

Agroecology education: Action learning and action research

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Abstract: *Agroecology is described as an integrative and systemic approach to research and education in farming and food systems. This emerging area involves the ecology of food systems and the complexity of multiple challenges and stakeholders whose interests must be addressed. The quest for resilient and sustainable production and food systems is taking place in a time of growing scarcity of non-renewable production resources and an increasingly unstable climate. Over two decades, Nordic researchers and educators have conceptualised and implemented a series of PhD courses in agriculture and food systems, and used this experience as a platform to design an MSc degree programme in Agroecology that has attracted students from the region as well as from many other countries. Action-oriented learning has been the keystone for the programme activities, and much of student time has been spent on farms and in rural Norwegian communities. Students pursue education through group and individual exercises and progress up a learning ladder that leads to responsible action. They learn to deal with a wide range of stakeholder challenges and to bridge the divide between academic learning and needs of the real world. The Agroecology MSc programme in Norway is described as an effective model of open-ended case studies in the field, and the prerequisites and challenges for introducing this type of learning landscape into the mainstream university curricula are discussed. Examples of organic production and food systems provide many of the working examples used in the programme.*

Keywords: *Agroecology, Education, Action Research, Action Learning*

Introduction

In what ways can we educate students to become effective agents of change in the dynamic context of current global problems in agriculture and food systems? This question has been the point of departure for our work during the past 15 years to establish and develop higher education in agroecology. The first step in dealing with this challenge is to clarify the global problems surrounding farming and food. Current challenges were summarized well by Jules Pretty (2002): "Something is wrong with our agricultural and food systems. Despite great progress for increasing productivity during the last century, hundreds of millions of people remain hungry and malnourished. Further hundreds of millions eat too much, or the wrong sorts of food, and it is making them ill. The health of the environment suffers too, as degradation seems to accompany many of the agricultural systems we have evolved in recent years". The specific challenges in agriculture and the wider food system also call for transdisciplinary approaches to solve the complex problems we face today and in the immediate future (Francis et al., 2008).

Another aspect of our core educational question yields a number of consequences that are not directly compatible with the ways academic institutions operate today. In most universities the knowledge development has been split up in small disciplinary pieces. Academic institutions are not paying much attention to the link between research and teaching nor to the link between theory and practical situation improvement in society. At universities students are sent on a roaming journey of choosing and taking courses within different disciplines and sub-disciplines. Often these courses have few or no direct linkages to each other or to society. Such a structure does not contribute to broad goals for which students are educated. They are given very little support in terms of training and development for the complex reality where they will operate as professionals.

One might argue that agricultural universities, with their pragmatic roots (Bawden 1991), were initially built on an action-oriented profile. Although perhaps true in a historical perspective, during the recent decades these universities have embraced the process of “academisation” and turned towards the Humbolt ethos of giving priority to research and education that is disconnected from practise. Levin (2008) proposes that an action-oriented approach in higher education represents an important base for students to engage in change activities in their professional careers. Without such an academic experience, they will find it hard to engage in change-oriented activities later in life. This view is supported by Pfeffer et al. (2001) who found that the knowledge actually leading to action will much more likely come from knowledge gained in being involved in action-oriented activities than knowledge developed through reading or listening to lectures.

If disconnect from practice represents a major challenge for the modern university, the “compartementalisation of knowledge” in disciplines presents a further problem of vital importance for education in agroecology. For example, the conversion from conventional to organic farming represents a shift from a specialised, reductionist approach to a holistic approach where co-existence of people and nature are the centre of attention. A close coordination and transformation of research and education in universities is necessary to support this major change process in agriculture. This conversion calls for an education of professionals who not only have knowledge of farming and food systems, but also the abilities to engage in change processes in agriculture. Our present agricultural universities have only to a small extent engaged themselves in appropriate education for stimulating the process of change

In its most basic meaning, an education that is action-oriented has made a shift from theory towards action as the starting point for the learning process. In action-oriented education we bring the students in contact with people ‘out there’ that want change. Students then experience the real complexity of such local situations and become aware of the range of knowledge, skills and attitudes needed to deal with these situations. Within the domain of action-oriented education, both action learning and action research can take place. They both include action, an ability to act to deal with complex issues, and they demand that this activity lead to a comprehensive understanding through a reflection process of those complex issues. The boundary between action learning and action research is fluid, since they both contain action and reflection. The step from mere learning to research implies that more emphasis is placed on methodological rigor and on publishing of the work, in order to enable participation in a wider discourse on the topics dealt with. As such, action oriented education challenges the classical division between action and research and between research and education. Action research “seeks to bring together action and reflection, theory and practice, in participation with others, in the pursuit of practical solutions to issues of pressing concern to people, and more generally the flourishing of individual persons and their communities” (Reason and Bradbury, 2006). It is important to note that action research is not applied research, since action research “explicitly rejects the separation between thought and action that underlies the pure/applied distinction” (Greenwood and Levin, 2007). The sequences of learning in both action research and action learning will have the character of experiential learning (Kolb, 1984), where knowledge is created through transformation of experiences gained in the flux between theory and action.

The analyses and recommendations in this presentation draw on our experiences of developing and running an action-oriented MSc programme in agroecology in Norway. During the autumn semesters since 2000, we have facilitated weekly or bi-weekly reflection sessions with our students to bring out their learning about both the agroecosystem and the process of learning. In addition we have facilitated a two to three hour session at the end of the semester for an overall sum-up of experiences. This included asking what did the students like or benefit from, what did they dislike and their suggestions for improvement. The feedback from the students has provided an important source of information for our own reflections about action-oriented education, and we have strengthened the reflection practice through publication of a dozen journal articles and several book chapters that summarized the experiences (e.g., Francis et al., 2003, 2008, 2009; Lieblein et al., 1999, 2000a, 2007; Østergaard et al., 2010). In this presentation we first describe our experiences in

developing a programme over the past 15 years, and then discuss the agroecology programme in terms of an action learning–researching process and how this process is linked to the development of key agroecological skills, those that will be essential for an agent of change.

Developing action-oriented education in agroecology

PhD-courses in agroecology and organic agriculture (1993-1999)

In 1993 a group of Nordic researchers and educators started planning a series of PhD courses in organic farming and agroecology. The main emphasis of these courses was on how to develop research methodologies that are compatible with the holistic ethos of organic farming. The first course was held in 1995 on an organic farm in Norway. From the start, the responsible teachers and scientists were geared to actively use relevant cases in the learning process in order to enable interdisciplinary and relevant discussions around the research methods that were presented. During the first year, the course curriculum was built on a set of agricultural case narratives. Visits to farms in the surrounding landscape were included, but they served more as a way of contextualising the class-room work than to be at the centre of the educational activities. This learning process was summarised by Lieblein et al. (1999).

In the second course in 1996, a fundamental shift was made in the sense that farms were used as the basis for the learning process, not as examples of theoretical positions. Students started in the field with practical experience on farms, meeting with farmers and touring the landscape. Their task was, in an open and non-judgemental way, to explore their assigned farm in as rich a detail as possible. Based on the development of such rich pictures of the farms, students were asked to identify key issues for change and improvement. Their exploration and recommendations were presented in a plenary that was attended by the involved farmers. Such an action-oriented approach was then used as the basis for theoretical discussions about key concepts and methodologies of relevance for agroecology and organic farming.

The third course in 1997 further expanded the scope of attention from the farm to the local community and food system with student teams beginning on the farm but including local processors and distributors among their visits and interviews. The same process of establishing a rich picture this time included key players, activities, and interactions in the local food system. The teams asked questions that helped them articulate the goals and philosophies of the farmers. These questions involved the additional focus on the farm as part of the surrounding food system. A pivotal evaluation and planning session was held in Stange, Norway in 1999 to bring together instructors with prior participants in the PhD courses, and to set in motion the plans for a practical, experiential learning activity for an MSc degree programme in Agroecology (Lieblein et al., 2000).

MSc programme in agroecology (1999-2009)

To benefit a wider audience of students in the Nordic Region and elsewhere, we then developed a prototype one-semester course in Agroecology that was tested in the spring semester 1999 with four students. From this learning experience in which teachers and students were co-learning, we moved towards designing of a semester-long learning activity with two courses: PAE 302 *Agroecology and Farming Systems* and PAE 303 *Agroecology and Food Systems* which were launched in autumn 2000. Developing an MSc programme in Agroecology centred on these two introductory courses in a core agroecology semester that built on action research and experiential learning. The PAE 302 curriculum focused on project work to assist a farmer with the difficulties associated with converting to organic production, while in PAE 303, students performed a county-wide food system analysis with stakeholders at all points of the value chain. This included producers, processors, distributors, retailers, associations and government agencies. Based on in-depth conversations with students about their experiences from the courses as well as the responsible teachers' own observations and reflections, the courses were continuously developed after the start in 2000. For examples early on we observed that the students tended to become so absorbed by their casework that they gave low

priority to reading theory. Consequently, we established a series of literature seminars in 2006, where the students in groups were given responsibility for presenting selected literature for discussion in the class. In 2007 we linked these seminars to the web platform of the course so that each student was asked to publish, prior to the presentation, a two-page comment on the literature to be presented and then to comment on the comments of at least two other students.

In 2008, the PAE 303 course was adapted to work with a new initiative by the Norwegian government called “Økoløft”, or “Eco-uplift”, which aims to raise awareness, production and consumption of organic food. The initiative was designed by two Norwegian ministries to enable the government to reach the goal of 15% organic production and consumption by 2020. The “Økoløft” is accomplished through a support structure where equally matched national and municipal government funds are allocated to municipalities to support food initiatives that increase the public use of organic food. By incorporating the “Økoløft” project into the food systems curriculum, students gain an even closer relationship to the stakeholders involved in the local food system, greater support and funding from the municipality, clearer boundaries and goals for the project work, and the opportunity to catalyse real and lasting improvements in the community.

In 2009, the two courses were combined so that students performed a farming system analysis on a farm in the same municipality as their “Økoløft” casework was located. This change gave multiple benefits, including enabling the students to learn more about the production component of the food system in which they were working, giving them more time in the field to observe and learn about the farming and food systems, and providing the necessary time and resources to lead a visionary workshop in their community. Whereas in the past the students had held meetings with a key informant in the food system to provide feedback on their project reports, combining the two courses allowed a more participatory stage for developing visions and action steps, which improved the applicability of the final reports while supporting the action-oriented aims of the course.

Full-semester agroecology course in 2009

The class in agroecology runs over 16 weeks in the autumn semester at UMB as a full-time course. Twenty-one students with a wide range of backgrounds from their Bachelor studies from 11 different countries participated in the course in 2009. The first two-week phase of the course aimed at preparing the students for the shift from a passive, theoretical and discipline-based education to an active, phenomenon-based learning process. The first day of the course was devoted to a transect walk exercise. The purpose of this exercise is to highlight the value of one’s own observations for learning, and further to allow the students to practise the skills of observation and separating observations and judgement. The experiences of the transect walk were conceptualised and viewed in relation to the course as a whole in a subsequent reflection session. During the first week, there was also a session on the students’ experiences and competencies, to recognise the value of what each student can bring into the learning community. Finally, during the first week there was a whole-day session Diversity Icebreaker® session, which included a psychological test of personality and preferences for communication and thinking styles (Ekelund et al., 2009). The main purpose of this exercise is to allow the students to explore human diversity, and to affirm each individual with special reference to how this applies to the team work that plays a central role in the course. During the second week, the students stayed on an organic farm. As teams they conducted a multi-perspective exploration of a farming system, based on farm visits. As a new activity in 2009, the students also spent one full day working on the farm. The main purpose of this new activity was to broaden the range of participation in relation to the explored farming system and to engage all senses in the activity.

During the next 14 weeks of the course, the students’ learning was based on participation in the nation-wide “Økoløft” project. The task they were given did not contain a concrete problem formulation nor was it a search for fixed answers. The assignment was in a sense simple: explore the present and future wanted situations of the assigned municipality in relation to public use of organic food, and develop a plan for how the situation as a whole can be improved. Following initial

preparation on campus, including lectures and seminars on key concepts and suggested methods for dealing with the task, groups of 5–6 students went for one full week to explore the present situation in its full richness in four municipalities, *Kvam*, *Stavanger*, *Tolga* and *Sauherad*, located in different parts of southern Norway. This was done through contact with the local "Økoløft" project leader and additional interviews with a range of stakeholders. The teacher group split up to visit all groups on location during this week. Upon returning to campus, the students summarised their findings, which were presented to the class and teachers for feedback. Copies of the presentations were also sent to the key clients for their suggestions

The teachers then led workshops on Soft Systems Methodology (Checkland and Poulter 2006), to improve student skills in dealing with complex situations, and on visionary thinking (Parker 1991; Vidal 2004), to explicitly introduce the importance of creativity.

Based on these activities, the groups designed their plans for the second visit to the case locations. Aims of this visit were to move from exploring the present situation to the desired future situation and the action needed to move towards that goal. For the second visit, the students were given the additional specific task of planning and facilitating a meeting with local stakeholders. After a four-week stay on campus, the student teams returned to the municipality to present their findings in workshops tailored to their casework. The teams incorporated the results and feedback from these visits into finalised proposals for action that stakeholders and key clients could carry out to improve the local and organic foodsheds that they visited.

Each "Økoløft" municipality presented students with the common purpose of increasing organic and regional food in public institutions such as kindergartens, schools, nursing homes, hospitals and municipal cafeterias. The specific organisations targeted in each local project depended on which were important in the municipality, and often were affected by the interests of those running each institution. At the same time, the localities also had goals specific to the area. These created a different starting point for each group's work. For example, *Kvam's* goals included increasing positive attitudes toward environmentally friendly foods and doubling the amount of organic production in the municipality to equal 5% of total food production. In *Stavanger*, the emphasis was on fostering organic milk, sheep and tomato production because these are key local agricultural goods, and on boosting the quantity of organic food in municipal cafeterias, schools and nursing homes. In *Tolga*, important Økoløft aims were to bring organic milk, fruit and vegetables to schools, increase organic food in grocery stores to 10%, develop a common marketing strategy for promoting organic food, and set up a field to demonstrate the production of organic vegetables. In addition to increasing the supply of organic fruit and milk to schools, *Sauherad's* project objectives included the ambition to stimulate local businesses, enhance the community's reputation as a pleasant place to live and increase organic fruit production because apples are prevalent in the region.

Based on their experiences and analyses, student groups developed unique workshop agendas that they presented to interested project participants. In *Stavanger*, for example, the main key client requested that the students hold a small meeting with the project leaders to share their findings and suggestions. In *Tolga*, on the other hand, due to the personality and influence of the key client, a full visionary seminar format was chosen and a large turnout was assembled. In *Kvam*, the project leader was, based on knowledge about the local culture, hesitant to employ some of the visionary thinking techniques that the students had used in class. So the team adapted their seminar to combine their ideas with those of the key client. In the case of *Sauherad*, the group identified lack of communication as a central problem for the project. Consequently, they chose to use the workshop format as an opportunity to stimulate an exchange of ideas by leading the group through a series of strategic questions designed to empower those involved by releasing hindrances to change while generating answers and energy to begin to tackle the problems.

After returning to campus, the students summarised their experiences and findings, and gave oral presentations to the whole class and teachers for feedback. They also maintained communication with the local project leader in the process of writing their final documents.

The Økoløft cases challenged the agroecology students to use participatory methods and multiple perspectives that encompassed social, economic, agronomic, ecological and political issues. The cases also revealed specific project goals, attitudes and resources that led to unique student-led workshops and suggested action steps for each locality, a socio-ecological specificity that emerged from the process.

Ultimately, all four groups created client reports with strategies to reach the goals of the Økoløft project based on their understanding of the community and feedback by stakeholders.

Throughout the course, the teaching staff, consisting of three professors and one teaching assistant, facilitated weekly reflection sessions enabling in-depth conversations around students' experiences and facilitated an enhanced communication between teachers and students. In recognising the importance of the theoretical domain, every second week the students were given the task of presenting core agroecology literature for plenary discussion in the class. A range of outside and internal presenters were also invited to give presentations on topics of relevance to the casework of the students, such as qualitative research methods including interview techniques, systems thinking, action research, facilitation, agronomic and environmental topics, consumer issues, human nutrition and food systems.

Through the whole process, the students developed a strong collective spirit, experimented with creative ways for presentations, and took initiative to organise a seminar series ("brown bag lunch seminar"), where different students and teachers presented topics in which they had interest and competency.

Learning and research outcomes of developing action-oriented education

In the previous section, we described our journey of developing a pedagogy relevant for agroecology. Central in that journey was the realisation of letting situations 'out there' be the starting point for learning, and the goal of developing knowledge *for improving those situations*. The knowledge dimension of such an approach is further emphasised in the credo of Kurt Lewin (1948): "If you want to truly understand something, try to change it".

Based on this conceptual foundation, our continuous process of improving agroecological education has in itself been an action learning process for the faculty. We conceive action learning as "learning from action or concrete experience, as well as taking action as a result of this learning" (Zuber-Skerrit, 2001). This time it is not the action 'out there' that is in focus, but our own actions as teachers and researchers. We have during the past years moved this action-learning process of developing knowledge for improved educational practice in a direction more susceptible to careful scrutiny, and thus turned it into action *research*. As in the action research tradition, there is a double aim; practical action for improvement and acquisition of theoretical knowledge to be communicated through publications in scientific journals. The innovations that have been introduced through the first nine years of the courses have compelled us to prepare several conceptual articles about learning theory (Lieblein et al. 2004; Lieblein et al., 2007), methods of practical education for responsible action in the field (Lieblein and Francis, 2007), and reorganisation of the agricultural universities to accommodate the implementation of education that involves close interaction of farmers and communities (Lieblein et al., 2000b).

The dual learning ladder as a conceptual model of action-oriented learning

In the project work, the agroecology students enter the case – an "Økoløft" municipality – at step three, not step one, on the learning ladder presented in Figure. 1. They explore the current situation through their own observations and contact with stakeholders in the municipality. If the students lack information at this stage they can step down *the external learning ladder* to search for existing theoretical knowledge. Stepping down the learning ladder to acquire facts, principles and theories

becomes an open-ended activity. Instead of the teachers providing a fixed or closed set of readings, their task is to facilitate the students’ search for relevant theory and information. Based on the exploration of the present situation, the students can then move up the learning ladder to the creative step of envisioning desired futures in order to provide direction for action. Whereas the lower levels of the learning ladder are de-contextualised and largely value free, the importance of values and ethics increases as the students move upwards. Parallel to the students moving on the external ladder, they also step up and down on an internal ladder. Their exploration in the *outer world* of the municipal cases becomes coupled with an exploration of their individual *inner worlds*. We are still searching for meaningful ways to evaluate learning in these inner worlds, but there are clues that emerge in the individual learner documents prepared and submitted by each student. We also learn about this process through our personal interactions with students in class, in the field, while working with clients in their project communities, and in social situations. We have yet to publish these observations.

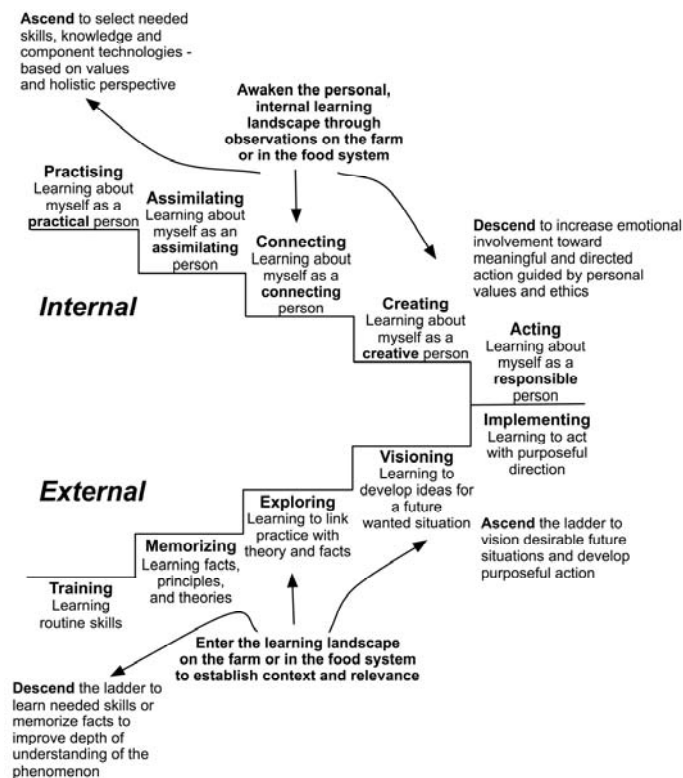


Figure 1. The dual learning ladder (adapted from Lieblein et al., 2007).

The Organic Edunet project

The availability of knowledge repositories and search engines within the Organic Edunet project (<http://www.organic-edunet.eu/>) can facilitate the students’ and teachers’ open-ended search for relevant information. Organic.Edunet is a ContentPlus EU-project which aims to collect digital learning resources in several learning repositories, describe them with a set of metadata and make them available through a multi-lingual web portal with a number of search mechanisms.

To collect, store and describe the learning resources with metadata, a web based tool called Confolio has been developed. This tool allows a network to internally share learning resources, comment and re-use them in an efficient and easy way. The tool makes it possible to rearrange the learning resources (or copies of them) in different folders and give specific students and teachers access to the folders. Thus, digital learning resources may be collected for different courses, topics or training situations. The metadata fields can be adjusted to fit the specific context. These resources in a repository will, over years, become a valuable international source for information, not only through gaining knowledge from the existing content, but also to see development over years, including changes through interactive feedback and re-use.

Students bridging university and municipality in action-oriented learning

One of the main challenges in developing action-oriented education at universities is that the students have to become “citizens of two worlds” in their learning process, the theoretical world of the university and the practical world of the municipality (Fig. 2). The university is divided into departments by discipline, a reductionist approach widely used to help academics to understand the mechanisms of system function and provide a framework for setting up courses and budgets, and to support academic commodity production. In contrast, the world “out there” is complex, uncertain and dynamic, and is embedded in both a societal as well as a natural context. Coming from traditional higher education activities, the students are not used to both being able to interact with concrete situations in the outer world and to integrate that learning with deep, theoretical reflections in their inner world. According to Levin (2007), the task is to nurture action capability and in parallel to facilitate reflective capacity of the students.

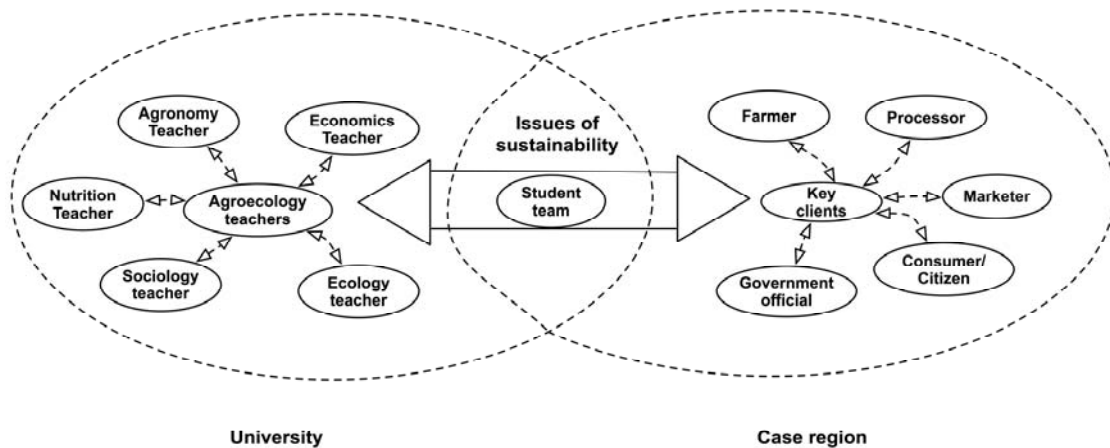


Figure 2. Students bridging academia and municipality, developing the skills of operating effectively in both contexts (adapted from Østergaard et al., 2010).

Students' views

Overall the feedback from the students has been very positive. The average evaluation scores for the courses in all years have been higher than the university average, which we consider quite favourable given the class size (around 20 students) and diversity of the students country and discipline background. The two main challenges involved in action-oriented education appear to relate to paradigmatic and interpersonal issues. Working in teams represents a cornerstone in action research and action learning in agroecology, but team work is difficult, especially in highly heterogeneous classes. This diversity can sometimes undermine the whole learning process. Although we as teachers are highly aware of both potentials and problems of team work, and try to facilitate good team relations, we still see bad team dynamics occur every year. The paradigmatic challenge is related to the academic background of the students. Everyday experiences, our own immediate observations of the world, have been trivialised in formal learning environments, or “set aside as belonging to the ‘not real’” (Dahlin, 2003). What has been presented as ‘the real’, and therefore science based, are “the abstract representations and mathematic formulas” (Dahlin, 2003). In the agroecology courses we reverse this “ontological reversal” (Dahlin, 2003) in basing the learning process on daily-life experiences as the primary source of learning. This comes as a shock to many students, who have been taught that climbing the academic ladder is a climb away from these experiences towards the abstract representations. They therefore feel that starting our MSc programme is an academic step-down, making them feel uncomfortable.

The challenge for the teachers is to provide enough epistemological information to enable the students to understand that the action-oriented road is an academically walkable one. This frustration often exists among many students during the first 4–5 weeks of the course and, interestingly enough we every year see the process of students grasping the importance of an action orientation. “What I found most frustrating in the beginning of the semester, was what I appreciated

the most in the end. This was the freedom and own responsibility in group work, the holistic approach and different perspectives and the reflection on our own learning and the group work” (Swedish student, 2004),

The main challenge for the students in terms of learning about the agroecosystem frequently has to do with how to orient oneself in the different hierarchical levels of the system: “Often it was hard to know when it was necessary to go into details and when it was more beneficial to work on a higher level in the agroecosystem” (Norwegian student, 2001).

Logistics

Every year we are faced with a range of logistical issues needed to be conducted the course, and the more we aim to immerse the students in the world ‘out there’, the more challenging these issues become. The network of stakeholders must be maintained and further developed, travel plans must be made, and funding for the travel must be found. In addition, a high level of flexibility is required, since the agendas of the stakeholders, for good reasons, often change on short notice.

Teacher competencies

The shift from a theory to an action orientation in agroecology education represents a challenge not only to students but also to teachers, who themselves are educated in conventional academic environments. The teachers must master solid agroecological knowledge but in addition a substantial pedagogical competency, including ability and willingness to improvise. We as teachers have had to give away the traditional university professor’s control of, and step down towards the students. Although this initially appeared to be “stepping down”, and it is still perceived that way by some of our colleagues, in fact we see the process more as bridging an important and unnecessary gap between faculty and students. In doing so, we open up for more explicit feedback from the students, and we have therefore coined this educational approach a ‘pedagogy with no mercy’.

Action learning and action research to revitalise agricultural universities and agricultural education

The vital challenge of developing action-oriented education is connected to the students having to move back and forth between two worlds: the reflective world of academia and the action-oriented world of society. This implies developing the ability to move between *the specific* – every case is unique – and the general (the theory), and to link the two. The challenges, both at the institutional level and for the individual student, of establishing this move as a credible way of learning agroecology is linked to the distinct analytical perspectives of traditional research and education. In the action-oriented world of society, the students are confronted with everyday experiences that they are asked to use as a resource in their learning process. For most of them this is very challenging at first, because they have been subject to the trivialisation of everyday experiences during their previous education. During the first weeks of our course many of them, therefore, have the impression that they “learn nothing”.

Let us return to our initial questions: in what ways can we educate students to become effective agents of change in the face of the current global problems in agriculture and food systems?

Our main response to this question is to move the educational activities “out” into society. As professionals, our students will later face unique and complex situations out there, and we see it as our main task to prepare them for dealing with such situations, by moving from theory to concrete situations. There is, with reference to Aristotle in the *Nicomachean Ethics* (Bostock 2000), a shift from theoretical knowledge (theology, natural sciences and mathematics) to practical knowledge (called *Praxis* by Aristotle). The practical knowledge is what is needed to deal with unique cases, and it is different from theoretical knowledge.

Our task as educators is to establish a “mid-field” where the stakeholders outside of university can meet with students and agroecology teachers (Fig. 3). In this mid-field, they can learn from each other as they collaborate on improving unique and complex situations, such as what is done in the “Økoløft” project. During this activity, the students have the opportunity to develop what we see as *key agroecological skills*: deep reflection, rich observation, creativity and moral imagination, responsible participation and action, and dialogue-based communication. If, during their formal education, students do not get the possibility of training these skills, including their interrelationships, they are hard to get at later.

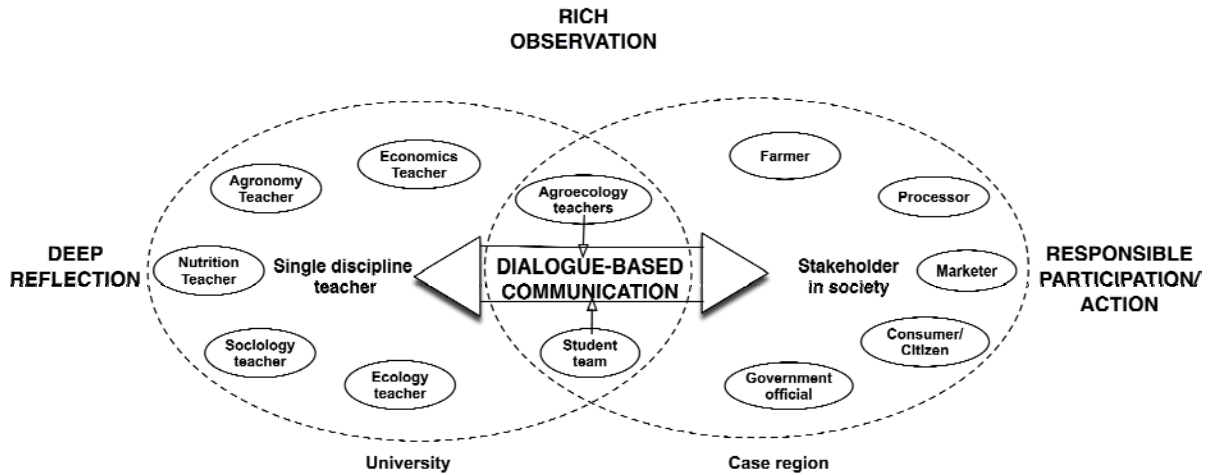


Figure 3. Students learning agroecological skills through action-research.

Deep reflection is the skill of consciously connecting theoretical aspects in agroecology and personal growth and learning to the improvement of situations which the students meet in the case regions. *Rich observation* is the skill of carefully examining situations with which the students are confronted. This has the intention of an unbiased examination. Further, and parallel to the “outer” observation, the “inner” observation has the students’ own learning process in focus. *Creativity (visioning)* is the skill of transcending the mere repetition of actions to be taken in the field work. The skill of creativity implies articulating *new* and *innovative* ways of approaching problems and challenges experienced by the stakeholders. The “results” of these “creations” might be presented in the clients’ document. *Responsible participation and action* is the skill of participating in the field work, not as a distant researcher, but rather with personal commitment and dedication, and in fact an immersion together with the stakeholders in the context of the community. *Dialogue-based communication* is the skill of performing a two-way communication. The dialogue takes place between students and people in the field, between students and teachers, and among the students themselves.

These skills must be trained during the course period – not separately, but always connected to the actual situations – in class or in the field. They can, however, separately be analysed and discussed by, for example, reflection on the question: “How can we strengthen ourselves as responsible participants in this case work?”

It is of further importance that we have established a flexible but rigorous protocol for the students’ case-work in the regions. With the additional requirement of presenting their results, including their own reflections and links between theory and practice, they are in fact doing action research on open-ended cases (Francis et al. 2009) as part of their agroecology education. As such, the researching activity is integrated in the educational activity. The learning encompasses both the results of the research (present situation, issues and suggested improvements) and the process of researching (methodology, tools and their application). As teachers, we are doing both first- and second-order action research, to be able to support the students in their learning process: we

participate and reflect jointly with the students as part of their project work, and in parallel we explore and reflect on our own practice as educators with the aim of improving that practice.

Within the area of organic agriculture we see transition processes in today's society that call for a parallel conversion of research and education at agricultural universities. However, such an imperative is also coming from other sectors, e.g. the transition from fossil to renewable energy. We see little of conversion happening in academia, and few signs of a spread of our ideas. We hold the lack of change to be a consequence partly of the scientific ethos that dominates our institutions ("rigorous research is made by the distant observer") and partly of the way our universities are presently organised. What we can do here is to provide an example of an attempt to create change at small scale.

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