# Institutional Development in International Agriculture: A Collaborative Approach by 1862 and 1994 Land Grants

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## Abstract

This article examines how Montana State University worked with two Native American Tribal Colleges (Dull Knife and Fort Peck) to establish three new undergraduate international courses, which integrated technology, multidisciplinary content, and experiential learning. Students were involved at all three campuses. International agriculture programs augment the student's college experience by providing a meaningful opportunity to learn directly about other cultures. This opportunity enhances a student's self-esteem and leadership qualities. Before the international courses were established, few faculty and students at the participating campuses knew about the benefits of international agriculture.

## Introduction

Colleges of agriculture provide discipline-specific undergraduate and graduate programs that provide students with comprehensive technical skills. Through liberal arts requirements, they also enable students to obtain broad-based knowledge. However, they typically do not provide students with capstone multi-disciplinary courses that offer pragmatic experiential learning which broadens students' perspectives on the industries in which they intend to establish their careers. Furthermore, many students in land-grant universities lack adequate opportunities to travel and to study abroad in agriculture (Mason, et al., 1994). The number of U.S. students studying abroad (160,920 are reported to have received credit for study abroad in 2001-02) is low compared to the number of U.S. students in higher education, up to 15 million depending on definition. More alarming is the fact that students who study agriculture constitute 1.1% (1,770) percent of all students who study abroad (Open Door, 2003). Study abroad participants overwhelmingly remain social science and humanities majors and exhibit little ethnic or economic diversity (Hayward, 2000). International agriculture programs augment the student's college experience by providing meaningful opportunities to learn directly about culture and international political and economic issues related to food production. This experience enhances a student's confidence by providing leadership opportunities for participating students. It is in every college of agriculture's best interest to prepare its students to compete in a global community context (King and Martin, 1994). The single most daunting, exciting, and pervasive factor affecting the viability of U.S. farming and ranching today is globalization (UDSA, June 2002). Few students from colleges of agriculture and tribal colleges are knowledgeable about the benefits of international agriculture. Thus, there is considerable need for colleges of agriculture to develop international educational programs that provide international experiences to students.

According to former Secretary of Education Richard W. Riley, globalization must proceed hand in hand with advances in international education, or we will miss the opportunities that the 21st century can offer (USDE, 2000). According to NASULGC (1999) an educated person in the 21st century will need to function effectively in a global environment. The goal, according to NASULGC, would be that all undergraduate students would graduate with an enriched international experience. To enable our students to more effectively compete in the world, we must broaden our concept of the classroom and be inclusive of international networking and active learning that comes with being a partner in global solutions (Mason, et al., 1994). This means taking a local or state problem and determining how to solve it in the broadest context.

External and internal constraints inhibit a faculty members efforts to initiate an international agriculture education initiative. International travel is difficult to arrange, expensive, and time consum-

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ing. Therefore, organizing an international education experience means faculty will conduct their international efforts on top of current teaching, research, and service responsibilities. In addition, a new international course means submitting paperwork for course approval. International faculty development experiences are not easily attained without jeopardizing existing programs, and in some cases, tenure and promotion. The National Research Council's Agriculture and the Undergraduate noted that the importance of the international perspective should be reflected in tenure policy and should be stated in the missions of colleges of agriculture (1992). Faculty within colleges of agriculture need to be reassured through administrative endorsements that new international initiatives will be structured to deliver effective teaching, and can be sustained for positive professional growth opportunities (NASULGC, 2000). Professors also need reassurance from peer professors that international teaching and service are excellent experiences that will enhance career development (King and Martin, 1994).

The purpose of this study was to describe a new model for offering an international curriculum within a land grant college of agriculture. Objectives of this study include: (1) Describe the rationale and context for and implementation of new international courses; (2) describe student perceptions to the international courses and their implementation, and (3) describe the collaborative efforts between a traditional land grant and tribal colleges that made the new model functional.

## Materials and Methods

The impetus for this initiative began with a request from the Dean of the College of Agriculture at Montana State University to develop, as a pilot project, a senior level capstone course on the grains industry. This was to be cross-listed as a senior level seminar course. The Agriculture in a Global Context project espoused four important innovative dimensions. First, it represented an 1862 College of Agriculture (COA) wide initiative to give students capstone course experiences that integrated knowledge from several disciplines to provide them with a comprehensive multi-disciplinary and global perspective of agricultural industries. Second, it emphasized experiential learning throughout the entire course curriculum. Third, it utilized distance learning technologies and faculty teaching teams to enhance collaboration between a traditional 1862 land-grant institution and 1994 tribal land grant institutions. Fourth, it provided an opportunity for tribal college students to participate in a higher education program at MSU.

Student data were collected after the course content was taught and post travel occured. Twenty-four students (66% of population, 34) were randomly selected prior to travel to complete a post-course and post-travel survey to determine their perceptions regarding international agriculture travel. The instrument was a slight variation of an instrument used previously by Bruening (1999) to identify perceptions of students in an international program. As written into the original USDA proposal, a post experience questionnaire was included in the protocol. Fifteen quantitative questions were based on the students' perceived value of each representative course, cultural impact, preparation to participate, motivation for participation, and impact of international learning. Researchers were interested in collecting the data (July 2002) well after the "initial glow" of the travel portion of the experience (6-28 months after the students returned home). Seventeen students returned the instrument (50%) of the original group that participated in the three courses.

Montana State University COA faculty in the departments of Plant Sciences and Plant Pathology, Land Resources and Environmental Sciences, Agricultural Economics, Agricultural Education and Animal and Range Sciences were involved in the development and delivery of the courses offered. The three courses offered faculty and students opportunities to collaborate with the Montana Stockgrowers organization, USDA Natural Resource and Conservation Service, Nottingham University, Argentine Extension Service, University of Puerto Rico Extension Service, and the Argentine Stockgrowers Organizations. In addition, faculty at two Montana Tribal Colleges — Fort Peck and Chief Dull Knife - reviewed course content, provided input on delivery, and participated in every phase of the experiential learning component. The following courses were developed and offered during the 1999-2000 and 2000-2001 school years.

### *Ag Economics - "Follow the Grain" Course*

This is an upper division multi-disciplinary seminar course examining the small grains industry, from bench science to international marketing. It was offered during the Spring 2001 semester. The objective of this course was to examine and follow the Montana grain industry from genetic development of small grains in MSU laboratories to mills and bakeries in France and England where grain is processed into end products. Participants in this course learned about modern grain production, grain processing, and grain product development involving sophisticated science. Students investigated the human and capital investment required for scientists and venture capitalists to develop the new science and technologies that improve end-use product mix and quality.

The experiential component for this course consisted of a field trip to European grain markets grain processing laboratories, and commercial processing operations in western Europe. Students

learned the impact plant breeders had on the quality and quantity of grain as well as consumer products. They also learned how farmers produce grain under agronomic and market constraints, the role of grain handlers, grain shippers and marketers, and the processes used by millers and bakers in the European market.

### *Animal and Ranges Science "Conception to Consumption with an International Flavor" Course*

This upper division course examined the beef livestock industry from bench science to international marketing. This semester-long course was offered during Spring 2000 with the objective of examining the beef industry and its use of modern scientific techniques designed to improve the efficiency and quality of beef products in an international context. Participating students also learned how biotechnology has affected the entire beef production system from conception to the grocery store, and the effect international markets and competitors have on domestic production and markets. The course included a two-day field trip to Colorado followed by a 10 day trip to the Pampas of Argentina to meet with Montana beef genetics customers (purchasers of breeding stock) and competitors (Argentina exporters of fat cattle).

The experiential component of this course integrated course content with field trips to Colorado and Argentina. The Colorado visit included meeting with commercial packers along the front range of the Rockies. This is particularly important since Montana feeder cattle and Mexican cattle are found in Colorado feedlots and, thus, contribute to commercial beef production. After a thorough analysis of US domestic beef production, students traveled to Buenos Aires. This experiential learning activity refuted preconceived ideas and concepts regarding the international sale of genetics and its impact on another country's economy. Students traced beef cattle production from Montana seed stock to Argentina's commercial feedlots from which cattle are destined for foreign markets.

### *Agricultural Education "Limited Resource Farmers: Implications for Technology Transfer and Adoption and Diffusion of Innovations" Course*

This course was an upper-division undergraduate interdisciplinary course. It was offered on campus and at two Montana tribal colleges (Dull Knife, Fort Peck) during Fall 2001. It examined the contributions of agricultural sciences and social sciences in enhancing productivity and economic development among limited resource farmers in the United States and other countries. This course utilized the Participatory Rural Appraisal (PRA) type process to evaluate challenges and opportunities in rural communities. Participatory Rural Appraisal (PRA) comprises a set of techniques aimed at shared learning between local people and outsiders. The term PRA is one of many labels for similar participatory assessment approaches, the methodologies of which overlap considerably (FAO, 1999).

Course content focused on the complex problems of agricultural development at the local level in both developing and developed nations. Specifically, the course aimed to acquaint students with the interaction among available resources, existing technology and science, farmers, and culture, and the role educational channels play in the adoption of innovations (technology and science) to produce more high quality food and fiber. Students learned how agricultural development impacts most societies to upgrade the quality of life through programs of planned social change (Rodgers, 1995), which manifests itself throughout agriculture as increased efficiency. Employing this process with limited resource farmers was the focus of the experiential component of this course. Course instructors emphasized the links between, on the one hand, science and technology and, the economic forces that matter in determining the adoption of technology and science at the local level. The course invited presenters to provide students with a genuine view of the complex interactions between science, technology and the adoption and diffusion of innovations that are employed to further the efficiency of agricultural enterprises.

Students were heavily involved in field trips with agricultural extension educators and other agricultural practitioners at off-campus experiment station facilities, dry-land farm operations, and livestock operations in Montana. A PRA type process was practiced in these contexts to prepare students for the capstone field trip of the course: an eight day field trip to Puerto Rico which provided a context for applying skills and techniques for working with limited resource farmers. The PRA was developed in the early 1990s to help rural communities in developing countries mobilize their human and natural resources, define problems, consider previous successes, evaluate local institutional capacities, prioritize opportunities and prepare a systematic and site-specific action plan for managing natural resources. The PRA, which represents an integration of traditional skills and external technical knowledge, models how indigenous (or local) knowledge and expert (or scientific) knowledge can complement each other in the process of making decisions about natural resource use and the environment (FAO, 1999).

## Results

### *Project Attributes and Impact*

An aspect of each course in the Agriculture in a Global Context project was the specific design of

course content to prepare students for the culminating experiential learning activity. During the courses students were taken on field trips to observe or practice activities in preparation for the culminating experiential activity. Two of the courses (Follow the Grain and Conception to Consumption) offered in-state experiential activities related to core segments of the agriculture industry in Montana (grain and livestock) while students in the third course (Limited Resource Farmers) engaged in a process commonly used by social scientists to help local people identify their most pressing needs. For example, students in the Limited Resource Farmers course, through a local extension agent, were given the chance to conduct a PRA in a local farming community. Simultaneously, instructors at the 1994 land grants were conducting the same experience with their students. These learning processes were received positively by students and local Montana ranchers and community members, the subjects of the PRA. Field trips were also arranged to hear agribusiness professionals and government officials from a variety of agencies discuss issues related to topics in all three courses. Topics addressed local, state, and national policies and actions, which impacted international trade and development.

The results of the student post-travel questionnaire are shown in Table 1. Overall, students agreed that the internationally focused courses were a positive experience. Students tended to strongly agree that the courses presented an excellent learning opportunity and that the education abroad program made them more receptive to different ideas and ways of seeing the world. Statistics presented (Table 1.) show that students strongly agreed that more university students should participate in study abroad programs and that their experience was a good opportunity to understand another culture. Students agreed that their interest in world events increased after their international course and experience were completed and that they were prepared to participate in this internationally focused course. However, respondents were uncertain about how difficult it was to understand the culture because of their participation in these courses. Immediately after the courses, students agreed that the courses were good motivation for learning a foreign language. Respondents agreed that they were more interested to learn the semester that they traveled abroad.

A major objective of the project was to enhance collaboration in education between 1862 traditional land-grant institutions and 1994 tribal land-grant institutions. Each of the courses was offered to students at two of Montana's 1994 land-grant institutions — Fort Peck and Chief Dull Knife College - through the use of distance learning technologies available at the Burns Technology Center at Montana State University - Bozeman and at both tribal colleges. The 1994 land grant institutions' distance education resources and their programs were non-existent prior to project collaboration with Montana State University for program delivery. Therefore, their programs were augmented through this initiative and faculty's knowledge about distance education grew and opinion about distance education became more positive.

**Table 1 Mean Student Perception to International Agriculture Student Courses at Montana State University**

| | Mean* n=17 |
|---|---|
| Overall this internationally based course was an excellent learning opportunity. | 4.75 |
| This education abroad program has made me more receptive to different ideas and ways of seeing the world. | 4.92 |
| More university students should participate in a study abroad program. | 4.83 |
| This experience has been a good opportunity to understand another culture. | 4.58 |
| Study abroad is the best way to understand another culture. | 4.50 |
| My interest in world events has increased as a result of participating in the internationally based course. | 4.17 |
| My tolerance of other people and their culture has increased because I participated in this internationally based course | 4.42 |
| Sometimes it was hard to understand the culture as we traveled internationally. | 3.17 |
| I felt that I was prepared to participate in the internationally based course. | 4.00 |
| The faculty did a good job of preparing me for the internationally based course. | 4.33 |
| An internationally based course is good motivation for developing language skills. | 4.08 |
| In general, the US educational system does not emphasize foreign language development enough. | 4.00 |
| My interest in learning a language has increased because of the internationally based course. | 3.67 |
| Learning was more interesting the semester I participated in the internationally based course compared to a typical semester. | 4.25 |
| I was more motivated to learn the semester I participated in the internationally based course compared to a typical semester. | 4.00 |

* Mean calculated from a Likert-type response scale ranging from Strongly Agree (5), to Agree (4), to Undecided (3), to Disagree (2), to Strongly Disagree (1).

Faculty at the 1994 Tribal land grants benefited from the distance delivery component. The distance education delivery system used a live audio and video feed for scheduled classroom lectures. It also provided the opportunity for coordination of field-based experience for all students enrolled in each course. A Web page was developed for each course on which to post course materials, provide related links to course topics, and provide information related to field-based experiential learning opportunities for each course. This initiative provided tribal college faculty with their first distance education experience. According

to tribal college faculty members, this experience motivated them to attend national workshops in order to facilitate more effective distance education delivery (personal communication, August 19, 2002).

Eight MSU faculty members and two tribal college faculty members were involved in the instructional and experiential elements of the program. Data collected through faculty interviews indicated that faculty found their involvement productive and felt it served as a catalyst for other international work. Five of the eight have pursued additional international activities since their initial international experience that was fostered by their involvement in the Agriculture in the Global Context project (Table 2). Through this professional experience, faculty had to develop new teaching strategies to cope with teaching in a new environment and with a modified teaching schedule. Lecture time was reduced and active learning/teaching activities such as decision cases, lab and field experiments, field trips, discussion groups, and cooperative learning were featured.

The approach used to internationalize the college of agriculture contained several vital elements as seen in Table 3. All of these elements were important factors as others might attempt to replicate the model in other universities. The approach used was holistic and comprehensive. Some necessary elements need to be in place at other land grants for replication of this model. These include the support of college administration and a collaborative approach among departments and programs across campus.

Faculty have continued to offer two of the three courses since the project ended - Follow the Grain and the Conception to Consumption both of which are supported by farmer/rancher organizations within Montana. External support and more qualified faculty has allowed them to be taught on an annual basis. The third course is scheduled to be offered on alternate year basis due to the lead instructor's teaching and administrative responsibilities. Teaching resources are a major consideration to this model. This has been addressed, in part, by assigning other qualified faculty members teach these courses without a teaching overload. The primary incentive for faculty to teach these courses has been the professional development gained through travel associated with each course.

**Table 3. Montana State University College of Agriculture model for internationalization**

| | |
|---|---|
| Need for internationalization | Amount of exports in the state, demand in the workplace, and employment opportunities for students. |
| Basis for the curriculum | Wheat, beef cattle, and educational processes are important components that are part of the MSU curriculum and mission of the university. |
| Teaching/learning processes | Active learning, enriched examples and extensive field trips, outside speakers, and student engagement in the curriculum through peer teaching. |
| Travel component | Student interest created through opportunity to travel outside the state. |
| Cultural emersion | Students had multiple opportunities both domestically and internationally to develop cultural understandings through repeated interactions. |
| Resources | The college and the grant supported and reduced the cost of participating in the program. College human capital, financial resources and organizational support ensured a seamless transition between domestic and international teaching/learning activities. |
| Evaluation | Systematic feedback indicated that students and faculty gained additional global perspectives through participation. |

In addition to the collegial collaboration between Montana tribal colleges and Montana State University, other organizations provided in-kind resources to enhance the curriculum content and experiential learning experiences offered through this project. These in-kind resources were in the form of domestic experts and foreign experts on topics related to each of the courses. This network of resources modeled the experiential component is now used in other College of Agriculture international initiatives.

The project courses stimulated most of the students to learn a problem-solving process in a unique setting and connecting the international experiential component to applications in Montana. All university students should be given the opportunity to see other cultures in a positive setting so that they can learn to appreciate others and to reduce the stereotypical views often expressed when the lack of knowledge exists. Ultimately, transferability is the objective that most educators are seeking. Perhaps more university programs should consider capstone-culminating experiences such as this to stimulate and integrate learning activities. It is through activities such as

**Table 2. International activities of faculty since their initial international experience**

| | |
|---|---|
| 1. Tribal college instructor | worked in China; scheduled to travel to Mali in 2004. |
| 2. MSU professor | taught an upper division course at Moscow State Agroengineering University, collaborated with the University of Zagreb in Croatia to develop an agribusiness course. |
| 3. MSU instructor | learned about modern greenhouse applications in the Netherlands. |
| 4. MSU professor | traveled with students to learn more about the livestock industry in Australia and New Zealand. |
| 5. MSU professor | collaborated with another university to establish internships for MSU agriculture students in Russia. |

these that individuals will further develop their interpersonal communication, leadership by example, and their understanding of other people.

## Summary

### *Future Direction*

Faculty and students can be reluctant to participate in new offerings that include unknown outcomes, additional work, and considerable expense associated with international travel. The vast amount of research and public press indicate the high value associated with a student population competent in international knowledge, culture, and experiences.

Instructors must actively recruit students who would benefit from the experience, allowing for adequate lead time to raise the funds required for travel. A greater marketing effort would attract students from across the college who might not be familiar with the instructor(s).

One Montana Secondary Agricultural Education instructor enrolled in the Limited Resource Farmers course. The instructor stated that the course and international experience was invaluable and beneficial to him as a secondary educator. Future plans include offering the third course (Limited Resource Farmers) and subsequent travel experience (PRA) for Montana secondary agricultural educators, which will provide them with the knowledge needed to incorporate international components into their secondary curriculum.

Based on project experiences, Agriculture in a Global Context courses should emphasize a more intensive cultural component. Even though faculty delivered instruction on the culture of each country visited, more study of culture would have better prepared students for the experiential component of each course. Increased emphasis could be accomplished through traditional student research projects or by using an exchange student from that country to assist with this component of the class. This addition will more adequately prepare students for the international portion of the course. In turn, this better prepares students to be "global-ready" graduates.

The success of the three courses has spurred interest from other college of agriculture instructors to develop experiential learning opportunities. Plans are being developed to establish a clearinghouse to facilitate the development of new experiential courses and assist instructors with the complexities of international group travel.

The Agriculture in a Global Context project focused on communicating the need for internationalization to students, designing new curriculum, practicing appropriate teaching/learning processes, using domestic and international in-kind resources, and providing for and experiential learning and cultural emersion through foreign travel. The approach used can serve as a model for implementation at other colleges of agriculture.

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