citizenship in a global society</td>
</tr>
<tr>
<td>Student-centered learning</td>
<td>Enabling students to develop critical thinking skills, make informed decisions and a sense that most things are not always black and white. Integrating excellent science with societal engagement; Motivating students to keep abreast of current events; Maintain hands-on approach while emphasizing science-based learning; Preparing for career/life vs. preparing for the first job; Keeping undergraduate programs relevant to rapidly changing/evolving industries</td>
</tr>
<tr>
<td>Student recruitment, and changing the image of agriculture</td>
<td>Changing the perception of agriculture as viewed by those not familiar with the opportunities available in food, environment, and natural resources industries. This is a recruitment issue. How do we improve our attractiveness to the best and brightest students? Expanding and engaging a more diverse student population in both agricultural sciences and natural resources and through service courses to non-majors Marketing careers to rural and urban students, identifying and developing new career opportunities for our graduates, and developing the capacity and confidence for recent graduates to assume leadership positions</td>
</tr>
<tr>
<td>Systems (interdisciplinary) approach</td>
<td>The need to teach students about the interrelation between themselves, as individuals, and their local national and global environments. For example, the relation between the foods they eat (nutrition) and their health and well-being. Continuing to move curricular matters and offerings into a more integrated configuration (i.e., soil, water, plant and animal interactions, environment, people; weaving critical thinking, problem-solving, written/verbal communication; and leadership skills throughout the college offerings and programs) Adapting an exponentially expanding knowledge base to the “traditional” 128 credit hour degree program, in the context of integrating more social sciences and co-curricular learning Creating a rich, diverse course of study which allows students to be creative, work in teams, and foster new perspectives. Course of student issues would include environmental quality; international economics and culture; technology advancements; and community leadership Transference from production to technology/science-based curriculum. Making education relevant to field and career path</td>
</tr>
<tr>
<td>Rewards for faculty</td>
<td>Recognition and reward teaching compared with research Faculty balance with all expectations in teaching, research, and outreach Motivating busy faculty to place higher priority on teaching</td>
</tr>
<tr>
<td>Use of technology and its impacts</td>
<td>Better use of electronic instructional technology to supplement learning Distance delivered programs (quality)</td>
</tr>
</tbody>
</table>
Washington, DC.
From issues to action: A plan for action on agriculture and natural resources for the land grant universities. 1996. Board on Agriculture (National Association of State Universities and Land Grant Colleges) and the Professional Scientific Societies. Washington, DC.