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Students Learning Agroecology: Phenomenon-Based Education for Responsible Action

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ABSTRACT *Preparing students for a complex and dynamic future is a challenge for educators. This article explores three crucial issues related to agroecological education and learning: (1) the phenomenological foundation for learning agroecology in higher education; (2) the process of students' interactions with a wide range of various learners within and outside the university environment; and (3) the unique characteristics of agroecology as a discipline and why these require different ways of learning than the conventional academic education. Phenomenology provides an epistemological foundation for learning about and interacting with the world outside the university. A profound aim is to bridge two learning communities: the university environment, where most traditional education takes place, and that of the stakeholder groups in farming and food systems. In this paper, we discuss several challenges of such a bridging activity: the integration of learning processes within the university with those in the case regions; the role of core and single discipline teachers; the role of the stakeholders; and the role of the students. Dealing with complex sustainability issues requires the assembly of a wide range of expertise in an inter-professional mode of collaboration. The article concludes that phenomenology and agroecology meet most fruitfully when phenomenology is done, when it is turned into actual* efforts for promoting learning*, and when phenomenon-based learning provides* practical relevance *for students to ground their knowledge in farms and in communities and this relevance ance of education leads to* responsible action.

KEY WORDS: Agroecology, Higher education, Phenomenology, Action learning

Introduction

Modern agriculture has developed to become multi-functional and multi-dimensional, and this challenge of complexity demands new strategic roles in university education 'with respect to how they critically engage with the multi-stakeholders of entire agri-food systems' (Bawden, 2007: 17). Agricultural and rural development

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students must be prepared to work in inter-professional and multidisciplinary groups focusing on the challenges that these stakeholders face. Despite the range of challenges facing academia, teacher-centred lectures still dominate the teaching at agricultural and life science universities. Just as farms have become more specialized over the past half-century, researchers and educators have come to focus on increasingly narrow parts of the overall puzzle in agriculture, and this has been reflected in higher education (Langer et al., 2007). Agroecology represents a profound critique of assumptions in conventional agricultural research and education, and therefore teaching and learning about agroecology cannot be built on assumptions and views in conventional agriculture (Francis et al., 2003; Wezel et al., 2009). This realisation calls for a critical reformulation of the epistemological foundation for both research and for higher education in agroecology, as discussed by Drinkwater (2009) and Francis (2009).

In guiding students toward becoming agroecologists, we have described a different set of assumptions about the future and the types of professionals who will be needed in agriculture (Lieblein et al., 2004). Central to this process is an ecological view of agriculture where farming and food systems are unique regarding their ecological, economic and social properties (Gliessman, 2007) and where agroecologists have the skills to take responsible action (Lieblein et al., 2007). In order to meet the current challenges, we need a curriculum for teaching and learning agroecology which enables teachers, students and stakeholders to interact as learners around issues of sustainability.

The traditional agricultural education system is facing profound conversion challenges. In a teacher-dominated agricultural education, the teachers may be the major obstacles to student learning. In most decision cases used in problem-based learning, for example, students attempt to find solutions already known to instructors and clients, and this is the 'right answer'. In open-ended cases, students work together with instructors and clients to discover potential strategies or scenarios that will lead to an improved situation (Francis et al., 2009). To achieve this, a conversion of how we teach and how students learn is similar to a conversion of farming practices. In the agroecology MSc programmeme presented and discussed in this article, we propose a conversion of how to teach, from present courses such as discipline-oriented farming recommendations, to a renewed way of integrating the various disciplines from an ecosystem perspective, often using case studies on the farm and in the community.

This article is based on experiences from the Nordic Region master's programmeme in agroecology that has been running at the Norwegian University for Life Sciences since 2000. Since the Nordic network of agroecology started with Nordic PhD courses in 1995 (Lieblein et al., 1999), action learning has been an in-built activity to improve the quality of the agroecology curriculum. Characteristics of learning agroecology have been discussed in prior publications (Francis et al., 2001; Lieblein et al., 1999; Lieblein et al., 2000). We have, however, not previously examined phenomenology and phenomenon-based learning as a foundation for the programmeme. The aim of this article is to connect agroecology with phenomenology by answering three questions: (1) What is the phenomenological foundation for learning agroecology in higher education? (2) How do students interact with heterogeneous groups of learners, a wide variety of other people inside and outside

university while learning agroecology? (3) What are the main characteristics of this specific discipline concerning students' learning? In this article, we focus on experiences drawn from the Norwegian phenomenon-based approach to agroecology and the challenges for improving both curriculum and students' learning.

Student Learning in the Agroecology Curriculum

The MSc programme is designed to establish a close agreement between the *nature of agroecology* and the approach to *learning agroecology*. Table 1 summarizes what we consider a necessary epistemological shift to an agroecological approach to learning, based on both literature and our teaching experience. Here we outline a rather substantial shift from the conventional classroom and current organization of concept- and discipline-based education to a phenomenon-based and holistic paradigm for learning. This is in line with a general change from primarily deductive to more inductive teaching methods, as described by Dameus et al. (2004). We ask the question: What is necessary for the graduates in order for them to master future complex and dynamic situations as agroecologists? To answer this question, we first formulate learning goals and what we want students to achieve by learning agroecology, and then we design the learning process.

Goals in the Agroecology Curriculum

Agricultural universities often base educational programmes on the notion that the main goal is to move the students from ignorance to knowledge through transfer of information, and that knowledge automatically will lead to action. As such, knowledge goals have primarily been emphasized, whereas skills and competencies are taken for granted, and values and attitudes are not discussed explicitly. In contrast, research has shown that in the quest for sustainable development, knowledge in itself is not enough and does not necessarily lead to action. Pfeffer (2000) has coined this as 'The Knowing–Doing Gap'.

The MSc programme in agroecology has an overall aim of enabling the students to put knowledge into action (Lieblein et al., 2007). This has a phenomenological point of departure in the sense that the learning process begins on the farm or in the case

Table 1. Major shifts to an agroecological approach and learning landscape

Changing from a single discipline focus to a holistic approach
Changing from universal principles to site-specific applications
Shifting from general knowledge to context-specific knowledge
Integrating methods from natural sciences and social sciences
Incorporating ethical and moral dimensions to learning
Shifting from a culture of fixed answers to a culture of curiosity and improvement
Expanding the concept of faculty to include a range of professionals
Including education in classroom with the farm and food system
Expanding from teacher-oriented to student-oriented learning landscapes
Shifting from transfer of knowledge to experiential learning
Redirecting focus from present situation problems to future wanted situations
Combining deductive and inductive teaching methods

Table 2. Learning goals in the master's programme in agroecology

To educate agroecologists as active participants in civic society who:
• can apply key concepts about the structure and function of farming and food systems; • can link theory to practical situations; • can handle complexity and change; • can clarify and integrate their own attitudes about applying knowledge and skills; • are good communicators and facilitators.

region, and real world contexts are used to understand and shape concepts and theories, the goal being to support sustainable improvements. Major goals in the master's programme are summarized in Table 2.

Our task is to design the curriculum so that the students' own learning process and activities become more important to them than what the teachers want to teach them from their own particular disciplines.

Overall Structure of the MSc Programme and the Two Introductory Courses

To achieve these learning goals, we have designed a two-year programme where the first autumn semester is an intensive immersion in a sixteen-week agroecology course consisting of *Farming Systems* and *Food Systems* components. The rest of the programme is designed individually in consultation between teachers and students, and it ends with a one- or two-semester thesis. The first-semester courses start on the farm and in the community with a shared experience of students, teachers and stakeholders from farms and the food system. This shared experience forms a context for later discussion and learning. Lectures, facilitated plenary discussions, and group work make up the bulk of the activities. The agroecology courses include participation from several subject-specific researchers and teachers in addition to the core teachers being responsible for the agroecological profile as such.

Learning Methods and Assessments

To guide the students' journey through the course and to enable them to step up and down on what Lieblein et al. (2007) call the external and internal learning ladders, we establish four case regions in different parts of Norway as the main learning arenas. The students travel in teams of five or six to these regions for two one-week stays during the autumn. In these regions, they explore both the farming and the food system realms, with the aim of developing knowledge to support sustainable improvements. In the case regions, the students interact with a key client and a heterogeneous group of stakeholders. This learning experience is reported in plenary sessions in class and is further developed in preparation of group project reports. An important issue is for the core teachers to create a safe space and learning landscape through which students can journey while trying out new ideas and getting feedback from their peers, from other teachers and from clients in the field.

Students participate in group activities and sessions involving the larger learning community, and the case study provides a realistic context that is grounded in today's

farming and food system realities. The results of the work with the key clients in the case regions are formulated in *client documents*.

Since reflection is crucial for learning, the process of reflection has a key role in the course. At the very start, students are given instruction on how to write a learning log, and the teachers facilitate a weekly plenary reflection session. These sessions are designed so that they also allow for feedback from the students to the teachers. As such, the reflection sessions have the added value of providing insight into how the students perceive the pedagogical process and content of the course. Parallel to the writing of the team-based client document, the students write a *learner document* where they describe their individual reflections on course content and process. These learner documents provide an additional window into the students' reactions to the course and their individual learning.

In several thematic seminars, students are presented with agroecological concepts and theory (*what* and *why*); for example, sustainability; systems thinking; evolution, structure and function of agroecosystems; ecological principles; selected agronomic issues; farming systems in a global perspective; extension and rural development; food distribution; consumer issues on food; nutrient flows; and recycling. We also present different methods and tools to deal with complex and practical situations (*how*); for example, soft systems methodology; multi-perspective analysis; SWOT-analysis; mind-mapping; farming activity calendars; group dynamics; use of metaphors for farm analysis; computer software for farm design; intercultural learning; qualitative methods; visionary thinking; dialogue; force-field analysis; creative problem solving; and facilitation skills. Most of these concepts and methods are new to students who have come through the conventional undergraduate (bachelor) programmes in agriculture, environmental studies or other disciplines. This new orientation requires us to design a learning situation where integration of different aspects and types of knowledge is emphasized, and where the learning process starts with practice and phenomena in actual situations. We find the epistemological rationale for this learning approach in phenomenology.

Phenomenon-Based Learning and Agroecology

A phenomenological perspective on students learning agroecology is relevant for three reasons. First, it prepares students for a broad and receptive appreciation of the *whole* system, thus complementing more narrow, concept-based education. Second, it explicitly emphasizes the training of relevant skills and competencies, integrated with ethics and values, thus complementing the students' cognitive competencies. And third, it promotes the action aspect of learning and teaching, thus bridging the gap between theoretical knowledge and knowledge-based actions in real life situations.

Phenomenology and Learning

In his phenomenological critique, Edmund Husserl (1970) argues that the development of modern science has led to a 'mathematisation of nature'. Within the European sphere of influence in the 17th century, there was an established view that a scientific understanding of nature must be founded on mathematics and quantifiable

data. According to Descartes and other leading scientists and philosophers in the scientific revolution, properties like colour, smell and taste were secondary in the sense that they only existed in the consciousness of the human being, not in things themselves. These properties are mere subjective phenomena, in contrast to primary properties of things in a strictly objective sense; primary properties are measurable in size, numbers, durability or energy units (Dahlin, 2003). This scientific attitude has led to what Harvey (1989) describes as *the ontological reversal*, where mathematical formulae and models are supposed to describe a more true and objective reality than that which is available to us in our immediate experience through our senses. In this perspective, we only extract from nature what can be measured, and other qualities are neglected. As Dahlin (2001) notes, it is as if nature has 100 languages, but we have become deaf to 99 of them. Mathematics in general and algebraic formulae in particular are typically and purely cognitive experiences. The ontological reversal puts intellectual cognition at the very centre of learning about nature. In contrast, phenomenology starts with what is actually given in experiencing the world. With such a starting point, colours and smells are *given* in our immediate experience, and there are no experiential reasons for making a distinction between primary and secondary properties (Dahlin, 2003). Husserl wanted to build a general philosophical basis for all sciences, not only natural sciences. According to him, 'we must go back to the "things themselves"' (Husserl, 1970: 252) and relearn our capacities to listen to these phenomena with all of our senses.

Phenomenology provides a shift of focus from understanding the world to perceiving and acting in relation to the world (Merleau-Ponty, 1962). Our relation to nature is primarily a doing, not a knowing, relationship. Our consciousness and our ability to think are based on our already being and acting in the world: '... consciousness is in the first place not a matter of "I think" but of "I can"' (Merleau-Ponty, 1962: 137). In practical terms, we perceive, and then react, and then reflect on our actions (Kolb, 1984). Yet, theoretical knowledge cannot automatically be transformed into action whenever we wish—it is in fact just the other way around: our already being in the world and our individual acting skills form the basis for developing thinking skills. Lived experience 'overflows the boundaries of any one concept, any one person, or any one society. As such, it brings us to a dialectical view of life which emphasizes the interplay rather than the identity of things' (Jackson, 1989: 2). In this sense, phenomenology is constantly encouraging us to reflect upon our immediate experience.

This phenomenological perspective is in accordance with the early works of John Dewey on learning and experience (Dewey, 1961). Experience is a core concept bridging phenomenology and learning. The students bring their individual experiences into the classroom, and the teachers must understand and accept this experience in order to reach their life worlds. Dewey argued that knowledge is derived from *embodied* intelligence, and not from an abstract reason having an existence independent of the senses and affections of the lived body (Dahlin, 2001). For the teacher, understanding this embodied intelligence implies taking seriously the students' lived experience as a point of departure in teaching. These basic philosophical dimensions of phenomenology need, however, to be transformed into guidelines for learning.

Phenomenon-Based Learning and Action Learning

In the agroecology programme, phenomenon-based learning promotes the training of skills through active participation, as much as the focus on cognitive training. Action learning is an important part of the curriculum because it emphasizes the close relation between learning processes and human development. The basic principle of action learning is that acting in the world and learning can be one and the same thing (McGill and Beaty, 2001). Action learning also draws on the works of John Dewey. According to Dewey, education and upbringing of children is life, and life itself is human growth and development (Dewey, 1916). His well-known credo, learning by doing, points at our activities in the world as starting points for learning. According to Dewey, the task of the teacher is to create *a genuine situation for experience*, which means that acquiring of theoretical knowledge has to build on the student's own experience. Learning by acting in the world is thus a process of reflecting on actions, as they appear in one's own experience, and their links to theory, which is a prerequisite for transforming knowledge into action. In recent years, several other pedagogical methods have risen from these basic ideas of Dewey, such as experiential learning (Kolb, 1984), problem-based learning (Barrows, 1985; 1994) and situated learning (Lave and Wenger, 1990). A similar approach to our agroecology MSc programme was taken from the late 1970s onwards by an undergraduate programme in Australia (Packham et al., 1989). The development of our programme owes a great deal to the pioneering efforts at Hawkesbury agricultural college.

Phenomenon-based learning has emerged as a pedagogical alternative in science education emphasizing three aspects of the learning process: the natural phenomenon or the subject taught; the students and their learning activity and connecting the two; and the teacher's own teaching and self-reflection (Østergaard et al., 2008). Phenomenon-based learning in the agroecology programme at the Norwegian University of Life Sciences rests on an epistemology for learning about and interacting with the world outside the university. The case studies used in our courses provide this contact with people and the opportunity to learn from their lived experiences.

Students Bridging Groups of Learners through Phenomenon-Based Learning

How do students interact with various actors that may be considered their co-learners in their learning of agroecology? In order to discuss this question, we distinguish between four fields of attention: the integration of learning processes within the university with those in the case regions; the role of core and single discipline teachers; the role of the stakeholders where they do their case studies; and finally the role of the students.

Integrating Learning Processes within the University with those in the Case Regions

With phenomenon-based learning as the basis of the courses, it is imperative that real world situations are not simply examples of theories taught in class; on the contrary they become the very starting point for the learning process. Through this reversal,

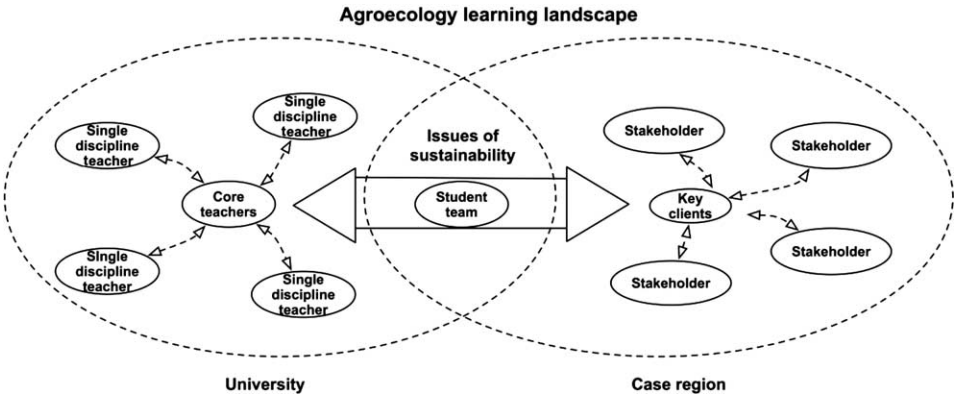

Figure 1. Agroecology master's programme in Norway: students bridging communities of heterogeneous learners at the university (core teachers and discipline teachers) and in the case region (key clients and stakeholders).

the aim is to bridge two learning communities: the university environment where most traditional education takes place and that of the stakeholder groups in farming and food systems (see Figure 1).

The students gain access to the regions through a key client and other stakeholders. The key client may be an individual farmer or a person facilitating rural development, for instance, an employee in the county office of agriculture. Within the university, the core teachers provide the students with concepts and theory from agroecology and systems thinking, as well as contacts with single discipline teachers and their respective knowledge areas.

One of the largest challenges we face when trying to bridge theory and practice is supporting the students in integrating and balancing the inputs from university with those from the stakeholders. This is a challenge because two types of knowledge meet: knowledge from practice is brought into the classroom through practitioners and discussed at the same level as knowledge from theory. Core teachers bring students into real situations in the case regions, and in dialogue with stakeholders they learn to apply their theoretical knowledge to the actual situation or problem. This approach is in line with Kaltoft and Rasmussen (2004), who note that it is a question of achieving a symmetric view of the knowledge of experts and practitioners. They argue that there is no principle difference between these two types of knowledge. Knowledge that is co-created with stakeholders is brought back into the classroom and dealt with equally to the theoretical knowledge.

Another challenge when developing the bridge is the integration of knowledge from single discipline teachers with the case-based, systemic knowledge. Wals et al. (2004) argue that creating a truly integrated curriculum entails that teachers and students become reciprocal members of a shared, self-critical learning community. According to our experiences, such a learning community must also encompass the stakeholders. The integration of the stakeholders and their competencies is a crucial element of both action learning and phenomenon-based learning. This integration is done by establishing contacts with stakeholders to whom we can offer involvement in their improvement processes. We choose farmers who plan to make major changes in

their farming operations. We identify food system stakeholders who find it fruitful to have discussions with a diverse group of students coming from different countries. These stakeholders are often site-bound in their daily activities, and value the international academic atmosphere we can provide.

Role of Core and Single Discipline Teachers in the Learning Landscape

The phenomenon-based perspective demands an explicit recognition of the value of knowledge co-created in the dialogue between students and stakeholders. This value must first be recognized by the teachers, and then the core teacher can encourage the students in valuing this knowledge. Phenomenon-based learning also demands an ability to relate discipline-specific knowledge or any other theoretical knowledge to life-world contexts. These are key qualifications for understanding the present system as well as for proposing better alternatives. The challenge is to weave together the participation of both the single discipline teacher and the core teachers who are responsible for facilitating the students' learning in the agroecology learning landscape (see Figure 1). The very act of basing the learning process in phenomena of farming and food systems provides the basis for weaving in the contributions from single discipline teachers. When the students return from their case explorations, they identify gaps in their knowledge, both at the systems level and also at the single discipline level. They report their needs for specific knowledge to the teachers, and it is our task to bring in the necessary expertise.

How do we relate the knowledge of the single disciplines to the case work of the students? As teachers we continuously discuss whether to present discipline-based topics ourselves from a highly integrated perspective or to count on experts who obviously have more depth in each field but may lack a systems perspective. It may also be a challenge to convince some single discipline teachers to enter the classroom in a fully participatory learning mode, rather than take the more comfortable and convenient lecture approach. These teachers often lack the immediate experience of specific case studies in which students are immersed. It is the task of core teachers to support them in contextualizing their disciplinary knowledge through a discussion of the current class and project each year. We are continuously trying to provide the students with what Bleakley and Bligh (2008) refer to as an *inter*-professional rather than a *multi*-professional experience.

The glue in inter-professionalism is not a common theory, but rather a common task. In the phenomenological approach, the learning process is derived from the students' experience and their individual and group-based learning. Teachers work together with students on issues that emerge during discussions of sustainable development of farming and food systems. A new teacher arriving in class in a particular session with specific disciplinary knowledge does not assure that the contribution will be integrated into the flow of learning as related to the case studies. In our experience, such integration requires active dialogue with the core teachers before and during the session regarding the relationship of the topic to the students' project work.

A further challenge for the core teachers as facilitators for heterogeneous groups of learners is to balance many different pedagogical perspectives and methods, such as holism and reductionism, action and reflection, group work and individual work,

and inductive and deductive learning. The learning goals for the courses, emphasizing skills and attitudes in addition to knowledge, are also fully valid for all teachers involved. Especially for the core team of teachers, it is not sufficient only to have mere content knowledge about the farming and food system. We must develop our facilitation skills, including knowledge about group dynamics and practice in negotiating conflicts. This is in line with ideas of Boxelaar et al. (2007), who discuss reflexive practice as a way of facilitating a sense-making process, rather than one that facilitates mere rational cognition of the situation. Sense-making in agroecology education is connected to an action learning approach and co-creation of knowledge among students, teachers and stakeholders. This basic educational approach of connecting learning, sense-making and action is shared by the teachers in agroecology education at the University of Minnesota, where action learning has been central to teaching agroecology (Jordan et al., 2005).

Stakeholders' Role in the Learning Landscape

Even though both the teacher-centred and the student-centred models of agricultural education in some ways may involve stakeholders of farming and food systems, in conventional teaching these stakeholders are most often not incorporated or legitimized to the same extent as the students and especially the teacher. The key relationship is still the one between teachers and students. In the teacher-centred model, the students tend to be passive receivers of knowledge, and in both models the stakeholders are passive objects of inquiry. In a stakeholder-centred form of education, on the other hand, the core relationship is the one between the students and the stakeholders, with the teacher as facilitator, and the emphasis is on providing a dialogue between the two groups to create knowledge. In this situation, the teachers are supporting and promoting communication rather than forming the individual knowledge creation process. As co-creators of knowledge, the stakeholders have an active role as educators, rather than a passive role such as in a teacher-centred education. This, of course, also encourages the students to become more active in their educational activities. The core contribution from the stakeholders is that they provide students and teachers with lived experiences that encourage the students to develop as professionals along a wider scale than just the academic one (Bleakley and Bligh, 2008). The contributions from the stakeholders are cultivated especially in the weekly reflection sessions, where the students are encouraged to think outside the traditional boundaries of academic activity, particularly in terms of bringing in the personal dimension. An example of the type of questions that we as teachers pose to the students during reflection sessions is: 'What was it about the farm visit or the theoretical paper that moved me?'

An education engaging in civil society by intentionally incorporating the expertise of stakeholders is in direct contrast with the conventional academic distinction between 'the expert' and the 'lay-person' (Bawden, 2007: 23). For example, from an experiential learning perspective, farmers and other stakeholders in conversion to organic agriculture share an essential, personal experience (Østergaard, 2003), and this experience is brought into the MSc programme classroom. The incentive for the stakeholders to give their time is that we can provide them with something in which they have interest. Examples of what students provide are good questions for

reflection, overview of complex situations, clarification of goals, identification of key issues for development, identification of forces that support and hinder development, and scenarios or proposals for action steps.

Students' Role in the Learning Landscape

The students' activities and their learning are regarded both as an individual and as a social process, and these are at the centre of the whole programme. Students come from many different countries, and most encounter a programme in English that is not their mother language. Although contributing to a rich human resource, this diversity introduces substantial communication issues. In the past nine years, students from 20 different nations have participated in the MSc programme, bringing very different cultural experiences into the educational process. Thus, the inclusion of learners from different disciplines, countries, cultures and languages presents a special challenge to coordinate the exploration of agroecosystems and to build on diverse cultural and knowledge backgrounds. This fact reinforces the need to build confidence in group work skills. In agroecology, learning together as a pedagogical method is especially important because this activity reflects profound values in agroecology. The core idea of agroecology is the symbiosis of different, often contrasting, elements in order to understand the one whole system. By definition, agroecology includes many sources of expertise, and more importantly the capacity to weave them together into a seamless whole. Most complex issues of sustainability will require the assembly of a wide range of expertise, and each agroecologist needs to keep up with their specialty as well as share this effectively with others toward a common goal. Thus, working as a team develops some of the same qualities as the interdisciplinary approach in agroecology. The slogan from such an interdisciplinary approach—that the whole is more than the sum of the parts—is also valid for team work. The reasons why some students experience group work as problematic may be many. One important aspect is the open situation implying that the responsibility for learning and decision-making is shared among group members. Also the students may often sense that they are less effective when they operate outside of their learning comfort zone, which used to be dominated by teachers and textbooks. In addition, it takes time for students to realize how to learn from encounters with stakeholders as well as from each other.

From an action learning point of view, the students' abilities to participate is crucial. Ison et al. (2007) note that participation in learning only makes sense if it is purposeful and that the primary purpose of this participation is to achieve more effective management in situations of complexity and change. Students interact with fellow students, core teachers and people on the farm and in the community around sustainability issues. The challenge of promoting student participation is first of all connected to the choice of genuine learning situations in the case regions. The cases are introduced early in the course and used to establish context for discussions in class. We have learned that participation can best be experienced as purposeful when current issues and problems in the case regions are explicitly identified and made relevant to students.

Since learning is a personal and a group concern, one task of the core teachers is to assess both each student's learning and the learning in each group. A challenge here is

obviously the academic tradition of assessment of individual learning. The learning situation essentially becomes an open situation when lived experience is put in its centre (van Manen 1990). The goal of student learning (both individually and in groups) is not to uncover answers already known by the teachers; instead, teachers and students will engage in a joint process to learn about complex, ambiguous situations (Francis et al., 2001). We have recently termed this process an 'open-ended case study' approach (Francis et al., Forthcoming). The challenge of assessment is to make it an integral part of the learning process. Assessing the students' gained knowledge, skills and attitudes is performed by both the teachers (related to mastering theory) and the stakeholders (related to practice). The assessment is still the responsibility of the core teachers who base the evaluation on criteria shared with the students at the start of the courses. Important criteria for assessing the individual learner document are:

- Ability to link the real life case to discipline-specific knowledge;
- Ability to critically examine concepts and methods;
- Ability to critically reflect on personal experience;
- Ability to describe personal competency development;
- Ability to make plans for further individual development.

The challenge of assessment in an 'open situation' is to convert our own thinking and that of students from an 'evaluation *of* learning' to an 'evaluation *for* learning', one that makes assessment an integral and ongoing part of the learning environment.

To find reliable quantitative indicators to determine the extent to which students practising action learning in open-ended cases are reaching the ambitious learning goals of the course and becoming better at managing complexity and change in their professional lives is difficult, at best. One indicator comes from the formal university final course evaluations that are completed shortly after finishing the course, and which indicate the degree of satisfaction about each course. During the years 2005 through 2008, in response to the statement 'In general, I am pleased with the course', on a scale of 1 (low) to 6 (high), students in the two agroecology courses had an average score of 5.02; comparable scores for all courses in the same four years in the same department were 4.61 and in the whole university were 4.60. From these limited data, we may conclude that the agroecology courses are rated at least as high if not higher than courses in general. Given the extreme diversity in the agroecology classes, in terms of nationality (10–12 nations) and educational cultures, as compared to the much more homogenous classes in other courses at the university, we take the high rating for the courses as an indication that the phenomenological approach works well for students across a range of different backgrounds.

Phenomenology of Learning Agroecology

According to our experiences, phenomenology and agroecology meet most fruitfully when phenomenology is *done*, when it is turned into actual efforts to understand and promote learning. Phenomenology reminds us of the value of direct life experiences. By acknowledging the value of lived experience, phenomenology provides a framework for legitimizing learning agroecology through co-created knowledge. This

educational approach in touch with life implies a very open situation, where the wall between the safe classroom and the complex and unpredictable everyday life to a large extent is broken down. The phenomenological approach provides a two-fold contribution to the epistemological framework of agroecological education. The first is a fundamental reorientation, from a position where the main emphasis is put on our concepts about the world, to a position where *the things as they are and as they could become*, and is where the learning process starts and continues. The second contribution comes from the position of radical phenomenology that was largely informed and developed by the French phenomenologist Maurice Merleau-Ponty. Here, reflection and learning are not mere cognitive processes, but more 'an aesthetical and ethical act of participating in the world' (Bleakley, 1999: 328). As the main goal of the MSc programme is to educate students as active participants in civil society, building this ability for participation must be emphasized and trained from the very first day.

We fully recognize the challenges of conducting a phenomenon-based educational programme within our relatively conservative agricultural institutions, as we confront colleagues with a different epistemological approach and different teaching methods. What could emerge from this agroecology education is a vastly different culture in agriculture and food systems education. Bawden (2007) points at the universal need for food and the life-sustaining connections between all people and the planet as a crucial concern for higher education in agriculture. The MSc programme in agroecology at the Norwegian University for Life Sciences provides ideas on how such active learning universities may be structured. In a reflection on participating in the MSc programme, one of the students described the agroecology learning strategy as an approach in harmony with basic assumptions and values, in contrast to other courses in the university:

> It was especially hard to change the typical 'university-way' of thinking. It needed some double-loop learning, which usually had some resistance for me. (Agroecology student, 2002)

As teachers we appreciate that students learn in different ways, and that the phenomenological approach provides practical relevance for students to ground their knowledge on farms and in communities. Experience so far has shown us that the agroecology programme prepares students to cope with challenges with which they are confronted after finishing the programme. Our next step would be, more systematically, to study students' long-term learning outcomes.

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