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Farming systems education: Case study of Swedish test pilots

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Research Paper

Abstract

We describe and analyze a pedagogical experiment that introduced a broad and holistic perspective on complete farming systems, systemic learning tools, and a participatory learning strategy at an early stage in agronomy education. The paper describes the adventure of three students, who came from a conventional agronomy program at the Swedish University of Agricultural Sciences (SLU), who were frustrated with the lack of integrated approaches to the study of agricultural systems and a strong focus on molecular-level processes in their first year of education. They encountered a narrow focus in most courses and the overall curricula of agricultural education that is a function of specialization and university organization in unique departments that concentrate on small pieces of the large puzzle, that is the production milieu. In the current educational environment, it is difficult for students to make connections, integrate information and theories, and to create relevance to the challenges they observe in the practical world of farming and food systems. The three students agreed to put on pilots' costumes and climb into an experimental vehicle called *experiential learning*, one that provides *just-in-time education* and a very high degree of self-responsibility for the learning process. The paper describes, analyzes, and evaluates the comprehensive and exhausting pedagogical process they followed in one semester in Sweden and Viet Nam, with positive and negative aspects of the program. We provide reflective recommendations from students and advisors for future agronomic education programs with the focus on developing renewable agriculture, selecting students and evaluating performance, and designing practical programs that will motivate highly committed and action-oriented students.

Key words: experiential education, action learning, rural development, sustainable agriculture, Viet Nam, Sweden

Introduction

There is growing concern about the limited attention given to systems studies in agricultural education and training on one hand, and on the other hand *how* farming and food systems are interpreted as systems: as complex, open, interactive, developing, self-organizing systems, or as closed mechanical systems at equilibrium. These two kinds of problems need to be given much more attention in our agricultural universities: (1) what hierarchical scale will be the focus in the study program, and (2) what kind of theories and tools shall the students be exposed to in their education and learning process to be able to develop as professionals in understanding, describing and designing responsible action in farming and food systems?

A third problem we see in agricultural education today is a lack of motivation and inspiration for taking the conventional curricula, especially for an increasing number of

students without any previous experience in agriculture. Students in agricultural universities normally major in agronomy, entomology, animal science, agricultural economics or other specific discipline. They rarely are faced with the challenge of how this new and specialized knowledge fits into the context of whole systems, nor into the context of the farm and food chain. In addition, many of our agriculture students today arrive without a farm background, further adding to the difficulty of their creating relevance from study of isolated disciplines. Here, we use the definition of academic discipline expressed by Odum¹: 'A discipline can be defined as a set of people studying the same scale of science with shared models of performance.' We are quickly moving away from providing society with well-educated generalists who can contribute to whole systems, thinking and acting as facilitators for improving problematic situations with inherent goal conflicts, and instead today we are preparing disciplinary 'problem solvers' in isolated

systems. Further, we contend that even specialists who are well prepared in one narrow area will be less capable of identifying challenges in production systems in an uncertain and rapidly changing future². Education in the emerging area of agroecology is designed to correct this deficiency.

Agroecology has generally been considered to be the marriage of agriculture and ecology^{3,4}. It can also be defined as the *ecology of food systems*⁵, to include the study of production, economics, environment and natural resources, and social implications of farming and food systems. The latter definition provides a foundation for a systemic view and study of the whole, where societies and nature are integrated parts of the same open, interactive and constantly changing system. Some of the new courses in this area are guiding students through a learning landscape that gives a broad appreciation of the challenges of current systems as well as a learning space for envisioning new systems that will be productive and economically sound, preserve and enhance the natural resource base through dependence on renewable energy and internal resources on the farm, and provide relevant and equitable contributions to food supply and society. Also important are farming impacts on essential ecosystem services that are neither recognized nor rewarded in today's industrial farming and economic system⁶. An agroecology education is designed to develop a new generation of agroecologists prepared to deal with complexity and change⁷, and at a relevant chosen scale¹ (in time and space) that fits the complex problematic situation to be scrutinized and improved.

We have observed that some students who enter the agricultural university to learn about food production and food systems quickly become disillusioned by an education that is subdivided into components, and a curriculum that makes it difficult to see the whole system and ways to improve it. They are placed in courses such as introductory chemistry or calculus that appear to have little relevance to what they want to learn and apply in the future. One could say that they are neither ready to put this information into context (both in scale and in systems perspectives – systems seen as mechanical systems or seen as self-organizing systems¹), nor are they provided with much help in establishing the importance of subject matter to real world situations⁸. Not satisfied with our assurances that they will understand later how it all fits together, some highly motivated students leave the study of agriculture to pursue other endeavors. They are impatient with the rather fixed establishment in education, and choose to pursue their own goals and methods to achieve them.

It is in this environment of limited systems orientation to agricultural education, and dissatisfaction of students with the current subjects and sequence of courses, that we are searching for alternatives. One innovative program introduced in 2006 in Sweden was an independent study option that put responsibility for design of one semester's learning agenda in the hands of the students, with guidance from senior faculty with much experience in farming systems. In this paper, we describe the background and objectives of

the program in experiential learning, the methods used in Sweden and Viet Nam by students who designed their own practical course in farming systems analysis, the results of their field observations and interviews with farmers and others in the food system, the students' reflections on this type of learning and specific experience, and the potentials and limitations of introducing such an opportunity into the study of agricultural systems in our universities. We summarize and evaluate the experience and provide conclusions about whether this will become a meaningful option for more students in the future.

Experiential Learning

John Dewey⁹ was one of the first in professional education to insist that experience was the basis for learning, and recommended that teaching should be done in a way that will imbed new knowledge in the prior experience base of students. In some ways this is akin to learning to ask the right questions, an approach attributed to Socrates and more recently popularized in the book *Ishmael* by Daniel Quinn¹⁰. It could be argued that students who are conditioned by the time they reach the university to be passive learners, captives in classrooms designed for one-way transfer of information or observers in front of a video screen, are seriously in need of a transformation that will turn them into active learners. Jack Mezirow¹¹ provided an insight on how students build understanding from the contexts already familiar to them, and why both teachers and students should clarify their experiences, expectations and assumptions in order to design an effective learning environment.

This philosophy is being discussed and implemented under the term 'action learning' that implies some application of theory outside the often context-free environment of the classroom^{12–14}. In agriculture, we interpret this to be hands-on experience, not only outside the classroom and into the field, but preferably working with clients in the farming and food system. It is a learning process put into practice in the Hawkesbury experience in Australia¹⁵, in the summer travel courses in agroecosystems analysis in the US Midwest¹⁶, and in an agroecology class on campus that reaches out with projects in the community¹⁷. Students quickly learn that many of the constraints are not just only soil fertility or pests in the field, but uncertain crop prices in the marketplace, and environmental regulations that must be considered. The social dimension, including labor, farmer goals and financial situation, family needs, and linkages with neighbors and the rural community, are key factors in farming system design and choice of enterprises. A consequence of this experiential learning approach is also that the system perspective in use must be adapted to the real situation instead of moving the system into another 'controlled' environment in a laboratory or computer simulation. That is, the students are facing complex situations and have to find relevant perspectives, theories and tools for a system that is complex, open, interactive with its surroundings and under constant change and development.

The Norwegian masters degree courses in agroecology start on the first day with practical experience on the farm¹⁸, which in effect is a practical application of the principles used in research using phenomenology¹⁹. With experience as instructors and students in agriculture, we have become highly motivated by this immediate exposure to real-world systems, both in farming and in the food system. Learning about mixed farming by walking the fields through the mud, interacting with livestock and dodging manure in the pasture, hearing and seeing and smelling the stimuli that are part of the farm environment can be a transforming experience in understanding complexity and interactions of a near-infinite number of factors that influence farming success. It can also create an extremely efficient foundation for reflection and theoretical analyses of an open, interactive, developing and complex system later on in the class. Interviewing processors, conversing with shop keepers, accompanying government agriculture officials in their work and conducting focus groups with consumers brings us closer to the human food web in all its complexity. The experience also gives the students a flavor of their future work environment and challenges as professionals. When we look at the complexity of the process of moving food from field to table, we recognize quickly that this is a web of material and information exchange among different actors in the system. It becomes easy to see that the web cannot be complete without recycling of wastes from the system, including human waste, in order to close some of the nutrient cycles and make the system more sustainable. It also becomes easy to see potential goal conflicts between different actors in implementing such recycling systems. We conclude that this type of experience linked with formal education brings meaning and excitement to the learning process, and opens up the perspectives for the student on the processes and interactions in open systems under constant change. How can students participate in this planning process?

Methods

Planning process

The concept of test pilots was born out of the concerns of some Swedish students in their first semester (autumn 2005) who felt locked into a fixed curriculum that did not have the excitement and relevance they expected upon coming to the university and starting an agronomy program. Based on narrowly focused courses with specific knowledge and theories taught in the context of the classroom, this curriculum had pushed them to seriously consider leaving the university to pursue other careers. The challenge of designing their own courses and learning activities that seemed meaningful to them was an opportunity they were willing to try as an experiment for one semester. In the initial meeting, at the end of their first autumn semester of the agronomy program, there were ten interested students; in the second meeting eight returned for

more information and discussion. In the months leading up to the start of the course there were five seriously interested, and just before the summer vacation 2006 three actually put on their pilot's costumes and climbed into the experimental vehicle. All were highly motivated to try a new approach to independent education, with a guarantee that their credits could be used to fill the free elective courses that were part of their conventional educational curriculum.

Two instructors with years of background in experiential learning in agroecology and agroecosystems analysis were equally concerned about the availability of courses for undergraduates that would provide field experiences, learning in context, and multidimensional evaluation of farming and food systems. Their prior organization of PhD and MSc courses provided indications that guided learning in practical systems could result in highly motivated students who went on from those courses with a much broader perspective and a capacity to plan and deal with uncertainty and complexity in systems^{20,21}. Instructor and student enthusiasm carried agroecology students forward through their other classes and into a thesis project that reflected an appreciation of the systems approach and an ability to use both hard systems and soft systems methods. Although the faculty participants had experience guiding students in project work in undergraduate and graduate courses, they had not provided the opportunity for students to design their own course in a completely open-ended manner, nor with undergraduate students so early in their university training. The test pilot idea provided just such an opportunity.

The three students who agreed to test this model moved away from the prescribed courses in their traditional crop science sequence in their third semester of the agronomy program. They felt that this project should provide an opportunity for individual growth, experience with a small team of students who would set their own objectives and course expectations, and space to explore ideas about integrated farming and food systems that would transcend discipline lines and give a more complete picture of the entire, dynamic system. In the course planning, the students communicated a strong interest to study both Swedish farming systems as well as farming systems in developing countries. The semester was therefore divided into two courses, the first with a focus on the Swedish farming sector near Uppsala in east central Sweden, and the second course with perspectives, theories and tools for analyzing farming cases in developing countries, using An Giang province in the Mekong Delta in Viet Nam as the case study. Funds for travel and support for the travel experiences were provided by the department's reallocation of resources from the course budget, and from the students' own savings.

Course structure

The courses were designed as a tentative first semester for agronomy students, with the overall aim to create a learning environment for learning and training to *read the agricultural context*, both in Sweden and in another country in

the global South. The Swedish agricultural systems were studied in a course designed by students that was called *Analyzing Swedish Farming Systems*, with the practical experience taking place near the campus in Uppsala on two farms. One was an organic farm with mixed animal stocking, hens, pigs and beef cows, and total 100 ha farmland and 60 ha forest. The other farm was a conventional stockless farm of 800 ha farmland. Students also visited agencies and institutions related to the food system in Sweden. This was the first half of the autumn semester in 2006. As an introductory core book on Swedish farming systems, the students read *Organic farming, crop and animal husbandry* (Swedish title *Ekologiskt lantbruk, odling och djurhållning*) by Inger Källander²² who is an organic farmer and leader in alternative farming. Most important for this course, the book integrates cropping, animal husbandry and farming economics in a more holistic way than traditional Swedish books in agronomy. Along with this book, the students read other references they discovered and some recommended by other actors in the food system during this educational journey.

The course design was set up as a sequence of ‘events’ to create a learning environment on new aspects and perspectives on agricultural contexts. One new aspect or thematic area of farming systems was introduced each week through literature reading, sometimes supplemented by watching a movie, all organized by the students with the instructor as a facilitator. Literature readings were followed by interaction about a case situation, for example the two Swedish farms used as references through the whole course, study visits to agricultural businesses or state/local institutions, and discussions with invited specialists in the Swedish food web. Students processed the literature study and the case study together in group work. The learning process of the thematic area was finally discussed in a feedback session with teachers and students together at the end of each week.

First course process and content

The thematic areas covered in the first course included:

- Working in groups using appropriate tools for efficient group action and reflections, which we consider essential for student-driven courses to be successful.
- Approaching farming systems as integrated human and natural systems, also introducing mind mapping as a tool.
- Gaining data and information by dialogue and interviewing, while also introducing some very basic interview techniques.
- Developing perspectives on nature as related to interactions with farming systems.
- Exploring gender perspectives, a key factor often overlooked in conventional studies of production and economics.
- Anticipating agriculture after peak-oil, with all the adjustments that will be necessary in production practices and reduced energy use.

- Exploring agriculture as a self-organizing system, similar to general principles in ecological and other biological systems, but including humans as managers of enterprises and system design.

- Integrating perspectives from different actors in the food web, including interviews of people from the National Food Administration, Swedish Board of Agriculture, and different small-scale food processing business ventures, farmers unions, and environmental NGOs.

The different categories of perspectives covered in the first half of the semester course were:

- Perspectives of the farmer family, including the farmer’s and farm family member’s motivations for farming, ‘internal’ and ‘external’ motivations, connectedness and dependency of biophysical elements with the economy and institutions, and traditions, norms and values that influence farming decisions.
- Production perspectives, including basic crop production and animal husbandry, production systems planning from sowing to harvesting and from calf to cow, alternative production systems, organic certification, and strategies and goal conflicts in production versus conservation.
- Economic perspectives, including the overall economy of a farm, money flows out from and into the farm, overview of the tools used for administering diversity and sustainable, holistic policies, and investment strategies and financial sources from the farmer’s point of view.
- Perspectives on institutions, including rules, regulations, and subsidies that highly influence farming practices and planning, local norms and values, certification organizations, institutional hierarchies, e.g. municipal, county, state, EU, WTO.
- Systems ecology perspective, including a historical vision, the farming system’s resource base and the farmer’s time and space scales, ecosystem services, control versus dynamic adaptation and following natural principles, role of unpredictable events and system resilience, and farmer creativity in dynamic development processes of self-organizing systems.

Second course process and content

For the second half-semester course the course goals were both to expand the perspective of food web to include aspects of globalization of the food system, and to learn how to read a farming context in a country in the global South (the so-called ‘Developing Countries’). The first part of this course focused on perspectives, theories and tools. Learning goals were for preparing students to be able to approach the agricultural context in an entirely new situation and:

- describe key concepts and principles of the globalized food chain;
- identify and relate the interactions with and dependency of the food chain on both the biogeosphere and local society;

- describe the roles of some key actors in the globalized food chain scene;
- apply interdisciplinary methods and tools, in a qualitative way, to describe and analyze and then suggest improvements to sustainability of the food chain; and
- use concepts and methods in an independent way to read contexts of different concrete areas for actors in the food chain.

The course started with literature readings on global food systems, and selected lectures from other university courses and conferences that were relevant to the subject. The literature readings and lectures were processed in group meetings, and opportunity was provided for feedback from teachers.

Students rather quickly decided that it would be more meaningful to see systems in the developing world 'up close and personal'. They felt that reading and discussing agriculture, food systems, and hunger in the relative comfort of a Swedish university and at a long distance from these actual systems in the field was not the best way to learn about them. It was not a realistic use of the potentials of an experiential education.

In the second half of the course, the field section, students decided to travel and gain first-hand experience in another part of the world. For this activity, the goals included preparing students to be able to:

- demonstrate skills in analyzing agricultural systems, at a farm and family level, in a project format;
- present how the studied farming system is connected to and is influenced by the global food system, and prepare this in written and/oral form; and
- apply interdisciplinary methods and tools to describe and analyze sustainable aspects of the case study in a qualitative way.

In terms of content, the course was designed for students to learn, practice and apply:

- different tools of Participatory Rural Appraisal (PRA) and Rapid Rural Appraisal (RRA) such as building a rich picture, VENN diagramming, seasonal activity calendars, mapping, scoring and transect walks;
- systems diagramming using energy flow and other measures of efficiency; and
- reflection on the field studies with respect to the conditions for food production in a location outside Europe, including the resource base, biological potential, agronomic practices and socio-economic situation, and how all these factors interact.

The field work was carried out in Viet Nam, within the bilateral co-operation in a Viet Nam–Sweden network for research and education (called RDViet, see <http://www.rdviet.net/>) and especially within the co-operation between Hue University and SLU within this network. In Viet Nam, the students studied and documented different kinds of farming systems and their dependency on local and external resources, and how they were connected to different kinds of markets (self-sufficient households and local, national and global markets). In the first phase of the

students' Viet Nam visit, they were integrated into some of the teaching topics in an ongoing masters program course in rural development, a program set up as a co-operation between Hue University and SLU. After this three-week course training in Hue, the students traveled to the Mekong Delta and the University of An Giang. The students planned the culmination of the course as a two-week travel, observation, and interviewing experience with interpreters in two different villages in the *An Giang* Province in the Mekong Delta. They visited a village called *My Luong Commune* in the *Cho Moi* District; the second was an ethnic Khmer community, *O Lam Commune* in the *Tri Ton* District. Both were rice-growing communities, and had both irrigated and rainfed crops, with the latter more prevalent in the Khmer community in the uplands. Working with translators from the nearby agricultural university, students visited the two villages and used PRA tools and Farming Systems Diagramming²³ which combined interviews with farmers and leaders in the community, and evaluation techniques for facilitating development by working with local people. The tools were used for mapping villages and their resources, irrigation systems and other infrastructure, and then in describing the farming systems and estimating economic activity. There was also attention given to the environmental resources and impacts of farming and social relationships in the communities that impacted the production and food systems.

Specific tools used in group discussions with ten farmers in each village included developing a rich picture of the community and food system, based on opinions and information from people in the village, and a season calendar of farming and food-related activities. From these, some scoring of production, economics, and social relationships was possible. Individual farmer interviews were accomplished with a rich farmer, a medium-income farmer, and a poor farmer in each village. Specific tools used in interviews of these farmers were developing a rich picture of the farm, a Venn diagram to use symbols to show relationships between household and community, and rankings of production, economics and social relationships of the family with the community. The families to be interviewed were selected by the village leader with help from the university interpreters. There were four interpreters who accompanied the students to the *My Luong* village, and an additional Khmer-speaking interpreter was added for the visit to *O Lam* village.

The modest set of materials used during the interviews and interactive process with farmers and families included large papers for drawing, colored markers, scissors and tape. Cameras, notebooks and pens were used for note taking and documentation. There were small gifts of fruit, candy, cigarettes and water for the farmers, to recognize and reward their time shared with the student team during the interviews. The farmers in the group discussion were invited for a lunch together with the students and staff from the university.

During the village visits, students were able to identify

- the principal crops and cropping systems,
- the principal issues related to soils and soil quality,
- the issues related to poverty and potential for new markets,
- the changes in policy and economics that changed the focus of farmers from quality products to maximum quantity of production,
- the promise of future markets based on quality and value adding in the community,
- the potentials of cooperatives to improve the economic situation of farmers and families, and
- the expected changes in local village economies as a result of the pending decision to join WTO.

General observations during the travel and village visits and interviews included

- details on the functioning of the extremely hierarchical extension system,
- the role of livestock today and its potential for the future,
- the prevalence of waste in the countryside, especially plastic,
- the history of agricultural policy and its impacts, and
- the future perspectives for Viet Nam agriculture with the pending entry into the WTO.

We recognize that the results presented from a comparison of two Swedish farms and the short visits to two villages in Viet Nam provide only a snapshot of the total agricultural situation and complexity in two countries, yet it does give us an insight into the plight of a rural population in both a developed and a developing country today, the impacts of international economics and politics, and the potentials for people to operate in a complex world. It also shows that the learning environments created in this one semester for reading the agricultural context were highly effective in supporting experiential education. The students' capacity to read complex agricultural contexts has developed to a rather high level during these two courses, and indicates the possibility of introducing complex cases as a basis for learning systemic analysis and systems thinking at an early phase of university studies.

Learning goals and evaluation

In the development of the test pilot experience, we were interested in learning how well students early in an agronomy career could take major responsibility for design of their own learning landscape, with guidance from instructors. Both students and instructors were concerned about the intensity of the planning and learning experience, and whether the investment of additional energy on the part of both groups would result in successful learning. We also wanted to learn how this experience would compare with a full semester of courses in a conventional, on-campus class environment. The investment in faculty time with a small number of students was another concern, as well as the additional cost of travel and other logistics. Finally, we wanted to explore how well we all could evaluate learning

in this unconventional educational environment. These elements are discussed in the final section. This study was based on a real case situation, not an experimental design. That means that the number of students taking part in the study was very few (three) and also not 'randomly' chosen, but based on their individual preferences and 'risk taking' in such an unconventional course situation. We are fully aware of this 'bias' in the study, but as a case situation we find it relevant to make some general reflections, put into our long teaching experience context, from the learning process we explored.

Results

General observations on the class organization and experiences

The course organization was built through a dialog between the instructor and the students. The Swedish instructor had extensive experience and had made substantial reflections on his own agronomy education. He had also developed an interdisciplinary perspective and theoretical framework for agriculture, and this was used as a platform for the planning process. During the meetings the instructor listened to the students' concerns with their present program's course design and implementation, and through questions and discussions tried to identify the key points in their frustration and key elements of the students' original interests in studying agronomy. In this process, the instructor and students uncovered the key elements of student motivation to pursue further education in agronomy. At this stage, the instructor had already interpreted the main frustration expressed by the students as: (1) frustration of not seeing a clear connection between the scale of farming and food systems (which was the focal interest for the students in entering the agronomy program) and the scale in focus in their first two semesters of the program (courses mainly in chemistry, molecular biology and soil chemistry); (2) the fixed and inflexible pedagogical teaching approach that enhanced a 'copy and paste' learning style instead of a 'learning for life' learning style; (3) the attitudes of many instructors in communicating with students as 'empty buckets to be filled with knowledge of the instructor', 'they (the instructors) don't seem to take us seriously in communication', said one student.

This method of designing a student-driven course, facilitated by dialog, was on the whole very successful and illustrated the potential for using such an approach for introducing more student initiative in course and program planning. But the students are not just turned loose, and we believe that a facilitator or instructor with personal experience and reflections, as well as knowledge in the area of the program, is crucial to the planning process.

An important experience in course design was the connection between trust in the students' capacity to take a major role in planning, in the instructor's ability to listen seriously to the students' needs, and in the high potential

students have for taking responsibility for their own learning. It was also important for the instructor to learn through the course evaluations, how much energy, power and effort it took for the students to take on such responsibility. There is obviously a great difference between student-driven and teacher-driven courses in the implementation of a full experiential learning program.

Reflections on the farm visits and analyses in Sweden

The choices of the two very different farming systems in Sweden turned out to be highly successful. By meeting two unique farming systems, the students quickly came to realize the importance of different motivations, goals and conditions that contribute to farming systems and practices. On the other hand, by limiting the number of cases to just two, it was possible to develop both a broader and deeper understanding of the farms, instead of a surface understanding of many different cases. It also helped students realize the importance of using different perspectives and 'glasses' in reading the context of a farming system. The influences from the human side of the system become very obvious early in the process. This could be an important learning objective if such a course could be used as the introductory activity for agronomy programs in the future.

The combination of reading text within a thematic area, discussion of this information with the two Swedish 'reference farmers' and with teachers and researchers at the university, was a unique opportunity to fit theory into local context. It was important to create a successful balance between students' time spent on individual and group processing, and how best to interact and efficiently use farmers' and teachers' time. The parallel reading and reflecting on a textbook on farming as a production system with environmental care²² was also an essential element for learning about farming as an integrated activity.

Reflections on the visits to two villages in Viet Nam

It is obvious that this field trip provided many different and valuable inputs to the students' learning process, as described later. Students decided to undertake a field exercise in a totally different context from the first half-semester course, when important theoretical and methodological issues were processed in connection with Swedish farming systems. They needed to process and evaluate previous learning in order to determine what seems to be general and what is more contextual, and why. The great differences between Sweden and Viet Nam in climate, farming systems, social and economic situations, as well as culture and language, also contributed in a significant way to the students' learning, as expressed in their evaluations. It also put strong pressure on them to take initiative in the whole process, which was very demanding but also generated great confidence when they could realize good

results from these efforts. Details of this multidimensional learning are provided in the individual student evaluations given later.

It is important to point out that this successful learning environment was only possible because of previous contact and solid cooperation already established between SLU, Hue University and the University of An Giang. To send students in their second year of university out to a field study in a different context requires appropriate contacts and a trusting academic environment as a starting point. We as teachers need to provide assurance to students that they can meet their learning goals to justify their investment of time and resources in the new program. Students need to place their trust in the cooperating institutions for orientation and support. To assure that collaboration, a long experience of institutional cooperation is probably needed. This reflection opens up the concept of establishing future organized international networks for this kind of student exchange in education.

Reports and evaluation of the field experiences

The students' learning process was evaluated and they were given regular feedback from teachers in reflective sessions, usually at the end of each week. Results of the students' field work were presented to an instructor in different formats, and often the feedback was given in oral form. Overall results of the first course were presented in a seminar organized by the student organization IAAS (International Association of Students in Agricultural and Related Sciences) in St. Petersburg on 22–29 October 2006. Results of the second course were presented in a report of the field study in An Gian²⁴ published by the SLU Center for Sustainable Agriculture.

St. Petersburg seminar. The seminar in St. Petersburg was part of a student union conference, with the theme 'agriculture and environmental issues in the modern world'. The students asked the organization if they could deliver an extra element in the conference by describing the course and their reflections on their learning process. The seminar was videotaped and presented to the course instructor back at the home campus, along with feedback and evaluation of the seminar event. The seminar was also a good environment for training in oral presentation skills.

Final report on Viet Nam. The field study at An Giang was processed into a full report. The course instructor and an external evaluator scrutinized and edited the report and gave feedback. This feedback was further processed by the students into a final version, which will be published in a report series at the department²⁴. The report writing provided an additional learning process, in extraction of information from the field study, further reflection on the field experience, and also in organizing and communicating students' findings in the Viet Nam experiences.

Reflections on the Educational Experiences

The students and instructors responded briefly to three questions about the test pilot educational experience. Each of them provided comments on initial expectations for the independent study time, their reflections on the experience in the field and in working with the group, and their anticipated applications of the experience to future education and potential jobs. Here are the comments:

Reflections from Anna Nilsson (student)

The test pilot program excited mixed emotions, from really wanting to join this new experience to serious concerns about the unknown. Would it be relevant and would I have the discipline to do a very independent type of study? Much of my energy had been in the student union, so it was normal to be involved in my own future and take responsibility, and by then I had invested much time in planning the ideal ‘course of our dreams’. I wanted to learn more about farming systems, connections between different sectors, and an overview as well as practical details. The opportunity to visit different farms, companies and researchers in Sweden seemed like a unique experience. And planning to go to Viet Nam provided a whole new window on agriculture and a different society, although I was not sure how well my previous knowledge would be applied to the completely new situation. The actual trip to Viet Nam and the experience at the university and in the field and villages are events that I still think about every day. It took a large amount of time and energy, but I learned so much that it was definitely worth it. The overall experience as a test pilot will follow me whatever I do in the future. It has helped me in planning, writing, communication and speaking, as well as in creating new possibilities for learning. It has also given me courage to work for change at the university and in society. With a friend, we plan to study the social and ecological impacts of GMO crops in South Africa, and I may become a journalist in science or an agronomist in rural development. The test pilot experience helped me in clarifying my own future goals for a career. I hope that this model can help change the conservative university education system, and that more power can be shared between students and teachers. With more students involved, there will be more growth in thinking, new attitudes and better connections with the real world. The process will create more self-confidence, belief in ourselves as people, less anger and more positive thoughts toward the system, and fewer students who drop out due to frustration. In general, this was a fantastic experience and I hope that more people have this opportunity.

Reflections from Sofia Palmer (student)

A very important learning experience for me was to realize the complexity in many situations and improve my ability

to deal with that by *multi-perspective thinking*. For me the project introduced a totally new way of studying, which meant much more individual responsibilities and demands, but also a big challenge. Sometimes the situation during the project felt extremely exhaustive, but it definitely had a lot of good outcomes. The project gave me a much deeper engagement in my studies and much more motivation for future studies and career. First of all, it meant a lot to ‘land up’ in a more or less unknown situation—culture, society, language—and to try to deal with a new complexity and make an analysis from it. This kind of action-learning was a great experience for me. A very important and connected learning situation was how often we make wrong assumptions, because we are over hasty in applying our previous stereotypes about another country and culture. The experiences from the project gave me much practical knowledge through reading, writing and integrating all this with the field study, but also self-confidence and trust in my own abilities in a new situation. I am really impressed by our own group’s performance, which is far better than my expectations before the project. After my studies, I want to work with environmental issues on a regional level connected to environmental communication and the use of natural resources. This insight partly came from the test pilot project, and I am sure the experiences from it will be useful for me in many different ways in the future. I am often reflecting on my experiences from the project and using these reflections in many different situations.

Reflections from Adam Roigart (student)

The course we took part in was something new to our university from two points of view. The overall thinking around the way of making a course as well as the subject was progressive. The normal way of dealing with agricultural subjects at our university is, as described above, to first be put in basic chemistry and calculus classes and from that point moving on to wider subjects. How wide they get, though, is a relative question. There are a great number of specialist educations, but none that has the ambition to create skilled generalists, until now. Before starting the course, I experienced a sort of intuitive feeling that this (current system) was wrong but had no means to put the feeling into words, due mostly to a lack of practical experience. Through field studies that were well within reach, relying on the knowledge gained through the seminars and the literature, we could experience *what it really was all about!* This included understanding, and appreciating, the role of the generalist as well as the specialist. I believe this point is important to make, since we were sometimes criticized for not wanting to learn things seriously. ‘Taking matters seriously’ meant dropping the overall picture in favor, for example, of deep studies of soil fertility (when the criticism came from the soil department). I assume someone from the department of animal husbandry would have another version! By having some practical experiences that clarify the role and the

importance of the generalist, one's self-image gains a lot. I am sure though that the kind of learning experience we had could be just as positive for someone wanting to specialize by helping them clarify their role in the whole context of agriculture.

Reflections from Lennart Salomonsson (instructor)

The idea for a test pilot project grew from our concerns as instructors that the present curriculum that includes a set of requirements for all students, starting with basic science such as chemistry in the first year, was not in tune with students' needs⁸. Without having a practical context into which new skills and knowledge could fit, students were often lost and not very motivated for education in our traditional classes in soils, crop science or other specialties. This was also my interpretation of what was the major part of the students' feeling of frustration with the curricula they opted for, when they first contacted our department. They seemed to be more interested in whole systems, and especially the interactions of the biological and economic dimensions with human society. Many students want to make a difference, but they are discouraged by not seeing how their studies could help them achieve that goal. By combining theories in systems ecology and farming systems with social science methods, students were much better prepared to look at systems both in Sweden and in Viet Nam. PRA and other practical tools used with farmers were found to be highly valuable, especially when students learn by actually doing this on farms. As a group, the students gradually took over more control of their learning agenda, and I became more of a facilitator and guide. We are sure that these students would have left crop science and perhaps the university if not given a different opportunity to grow. The final result is that all three of them have left their original programs; one started the landscape architecture program, one is starting a degree in rural development in the autumn semester of 2008, and one is now in environmental studies. All of them are however now highly motivated to seek careers in areas that are important to them. Each student has a clear plan of what to study, where they want to go, and how they will get there. Each feels that this opportunity to take charge of their education has resulted in personal growth, ability to work in teams and better understanding of whole systems. These should be among the goals of any educational program. I also reflected on the very high work load the students were putting themselves into, by taking such high responsibility in the planning of their curriculum and its implementation. As one of the students expressed in one of our evaluation session half a year after the course: 'In one way it was also comfortable to go back to conventionally planned courses, by the relief I felt to let all planning work to the teacher, and to have a period of 'lay back' for a while'. It was also important for me to understand the importance for the students in group reflection work to have a chance to

change groups. All students in this course expressed that by the end of the full semester they had been working for such a long time in the same group constellation, that the importance in group processing to get other peoples' perspectives was less visible, as by now they could foresee many of their groupmates' comments.

Reflections from Charles Francis (instructor and evaluator)

The test pilot project provided one unique opportunity for Swedish students in the College of Agriculture to design and pursue their own ideas on how to accomplish their education. Based on reading the report from their study tour in Viet Nam, I am impressed with the depth of information and insight gained by the students in a short period in the field. To be sure, they were well prepared with a number of soft systems methods before leaving Sweden, and had some prior practice in the Swedish farming context. The help of people from the university in Viet Nam and from village leaders was essential in locating people to interview and providing students with local credibility in their task. Yet it is truly amazing what was accomplished in a short time. The production data they were able to access in Viet Nam are limited, of course, and the economics are necessarily shallow because it is difficult to obtain detailed information in such a short time and with so many people in the group—three students plus four or five interpreters. It would take a longer time and perhaps some fluency in Vietnamese language to achieve close confidence of the farmers and gain access to more detailed data on production and incomes. The environmental analysis is rather general, and relates primarily to pesticide use and comments about impacts of too much chemical residue in the ecosystem. The social elements are especially well developed, as the team focused in on labor use, family involvement, relationships with the commune leaders and women's groups and relatives, and national politics and their influence on local success in agriculture. This dimension is impressive, especially as conducted by crop science students with limited prior exposure to the methods needed to get this information. It appears to me that this type of educational experience can provide an unforgettable personal journey into another culture, and an essential part of the preparation of well-grounded professionals.

Reflections from a Group Session one year later

Sharing reflections in a group after a significant time has elapsed can bring out additional issues and conclusions, and can represent the consensus of all participants if a session is facilitated in a collegial way. As students, we were initially a bit skeptical if it would be possible to design an ideal course, with our limited experience, but we had in common a frustration with the currently structured curriculum. The student-designed course seemed to be an exciting opportunity. Each of us had different motivations, but saw this as a way to build on our previous experiences. There

was a strong belief among teachers and students in the concept of democracy in education⁸, and we all considered it more important to focus on holistic views of agricultural systems rather than getting lost in the parts. The experience of meeting Swedish farmers was an opportunity for growth in our knowledge, and also to test the methods that can be used to gather information and analyze this to better understand the whole system. Applying these same methods and some complementary tools in Viet Nam provided additional challenges, working through interpreters in a totally different culture and environment, but it also gave a different type of chance for individual growth and building confidence. Moving back into more conventional classes was easier in some ways, since we did not have such a large responsibility for organization, yet it was discouraging to see the lack of motivation of others, some going to sleep, and some students not really interested in having an in-depth discussion. There was an obvious and large separation between teachers and students in conventional classes, compared to the co-learning environment in the test pilot program. As students we anticipate a large demand for future programs where students take more responsibility, where there is more interdisciplinary focus, and where there is more learning outside the university with clients in the real world. We conclude that students should participate more in the design of their learning, even though this is outside the comfort zone for both students and for instructors. The consensus is that we need new programs that incorporate all these ideas for change, and that it would be very difficult to introduce enough meaningful change into existing departments, curricula and courses. We recognize that this would take an incredible amount of resources and human energy, but the results for students and the university would be highly valuable as we create new learning environments and a learning organization.

As faculty in this review session, we were impressed with the level of excitement from students even one year after the field experience. They shared specific anecdotes, especially from the Viet Nam interviews, as if these had occurred yesterday. It was obvious that the experiential education as co-planned by them had a lasting effect on their motivation for continuing their studies, as well as creating a desire to continue to be more involved in planning and execution of educational activities. We have concern about the small number of students, and also the self-selection process that obviously limits the extrapolation of results to a larger student population. We concluded that only highly motivated, self-starting students who are willing to take responsibility and dedicate much additional time to the course would be prime candidates for this alternative type of education. It is a complement to conventional courses, rather than a complete substitute. In terms of faculty time dedicated to only three students, we recognize that this is less efficient than presenting lectures to a class of 50 or 200, at least as measured by conventional credit-hour criteria. On the other hand, the lecturing time was set to a minimum and much of this 'information

delivering' was handled by students reading and group processing, and students' interviewing of people outside the university. There is a certain fixed cost to faculty who organize such a course, and the marginal additional time needed for 10–20 test pilot students would result in some efficiencies of scale in a course with expanded student numbers. Some of the fixed costs such as travel and support for a foreign experience such as the Viet Nam adventure would increase in proportion to student numbers. Alternatives that would be less expensive, yet provide experience in another culture, could be realized in nearby venues such as Estonia, Poland or western Russia. Finally, we recognize the difficulty in comparing the amount of learning from the test pilot experience with a semester in classes on campus, but our qualitative observations are that this was a highly impactful experience and one that would be difficult to duplicate in a local educational facility with formal classes. We also deal with students in conventional lecture classes, and this provides a standard for such comparison. There is no doubt about the importance of the field experience, and the level of motivation and dedication that was developed as a result of the test pilot opportunity.

Recommendations

As instructors, we can say that much of our previous experiences and reflective knowledge from curricula planning and course implementation at masters and graduate level was both confirmed, and even strengthened, in this test pilot course with undergraduate students in their third semester. We found this especially true in our reflections on 'just-in-time education'⁷ and experiential learning^{15,17,18}, and the more dynamic perspectives on the cognitive process seen as a 'learning ladder'²⁴. We observe the possibilities for students to achieve an integrative 'internal development', including an ethical and emotional maturation, by using an experiential approach in education.

This case study also showed us that it is possible to increase students' engagement and responsibility in their own learning process if instructors: (1) give the students space and facilitation to analyze and formulate their own inner driving force for learning; (2) take their perspectives, experiences and personal knowledge seriously in planning, feedback and valuation discussions; (3) give the students tools to work efficiently, but also space to develop in group project work and group reflections; and (4) take into account the energy needed for program planning, remember the challenges faced in implementing education, and also taking responsibility for the learning process. Much of this responsibility is passed on to the students, and we need to appreciate that serious students will find this a large but rewarding challenge. We also need to consider differences in learning styles, and that students will be involved in other courses that include different kinds of courses within their full programs.

This case study also shows that it is fully possible to let students in a very early stage of their undergraduate studies

take responsibility for rather advanced field work in the context of another country, but this assumes that good cooperation with colleagues in the partner universities is already in place. We observe that it is important for people in the host institution to have facilitation competence and abilities to guide the students in the new context, and give the students time for adapting and reflecting on the new context. This kind of advanced field study also demands a course structure that provides space for students to assume responsibilities for their own learning process and gives credit for the results. We observed the great impact that such a field project in another culture and context had on the students' self-confidence, maturity and self-insight, and how this led to choices in their future education and learning. Such advanced fieldwork opportunities take substantial resources for planning and implementation, but provide new qualities to the student's future learning process that are hard to overestimate.

Summary and Conclusions

Based on the levels of enthusiasm we achieved as students and instructors, the breadth of understanding generated about farming systems and the motivation to continue study in agriculture, this was a highly successful field exercise. As students, we gained invaluable experience in the international arena, leaving our comfort zone in the Nordic Region and traveling to the tropics to experience a completely different culture and series of farming systems. We had to adapt quickly to a new regime of food, language and translations, time change, and culture—typical of Southeast Asia and extremely different from Scandinavia. We used methods that had been tested in our own language and culture, and adapted these to a completely different context. It was essential to present ourselves well and quickly gain confidence with our interpreters and especially the people in the two villages. This seemed like a momentous task to accomplish in a short period of time, but we were able to meet all these challenges through close cooperation and with good humor. We stayed healthy. We adapted to the new situation, collected a large amount of information, took countless photos, and assembled a report that makes us proud. We are inspired to share this experience with others through publications and presentations.

This report should serve as a model for other student groups to emulate as they seek innovative ways to pursue an independent education. As instructors, our mission should be to provide some guidelines for design of a learning experience, and some checkpoints as students navigate themselves through the learning landscape. In a conventional curriculum made up of courses on campus, tested over decades and found to help students achieve certain learning goals, this path through the landscape is clear. What we are learning is that not all students are motivated by this traditional path, not all people learn in the same ways, and some seek new routes that will provide them with a broader perspective about what farming and

food systems include. They want to be able to deal with complexity and uncertainty, and to deal with the multiplicity of factors that will be important in food systems in the future. This student-designed semester in Sweden and in Viet Nam has definitely provided such an experience for the three Swedish test pilots. With their help, we hope to improve the learning environment and provide more opportunities for growth in potential for independent thinking, setting personal and group priorities, and thus be better prepared for professional contributions in the future. The test pilot experience is one large step in that direction.

Finally, as instructors we have reflected on the importance of the teacher's attitudes in meeting and working with students. To face the student with trust, true interest in their individual goals, and taking their own experiences and knowledge seriously, we recognize these as key elements for creating a productive and trusting co-learning landscape. We make it clear from the start that all individuals in the learning group, students as well as teachers, will explore in their own ways. This demonstrates trust in dynamic self-organizing processes, where you have confidence that emergent properties will result if the process provides space to invite new, unpredictable events to happen, and to let them be tested and evaluated in each context. It becomes obvious to us that the central issue is more about trust and less about control.

From two experienced teachers with many years of practical teaching and curriculum development, implementation and reflections, and as fathers of our own adult children, we find great wisdom in a quote from Kahlil Gibran:

Your children are not your children.
They are the sons and daughters of Life's longing for itself.
They come through you but not from you,
And though they are with you yet they belong not to you.
You may give them your love but not your thoughts,
For they have their own thoughts.
You may house their bodies but not their souls,
For their souls dwell in the house of tomorrow,
which you cannot visit, not even in your dreams.
You may strive to be like them,
but seek not to make them like you.
For life goes not backward
nor tarries with yesterday.

[Kahlil Gibran (1883–1931, <http://www.leb.net/mira/>)
On Children]

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