Approaching initiatives stimulating sustainable farming as characteristics of learning practices

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Abstract: Sustainable development can be described as 'wicked problem' without fixed end goals or templates to achieve it. Suggestions to start challenging our existing practice resulted in a number of initiatives stimulating farmers to increase the sustainability of their farming practices. These initiatives are very diverse with respect to the actors involved, the tools used, the setting in which it takes place, etc. The contestable, normatively and revolutionary concept of sustainability calls for learning as an essential element of projects and practices seeking contribution to a sustainable development. Insights on how and if these initiatives influence the sustainable development of farming practices are lacking. Therefore we try to find out the kind of learning necessary to achieve a sustainable development of farming practices through literature on Education for Sustainable Development (ESD) and educational practices. Based on a framework of Lankester, we ordered a non-limitative list of characteristics of educational processes mentioned in literature in categories 'who learns', 'why is learned', 'how is learned', 'what is learned'. These characteristics will be used to analyze four cases where farmers are stimulated to increase the sustainability of their farm. Two of these initiatives are located in The Netherlands (Veldleeuwerik' and 'Koeien en kansen') and two are located in Belgium ('Beloftevol Boeren' and 'Boerenbond duurzaamheidstraject'). Based on this analysis, we derive recommendations on how the educational dynamic within these practices can be further stimulated and farmers learn to deal with sustainability as a wicked problem.

Keywords: sustainable farming practices, learning practices, learning dynamics, literature review

Introduction

After decades of discussion, 'sustainable development' seems to be a contestable concept that is open to multiple interpretations (Loeber et al., 2007). Considering the characteristics mentioned by Rittel and Webber (1973) 'sustainable development' can be described as a 'wicked problem' (Dentoni et al., 2012), because: (1) there is no agreement on the problem definition because of multiple views and understandings of the problem; (2) it has uncertain outcomes and no clear end point (Rittel and Webber, 1973; Conklin, 2006; Australian Public Service Commission, 2007; Dentoni et al., 2012); (3) it has many interdependencies and causes and is socially complex; (4) solutions are neither true nor false, but are rather the result of a particular way of articulating the problem. According to Tilbury (2007) sustainability is about transforming current systems instead of just linking society, environment and economic systems, accommodating dimensions into current work or finding common ground between related programs. Based on these interpretations,

sustainability can be described as a contestable, normatively (i.e. offering desirable directions for action) and revolutionary concept (Loeber et al., 2007).

This normatively and revolutionary interpretation of sustainability calls for learning as an essential element of projects and practices seeking to contribute to a sustainable development (Loeber et al., 2007). Loeber et al. (2007) consider learning as a way to ensure that any particular elaboration of what is sustainable, is meaningful and practical to whom it concerns. It offers an answer to the contestable, normatively and revolutionary concept by respectively, facilitating determination of sustainability in a given context, inducing processes of value judgment and supporting system innovation through reflection on theories, beliefs and assumptions underlying action (Loeber et al., 2007). Although the word 'sustainability' is widely adopted in titles of programs, project activities, departments or units, only few tackle such new learning approaches (Tilbury, 2007).

In this paper we try to elucidate the kind of learning necessary to achieve a sustainable development of farming practices. First, we perform literature research in both the fields of Education for Sustainable Development (ESD) and farmers' learning related to the increase of sustainability. Based on this literature we present a framework to analyze four specific initiatives aiming to increase sustainability of farmers' practices. Two of these cases are situated in the Netherlands 'Foundation Skylark'('Stichting Veldleeuwerik') and 'Cows and Opportunities' ('Koeien en Kansen') and two in Flanders (Belgium) 'Promising farming' ('Beloftevol boeren') and 'Farmers' union sustainability trajectory' (Boerenbond duurzaamheidstraject).

Roberts (2000) identifies three possible strategies to tackle wicked problems: (i) authoritative strategies, in which a few stakeholders have the authority to handle the problem solving process, while other agree to abide its decisions; (ii) competitive strategies, in which a win-lose mind-set rules interactions and the search for power is the main pursuit; (iii) collaborative strategies, in which a win-win view of problem solving is central and the power is dispersed amongst many stakeholders. With many other authors we will advocate for collaborative strategies to tackle wicked problems which require learning as part of their solution (Australian Public Service Commission, 2007).

Education for sustainable development (ESD) and the emergence of alternative forms of education

The United Nations defines education for sustainable development (ESD) as a practice that: "develops and strengthens the capacity of individuals, groups, communities, organizations and countries to make judgments and choices in favor of sustainable development. It can promote a shift in people's mindsets and in so doing enable them to make our world safer, healthier and more prosperous, thereby improving the quality of life. Education for sustainable development can provide critical reflection and greater awareness and empowerment so that new visions and concepts can be explored and new methods and tools developed." (Van Poeck and Loones, 2011).

UNESCO (2012) emphasizes that ESD is based on the contexts in which it takes place and the types of learning that are adhered to. Besides the more traditional contexts (early childhood care & education, primary education, secondary education, higher education, technical and vocational education), UNESCO recognizes the emergence of non-formal education, often initiated by the commercial/private sector, community groups, civil society organizations, non-governmental organizations (NGO's) and networks seeking to engage citizens in sustainability issues. These non-formal contexts for ESD go along with alternative forms of learning and education, considering participation in local development, use of local knowledge and recognition of local realities as crucial.

Wals (2010) recognizes two perspectives in which ESD can be approached: an instrumental perspective or an emancipatory perspective. This division is similar to what Vare and Scott (2007) determined as ESD1 and ESD2. According to Van Poeck and Vandenabeele the instrumental perspective or ESD1 is the dominant discourse on ESD (Van Poeck and Vandenabeele, 2012). This type of education facilitates changes in what we do by promoting predetermined behaviors and ways of thinking (Vare and Scott, 2007). This learning for sustainable development. It supposes that there is a strong sense of what is right and should be done, and a high certainty about the current knowledge and the kind of behavior needed (Vare and Scott, 2007). Therefore, ESD1 is mostly expert driven and understands learning as a way to achieve sustainability (i.e. learning for sustainability). However, the ESD1 perspective does not fit for the idea of sustainability as a wicked problem. People's environmental behavior is too complex and contextual to be captured in a straightforward model based on a linear relationship between knowledge, awareness and behavior (Wals, 2010). Moreover, the complex concept of sustainability and the uncertain knowledge linked to it ask for a different approach than ESD1. Instead, people need to develop capacities and qualities allowing them to contribute to alternative behaviors both individually and collectively (Wals, 2010). This viewpoint is also claimed by emancipatory perspective or ESD 2. It recalls the foundation of education which is about encouraging autonomous thinking (Wals, 2010; see also Jickling, 1992), and therefore education should be driven by a collaborative and reflective learning process (Vare and Scott, 2007). This perspective interprets sustainable development as a learning process. It aims for empowering, building capacity to think critically, and involving and engaging learners in issues that affect them and others.

Whereas some claim that the instrumental perspective on ESD cannot match with the complexities and uncertain knowledge related to sustainability, Vare and Scott (2007) advocate for a complementary use of ESD1 and ESD2 approaches. Also the respondents of the UNESCO survey (2012) commented that ESD requires a mixture of learning types, depending on the group of learners, the learning context and the available resources. This call for combined use of ESD1 and ESD2 has implications for educators. They have to: (i) use strategies that clearly promote learning as an outcome as well as means to an end, (ii) use different learning strategies, such as information and communication balanced with facilitation of learning through mediation, (iii) be open towards unplanned directions learners will take, (iv) evaluate by asking questions as "what has been learned?" instead of "has it been learned?" (Vare & Scott, 2007). This combined use of perspectives in practice particularly emerges in education in non-formal contexts. These educational practices have following common characteristics (Wals, 2010):

- learning is more than knowledge-based,
- they focus on 'real' issues for engaging learners,
- they view learning as transdisciplinary and transperspectival,
- it cannot exactly be known what will be learnt and learning goals might shift during the learning process (i.e. 'indeterminacy of the learning process'),
- it goes further than the dominant structures that have shaped education for centuries.

Crucial in these experiential practices of non-formal education is the quality of interaction with others and the environment in which this kind of learning takes place. The relevance of interaction within these practices is especially elaborated on in social learning theories. According to Loeber et al. (2007) learning in social interaction is the central tenet in many of the projects which aim for sustainable development as it enhances "settings in which defense mechanisms[3] are dismantled and one is stimulated by others to take into consideration new and possibly counter-intuitive information. However, in literature there are different interpretations of what social

[3] Defense mechanisms discourage someone from questioning the daily routine to avoid the kind of feelings of uneasiness that occur in confrontations with discussion partners (Argyris 1990).

learning actually is (Reed et al., 2010), ranging from ideas that explain what and how social interactions contribute to individual learning to those that focus on collective learning to those that include both (Blackmore, 2007). de Laat and Simons (2002) offer a clear categorization of learning theories by making distinction between the type of learning process and the type of learning outcome: (i) individual learning processes with individual outcomes; (ii) individual processes with collective outcomes, (iii) learning in social interaction (the learning process is collective, but the outcome is individual), (iv) collective learning (both learning processes and outcomes are collective).

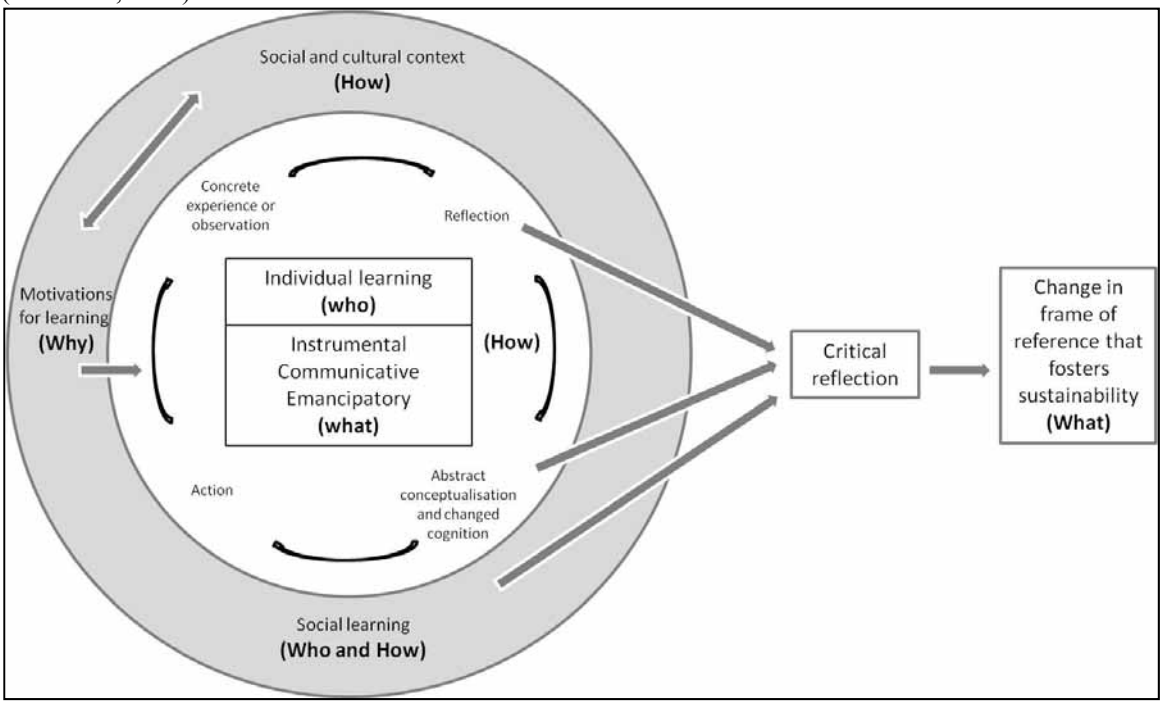
Educational practices for sustainable farming

The aim of our study is to find out what the influence of initiatives for sustainable farming on farming practices is. Therefore, our first aim is to focus on the third category of learning defined by de Laat and Simons (2002), 'learning in social interaction'. As literature on ESD and wicked problems advocate for educational practices leading to critical learning, we are especially interested in practices that can enhance critical reflection in order to achieve changes in meaning structures and perspectives (Blackmore, 2007). Furthermore, also insights in the collective outcomes are interesting to consider. Arguments can be found in the literature on wicked problems and ESD claiming that sustainable development requires a system transformation. In addition, our research of particular cases not only aims to understand the possibility of behavioral changes within individuals, but also the strive for collective outcomes. Therefore, in our framework we will also consider this collective learning addressed in the fourth category of de Laat and Simons (2002).

Suggestions to start learning and challenging our existing practice (Tilbury, 2007) resulted in agriculture in a number of initiatives stimulating farmers to increase sustainability of their farming practices (Röling and Wagemakers, 1998; Cerf et al., 2000; Blackmore et al., 2012). Although these initiatives claim to spur farmers towards a more sustainable farming practice, insights on how and if these initiatives influence the sustainable development of farming practices are lacking (Lankester, 2013). Lankester (2013) developed a framework that conceptualizes the individual learning of farmers based on experiential and transformative[4] learning theories. It is structured according to the perspectives of Maarleveld and Dabgbégnon (1999), questioning who learns, what is learned, why it is learned and how it is learned. The framework is built from an individual-centric perspective, where the inner circle represents the individual learning processes and the outer circle represents the social dimensions to individual learning. Within this framework, the learning of individual farmers and the conditions or context in which this learning may or may not be stimulated are presented as interconnected processes. As Lankaster (2013) and Loeber et al. (2007), we want to gain insight on how the learning context set up by initiatives for sustainable farming influences the farmer's individual learning.

[4] Mezirow stresses the need for critical reflection to achieve change in meaning structures and perspectives (Blackmore, 2007), thus being transformative.

Figure 1: Conceptual framework of individual learning in social learning in the context of learning for sustainability (Lankester, 2013).



In this section we use the framework of Lankester (2013) to order in a non-limitative way the educational characteristics of practices promoting sustainability.

Table 1: Non-limitative list of characteristics of educational practices ordered according the perspectives of Maarleveld and Dabgbégnon (1999).

Who learns? Actors and characteristics of these actors	
Individual farmers	Define ability to change practices (Loeber et al., 2007)
Collective learning of the other actors in agriculture Collaboration (Armitage et al., 2008)	Multiple types of stakeholders (harvesters, NGOs, government departments) Diversity of interests represented Multiple perspectives on the problem domain Connections across multiple scales and levels (local, regional, national)
Collective learning on the level of Institutional arrangements	
Why is learned?	
External triggers	Normative, revolutionary concept of sustainability evokes discussion (Maarleveld and Dabgbégnon, 1999; Lankaster, 2013) Legislation and economic principles

Internal triggers	Human cognitive capacities or competence motivations Balancing between competence and need motivations (Wildemeersch, 2007) Biographical learning around critical incidents (Vandenabeele en Wildemeersch, 2012)
How is learned? Types of learning processes and characteristics of the learning process	
Experiental learning (Kolb, 1984; Keen and Mahanty, 2006)	Learning as a process of creating knowledge through the transformation of experience or learning-by doing. This iterative learning cycle has four stages: concrete experience, reflective observation, abstract conceptualization, active experimentation. Largely modeled on individual learning processes, but applied to group processes.
Transformative Learning (Mezirow, 1995, 1996, 2000)	Learning as a reflective process that enables an individual's perceptions and consciousness to be altered. Transformative learning includes instrumental (task oriented, problem-solving actions to improve performance of current activities) and communicative (ability of individuals to examine and reinterpret meanings, intentions and values associated with actions and activities) learning. Largely modeled on individual learning processes.
Social learning process (Argyris and Schon, 1978; Keen et al., 2005; Leeuwis and Pyburn, 2002)	Learning as a process of iterative reflection that occurs when we share our experiences, ideas and environments with others. Social learning includes single-loop (correcting errors from routines), double-loop (correcting errors by examining values and policies) and triple-loop learning (designing governance norms and protocols). Modeled on group learning processes.
Balancing along the axes of *action*, *reflection*, *communication* and *negotiation*. (Wildemeersch et al., 1998)	The need for action emerges from a felt deficit, when an individual experiences a difference between reality and what he desires. In this process, competencies are acquired, restructured and developed by the actor. Reflection refers to the aforementioned aspect of critical reflectivity. It balances the axis of 'belonging' and 'distance' where belonging refers to one's claims to knowledge with which one identifies. On the other hand, distance refers to one's ability to move away from our stated positions and be willing to reflect from alternative frames of reference. The axis of communication balances unilateral and multilateral forms of communication. Unilateral communication is marked by one way flows, often leading to suppression of information, in group distrust and competition. Whereas in multilateral communication, there is collaboration and sharing of knowledge from all directions. In negotiation, opposing parties move from dissensus to consensus. However, consensus can often lead to group thinking and lack of critical questioning that hold the potential for an alternative vision.
Passive social learning (Glasser, 2007)	Does not require input in the form of communication or interaction from other living beings (e.g. reading a newspaper, observing practices)
Active social learning (Glasser, 2007)	Builds on interaction and communication between two or more living beings. Reflecting increasing levels of participation, it can be categorized as being hierarchical, non-hierarchical (partnerships), and co-learning.
System dynamics	Systemic thinking assists people to identify the root of the issues and to work actively towards trying to address these (Tilbury, 2007).

Group structure	Large or small, homogeneous or heterogeneous, young or old, high or low pressure of internal or external challenges, openness towards outside world, available competences (Wildemeersch, 2007).
Group dynamics	Trust and openness between participants; Power mechanisms (Wildemeersch, 2007); Commitment to reciprocity: the level in which the heterogeneous partners develop a feeling among each other that they are mutually dependent when solving a problematic situation (Loeber et al., 2007); Process of negotiation: might be consensus oriented or dissent-oriented (Wildemeersch, 2007; Loeber et al., 2007); Actor roles: Facilitator, core actor, obstructionist and go-between (Stroobants and Vandenabeele, 2000; Wildemeersch, 2007)
Resources and forms of transactive decision making (Armitage et al., 2008)	Instruments or tools used (Van Poeck, 2013); Types of information via systems of knowledge (e.g., local, traditional, scientific and expert) Decisions are reached through dialogue (tendency towards consensus and/or consent) Diverse inputs (e.g., knowledge types) present in decision making Equity and efficiency promoted
Broader institutional, organizational and socio-political context (Armitage et al., 2008)	Organizational alliances among communities, non-governmental organizations and governmental agencies can generate new opportunities for learning in which resource management strategies, approaches and goals can be tested .
Rules	Modes of judgment or sanctions.
Communication and negotiation (Armitage et al., 2008)	Shared understanding develops Dialogue builds consideration and appreciation Perspectives exchanged and modified via discursive communication
What is learned?	
Learning goals	Internally determined by the community of learners itself (Wals and van der Leij, 2007); Envisioning is a way to help learners establish a link between their long term goals and their immediate actions (Tilbury, 2007) Goals might shift during the learning process.
Loops of learning : first order, second order, third order (Argyris and Schön, 1978)	First order : given or chosen goals, values, plans and rules are operationalized rather than questioned. Second order : to question the governing variables themselves, to subject them to critical scrutiny, reframing goals, values and underlying assumptions. Third order: correcting errors by designing governance norms and protocols.

Learning as acquisition, learning as participation and learning as a response	In the literature on adult learning a dominant view on learning is captured by the so-called acquisition metaphor (Sfard, 1998). It is a learning that takes place mainly through the acquisition of new knowledge, skills and attitudes. It is a learning that is situated within well defined frameworks and which offers fixed solutions to particular problems. A second dominant view on the learning of adults is the participation metaphor or the understanding of learning as a process of becoming a member of a certain community. (Sfard, 1998). Learning as a response (Vandenabeele and Wildemeersch, 2012) refers to dealing with the public debate about modern agriculture and environmental issues.
Fundamental values, worldviews and identities	Must be included if reflexivity is involved in action for sustainable development (Wals and van der Leij, 2007)
Reflection on experiences	This can be established when feedback mechanisms are included and improved in the initiatives (Loeber et al., 2007; Tilbury, 2007)
Reflection on the role of actors and their relationships	(Stroobants en Vandenabeele, 2000)
Reflection on theories and beliefs	Question the thinking and assumptions behind our actions rather than judge our actions (Tilbury, 2007)
Processes of *qualification*, *socialization* and/or *subjectification* (Biesta, 2009).	Looking at Biesta's schemata first hand, it might give the impression that these 3 modes of education are exclusive. But in fact it is not so. Education that helps one to qualify can also promote socialization into a particular order (into the class of skilled professional, for instance) (Biesta, 2009). It can influence the individual to subjectify by thinking for themselves and making their own decisions which maybe against the social norms, guided by their new found skills and knowledge (Biesta, 2009). As a result, we can say that these modes make a composite Venn diagram with areas of overlap and separation (Biesta, 2009).

Further methodology

During the next months, we will interview different actors involved in the four cases of educational practices (a.o. farmers, experts, facilitators, initiators, etc) located in The Netherlands ('Foundation Skylark' ('Stichting Veldleeuwerik') and 'Cows and Opportunities' ('Koeien en Kansen')) and Belgium ('Promising farming' ('Beloftevol boeren') and 'Farmers' union sustainability trajectory' (Boerenbond duurzaamheidstraject)) (Table 2). These initiatives differ in many ways with respect to the abovementioned characteristics. We will analyze these initiatives taking into account the framework of Lankester (2013) and the described characteristics. We will use the method of open coding with Nvivo (QSR International, 2010) and add or exclude characteristics depending on the analysis. The results of this analysis will be used to make recommendations on how the context wherein these educational practices take place should look like. By organizing focus groups, we will use this outcome to set up a reflection process between the initiators and most important actors of our cases.

Table 2: Four cases of educational practices.

Cases	Koeien en Kansen Dairyman	Duurzaamheidstraject voor de boer (Marchand *et al.*, 2012)	Beloftevol Boeren (DurAgr'ISO 14001) (Beloftevol Boeren, 2011)	Veldleeuwerik (Stichting Veldleeuwerik, 2010)
Initiative	Koeien en Kansen 1998 – 2013 Dutch Initiative Dairyman 2009 - 2013 14 partners in 10 European regions with each 12 pilot farms	2012-2014 initiative in Flanders Start up with the development of a rapid farm scan for 8 farm sectors	2009-2014 local initiative in Flanders First farmers group started in 2010. New farmers group is starting up end 2013	2002- ongoing Dutch initiative 2002: 10 farmers, 1 group 2011: 58 farmers, 5 groups 2013: 363 farmers, 34 groups
Focus	Dairyman will strengthen rural communities by improving farm resource management in a profitable way. New ways of working are demonstrated within networks of commercial pilot farms and knowledge transfer centers	Achieving sustainable development on farm level using a rapid farm scan in a learning trajectory with advisors and farmer groups	Group of farmers working on environmental farm management using the ISO14001 methodology and farmer group meetings.	Veldleeuwerik stimulates arable farmers and food processors in their joint effort to improve arable farming through writing and realizing sustainability plans, building experience and exchange information during farmer group meetings.
Initiator	Researchers, Policy and Farms	Farmers organization	Farmers and research institutions	Farmers and food processors (the agrofood chain)

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