New Directions in Interdisciplinary Teaching

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Abstract: George Kennedy discusses new directions in interdisciplinary teaching (including distance learning) and research being adopted at The University of British Columbia (UBC) in Vancouver, Canada. He discusses initiatives at different levels: within one Faculty (College) - the Faculty of Agricultural Sciences at UBC; across Faculties at UBC; and between UBC and its international partner universities. One of the international partnerships is focussed on North America (British Columbia, Oregon and Mexico) initially for undergraduate education and another is focussed on Southeast Asia for graduate education and research.

Key words: Interdisciplinary teaching, interdisciplinary research, university partnerships.

1. INTRODUCTION

Recognizing that the problems of today are increasingly complex and require interdisciplinary approaches, universities are making more deliberate attempts to increase interdisciplinarity in their teaching and research. This paper discusses approaches taken to increase interdisciplinarity in the Faculty of Agricultural Sciences at The University of British Columbia (UBC).

The paper discusses approaches to interdisciplinarity at three different levels: (1) within the Faculty of Agricultural Sciences; (2) across Faculties at UBC; and (3) across institutions. For each of these levels, it discusses initiatives at the undergraduate level first, followed by initiatives at the graduate/research level. The paper ends with some concluding remarks on lessons learned along the way to increased interdisciplinarity in our teaching and research.

2. INTERDISCIPLINARY APPROACHES WITHIN THE FACULTY OF AGRICULTURAL SCIENCES

The Faculty of Agricultural Sciences at UBC until fairly recently was a traditional faculty of agriculture, made up of five small departments (Agricultural Economics, Animal Science, Food Science, Plant Science and Soil Science). The Faculty also had a program in Landscape Architecture (under Plant Science) and a School of Family and Nutritional Sciences. Each of the small departments administered its own, fairly narrow, disciplinary undergraduate program. This structure inhibited interdisciplinary study, as the departments actually had to compete to attract students to their programs, and once the students had chosen a major, there were a lot of disciplinary courses required by their program.

In July, 1998, the Director of the Landscape Architecture program, Professor Moura Quayle, became Dean of the Faculty of Agricultural Sciences. One of the first things she did was dissolve all of the Faculty's departments. This was to achieve more administrative efficiency, but it was also to achieve more interdisciplinarity in the academic programs of the Faculty. Faculty members were invited to form “circles” or groups that identified and focussed on a theme that they considered to be important for the Faculty. This process led to a re-definition of the Faculty's core values, grounded in the concept of sustainability – balancing ecology, economy and community to provide for a positive future. It also led to a clear understanding that the Faculty's basis for its academic programs is the continuum from land and water to agricultural production, food, nutrition, health and global resources.

As well as dissolving the Departments, the new Dean also allowed the School of Family and Nutritional Sciences to end as a separate entity. The family science faculty members joined other sociologists in the School of Social Work in the Faculty of Arts, and the nutrition/dietetics faculty members stayed on and became more integrated in

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the Faculty of Agricultural Sciences. Administrative activities from each of the Faculty's former departments have been consolidated into one central administrative unit in the Dean’s office.

2.1. Undergraduate level

The above process of academic discovery led to four new program areas, representing the continuum from land to food to community. The initial focus was on the undergraduate programs. This was because student numbers were declining and there was a real urgency to develop new undergraduate programs that would turn this around. The Faculty is committed to developing at least one new degree program in each of the four new program areas. The existing Bachelor of Science in Agriculture degree has recently been replaced by newly approved Bachelor of Science degrees in Agroecology, Food, Nutrition and Health, and Global Resource Systems.

2.1.1. Agroecology

Agroecology brings together the elements of agricultural sciences, ecology and environmental thought and is influenced by the experiences of people who manage land and water to produce food and other products. It integrates disciplinary knowledge within a framework of ecological principles. It allows students to develop a basic understanding of the interplay between human activity and the ecosystem in which we live. Students can focus their studies on animal studies, horticulture, soils and environment, resource economics, and sustainable agriculture.

2.1.2. Food, Nutrition and Health

The Food, Nutrition and Health program focuses on food security and its impact on health. It involves the integration of new knowledge and advances in science and technology with socioeconomic, cultural, ethical and legal considerations in the provision of a safe, nutritious and sustainable food supply. Encompassed are the effects of nutrition and diet on health, including both animal and human nutrition. Students can focus on dietetics, food market analysis, food science, or nutritional sciences.

2.1.3. Community and Environment

Community and Environment programs provide students with the knowledge and skills to analyze relationships within the family environment and the physical world of landscape and generate practical solutions that will provide for healthy individuals within resilient families and sustainable environments.

Within this program area, a new bachelor’s degree is being developed in Environmental Design. This degree will be jointly offered by Architecture (in Applied Science Faculty), Landscape Architecture (in Agricultural Sciences Faculty), and the School of Community and Regional Planning (in Graduate Studies Faculty). It will provide students with visual, spatial and cultural literacies through a broad arts-science base and applied skills in planning-design areas.

Landscape Architecture is a graduate program exposing students to current knowledge in design, planning and management of sites in urban, suburban, rural and wilderness environments.

2.1.4. Global Resource Systems

The Global Resource Systems program recognizes that resource problems are complex and require solutions that are global and interdisciplinary in scope. It allows students to study natural and social sciences within the context of a specific region of the world. Students select a “double major” – a resource specialization and a regional specialization, usually Asia Pacific, Europe or the Americas. Resource specializations include aquaculture, environmental studies, First Nations resource systems, food and resource economics, resource-based tourism, and sustainable agriculture. This program provides a global education for students who want to combine science with language and culture courses and first hand experience in the region.

Each of the above programs draws on, and contributes to, a common vertical core reflecting the core values of the Faculty of Agricultural Sciences. All undergraduate students in the Faculty take the three core courses, one in each of second, third, and fourth year. The core courses are interdisciplinary and are team taught by faculty from the different program areas.

2.2. Graduate level

At the graduate/research level, the commitment and mandate of the Faculty is to provide leadership in research and education relating to the following two issues considered most critical for the human food supply system in this new century: food security and the sustainable, integrated use of our resources. Now that the new undergraduate degree programs are mostly in place, the plan is that the Faculty transformation is moving more to the graduate level.

To get faculty members from diverse disciplines working together, collaborative research groups focussed on research themes reflecting the Faculty’s core values and strengths have been established. These are: Land and Environment, Animal Studies, Plant Biology and Horticulture, Food Sciences and Marketing, Human Nutrition and Health, and Sustainable Community
Design. Attempts have also been made to bring faculty in the collaborative research groups together physically by re-locating their office and lab space.

At the same time as encouraging new research collaborations, it is important that faculty maintain (even strengthen) their disciplinary roots. Effective interdisciplinary teaching and research is not likely to occur without a strong disciplinary base. In the former Agricultural Economics Department, for example, faculty are attempting to remain plugged into their discipline and to increase its critical mass by maintaining an active Food and Resource Economics Group in addition to participating in interdisciplinary teaching and research.

3. INTERDISCIPLINARY APPROACHES ACROSS FACULTIES AT UBC

3.1. Undergraduate level

UBC is structured along Faculty lines, and it is fair to say that the Faculty boundaries have impeded the development of interdisciplinary programs across the campus. Environment is a prime example. UBC has tremendous depth and breadth in environmental courses from a wide range of disciplines, but has not succeeded in coordinating them into an undergraduate degree program. The only existing undergraduate program specific to the environment is a small honours B.Sc. program in Environmental Sciences in the Faculty of Science.

Recently an ad hoc committee was established by the UBC Provost to review UBC’s undergraduate environmental offerings. The committee recommended the development of a new first year course on sustainability and creation of a College that would offer this course and coordinate environmental course offerings across campus. A follow-up committee is developing a more detailed proposal.

3.2. Graduate level

At the graduate level, the Faculty structure at UBC does not impede interdisciplinarity to nearly the same extent as it does at the undergraduate level. This is because all graduate programs at UBC are administered by one Faculty, the Faculty of Graduate Studies.

The Faculty of Graduate Studies encourages the realignment of traditional disciplines into new patterns, and crossing departmental and Faculty boundaries to foster development of new areas of learning. A number of formal, interdisciplinary degree programs exist. One example is Resource Management and Environmental Studies (RMES). RMES offers M.A., M.Sc., and Ph.D. degrees related to fisheries management, land management, environmental assessment, policy analysis, coastal zone management, agroforestry, water resource management, hydrology, energy, negotiation issues, risk perception and assessment, issues of governance, science and policy and community development. The program’s aim is to integrate the socio-economic (political) and biophysical (ecological) approaches to resource and environmental issues.

In cases where a formal interdisciplinary degree does not exist at UBC, a student may request admission into the Individual Interdisciplinary Studies Graduate Program (IISGP) administered by an ad hoc committee representing the various disciplines involved.

Another approach being used at UBC to promote interdisciplinarity is the residential graduate college. Green College was founded in 1993 as a centre for advanced interdisciplinary scholarship. Members of the College include graduate students, postdoctoral scholars, visiting scholars and faculty members. Many reside in the College. Members are chosen on the basis of excellence, interdisciplinary interests and receptiveness, commitment to involve themselves in the life of the College, and the need to achieve a diverse community. The College is committed to the belief that new ideas are best fostered by interdisciplinary activities involving graduate students, postdoctoral scholars and faculty.

A recent attempt to promote interdisciplinary research is the Canada Research Chairs (CRC) program. It has been created by the federal government in response to the major retirement/renewal cycle projected to occur in North American universities over the next decade. UBC has identified nine research clusters through a process of consultation with its various research units. These research clusters are novel in an academic setting because they transcend disciplinary and Faculty boundaries and create synergies among researchers who have not interacted in the past. The Sustainability/Environment cluster is concerned with the physical and human dimensions of global change. Seven UBC Faculties (Agricultural Sciences, Applied Science, Arts, Forestry, Graduate Studies, Law and Science) participate in this cluster. For example, current studies of the Fraser River and Georgia Basin include investigations of fluid mechanics and river dynamics, of aquatic systems in a continuum from rivers to the deep oceans, of riparian forests, of community watershed management, of commercial fish stocks, and of the social and environmental consequences of urban growth. This research cluster has an initial allocation of 15 Chairs. One is for a senior scientist studying aquaculture and the environment, to build on UBC strengths in aquatic biology and resource ecology, link with scientists investigating biodiversity, and explore a crucial interface between a growing food industry and the environment.
Another is for a junior scholar working on fishery conservation, who will consolidate the UBC Fisheries Centre as an international focus for work on sustainability in the fisheries.

4. INTERDISCIPLINARY APPROACHES ACROSS INSTITUTIONS

4.1. Undergraduate level

The “Tri-lateral Initiative” is an opportunity for innovation in the study and research of natural resources and the environment in North America. Initial efforts have been focused at the undergraduate level, but include a commitment to bring research more directly into the undergraduate curriculum.

4.1.1. Tri-lateral Initiative

The tri-lateral initiative is a cooperative, tri-lateral venture involving universities in Canada, the United States and Mexico. The partners are The University of British Columbia (UBC) and Malaspina University-College (MUC), Canada, the Oregon State University System (OUS), USA, and the Monterrey Institute of Technology (ITESM), Mexico. The program curriculum is being cooperatively designed and developed to be used by all the partners. It will include a combination of campus-based courses, field study, research exposure, and distributed/distance learning activities in the form of courses, topic specific modules, on-line seminars and discussion groups. Students from the three North American countries will form a community of learners. They will obtain a North American perspective on important environmental issues and problems, and alternative ways of approaching them. Language support and inter-cultural training will be an integral part of the curriculum design.

Research will be integrated into the undergraduate curriculum through collaboration among faculty in the partner universities and their research units. The partners will capitalize on their unique research facilities, including marine stations on the Pacific Coast, by combining on-site and on-line instruction. Students will spend part of their undergraduate program learning in each of the three countries through academic exchanges and work internships.

4.1.2. Tri-lateral vision

The vision is to develop a tri-lateral undergraduate degree program in North American Environmental Studies, in which students learn about natural resources and the environment in a North American and global context. The degree could be offered separately by each institution, or jointly by partner institutions with each having its name on the degree. ITESM currently offers one such program, a Master of International Management for Latin American Executives (MIMLA) with Thunderbird, The American Graduate School of International Management.

4.1.3. Tri-lateral curriculum

The program and its curriculum will be designed in such a way to be integrated with existing programs, but with the long range goal of development into a full fledged degree program. The program will initially combine existing, institution-specific courses; specially developed "field experience modules;" student exchange terms in all three geographical areas; research activities, ranging from basic undergraduate course assignments to fully developed faculty research initiatives; cooperatively designed tri-lateral courses for on-site or distance delivery; special topic modules, and on-line seminars or discussion groups. Because it is possible for on-line courses and modules to be "customized" with relative ease to create self-standing, cost-recovery professional development offerings, these continuing education offerings will also be considered.

All students will obtain “hands-on” experience. Field school opportunities will be developed at each of the three sites. It is critical for students to participate and experience the specific bio-regions of the tri-lateral partner institutions. Interactions between human systems and non-human systems are at the core of environmental studies of all kinds. Requiring students to investigate and to reflect on the nature of those varying interactions in a variety of geographical and social contexts has strong intuitive appeal. Field experience, especially when designed in such a way that emphasizes sensory contact, observation and interaction, can be a powerful educational tool in combination with classroom learning and independent study. Intellectual and conceptual work becomes grounded in the living reality of a specific environment. In addition to the field school concept, it is envisioned that other courses will involve a combination of new distributed/distance learning technology plus hands-on experience, and generally bringing research more directly into the undergraduate curriculum.

4.1.4. Tri-lateral Lessons learned

As the tri-lateral project evolves, the following key points have emerged:

- **Broad vision, with initial focus**

This project began with the objective of providing study and research opportunities in North American aquaculture. It then became broadened to marine...
resources management, and subsequently to environmental studies. The vision was further broadened from providing study and research opportunities to offering a degree program in environmental studies. While this is a broad vision, the project is currently focussing on course development in aquaculture and marine resources, clearly areas of the comparative advantage for the tri-lateral partners.

- **Institutional systems approach**

   As well as broadening the theme and vision of the project, the partnerships have been broadened from the one originating institution in each country to the system in which that institution belongs. In Mexico, the partnership was extended from ITESM’s Campus Guaymas to the entire ITESM System. In Oregon, the partnership was extended from Oregon State University (OSU) to Oregon University System (OUS); and in British Columbia the partnership was extended from The University of British Columbia (UBC) to a Team BC approach. Broadening the partnerships to the institutional systems provides a larger pool of resources, students, expertise, research facilities, and learning opportunities from which the tri-lateral project can draw.

- **Faculty involvement**

   International projects that originate from the International Centers of universities often report difficulty getting faculty support and participation. This has not been a problem with this project. In fact, anything the project has been driven by the faculty at the tri-lateral universities.

- **Strength though partnership**

   The partners in the tri-lateral project have already experienced strength through partnership. Although Campus Guaymas has unique research facilities and expertise, it is a very small campus. The tri-lateral project is helping to provide the critical mass that Campus Guaymas feels it needs to mount a viable program. Oregon is relying on ITESM to assist in providing opportunities to meet the rapidly growing demand among Oregon students for experience in Spanish language and Mexican culture. In British Columbia, aquaculture is one of the fastest growing industries, but in times of university cut backs UBC has not been able to expand, or even maintain, its aquaculture programs. The tri-lateral project offers students and faculty in Team BC an impressive spectrum of new learning opportunities in aquaculture.

4.2. Graduate level

At the graduate level, UBC and its partners have developed a post-degree diploma program and are in the process of developing a professional Masters degree. The post-degree diploma in Management of Aquaculture Systems is a joint offering from the Faculty of Agricultural Sciences, UBC and Fisheries and Aquaculture Department, Malaspina University-College in Nanaimo, British Columbia. It allows both advanced students and professionals to acquire relevant knowledge and practical skills to significantly advance their careers through a selection of courses at both institutions focusing on the technology, science, and management of the international aquaculture industry.

The professional Masters degree is being developed by the Southeast Asian University Consortium for Graduate Education in Agriculture and Natural Resources. UBC is the only Canadian university that is a member of this Consortium. The degree, a Master of Science in Sustainable Resource Management, will be offered entirely at a distance so that professionals in the field will be able to take specific courses or the full degree program without leaving their jobs. UBC and other participating Consortium partners are contributing distance learning courses to a pool of courses that students may draw from. At present, however, only two partner universities are in a position to award the degree - Universiti Putra Malaysia (UPM), Selangor, Malaysia and University of Queensland (UQ), Brisbane, Australia.

5. **CONCLUDING REMARKS**

- There is not just one model of interdisciplinary teaching that fits all educational needs. There are many models depending on student, faculty and university preferences and capabilities, the subject matter being taught and the form of delivery, the research questions being asked, etc. Thus, our approach has been to seek interdisciplinarity in teaching and research at different levels – within the Faculty (College), with other Faculties at UBC, and with our partner institutions around the world.

- In our experience, it is easier to achieve interdisciplinarity in teaching than in research. For this reason, and the fact that teaching provides an effective mechanism for faculty from different disciplines to get to know and trust one another, our approach has been to initially focus on interdisciplinary teaching, with the plan to extend it to interdisciplinary research. However, this may not apply where funding for interdisciplinary research is available, as in the case of the Canada Research Chairs program.

- A necessary condition for achieving excellence in interdisciplinary teaching and research is for faculty to stay well grounded in their discipline. Thus, as we form new collaborative groups and research clusters to facilitate interdisciplinary work, we also recognize the
need for faculty to keep on the forefront of their discipline and to maintain their discipline’s critical mass.

- There are real advantages for a small Faculty (College) to work with internal and external partners to achieve interdisciplinarity through joint programming. Each partner brings a different set of disciplines and relative strengths within those disciplines. We work with local partners like Malaspina University-College whose emphasis on teaching and applied learning is complementary to a large, research intensive university like UBC. Our international partners bring another set of benefits, including different perspectives and different approaches to teaching and research.