Research - Teaching Integration in Agroecology and Organic Farming[1]

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Abstract

Integration of research and teaching enhances the success of students in both areas, and contributes to preparation of graduates who are capable of handling the complexity of location-specific challenges in farming and food systems. A European Network of Organic Agriculture Teachers (ENOAT) convened a workshop in Italy in 2007 to explore the current state of integration and potentials for further developing this learning strategy in universities. We concluded that integration brings motivation to students and greater relevance to their learning environment, both key issues in providing success in the learning landscape

Introduction

Research results and practical experiences in agriculture and food systems provide the information we use in teaching courses, through journal articles, textbooks, farmer bulletins, and other types of learning materials. Research informs teaching. In addition, our teaching of research-derived knowledge and skills in principles of biological systems, ecosystem structure and function, experimental design and other technical areas influence future research, as these ideas are incorporated by our students. Teaching informs research. There is growing concern among our professionals that these two activities are too often disconnected. Teaching and research are often seen as distinct activities, with different goals, time frames, budgets, and specialists in the university. A workshop of the ENOAT in August, 2007 explored the importance of integrating research and teaching with the goal of improving both functions of the university. In this paper we relate the results of the workshop to future education in organic farming, and draw primarily from the proceedings edited by Caporali et al. (2007).

Methods

Linkages between research and teaching have been studied extensively, especially in education. Barnett (2005) describes the challenges of new linkages between research and teaching in established universities, while Brew (2006) explores how to bridge the research-teaching gap. Integration is more than making faculty assignments to these two activities. Success requires examination of how the university is organized, and even goes beyond our concerns about learning to address wider issues such as how economic and political pressures impact design of education (Brew, 2006). She expands on a future vision of institutions where academics and students work in collaboration to better understand the world, and to “develop the strategies,

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techniques, tools, knowledge and experience needed to solve complex, important, and yet unforeseen problems." In contrast to Brew's enthusiasm, Jenkins et al. (2003) conclude that most research evidence does not find a positive correlation between success in research and teaching, but there is potential value if integration is carefully built into courses and curricula. Integration of teaching and research depends on how we define them. Current university organization favors two different, unlinked activities, with separate budgets, faculty assignments, and facilities that do not foster integration (Barnett, 2005).

Current consensus is that *agroecology* describes an academic field of systems study, while *organic farming* is the application and integration of science with practical farmer experience to design productive systems in the field and meet certification criteria. We have published three models of organization of the agricultural university, contrasting current rigid departments and disciplines with two futuristic plans that lead to a near-total integration of research and teaching under the umbrella of education (Lieblein et al., 2000). These could serve as models for teaching organic farming and agroecology, with the latter defined as the ecology of food systems. The ENOAT workshop focused on finding relevant connections between research and teaching, and on how a well-designed university program could enhance both objectives.

Results

Integration of research and teaching is especially important for the education in organic farming and agroecology because of the complexity of questions and many interactions integral to farming and food system. Understanding systems requires a transdisciplinary strategy for education that involves experiential learning. We have found it essential to tie learning to real world challenges and clients. This links research in the field with learning activities in the classroom. The ENOAT workshop revealed a wide range of opinions on what constitutes research, what characterizes teaching, and what could be gained by better integration.

Table 1. Essence of Research as Defined by ENOAT Workshop Participants, 2007.

What is research?	o Activity performed in research centers to find new knowledge o Recombining old knowledge, constructing new connections o Solving practical problems, especially unsolved questions o Organizing experience and knowledge in new contexts o Paid or contract activity with obligations and requirements
What process is used in research?	o Includes individual and group learning o Discovery, experimentation, observation, analysis, synthesis o Working closely with clients is essential to success in systems
What characterizes research?	o Interest, curiosity, creativity o Objectivity and honesty in process and reporting results o Transdisciplinarity and systems focus

Research was viewed as a process of discovery, including combining prior knowledge and experience with new information often found in a new context (Table 1). Some viewed research as defining program priorities and setting in motion a process to solve practical problems. Steps include defining questions clearly, setting up accepted procedures to answer the questions, collecting data, analysis and interpretations, and reporting results. The job is not finished without publication or other dissemination of results. The term *multidisciplinary* was replaced in

discussions and the proceedings by *transdisciplinary*, preferred because the latter refers to a "transcending" of disciplines rather than a collection of people with multiple talents.

Teaching is a prime activity of the ENOAT workshop participants, and we asked what each person considered the essence of teaching. Groups of four discussed their responses and found three key characteristics to report. Responses gathered in a group plenary session are shown in Table 2. As conceptualized and practiced by this group of teachers of organic agriculture, teaching includes transmission of knowledge and interpretation in current and new contexts. The process of learning is complex, and we strive to promote both individual and group learning. One challenge is to stimulate curiosity, guide people through an examination of their own attitudes and preconceived ideas, and build motivation for action. Although there is great importance in building skills and knowledge, teaching should reach beyond these lower order issues to seek applications of what is learned and how this experience will interface with the real world and prepare graduates for the uncertainty and complexity they will face in the workplace and society.

Table 2. Essence of Teaching as Defined by ENOAT Workshop Participants, 2007.

What is teaching?	o Sharing, moving, and interpreting knowledge clearly to others o Catalyzing, promoting, and facilitating learning o Disseminating knowledge that can be applied in new contexts
What process is used in teaching?	o Promote individual and group learning o Stimulate curiosity, challenging attitudes, building motivation o Creating new capabilities and stimulating critical thinking skills
What characterizes teaching?	o Focus on skills, facts, theories and principles, and how to apply o Build communication skills, experiences and teamwork o More than merely a cognitive activity, but leads to application

Integration of research and teaching was explored in another workshop session. Participants were asked to envision a future learning landscape with close integration of research and teaching, and to describe what they would see in this landscape. Their ideas are summarized in Table 3. Some of the motivations for learning and aspects of application should be integral to any teaching situation. We found that greater motivation will result from students being a part of generating new information through research. Application of information to practical challenges is valuable.

Table 3. Vision of learning environment with integration of research and teaching, defined by ENOAT Workshop Participants, 2007.

Motivation of students and instructors?	o Teachers better prepared, and students more involved o Students are part of knowledge process, serve the community o Students feel teacher's conviction and passions for the topics
Relevance of materials in courses?	o High level of relevance to current topics and applications o Direct participation in research, higher awareness of needed results o Current context compared with past experiences, future situations
Focus of learning in the learning landscape?	o Literature and experience are connected in real world situations o Focus on practical issues, students more curious when involved o Learning process focused on interactions, large systems, context

Lastly, we focused on putting theory into action, and asked workshop participants what students would be better able to do as a result of research-teaching integration. As shown in Table 4, the instructors predicted that students would acquire new knowledge about the research

process, better understand themselves and their capabilities, and be ready to deal with complexity. They will also be more in tune with the research process, and will be prepared to deal with whole systems with tools and methods that sort out complexity. We see students as more prepared for action and applications with clients and real problems, as compared to dealing with lower order questions where most of the answers are already known.

Table 4. What are students better able to do after graduation as a result of research-teaching integration, defined by ENOAT Workshop Participants, 2007.

What knowledge will be acquired?	o Know how to do research, and how to communicate results o Know and understand one's own limitations and strengths o Understand reality, learn to be flexible, deal with complexity
What will they understand about learning process?	o Know where to look, how to analyze, interpret, conclude from data o Use transdisciplinary and whole-systems thinking o Know how to ask relevant questions, process the answers
What will they learn about action and applications?	o Become open and ready to explore opportunities for practice o Gain ability to moderate among people with diverse views o Gain a broader perspective about potential career choices

Conclusions

We conclude from this workshop that integrating research and teaching at the university level in courses on organic farming and agroecology can bring greater motivation to both students and teachers, and that there is a higher probability of finding answers to society's questions. As compared to a more static and known learning environment, students will be encouraged to explore the unknown, applying their new knowledge and experience to real world situations where the answers may not be known. Dealing with complexity, uncertainty, and change will be important for our graduates, and how we design the learning landscape to best help them cope with that exciting future is the largest challenge facing us as educators. We think that integrating research with teaching will help in the process of both education and research. What they share is the process of learning.

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